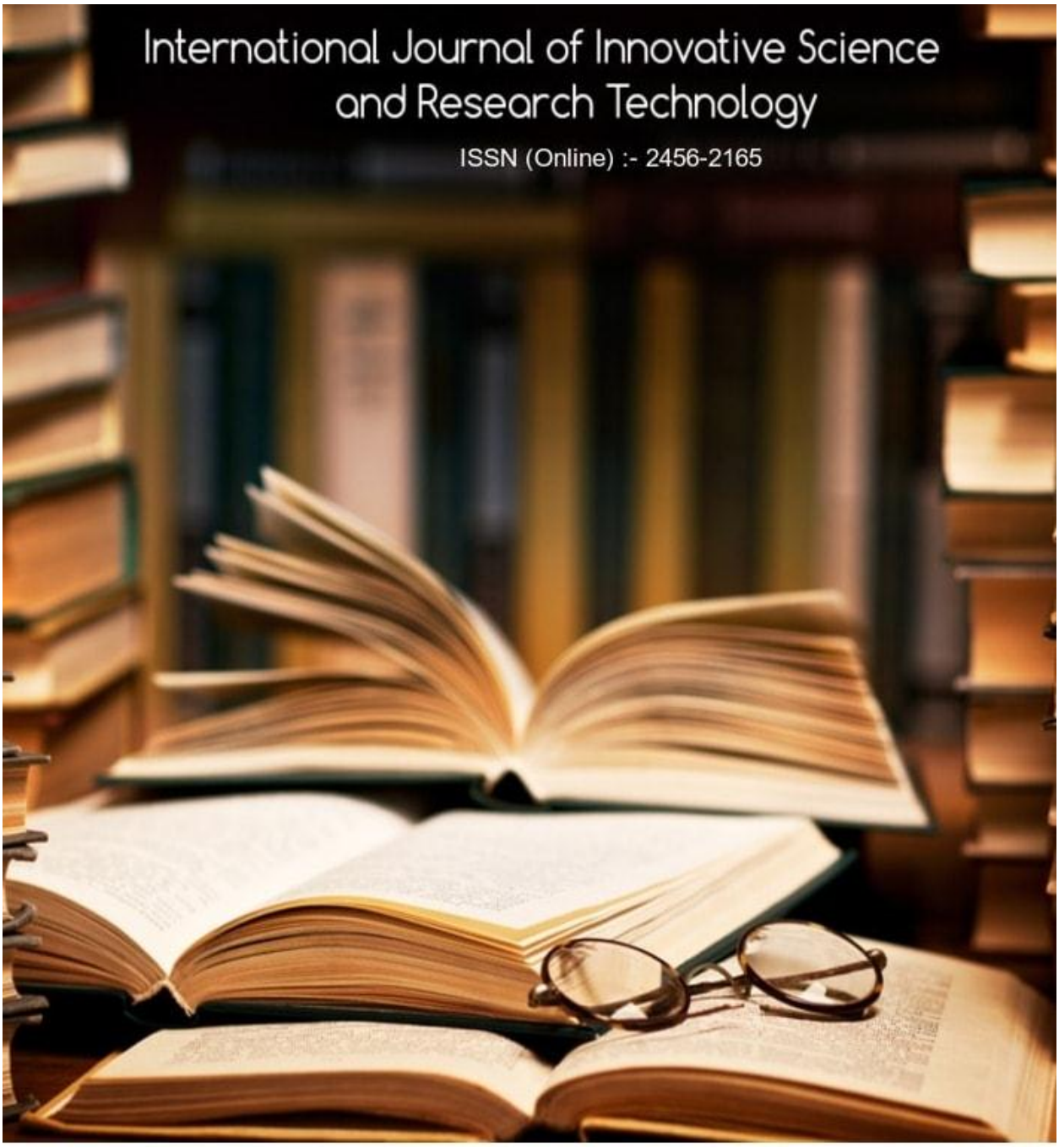

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Farmers' Preference for Innovation of Salibu Rice Technology in Garut Regency, West Java - Indonesia

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Abstract:- Increase in rice production is continuously done to meet the demand for national rice. One of innovations that is widely applied, particularly in West Sumatera is salibu rice technology. A study is therefore necessarily conducted to investigate the preference of community, especially rice farmers in other regions. The study involved farmers as research sample was performed for three months (April - June 2020) in Samarang Subdistrict of Garut Regency which was aimed to: (1) describe farmer's preference for innovation implementation of salibu rice technology, (2) analyze factors affecting farmer's preference, and (3) design the strategy to increase farmer's preference. A total of 51 samples of respondents were purposively determined by considering the limited number of farmers who implemented the technology of salibu rice. Data collection was done through direct interview using questionnaire that has been tested for its validy and reliability. Data were analyzed using descriptive statistics and multiple linear regression. Result of the study showed that farmer's preference for innovation of salibu rice technology was categorized as moderate; demographic factors that affected farmer's preference included education level, size of area, and cosmopolitan level; while the characteristics of innovation that determined farmer's preference were relative advantage and high observability.

Keywords:- *Preference, Innovation, Salibu Rice, Multiple Linear Regression.*

I. INTRODUCTION

Rice is the most important commodity crop in Indonesia. This plant produces rice that is the staple food for people in Indonesia, hence rice farming is encouraged in most area in Indonesia. Average annual increase in national rice production for the last several years was still considered low, amounted to only 6.37 percent. However, efforts to increase rice production is continuously done to fulfill the demand for national rice since population growth drives national rice demand.

Several innovations to increase rice productivity have been applied, including the implementation of Salibu Rice technology which allows rice to re-grow on the remaining stem after it is cut off for harvesting, thus new shoots will emerge from the nodes in the ground. Many advantages are obtained through the application of salibu technology in rice farming, such as rice has a relatively shorter growth cycle, requires lower amount of water and lower production cost due to efficiency in tillage, planting, and number of seed required, and genetic purity is maintained better.

Salibu is basically a simple technology which modifies the habit of farmers in Nagari Tabek of Tanah Datar Regency in West Sumatera prior to the development done by the Agency of Agricultural Research and Development. The habit of not burning straws in the ricefield provides the opportunity for organic matters to return to the stems after being cut off, thus rapidly encourages new shoots. Demo plot in Agam Regency of West Sumatera has resulted in excellent yield of dry paddy (GKP) which reached 7.2 ton. Other benefits provided through the implementation of salibu rice technology: (1) increase in farmer income of Rp.20-25 million/ha/year since production increased 4-6 ton/ha/year, (2) higher straw return opportunity (organic matter), particularly from the cut of stems remained after harvest, (3) providing assistance to regions with labor shortages in increasing their rice production, and (4) fulfillment of food needs.

Based on the description, the study about "Farmer's Preference for Innovation of Salibu Rice in Samarang Subdistrict, Garut Regency" was done to investigate farmer's interest or preference for innovation of salibu rice technology as an effort to increase rice productivity.

➢ *Hypothesis Framework*

Hypothesis framework of this research was developed based on theory and results of previous study. Several results of study showed that demographic characteristic of farmers provided significant result to the dependent variable (Y), as well as external factor of study result that significantly affected the dependent variable, similar to the characteristic of innovation. According to the explanation, hypothesis framework of this study consisted of three independent variables, namely: (1) farmer characteristic, included: age, education, farming experience, farm size, and cosmopolitan level, (2) external factors consisted of extension activity, facility and infrastructure, source of information, and government support; and (3) characteristic of innovation

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contained relative advantage, compatibility, complexity, trialability, and observability. Schematically, hypothesis framework of this study is illustrated in Figure 1.

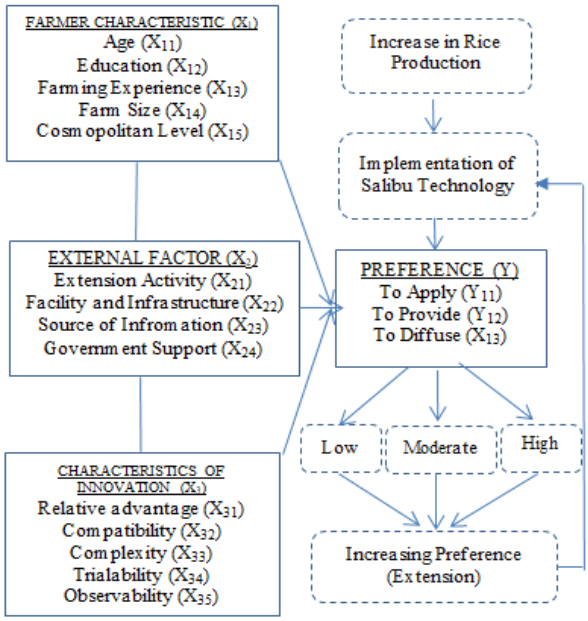

Figure 1. Hypothesis Framework of Study

II. RESEARCH METHODS

Study was conducted for 3 months (April-June 2020) in three villages, namely Sirnasari Village, Cinta Asih Village, and Cinta Karya Village of Samarang Subdistrict, Garut Regency, West Java Province. Population in this study included the members of farmer group who have applied or currently implementing salibu planting and lived within the three villages. This research was based on quantitative approach supported by data or qualitative information obtained through the method of survey and interview using prepared questionnaire. Population was purposively selected (*purposive sampling*) according to the criteria of study, that is farmers who have applied salibu technology in rice farming and those responsed this program very well, amounted to 51 people. However, all population were made as sample due to limited number of population.

The data collected in this research consisted of primary and secondary data. Primary data were obtained from direct interview with respondents, while secondary data were collected from documents in the form of report, reference manual of local Extension, and the subdistrict monograph. Data collection was done using questionnaire with close-ended question where answer is available in the form perceptional choice according to choice score 1 to 4, denoting that higher score measn better, perfct result, *vice versa*. Before being used as data collection tool, questionnaire was tested for its reliability to farmers with similar criteria, yet they were not respondents. Reliability test resulted in *Cronbach's alpha* of 0.944 which indicated that questionnaire obtained high value of reliability and vality, thus it was appropriate to be used as data collection tool.

Data analysis applied in this study consisted of: analysis of descriptive statistics to explain performance of research variables; multiple linear regression to investigate factors affecting preference according to the equation $Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3$.

III. RESULTS

3.1. Characteristics of Farmer

Characteristic of farmers categorized as respondents is defined as personal characteristic in individual farmer in the form of demographic and other characteristic, namely: age, education level, farming experience, size of farm owned, and cosmopolitan level. Performance of farmer characteristic is presented in Table 1.

Table 1. Characteristics of Farmers

No	Category	Respondent	Percentage
		Age	
1.	25 to 35	2	3.92
2.	36 to 45	6	11.77
3.	46 to 55	15	29.41
4.	56 to 65	15	29.41
5.	> 65	13	25.49
		Education	
1.	Elementary School	17	33.33
2.	Middle School	13	25.49
3.	High School	20	39.22
4.	Higher Education	1	1.96
		Farming Experience	
1.	2 to 8	10	19.61
2.	9 to 18	15	29.41
3.	20 to 29	9	17.65
4.	>30	17	33.33
		Farm Size	
1.	0.14 to 0.26	12	23.53
2.	0.27 to 0.35	9	17.65
3.	0.36 to 0.60	16	31.37
4.	0.61- 1.5	14	27.45
		Cosmopolitan	
1	Low	5	9.85
2	Moderate	37	72.50
3	High	9	17.65

Table 1 shows that the age of farmer was dominated (84.31%) by old farmers (>46 years old), and only 15.69 percent was below 46 years old, hence it is concluded that the majority of farmers were of old age and less productive. Moreover, education level of farmer was mostly low, 58.82% of farmers completed Elementary and Middle School, while only 40 percent attended High School. Furthermore, farmers majorly found to have quite a long farming experience (>20 years), farm size owned by farmers which was ranged of 0.3-1.5 ha reached 58.82 percent, and cosmopolitan level belonged to moderate category (72.50%).

3.2. External Factors

External factor is thing outside individual that is expected to influence the preference of farmers to act and behave, such as: extension activity, availability of facility and infrastructure, availability of information source, and government support. Performance of external factor is presented in Table 2.

Table 2. Performance of external factor

No	Indicator	Level (%)		
		Low	Moderate	High
1	Extension Activity	11.80	82.40	5.90
2	Facility and Infrastructure	11.80	76.50	11.80
3	Availability of Information Source	11.80	78.40	9.80
4	Government Support	9.80	84.30	5.90

Table 2 above explains that indicators of external factor are completely included in moderate category as shown by the range value obtained (about 76.50-84.30% respondent). Therefore, performance of external factor is not yet provide satisfaction, thus improvement is necessary.

3.3. Characteristics of Innovation

Characteristics of innovation is defined as characteristics that attached to an innovation, in this study, it is salibu rice technology. The characteristic observed in salibu rice technology included; relative advantage provided, compatibility of local socio-cultural condition, complexity in the implementation of salibu rice technology, trialability on small scale, and observability. Performance of the characteristics of salibu rice technology is listed in Table 3.

Table 3. Performance of innovation characteristics

No	Indicators	Category/Percentage (%)		
		Low	Moderate	High
1	Advantage	5.90	78.40	15.70
2	Compatibility	9.80	78.40	11.80
3	Complexity	13.70	74.50	11.80
4	Trialability	7.80	76.50	15.70
5	Observability	11.80	78.40	9.80

Table 3 shows that all indicators of salibu rice innovation characteristics were categorized as *moderate* as confirmed by most farmers (ranged of 74.50-78.40%). This way, it is concluded that salibu rice characteristic according to respondents was not yet satisfied farmers in term of innovation.

3.4. Farmer's Preference

Farmer's preference is the preference of respondents to apply, provide or make their farm as demonstration plot for salibu rice technology, and spread or diffuse the technology to other farmers. Result of descriptive analysis on the preference of respondent is presented in Table 4.

Table 4. Level of Farmer's Preference

No	Indicators	Level (%)		
		Low	Moderate	High
1	Willing to Apply	9.80	80.40	9.80
2	Willing to Provide	17.60	64.80	17.60
3	Willing to Diffuse	7.80	62.70	29.50

Table 4 describes that farmers' preference for innovation of salibu is still considered *moderate* as perceived by most respondents (approximately 62.70-80.40%) towards all indicators of preference, namely willingness to apply, provide farm area to be planted with rice through salibu technology, and spread the information to other farmers (diffusion). Based on this result, it is concluded that farmers' preference to implement salibu technology was still considered satisfying, hence such efforts are required.

3.5. Factors Affecting Preference

Result of multiple regression analysis on all indicators of research variables indicated that not all variables examined in this study provided significant effect on farmer's tendency or preference for innovation of salibu rice technology. Variables found to significantly affect preference are presented in Table 5.

Table 5. Result of regression analysis

	Model	Unstandard Coefficients		Stantard Coefficients	t	sig
		B	Std. Error	Beta		
1	(Constant)	1.446	.484		2.985	.005
	Age	.004	.026	.021	.160	.874
	Education	-.079	.032	-.315	-2.47	.018
	Farming Experience	.008	.025	.040	.308	.760
	Farm Size	-.056	.025	-.274	-2.26	.030
	Cosmopolitan Level	.306	.090	.437	3.39	.002
	Extension Activity	.173	.091	.224	1.90	.065
	Facility and Infrastructure	.014	.098	.018	.140	.890
	Availability of Infomation	-.024	.070	-.041	-.339	.737
	Government Support	-.045	.064	-.086	-.707	.484
	Advantage	.295	.097	.531	3.05	.004
	Compatibility	.100	.099	.185	1.01	.320
	Complexity	-.079	.071	-.159	-1.12	.268
	Trialability	.150	.091	.217	1.66	.106
	Observability	-.130	.064	-.277	-2.02	.051

Based on Table 5, factors significantly affected ($p<0.05$) preference included education level, farm size, cosmopolitan level, extension activity, relative advantage provided by salibu technology, and observability. Moreover, age of respondent, farming experience, availability of facility and infrastructure, availability of information source, government support, compatibility with local socio-cultural condition, complexity, and trialability on small scale on small scale provided insignificant effect ($p<0.05$). Therefore, the regression

equation obtained is written as: $Y = 1.446 - 0.079b_1X_{12} - 0.056b_2X_{14} + 0.306b_3X_{15}\ 0.173b_4X_{21} + 0.295b_5X_{31} - 0.130b_6X_{35} + ɛ$

IV. DISCUSSION

4.1. Effect of Farmer's Characteristics on Preference

Based on the result of regression analysis, representation of the variable of farmer's characteristic (X_1) that significantly affected ($p<0.05$) preference included education level (X_{12}) with coefficient of determination of negative 0.079 and farm size (X_{14}) with coefficient of determination of negative 0.056. Negative value indicates that education level and farm size were inversely proportional to farmer's preference, thus higher education level will result in lower preference for salibu rice technology. Similarly, increase in farm size will lead to decreasing preference for salibu rice technology. Result of descriptive analysis of the characteristics showed that the majority (58.82%) of farmers had low education level, namely Elementary School and Middle School, furthermore, farm size was included in moderate category, and cosmopolitan level also belonged to moderate category. This result proved that education level and farm size determined farmer's preference for salibu rice technology.

This finding confirmed the result of study conducted by Bilal and Barkmann (2019) which concluded that social capital is internal characteristic originated from an individual which shows the effect of the adoption of innovation. In addition, Effendy, Tassim and Pratama (2020) more specifically explained that preference for applying jajar legowo planting system was influenced by education level, farm size, availability of facility and infrastructure, and extension activity. Moreover, Wahyu, Effendy and Krisnawati (2020) reported that farmer age, education level, and extension activity affected the acceleration of farmer regeneration in horticultural farmer community.

4.2. Effect of External Factors on Preference

According to the result of regression analysis, the variable of external factor (X_2) that significantly affected ($p<0.1$) preference were extension activity (X_{21}) with coefficient of determination of 0.173. The positive value of 0.173 indicated that extension activity was directly proportional to preference, thus more extension activity will result in increasing farmer's preference for salibu rice technology. It is interpreted that all types of extension activity aimed at increasing farmer interest on salibu rice will determine farmer's preference. Result of descriptive analysis of external factor which consisted of: Extension activity, facility and infrastructure, availability of information source, and government support showed that most farmers (76.50-84.30%) considered that external factor belonged to moderate category, indicating that external factor has not satisfied farmers, thus improvement is necessary.

This result is in accordance with the study conducted by Jane *at al* (2020) which found that ease of access to information source has become an important factor in encouraging the adoption of innovation. Similarly, Effendy and Gumelar (2020) also mentioned that adoption of organic fertilizer is affected by the role of extension worker, the role of farmer group, mediator for extension service, and relationship within the community. Moreover, Effendy, Dayat, and Oktoviansyah (2020) confirmed that environmental characteristics influenced the use of new superior wetland rice variety. Later, Effendy and Haryanto (2020) concluded that external support like; group support, resource availability, extension activity, facility and infrastructure determined youth participation in program of agricultural development. In addition, Siswoyo, Effendy and Hartono (2020) suggested that external factor affected rural youth capacity.

4.3. Effect of Innovation Characteristics on Preference

Result of regression analysis showed that variables of innovation characteristics (X_3) which significantly affected ($p<0.05$) preference were relative advantage (X_{31}) with coefficient of determination of negative 0.295 and observability (X_{35})with coefficient of determination of negative (-0.130). Positive value indicated that relative advantage was directly proportional to preference, while negative value of observability indicates an inversely proportional result to preference, the easier the variable to observe, the lower the preference. To say, innovation characteristic strongly determines farmer's preference for accepting or applying innovation. Similarly, Jane *at al* (2020) concluded that advantage obtained is one of factors which triggered adoption. Result of study conducted by Manbar and Ganesh (2020) also conclude that economic value added determined the sustainability of livestock agribusiness. Later, Saheda (2008) found that farmer's preference was affected by innovation characteristic.

4.4. Effect of Simultaneous Variables on Preference

Based on the result of multiple linear regression analysis, factors affecting preference for salibu rice is following the equation $Y = 1.446 - 0.079b_1X_{12} - 0.056b_2X_{14} + 0.306b_3X_{15}\ 0.173b_4X_{21} + 0.295b_5X_{31} - 0.130b_6X_{35} + ɛ$. According to this equation, if coefficient of determination of education level, (X_{12}), farm size (X_{14}), cosmopolitan level (X_{15}), extension activity (X_{21}), relative advantage (X_{31}), and observability (X_{35}) is zero (0), farmer's preference for salibu rice will be 1.446.

Moreover, effect of education level was found to be negative (-0.079), if all variables which affected preference, such as farm size cosmopolitan level, extension activity, and observability remained unchanged or equaled zero, every increase of one unit of education level will decrease farmer's preference by 0.079. Later, it is known that coefficient of determination of farm size was approximately 0.056, hence, if all variables affected preference, such as: education level, cosmopolitan level, extension activity, and observability remained unchanged or equaled zero, every one unit increase in farm size will increase farmer's preference for salibu by 0.056. Moreover, the value of coefficient of determination of cosmopolitan level was 0.306, therefore, if all variables affected preference, namely education level, farm size, extension activity, and observability remained unchanged or equaled zero, every one unit increase in cosmopolitan level will increase farmer's preference for salibu by 0.306.

Furthermore, the value of extension activity was negative (0.173), thus if the value of all variables that affected preference, such as: education level, farm size, cosmopolitan level, relative advantage, and observability, remained unchanged or equaled zero, every one unit increase in extension activity will increase farmer's preference for salibu rice by 0.173. The value of coefficient of determination obtained from relative advantage was 0.295, hence, if the value of all variables affected preference, namely education level, farm size, cosmopolitan level, extension activity, and observability remained unchanged or equaled zero, every increase of one unit of relative advantage will increase farmer's preference for salibu rice by 0.295. Moreover, coefficient of determination produced from observability variable amounted to 0.130, therefore, if the value of all variables affected preference, such as: education level, farm size, cosmopolitan level, extension activity, and relative advantage remain unchanged or equaled zero, every one increase in observability will increase farmer's preference for salibu rice by 0.130.

This result confirmed that factors affected preference in salibu rice farming which represented farmer characteristic included education level, farm size, and cosmopolitan level; extension activity represented external factor; while relative advantage and observability represented innovation characteristic.

4.5. Strategy to Increase Farmer's Preference for Innovation of Salibu Rice Technology

The strategy of increasing farmer's preference for salibu rice technology was formulated based on the result of regression analysis and descriptive analysis. Increase in farmer's preference for technology of salibu rice is possibly started by maintaining cosmopolitan level through the increasing interaction intensity of relationship that has been established. Moreover, other efforts included choosing and sorting which innovation that could provide advantage by improving salibu rice technology to be more profitable and conducting extension activity by still considering materials that are suitable for farmers, appropriate method and media to achieve goals and intensity of scheduled and continual meeting.

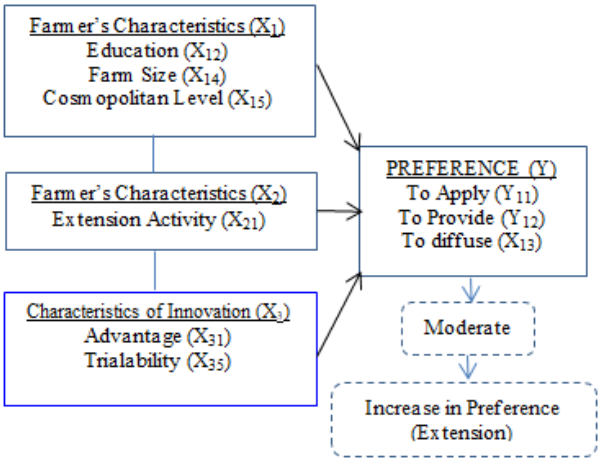

Figure 2. Strategy for Increasing Preference

V. CONCLUSION AND RECOMMENDATION

Based on the result of discussion, it is concluded: (1) farmer's preference for innovation of salibu rice technology was categorized as moderate; (2) factors that positively affected farmer's preference included cosmopolitan level of farmer, relative advantage obtained from salibu rice technology, and extension activity, while observability level, education level, and farm size resulted in negative effect; (3) strategy to increase farmer's preference for salibu rice technology is possibly started by maintaining cosmopolitan level through the increasing interaction intensity of relationship that has been established, later by choosing and sorting which innovation that could provide advantage by improving salibu rice technology to be more profitable, and by conducting extension activity while considering: materials that are suitable for farmers, appropriate method and media to achieve goals and intensity of scheduled and continual meeting.

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