# Effectiveness of Innovation Dissemination in Efforts to Increase Adoption of Sustainable Rice Innovation using LISREL

**Maesti Mardiharini, Sumardjo, Prabowo Tjitropranoto, Dwi Sadono**

***Abstract:*** ***The main issue related to the role of innovation-producing institutions during the last two decades is the limited innovation adopted by end users. The aim of this study was to (1) analyze the perceptions of researchers-extension agents-farmers about the accuracy and speed of innovation,(2) analyze the factors that influence the accuracy and speed of adoption and diffusion of innovation, and (3) formulate effective strategies for disseminating innovation in the future. The study was conducted through a survey approach, from March to December 2018 at rice production centers in Central Java and West Java Provinces, Indonesia. Number of respondents (n) was 270 rice farmers. The first objective was answered using descriptive analysis and tabulation, while the second and third objectives were answered using Structural Equation Models (SEM) with LISREL software version 8.72. SEM analysis is a combination of factor analysis, path analysis and regression. The results of the study indicated differences in perceptions within researchers-extension agents-farmers about the accuracy of innovation. The effectiveness of dissemination is very strongly represented by indicators of time and quality accuracies. The effectiveness of dissemination is at the same time a factor influencing the acceleration of diffusion. In the future, it is necessary to investigate the accuracy of each innovation produced by Indonesian Agency for Agricultural Research and Development (IAARD), and understand every actor who plays roles in the innovation system, starting from the producer/provider of innovation, extension agents and other sources of information, as well as users/farmers. The other factors influencing the dissemination of innovation (delivery system) are the capacity of the information sources and the characteristics of the innovation itself.***

***Keywords:*** ***Adoption, Dissemination, Effectiveness, Rice Innovation.***

## I. INTRODUCTION

One of the main issues related to the role of innovation-producing institutions especially the Indonesian Agency for Agricultural Research and Development (IAARD) over the past two decades is the limited innovation adopted by end users. The results of external and internal evaluations showed that the speed and level of utilization of technological innovations produced by IAARD tends to be slow, even declining [1]. The gap between the delivery subsystem and the innovation acceptance subsystem is the cause of the slow delivery of information and the low rate of innovation adoption [2]. This condition encourages IAARD to create efforts to accelerate the delivery of research results to end users, as one of the main programs in the dissemination activities group.

The efforts to accelerate the dissemination of IAARD innovation began with the Pioneering and Acceleration Program of Agricultural Technology Innovation Dissemination, whose concept was formulated in 2004 and implemented in 2007/2008. Over the past three years, another approach in accelerating dissemination has been through the development of integrated field activities. This pattern was tested on the development of rice intensification through various concepts, starting from Integrated Plant Management (IPM), Jajar Legowo, and finally Jajar Legowo Super (Jarwo Super) technology. Jarwo Super technology is an integrated cultivation technology for irrigated rice paddies based on 2:1 Jajar Legowo planting, supported by the application of various technologies, namely: New superior varieties (NSV), biodecomposers, biofertilizers, Control of plant pests (CPP), and agricultural equipment and machinery (especially Jarwo transplanter and combine harvester). The various efforts mentioned have not shown satisfying results [3]. As an illustration of the new superior varieties development of IAARD at the farm level from 2015 to 2019, there were dozens of Inpari rice varieties produced by IAARD, while at the farmer level the widely used varieties were still grouped of Ciherang, Mekongga, Ciliwung, Cigeulis, IR64 and Situbagendit rice varieties, where 6 of these varieties were used by 54.05% of farmers and 45.87% of them were the Ciherang variety [4]. Inpari varieties which number more than 30 series have a level of use in the field that is still below 5%. Studies related to acceleration efforts of the innovation delivery and its adoption process have been carried out. Identified aspects that contributed to the acceleration of adoption, for example the gap between the technology introduced and the technology required by farmers and the effectiveness of information technology dissemination (infotech), and the role of extension agents in the field [5][6]. Linked these efforts by developing a strategy in reforming agricultural innovation systems.

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The factors that influence the acceleration of innovation adoption showed that specifically in different regions, the influencing factors are also very site-specific[7] .

Various research results above have not yet comprehensively explained the factors that influence simultaneously in a dissemination model. It is interesting to examine simultaneously, how the effectiveness of various efforts to accelerate the dissemination of IAARD innovations, is associated with the adoption and diffusion process of these innovations, which in turn affects efforts to increase farming productivity. Effective dissemination is defined as the accuracy and speed of innovation delivered by the innovators through information channels to innovation users. The objectives of this study were (1) Analyzing the perceptions of researchers-extension agents-farmers about the accuracy and speed of innovation, (2) Analyzing the factors that influence the accuracy and speed of adoption and diffusion of innovation, and (3) Formulating an effective innovation dissemination strategy for increasing the sustainable farming productivity.

## II. MATERIALS AND METHODS

### Location and Time of Research

This study was conducted in Regency of Subang (West Java) and Boyolali (Central Java), Indonesia with consideration of rice production centers and these locations were once the location of the Jarwo Super program. In each regency, one subdistrict was selected, and each subdistrict selected two villages, i.e., the program village and non-program village. Site selection was all performed purposively and structured. This study was conducted from March to December 2018.

### Data Collection and Respondent Determination Techniques

Primary data were obtained through structured observation or questionnaire-based survey methods, and qualitative data collection was carried out on key informants at the study site. Secondary data were obtained from various related agencies at the central and regional levels, as well as searching through online media.

The study population was farmers who carry out rice cultivation in rice production centers in selected locations. Determination of the number of samples was based on the calculation of 5-10 times the number of study indicators as a condition for testing the model using the Structural Equation Model/SEM (Matjik and Sumertajaya, 2011). The number of study indicators was 29. Therefore, to meet the requirements, the number (n) of samples ranged from 145 to 290. The sampling technique used was cluster random sampling with the number of respondents determined proportionally in each village, i.e., n = 20-30 program and non-program households in each village. Total program respondents (n) was 152 and non-program respondents (n) was 118.

Data on perceptions about the innovation accuracy were not only obtained from farmers, but also from researchers and stakeholders (especially extension agents). Researcher respondents were researchers related to rice commodities and the development of models and institutional scope of IAARD. Extension agent respondents were Assessment Institute for Agricultural Technology (BPTP) extension agents (2-3 agents from each BPTP), extension agents from BPP of the research locations, and representatives from the Agricultural Service of selected regencies. Total respondents besides farmers were 64 researchers and 121 extension agents. The survey of researchers and extension agents was conducted through a mail survey.

This study was conducted through a quantitative deductive approach strengthened by qualitative data. Observations and confirmations in the field were based on a developed theoretical foundation. The elements that build the process of innovation diffusion have in common with the S-M-C-R-E communication model developed by Lasswell, i.e.: (1) Source/sources of innovation (inventors, scientists, reforming agents, opinion leaders); (2) Messages, in the form of new ideas or innovations; (3) Channels, which are tools or media for disseminating innovation; (4) Receivers, i.e., members of the social system; and (5) Effects, in the form of changes in knowledge, attitudes, and behaviors that appear, i.e., accepting or rejecting innovations [8]. This limitation shows that in the context of a communication strategy, a common interest must be achieved [9], or for effective dissemination there must be an effective "meeting" of the interests of the government and the community.

### Variables, Measurement Methods, and Data Analysis

The measured variable consisted of 4 (four) X variables and 3 (three) Y variables. Each variable was each represented by an indicator that builds it. The relationship between variables and their indicators is shown in Figure 1. Respondents' statements about attitudes and perceptions were measured using a tiered scale, a modification of the Likert scale measured in the ordinal category that was rated along a continuum. There were 4 (four) scale intervals used, i.e.: (1) very weak, (2) weak, (3) strong, and (4) very strong. The transformation process was needed to convert ordinal data into intervals with a score transformation index interval of 0-100 (10). The transformation was divided into four categories: Very Low (score < 25), Low (score 26-50), High (score 51-75), and Very High (score > 76).

The first objective was answered using descriptive analysis and tabulation, while the second and third objectives were answered using Structural Equation Models (SEM) with LISREL software version 8.72. SEM analysis is a combination of factor analysis, path analysis and regression.

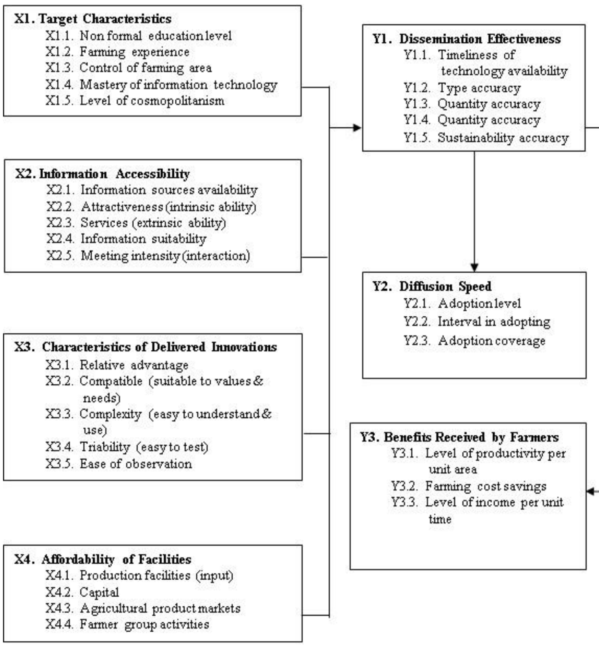


**Fig. 1. Variables and indicators of the dissemination effectiveness study in efforts to improve the adoption of rice innovation**

## III. RESULTS AND DISCUSSION

### Characteristics of Researchers, Extension Agents, and Farmers

The communication model developed by Rogers [8] mentioned that a message that will be delivered by the source of the message will be understood by the message recipient if they have the same perception of the message contents . This process is said to be effective communication. The dissemination and diffusion processes of innovations approached through the communication model can be sorted within the source of the message or the source of innovation (i.e. researchers), messenger (extension agents or mediators), message (innovation), and the message recipient or user of innovation (i.e. farmers).

The results of this study indicated that only the type of seed/seedlings innovations produced by researchers that were in harmony with its utilization by extension agents. Most researchers (37%) produced seed/seedlings/varieties (Figure 2), and around 29% of extension agents had used this type of innovation to be shared with the farmers (Figure 3). There was a quite noticeable difference that many of the research results in the form of models/institutional are relatively small utilized by extension agents.

Researchers who produced innovation (%)

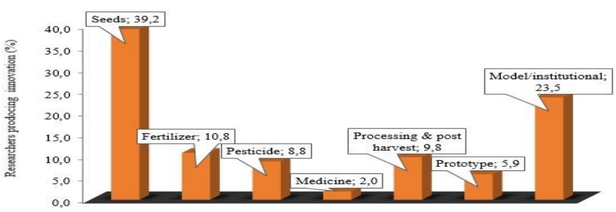


**Fig. 2. Types of innovations produced by IAARD researchers in 2016-2018**

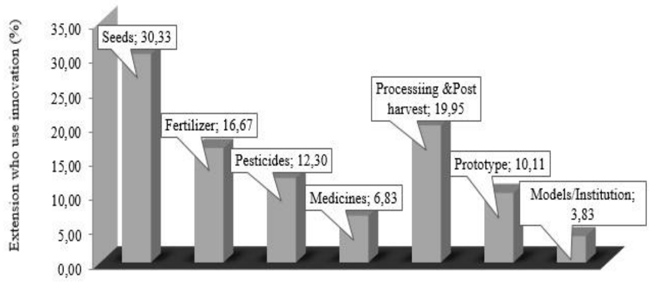


**Fig. 3. Types of innovations utilized by BPTP and the Agricultural Service extension agents in 2016-2018**

There are presumptions that so far the extension agents have applied many models produced by IAARD researchers, but it has not been realized that it is a package of various components of research technology. The intended model includes: Model of Rural Agricultural Development Through Innovation (M-P3MI) , Model of Sustainable Food Reserve Garden (M-KRPL), Model of Field School of Integrated Crops Management (M-SLPTT), and so on. The results of research in the form of post-harvest technology and agricultural products processing were relatively small, but it turns out that many were interested by extension agents in the area.

Respondents' characteristics of rice farmers based on groups who participated in the Jarwo Super program and those who did not follow the program showed that the average age, formal and non-formal education, and experience of farming, generally had relatively the same value. There was almost no difference between the two groups. Non-formal education in the form of trainings related to farming was also relatively the same, which was about 3 times training in the last 3 years. This information shows that farmers in the rice center area gained relatively even knowledge among farmer groups.

Tenure and status of land ownership are thought to also influence the effectiveness of dissemination. The results of this study indicated that around 82% of farmers controlled < 1.0 ha of land and 50% of this number were cultivators (not land owners). Some research results [1][11][12] reported that farming land tenure also influences the rate of innovation adoption. The more extensive the ownership of farm land, the higher the rate of innovation adoption by farmers. In line with the Rogers theory that land tenure status also affects adoption rates. The status of farmers as owners as well as cultivators of their land makes the level of adoption will be even higher.

### Researchers-Extension agents-Farmers' Perceptions of Innovation Accuracy: The Case of Introduction of Rice Seed Components

Many factors are thought to influence the adoption of innovations (especially those produced by IAARD). Various studies [1] [11] showed that not only the characteristics of the farmers, or the characteristics of their innovations, but the delivery system also influences the adoption of innovations.

This study showed that the effectiveness of dissemination, with one of the indicators is innovation adoption, is influenced by perceptions among actors in the innovation system. Perceptions about the accuracy of innovation, whether on time, quantity, type, and quality accuracies must also be appropriate within actors:


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researchers as creators of innovation, extension agents as mediators who will carry messages, and farmers as users. Figure 4 shows the different perceptions of the three actors regarding the time accuracy (timeliness) in applying innovation (case: rice seed).

The big difference was farmers' perceptions about the time accuracy. According to this group the right time to use rice seeds is at any time as needed. In contrast to the perceptions of researchers and extension agents about time accuracy, i.e., there is a tolerance of one planting season. This information shows that farmers were relatively not yet known to have an "expiry period" (especially rice seeds), and they still think that seeds can be used at any time if needed. The impact of this different understanding is thought to influence the relatively low farming productivity.

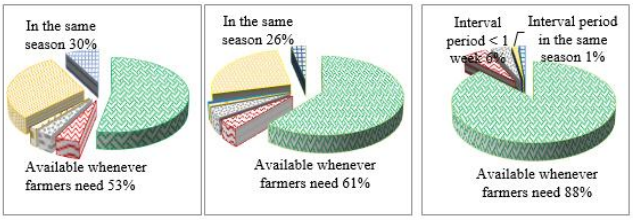


**Fig. 4. Perceptions of researchers, extension agents and farmers regarding time accuracy in innovation application (Case: rice seed).**

The difference in perceptions within the three actors in the innovation system was also shown in the aspect of accuracy in the quantity of rice seeds to be planted (Figure 5). The perception of researchers and extension agents about the quantity accuracy of rice seeds used was accurate according to the recommendations based on the study results and accurate based on location-specific (farmers' needs). Farmers' perceptions were relatively very different, that the quantity accuracy of rice seeds planted must be in accordance with the needs of farmers in their farming. It seems that farmers did not yet understand the right measure in utilizing innovation. The introduction of Jarwo Super, which emphasized the cost efficiency associated with the use of rice seeds, seems to continue to be conveyed to farmers.

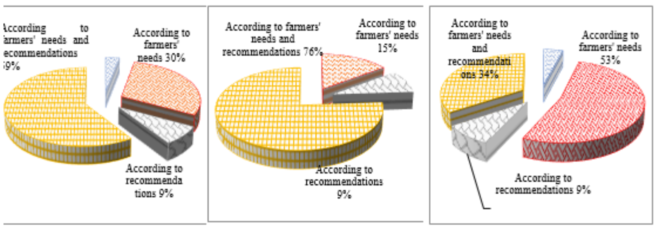


**Fig. 5. Perceptions of researchers, extension agents and farmers regarding the quantity accuracy in innovation application (Case: rice seed)**

Difference in farmers' perceptions was also quite large with regard to type accuracy in applying innovation (Figure 6). For example, in the selection of rice varieties, farmers expected that the types needed must be available, while researchers and extension agents assumed that the varieties introduced need to have a relative and competitive advantages. Farmers still need to be given an understanding of the innovation needs through type selection that is suitable for agroecosystems and has relative advantages.

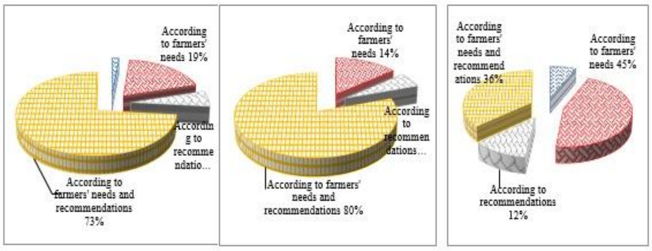


**Fig. 6. Perceptions of researchers, extension agents and farmers regarding the type accuracy in innovation application (Case: rice seed)**

The formulation of quality accuracy in innovation seems to be examined again (Figure 7). Difference in perceptions within researchers, extension agents and farmers were also not aligned, certainly the innovation needed must go through quality selection in accordance with agroecosystems and market needs.

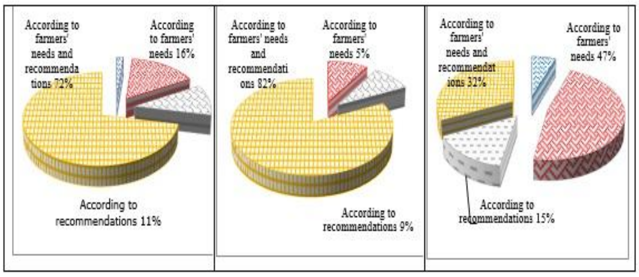


**Fig. 7. Perceptions of researchers, extension agents and farmers regarding the quality accuracy in innovation application (Case: rice seed)**

Various research results [13 - 15] showed that a variety of accuracy, either in the quantity, time, type, and quality in the application of rice innovation is very influential in increasing production per unit area. This means that in the dissemination of innovation as well as the delivery of information to extension agents and farmers, the accuracy aspect needs to be conveyed clearly and in accordance with the recommendations.

**Factors Affecting the Effectiveness of Dissemination and Acceleration of Innovation Diffusion**

Analysis of the factors that are suspected to influence the effectiveness of dissemination and acceleration of innovation diffusion was carried out using the Structural Equation Model (SEM). This SEM analysis is a combination of path analysis and factor analysis [16], [17], so that in addition to being able to explain simultaneously the influence of factors, it can also obtain the right model (fit) to describe the effective dissemination model.

The effectiveness of dissemination (Y1) was thought to be influenced by the characteristics of farmers (X1), sources of information (X2), characteristics of innovation (X3) and affordability of supporting facilities (X4). Each of these variables was represented by a strong indicator, characterized by a factor loading value > 0.96 or t-value> 1.96. Due to the collinearity between X2 and X3 in the rice commodity model, it is assumed that X3 has been represented in the indicators of information source services, then X3 was excluded from the model.

The model that was fit for rice commodities according to the rules in the analysis using Lisrel software is described in Figure 8 (standardized value).

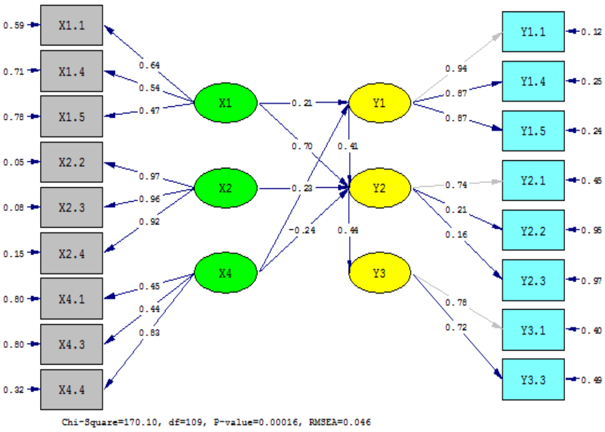


**Fig. 8. SEM analysis (Standardized value X1-X4 to Y1-Y3) for rice commodities**

The SEM model equation for rice is written as follows:

$$Y1 = 0.21X1 + 0.46X4, R^2 = 0.34$$

$$Y2 = 0.41Y1 + 0.70X1 + 0.23X2 - 0.24X4, R^2 = 0.83$$

$$Y3 = 0.44Y2, R^2 = 0.19$$

In detail, it can be explained that the effectiveness of dissemination, which is reflected by the accuracy of innovation, is influenced by the following factors: (1) Farmers' characteristics, represented by indicators of non-formal education, access to information technology and the level of farmers' cosmopolitanism; (2) Information Sources, represented by indicators of attractiveness (intrinsic), service level (extrinsic), and accessibility of farmers to information sources; and (3) Farmers' affordability of supporting facilities, represented by the availability of production inputs, markets, and the dynamics of farmer's groups.

This effectiveness of dissemination is very strongly represented by indicators of time accuracy, quality accuracy, and the desire of farmers to continue using innovations. The effectiveness of dissemination as well as a factor influencing the acceleration of diffusion, in this case is represented by the indicator of the time interval in adopting and the scope of diffusion. Finally, all of these factors will influence the number of benefits received by farmers, such as increasing productivity and increasing income.

In general, the $R^2$ value is quite high for Y2 equation, indicates that the model is very good or 83% can explain the factors that influence the acceleration of the innovation diffusion. The effectiveness dissemination model (Y1) for rice is also relatively good, but for equation Y3 it has a relatively low $R^2$. This means that there are still factors that are thought to influence, which cannot be explained in this study.

**Formulation of Effective Innovation Dissemination Models and Strategies**

The effectiveness model of agricultural innovation dissemination, especially for rice commodities was described in the SEM model. The model also explained the factors that influence the effectiveness of dissemination and the acceleration of its diffusion. When linked to Rogers theoretical framework of the SMCRE innovation diffusion model, as well as Leeuwis concept of effective communication and dissemination strategies, several important points that can be explained are:

(1) An effective dissemination model is indicated by the ability of farmers to implement innovations according to their time and quality accuracies of innovation. Factors that influence the effectivity of the dissemination of food crop commodities, especially:
- -The capacity of innovation users (i.e. farmers), mainly through participatory training and mastery of information technology.
- -The capacity of information sources (messenger of innovation), which can identify and understand precisely the needs of farmers, and at the same time can motivate farmers to utilize innovation in a sustainable manner. The source of information must also be able to communicate using the most effective media and methods.
- -Affordability (accessibility) of farmers to the facilities of farming production (input), markets, and infrastructure.

(2) The formulation of the model requires further testing at the field level, because it is estimated that there are still other factors that have not been identified that affect the innovation dissemination process model.

(3) The model has considered the positive impact of the dissemination and diffusion of innovations, but it has not taken into account the negative impacts.

Based on the results of the study, an effective dissemination strategy in the future can be formulated as follows:

(a) Short-term strategies in food crop commodities (especially rice), the existence of groups is crucial to the adoption process, as well as the groups' access to innovation is very influential on the process of adoption of its members. Government efforts to develop various approaches are needed to bring farmers together in groups that can increase the added value of products.

(b) Emphasis of material on innovation dissemination, especially on the technical aspects of cultivation is still a concern, because not all innovations are implemented optimally, especially related to the accuracy of innovation.

(c) Medium-term strategies in addition to technical innovation that is needed is institutional engineering that can unite farmers in a joint effort that allows to optimize the increase in added value through the application of innovation.

## IV. CONCLUSION

The perceptions of researchers-extension agents-farmers about the accuracy of innovation in terms of type, quantity, time, and quality (especially rice seeds) is relatively diverse. This difference in perception influences the effectiveness of rice innovation dissemination. Other factors that influence the effectiveness of dissemination include: (1) Farmers' characteristics (non-formal education, access to information technology and the level of farmers' cosmopolitanism); (2) Information sources (attractiveness, level of service, and accessibility of farmers to information sources;

and (3) Affordability of farmers to supporting facilities (availability of production inputs, markets, and dynamics of farmer's groups). The effectiveness of this dissemination is also very strongly represented by indicators of time accuracy, quality accuracy, and accuracy in program sustainability. The effectiveness of dissemination is at the same time a factor influencing the acceleration of diffusion.

Strategies for effective dissemination of innovations in the future include: (a) reformulating the accuracy of innovation, either the time, type, quantity, and quality of each innovation produced by IAARD. This needs to be understood by every actor who plays roles in the innovation system, especially for researchers (innovators), extension agents and other sources of information, as well as users (farmers) in order to have the same perception about the accuracy of innovation; and (b) increasing the capacity of extension agents or sources of information, especially for civil servant extension agents, private extension agents, and self-help extension agents, related to the importance of innovation accuracy to increase farming productivity. This is based on the consideration that the key factors which are very influential in the dissemination of innovation (delivery system) are primarily the capacity of information sources and the characteristics of innovation itself. Rice farmers with their farming experience had the capacity to process information and to implement innovations appropriately.

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## REFERENCES

1. K.S. Indraningsih, "Effects of Extension to Farmers ' Decision in Adopting Integrated Farming Technology," *Agro Ekon.* 2011;29(1):1–24.
2. M. Sarwani M, E. Jamal, K. Subagyono, E. Sirnawati , "Assessment Institute for Agricultural Technology ( AIAT) Dissemination : Innovative Idea on Locally Specific Technology Transfer, " J Pertan Indones. 2011;9(1):73–89.
3. E. Paturohman, Sumarno, "Formal and Informal Seed System in the Food Crops Production," Iptek Tanam Pangan. 2017;12(2):75–82.
4. Widiarta N, Sembiring H. Towards Sustainable Modern Agriculture. In: IAARD Press. 2017. p. 251–71.
5. W. Sudana, K. Subagyono, B. Besar, "Study of Determinant Factors of Adoption of Innovation of Integrated Crop Management through Integrated Field Crop Management Field Schools, " J Pengkaj dan Pengemb Teknol Pertan. 2012;15(2):94–106. (in Indoneian)
6. L. Damayanti, "Factors that influence production, income and opportunities of work in business of sawah rice farming in moutong parigi irrigation area. SEpa. 2013;9(2):249–59.
7. R. Moyo, A. Salawu. An Appraisal of Factors Influencing Adoption of Agricultural Innovations: Insights from Selected Developing Countrie," J Int Agric Ext Educ. 2017;24(1):7–9.
8. E.M. Rogers., "Diffusion of Innovations-Fourth Edition," 1995. pp. 204–251.
9. C. Leeuwis, "Communication for Rural Innovation Rethinking Agricultural Extension Third Edition Cees Leeuwis with contributions from. In: Blackwell Science. 2004. pp. 426.
10. Sumardjo. Transforming agricultural extension models towards developing independent farmers (Case in West Java Province). IPB (Bogor Agricultural University); 1999.pp. 348.(in Indonesian)
11. I.A Fachrista, R. Hendayana, "Socio Economic Factor As Determinant for Adoption of Integrated Crops Management (ICM) of Paddy at Bangka Belitung," Inform Pertan. 2013;22(2):113–20. (In Indonesian)
12. Y. Sewnet, E. Elemo, D. Derso, "A review of Agricultural Research , Extension and Farmers linkage in Ethiopia," Agric Biol J North Am. 2016;7(3):116–20.
13. F. Anggraini, A. Suryanto, N. Aini, "Cropping system and seedling age age on paddy (*Oryza sativa* L .) Inpary 13 Variety, "J produksi Tanam. 2013;1(2):52–60.
14. H.K. Faiz, D. Herdiansyah, Noormansyah,"Analysis of farmers capability and its effect on production In rice farming (Case Study in Bugel Village, Ciawi District, Tasikmalaya Regency," Jurnal Ilmiah Mahasiswa Agroinfo. 2016; 2(2): 87-95.(in Indonesian).
15. Herawati, A. V. Hubeis, S. Amanah, A. Fatchiya, " Capacity of rice farmers provate irrigation in applying the principle of environment friendly agriculture in central Sulawesi," Jurnal Pengkaijan dan Pengembangan Teknologi Pertanian, 2017; 20(2):155-170. (in Indonesian)
16. A. A. Mattjik, I. M. Sumertajaya, " M*ultiple Variance Imprint : using SAS*," IPB Press, 2011; pp. 423 (In Indonesia).
17. Ramadiani, "SEM and LISREL fr multivariate analysis,"JSI. 2010; 2 (1): 179-188. (in Indonesian)

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