JASc Journal Of Agribusiness Sciences e-ISSN :2614-6037

sinta Science and Technology Index Akreditasi Sinta 4

Oktober 2021 Volume 05 No 01

FARMER'S ADOPTION LEVEL ON THE USE OF LIVING SUPPORTS ON PEPPER PLANTS (*Piper nigrum* L.) IN PEMALI DISTRICT BANGKA REGENCY

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Abtrack

Adoption is the acceptance of an innovation in farming that is influenced by many factors. This research discussed the level of farmer adoption and the factors that influence farmers' in the use of living supports on pepper plants. The research was conducted in Pemali District, Bangka Regency from March to May 2021. Data collection methods were observation and interview methods using questionnaires that had been tested for validity and reliability, with data analysis methods using likert scale and multiple regression tests. The result showed the level of farmer adoption level on the use of living supports on pepper plants is high with a percentage 75,25%, for regression analysis it has a regression equation that is $Y = -0{,}573 - 0{,}129X_1 + 0{,}124X_2 + 0{,}623X_3 + 0{,}203X_4$. *Further test using t-count shows that the characteristics of innovation factor has a very significant influence and access to information media factor has a significant influence with the t-count value greater than t-table.*

Keywords *: Pemali district, use of living supports on pepper, multiple regression test, adoption level*

A. INTRODUCTION

The pepper plant (*Piper nigrum* L.) is the flagship commodity of a plantation sub-sector called the "King of spices." Bangka Regency is part of Bangka Belitung Islands Province which has eight districts and one of the potential districts for pepper farming is Pemali District. The total area of pepper plantations in Pemali District is 175.34 ha with details of 58.33 ha plants not yet produce plantsand 117.01 ha of producing crops. The most production comes from 3 villages, namely: Penyamun Village, Pemali Village and Sempan Village.

Based on data from Indonesian Plantation Statistics (2019) national pepper productivity data decreased by 2.29% every year. This decrease in productivity is due to the business of pepper cultivation of almost more than 90% cultivated by the people in the form of people's plantations with the application of relatively simple technology. People's plantations still use traditional cultivation technicalities without being supported by the adoption of recommended technological innovations. One of the technical applications of cultivation that is recommended is the use of living supports on pepper plants.

Pepper plants that need "tajar" is a type of climbing pepper that has higher productivity than the type of pepper perdu, so many farmers cultivated. In order for production to be optimal, climbing pepper requires tajar as a place for climbing tendrils to stick and stick because from each book of climbing tendrils will later come out tendrils or fruit branches (Suwarto, 2013). One of the adoptions of technological innovations in pepper cultivation to optimize the growth and productivity of pepper in a sustainable manner that is environmentally friendly, economical and better is the use of living supports as a climbing pillar in the cultivation of cultivated pepper (Panggabean, 2016).

Wahid and Yudi in Suwarto (2013) observed and analyzed the difference in the production of pepper plants of LDL varieties (Lampung Daun Lebar) and LDL 4 Namang with treatment of the use of tajar types: 1) concrete, 2) molestwood, 3) kapok trees, 4) gliricidae and 5) consecutive thorn chests resulting in an average production of : 1) 15.13 kg, 2) 20.87 kg, 13) 5.31 kg, 4) 19.25 kg, and 5) 23.81 kg. This shows that the use of living supports in pepper farming produces more pepper fruit production than the use of dead

DOI: http://dx.doi.org/10.30596%2Fjasc.v5i1.7894

taught types of concrete and wood which illustrates that there is an influence on the use of tajar in the technical cultivation of pepper with production to be produced and of course supported by good maintenance as well.

Lampung Agricultural Technology Assessment Center (2008) stated that the use of living supports on pepper plants is recommended because biomass from pruning "tajar" when immersed into the soil will increase soil fertility, stimulate the growth and development of soil microorganisms that are beneficial so that plants can grow and produce better. In addition, the use of living supports can act as a protector of pepper plants. The benefits of using other life lessons are easy to get, grow or multiply themselves and the price is cheaper than dead supports.

Dissemination of innovations regarding the use of living supports on pepper plants in Pemali District continues to be carried out. However, in the field there are farmers who use living supports as a whole and there are also farmers who use living supports at the same time as dead supports on one area of pepper plants that they cultivate. The living supports used by farmers usually comes from the plants dadap, sengon and kapok. This indicates the doubts or uncertainties of farmers fully in applying (adoption) of the use of living supports on pepper plants.

The presence of an innovation will not be useful without adoption. Similarly, the use of living supports which is an innovation in the technical cultivation of pepper plants will not be useful without the adoption by farmers. Adoption reflects the level of acceptance of technology and its implementation in agriculture influenced by many factors, such as the inherent nature of innovation, the state of the environment (social support) and the ability of farmers to deal with risks. Mardikanto (2009) states that adoption is a process of accepting an innovation or changes in good behavior in the form of: cognitive, affective and psychomotor in a person after receiving innovation. So that its application (adoption) is done with full confidence in its success.

Based on these conditions, this research aims to; (1) Reviewing the rate of farmers' adoption of the use of living supports on pepper crops, (2) Reviewing the factors that influence farmers' adoption of the use of living supports on pepper plants.

B. METHODOLOGY

This research used quantitative methods with a descriptive approach. The basis of the selection of the research site is purposive. The population of all pepper planters are the members of the farming group in 3 villages namely, 1) Penyamun Village, 2) Pemali Village, and 3) Sempan Village which represents Pemali District because it is a pepper plantation commodity center area with the highest land area among other villages and has received counseling on the use of living supports on pepper plants, while for the sample number in this study as many as 58 people were drawn based on the formula Taro Yamane with an error rate of 10% (Sugiyono, 2019). Samples in each group were conducted by deliberate (purposive) technique.

The validity and reliability test has been conducted on 15 non-sample planters in Pemali District of Bangka Regency. The results of the r-count (0.535 – 0.986) are greater than the rt-table value (0.514) can be concluded that the entire statement is declared valid and the Cronbach alpha value (0.813 – 0.935) is greater than the 0.600 results show that the questionnaire in the study is reliable.

Data collection techniques are performed by interviews, observations and questionnaire filling by research samples. Data analysis techniques for adoption rates use quantitative data obtained from the calculation of total scores that are sampled from the application of the use of living supports on the pepper plants they cultivate so that they can be interpreted into 5 categories based on levels : very low, low, medium, high and very high. For factors that influence farmers against the use of living supports on pepper plants using the likert scale (1-5) and multiple regression test with the help of SPSS version 25. The regression analysis equation used in this study is as follows:

$Y = \alpha + \beta1X1 + \beta2X2 + \beta3X3 + \beta4X4$

Information:
Y = Adoption level
X1 = The role of extension
X2 = The Role of farmer groups
X3 = Characteristics of Innovation
X4 = Access to information media

The operational definition in this study is : (1) The role of extension in this study is the role of extensionists in conveying information (communicators), encouraging farmers (motivators), providing knowledge and learning (educators), and accompanying (facilitators) of farmers in the use of living supports on pepper plants. (2) The role of the farmer groups in this study is the ability of the farmer group to study, discuss (study classes) and cooperate in the application of an innovation. (3) Characteristics of innovation in this study is the characteristics

DOI: http://dx.doi.org/10.30596%2Fjasc.v5i1.7894

that innovations have in the use of live living supports as a pillar of pepper plant climbing. In this study the nature of innovation in the form of relative advantage, compatibility, complexity, ease of trialabilityand ease to observe (observability). (4) Access to information media in this assessment is the medium used by farmers to obtain information about pepper cultivation in the form of sources of information used, ease of access and intensity of access to the information used. (5) Adoption in this assessment is the acceptance of ideas / innovations in the use of living supports on pepper plants presented so that innovation can be adopted by farmers in their agricultural activities which include the use of life, quality and conditions of life, maintenance in the form of routine pruning and propagation of life.

C. RESULTS AND DISCUSSION

1. Characteristics of Respondents

The characteristics of respondents are needed to know part of the respondent's life background consisting of data on gender, age, education level, land area and business experience. The characteristics of respondents displayed mindsets, attitude patterns and patterns of actions and interactions of farmers with their environment.

Tabel 1. Characteristics of Respondents Level of Farmer Adoption on The Use Of Living Supports on Pepper Plants in Pemali District

No	Characteristics	Category	Sum (person)	Percentage (%)
1	Age (years)	33 – 39	14	24,13
		40 – 47	21	36,20
		48 – 54	17	29,32
		55 – 61	6	10,35
2	Level of education	SD	18	31,03
		SMP	8	13,80
		SMA	29	50,00
		PT	3	5,17
3	Land area (ha)	< 0,3	1	1,72
		0,3 – 1,6	50	86,21
		1,7 – 3	7	12,07
		>3	0	0,00
4	Experience farming (years)	<11	14	24,13
		11 – 20	26	44,83
		21 – 30	8	13,80
		31 – 40	5	8,62
		40	5	8,62

Source : Primary Data Analysis (2021)

Based on Table 1, the data collected shows that as many as 52 respondents with a percentage of 89.65% are in the productive age category, where farmers have the ability to manage their crops better. According to Sholeh, et al (2021) state that the working age limit (productive age) is 15 years to 54 years old.

This productive age will have an influence on the process of adoption of an innovation, because age can display a person's thinking patterns, passion in obtaining things and the response and desire to obtain new technological innovations. This is in accordance with sari statement (2019), a person's age certainly has an influence on his farming activities. Age will affect the ability to think and the ability to make decisions for farmers. Farmers who are relatively young age tend to have sharper thinking power and high work enthusiasm when compared to farmers who are relatively old.

The majority of respondents to this study were categorized as having a high level of education. This high level of education will affect the process of accepting an innovation, due to a wider level of knowledge and insight and open to new ideas. According to Hasyim (2003) the level of formal education owned by farmers will show the level of knowledge and insights obtained to be applied in their agricultural activities. Similar to adoption, the level of education of farmers will affect the speed or delay of understanding of individuals in accepting innovation or new things (Meliyanawati, et al. 2020).

A person with a low level of education will experience a relatively slow process of adoption of innovation due to cognitive ability and low thinking intelligence so that the adoption decision process also slows down. According to Suryani, et al (2017) said the level of education determines a person's behavior and

DOI: http://dx.doi.org/10.30596%2Fjasc.v5i1.7894

influences his rational considerations in receiving information and decision-making on a technology.

The distribution of land owned by respondents is quite varied. The largest land area is land area of 0.3 - 1.6 ha as many as 50 people (86.21%), then land area of 1.7 - 3 ha as many as 7 people (12.07%) and land area < 0.3 as many as 1 person (1.72%). It was concluded that the majority of farmers are categorized as having a large area of land. Large land area makes farmers more receptive to innovation because it is more efficient in the use of production facilities when compared to farmers with narrow land.

Sayogyo (1977) in Susilowati (2012), defines farmers based on land area with the criteria of small-scale farmers having a farm area of < 0.5 and medium-scale farmers 0.5 - 1.0 ha and large scale with a farm area of > 1 ha. According to Pratiwi, et al (2018) in their study which concluded that land area affects the adoption rate, farmers with land area of ≥ 2 ha will be easier and faster to adopt new technologies, because of better economic capabilities, while farmers with narrow land areas tend to maintain existing habits. This arises because of the farmers' thinking about the big risks that will be faced when trying a certain innovation.

The distribution of respondent data based on the highest experience of respondents reached > 41 years as many as 5 people with a percentage of 8.62%. For the largest number of respondents who have experience trying to farm in the span of 11 - 20 years amounted to 26 people with a percentage of 44.83%, then in the span of < 11 years amounted to 14 with a percentage of 23.14%, the time span of 21 - 30 years amounted to 8 people with a percentage of 13.79% and in the span of 31 - 40 years amounted to 5 people with a percentage of 8.62%. This indicates that pepper farmers in the study area have long pursued pepper farming, this is because pepper farming has become a hereditary culture from parents to their children so that the pattern of pepper farming is formed from the experience and knowledge received from parents so that there are still farmers who maintain old habits in their cultivation.

Farmers who pursue farming on certain commodities for a long period of time, tend to have a lot of knowledge and efforts to advance their farming based on the experience passed. The same thing was expressed by Effendy, et al (2013) that the higher the farmer's experience, it will be in line with increasing knowledge and openness to innovation.

The experience that farmers have passed hones their skills cultivating pepper. Similarly, Meliyanawati et al (2020) said that the experience of farming will produce the skills and knowledge of farmers, which helps them in considering an innovation that has never been tried with the desire to achieve improvements in aspects of the farming business undertaken.

2. Level Analysis and Factors Affecting Farmers' Adoption of Living Supports On Pepper Plants

The level of adoption in the study is the application of the use of living supports on pepper plants carried out by farmers with full confidence that includes the use of living supports, the quality and requirements of life learning used, maintenance of live learning in the form of routine pruning and propagation of their own living by farmers. This application will illustrate the response and how the level of farmers' adoption of an innovation is the use of living supports on pepper plants.

Tabel 2. Level of Adoption of Farmers to Use Living Supports on Pepper Plants

No	Adoption Level	Earnes Score	Maximum Score	Percentage (%)	Category
1	Using living Supports on the whole pepper plants	225	290	77,58	High
2	Using a quality standard of living supports	214	290	73,79	High
3	Doing maintenance in the form of pruning on living supports	214	290	73,79	High
4	Doing life-tinging propogation on living supports	220	290	75,86	High
	Sum	**873**	**1.160**	**75,25%**	**High**

Source : Primary Data Analysis (2021)

DOI: http://dx.doi.org/10.30596%2Fjasc.v5i1.7894

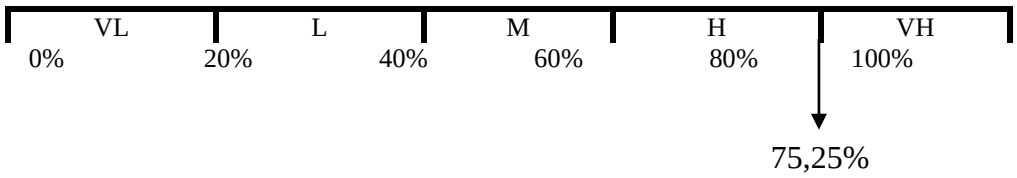

Figure 1. Continuum Line of Farmers's Adoption Level on the use of Living Supports on Pepper Plants (*Piper nigrum* L.)

Based on Table 2 and Figure 1 it can be concluded that the adoption level of farmers in the use of living supports on pepper plants in Pemali District is in the high category. This is due to the awareness in farmers who cultivate pepper plants that the use of living supports has several advantages over dead supports so as to accelerate the process of adoption. Farmers already understand the benefits of using climbing poles or familiarly called farmers in Pemali District "Junjung" the living supports system, for example cheap, has a longer harvest period of up to a dozen years, reducing high input when using dead climbing poles that are not durable and the benefits of the next life learning is to maintain environmental sustainability because there is no tree felling. Planting pepper using dead climbing poles makes it easier for pepper plants to be more susceptible to pests and disease. The results obtained in this study are in line with the results of a study by Panggabean (2016), which concluded that the level of farmers' adoption of innovation in the use of live climbing poles is in the high category, where farmers' knowledge of the technology of using living supports is good.

The types of living supports that many farmers use are Dadap wood, Sengon and Kapok. However, farmers prefer Dadap wood because it is easy to obtain, can be propagated on its own, the absorption of nutrients is not greedy, and mutually supports the growth and development of vegetative and generative pepper plants. This is in line with the Panggabean study (2016) which states that the type of living supports that is widely used by pepper farmers in Bangka Belitung one of them is Dadap.

It needs to be studied further, although the adoption rate by farmers is relatively high. In view of interviews in the field to the process of the decision of farmers to implement (adoption) the use of life as a whole and full of confidence determined by the stages of awareness, interest, assessment, and try and apply. All of these stages are continuous with each other.

According to Dewi (2019) stated, farmers with a high enough level of knowledge or interest in a particular new technology do not guarantee adoption, because over time, farmers may have difficulty in implementing it or do not feel interested, so it is possible to decrease the adoption rate.

Farmers will assess an innovation and weigh the decision to start trying or rejecting it. If at the time of trying the results obtained well, then the farmer will apply the use of living supports, but if the results obtained are not good farmers tend not to continue to the stage of applying (adoption) the use of living supports for all pepper plants they cultivate. Success at the stage of trying to encourage farmers to want to practice innovation on a large scale.

This situation if associated with the adopter category based on its innovativeness, respondents (farmers) in this study belong to the group early majority. In accordance with Rogers's statement (1983), the early majority are a group of individuals characterized by a pragmatic nature, comfortable with advanced ideas, but this group will not break or act without concrete proof of the benefits derived from the application of an innovation or new ideas.

Farmers who are not yet fully convinced to apply the use of living supports to the entire area of pepper cultivation they cultivate have an impact on the percentage of adoption rates by farmers. In addition to having many benefits, the farmer's consideration states that the living tajar that becomes a climbing pole for pepper absorbs a lot of nutrients, there is competition between pepper plants and living supports planted so that farmers' concerns arise about the risk of declining production. Judging from the level of complexity, farmers who are still hesitant expressed their reluctance to use live learning because it requires more intensive care, namely pruning and binding of tendrils must be routine in order to stick tightly to climbing poles. The results of the application of live learning innovation between each farmer may vary, depending on the quality of the type

DOI: http://dx.doi.org/10.30596%2Fjasc.v5i1.7894

of wood used, the time and manner of installation of tajar, living supports care and pepper maintenance, especially fertilization.

Tabel 3. Result of Analysis Regression Level Adoption Farmers to Use Living Supports on Pepeer Plants

No	Variable	Regression Coefficient	tcount	Information
1	The role of extension	-0,110	-1,232	No significant influence
2	The role of farmer groups	0,096	1,200	No significant influence
3	Characteristics of Innovation	0,602	6,180	Very significant influence
4	Access to information media	0,193	2,084	Significant influence

t_{tablel}(1%): 2,671
t_{table}(5%) : 2,005

Source : Primary Data Analysis (2021
Keterangan :$t_{hitung} > t_{tabel}$, has significant influence
$t_{hitung} < t_{tabel}$, has no significant influence

1. The Role of extension

Yahya (2016) stated that the successful spread of a technology (innovation) can not be separated from the role of extension as an agent of renewal and its role in the process of helping farmers make their own decisions by increasing choices to farmers, helping and developing knowledge related to the consequences of each choice.

The hope is, the higher the role of agricultural extension, the higher the success of farmers in their agricultural activities. But the results of statistical analysis concluded that the role of extension (X1) had no real effect on the adoption level of farmers (Y). This happens because farmers get information and knowledge about a new innovation not only sourced from agricultural extensionists, but also from various information media including by accessing the internet and mass media. At the knowledge formation stage, mass media can be used for the dissemination of information about an innovation. Andrianty and Endang Setyorini (2012) stated that information media can be accessed by farmers through various communication facilities, such as gadgets, computers, television / radio broadcasts, internet cafes, libraries and print media that will motivate farmers to increase their farming.

Extension methods that tend not to be interactive and effective are also one of the obstacles to the achievement of adoption by farmers. Even though the use of appropriate methods will accelerate the understanding and interest of farmers to the information conveyed.

In addition, extension while carrying out the role as a facilitator has limitations to accompany all farmers intensively in applying the use of life. Extension workers have difficulty visiting each farmer as a whole, due to time constraints, costs and locations that are difficult to reach. Discussions and consultations with extensionists are conducted in groups. So, farmers obtain more information independently by accessing other information media.

2. The Role of farmer groups

The results of statistical analysis concluded that the role of group farmers (X1) had no significant effect on the adoption level of farmers (Y). This is because farmers when adopting an innovation is largely determined by the personal thoughts of farmers. Starting from the stage of realizing until accepting or refusing to apply it. Although farmers are involved in farming groups, the response to the information obtained depends on the farmer himself, receiving and finding out more or just being aware of the presence of information about innovation. This is supported by the statement of Foster and Rosenzweig (2010) in Dewi (2019) mentioning that learning from fellow farmers or closest neighbors allows the exchange of knowledge, but the impact of the exchange of knowledge can vary between farmers.

3. Characteristics of innovation

The results of statistical analysis concluded that the characteristics of innovation (X3) has a very significant influence on the adoption level of farmers (Y). This is because the characteristics of living supports of innovation directly affects the decision of farmers to accept or reject an innovation by seeing what benefits will be obtained from the application of such innovation in this case. The statement supported Listyati, et al (2015) in his assessment that the adoption level was driven by farmers' preferences regarding the characteristics of a desired object.

The higher the relative advantage, compatibility, ability to be tested and observed

DOI: http://dx.doi.org/10.30596%2Fjasc.v5i1.7894

and the smaller the level of complexity, the higher the chance of learning life will be adopted by farmers. According to Akbar (2018), in his study stated the influence of the characteristics of innovation on the speed of adoption, where if an innovation can be reached by farmers' finances, not complicated, simple, can be tried and observed then the continuity of innovation will be maintained and the more in accordance with the nature of innovation with farmers' expectations, the faster and higher the level of farmers' decisions to adopt the innovation.

Of course, before the decision to accept or reject innovation, farmers have gathered a lot of information and seen the conditions of land in the field that indirectly farmers make selection according to the level of knowledge possessed by their respective farmers. The information obtained and the real circumstances of the application of life in the field become a stimulus for farmers to do the same and weigh the risks of adopting the technology. This statement is supported by Sudjarmoko, et al (2013) who said the opportunity for farmers to adopt a technology is largely determined by the ability of farmers to face risks that can occur, the nature of the technology itself, and the environmental factors of the farm.

Generally, farmers in Pemali District before taking the decision to use innovation with confidence will go through a thoughtful process. Farmers see the success rate and suitability of the application of innovation by other farmers who have tried and succeeded and the impact on increasing productivity in the form of profits. The same thing was also expressed by Dewi (2019) that adoption is not limited to accepting or rejecting, but the extent to which innovation can be integrated appropriately and appropriately. Farmers tend to be reluctant to adopt an innovation if in its assessment the innovation does not provide benefits, fear of the risks of its application causes farmers to pay more attention to the nature of the innovation to further decision to implement it.

4. Access to information media

The results of statistical analysis concluded that access to information media (X4) had a significant influence on the adoption level of farmers (Y), the higher the openness of access and frequency of access to various information media will be directly proportional to the decision of adoption by farmers. As Widiyanti, *et al* (2016) said, the purpose of using media is to clarify the information conveyed so that it will stimulate feelings, thoughts and attention and the ability of the target in understanding the information you want to know.

This is because most farmers in Pemali District have started actively looking for various sources of information about agriculture both through various websites on the internet and through various mass media to support decisions in their farming. Technological advances plus the availability of internet networks become a stimulus for farmers to learn to utilize existing technology with ease of access. Similarly, Dewi, *et al* (2019) concluded that the type of mass media and the frequency of farmers accessing various sources of information such as magazines, newspapers, newspapers and internet-based electronic media (websites) positively affect the increasing power of farmers' adoption of an agricultural innovation or technology. In addition, accessibility to a variety of information media has a significant positive effect on increased adoption.

Farmers are aware of the presence of information technology that encourages them to utilize the information media as a source of information and knowledge in managing farmers. In addition, the intensity of the use of information sources can indicate the extent to which farmers utilize information repeatedly. So it is concluded that farmers often access information about pepper cultivation from various sources of information media. Mardikanto (2009) states that individuals or groups that are actively looking for new ideas or information will be more innovative than those who are closed or passive to new things.

Farmers in Pemali District respond well to the existence of internet information media because it does not conflict with local culture, in addition to the availability of electronic media and internet networks make it easier for farmers to utilize this information media. Similarly conveyed by Syathori (2017) that the ease of farmers accessing information is very supportive of their agricultural activities, especially information related to needs and can access more than one type of information technology at the same time.

Distribution of formal education levels of respondents included the category of education levels that showed the ability to read and write so as to absorb knowledge accessed from various information media. This ability to read and write supports farmers to understand messages related to technology and verbally introduced information. Farmers feel enough with the ability to read and write with the level

DOI: http://dx.doi.org/10.30596%2Fjasc.v5i1.7894

of education taken is elementary school (elementary school).

The ability of farmers in literacy becomes very crucial to be considered, especially when utilizing the available information media to gain a variety of knowledge to advance their farming, including technological innovations in pepper cultivation by respondent farmers in Pemali District. This is supported by Yodiansyah's statement (2017), that media literacy is important for life. So that individuals can effectively and efficiently utilize communication media to interpret the meaning of the messages obtained, such as mass media.

D. CONCLUSIONS AND SUGGESTIONS

Conclusions

Conclusions on this study:

1. The level of farmers' adoption of the use of living supports on pepper plants (*Piper nigrum* L.) in Pemali District is relatively high at 75.25%.
2. The factors of the nature of innovation (X3) have a very significant influence and access to information media (X4) has a significant influence on variables Y (adoption level). Meanwhile, the role of extension (X1) and the role of the farmer (X2) did not have a significant influence on variable Y (adoption level).

Suggestions

As for the advice on this study:

1. It is necessary to increase the nature of innovation from the application of living in accordance with the recommendations through field school activities as a means of education and efforts to increase the productivity of pepper plants.
2. It is necessary to increase the utilization of the Ministry of Agriculture's Cyber Extension Website as a source of information that can be accessed by farmers including innovations in the cultivation of pepper plants.

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DOI: http://dx.doi.org/10.30596%2Fjasc.v5i1.7894