Arabian Journal of Business and Management Review

Mappigau et al., Arabian J Bus Manag Review 2016, 6:6
DOI: 10.4172/2223-5833.1000263

Research Article Open Access

Determinant of the Post Adoption Behaviour of Small Scale Farmers: Evident of System of Rice Intensification (SRI) Practices in Indonesia

Palmarudi Mappigau[1]*, Yunus Musa[1] and Amraeni[2]

[1]*Hasanuddin University, Tamalanrea campus, Indonesia*
[2]*Sekolah Tinggi Ilmu Ekonomi Pembangunan, Indonesia*

Abstract

The purpose of our study is to determine post adoption bahaviour of small scale farmers in practicing SRI. A method conducted surveys on 125 small scale farmers who adopted SRI at two regencies of South Sulawesi Province in Indonesia. The binary logit regression used to examine factors that have determine influence on the post adoption behavior. The factors included in the study are benefits of SRI, the ease of use SRI, skills and the knowledge and experience, entrepreneurship attitude, resources endowment, and social cultural. Our findings demonstrate that benefits of SRI, ease of use SRI, skills and knowledge and experience, and social culture were important determinant; and entrepreneurship attitude was very important determinant influencing post adoption behavior. While resources endowment was less important determinant. Thus, farmers who perceive gained benefits from SRI, eased of use SRI, needed skills and knowledge and experience, needed willingness to take risks and self-confidence (entrepreneurship attitude), and needed social and culture supported to SRI practices have increased their propensity to continue with SRI. While farmers who perceive needed resources endowment from government support has increased their propensity to stop with SRI. This study makes some valuable contributions to the empirical study of post adoption behavior of small scale farmers in utilizing a technology continuously.

Keywords: SRI practice; Post doption behaviour; Dis-adoption technology; Rice cultivation; Small scale farmers

Introduction

Since 1970, Indonesian government tried to increase rice production through system of intensification (Green Revolution). The system has made Indonesia achieved rice self-sufficiency in 1984. On other hand, the system may have health and ecological negative impacts , such as soil degradation, water pollution and health problems caused by chemical residues (from pesticides). Farmers have been highly depended on industrial sector for their chemical fertilizers and pesticides causing farmers less autonomous. Over utilize of N and P fertilizers in paddy fields, causing several ecological impacts, such as: declining soil fertility, nutrient deficiency, soil and water pollution (due to fertilizers and pesticides), erosion and greenhoutilize effects In addition, chemical residues in rice commodities due to the utilize of pesticides have had negative impacts to human health [1]. To eliminate the negative impact of the system, the System of Rice Intensification (SRI) practice has been introduced Indonesia since 1999, and in South Sulawesi since 2000 by Japanese ODA through the decentralized irrigation system improvement management project (DISIMP). Beside that, Central and Local Government have encouraged farmers to practices by giving helps both in variable input and training. Unfortunately, Sato [2] who studied SRI application by farmers for four years in South Sulawesi, found that although SRI increased land productivity and became more efficient in production, but the adoption level of SRIwas low, only 10% farmers who adopted SRI.

Besides low of adoption rates, the other controversy about SRI adoption in Indonesia and many developing countries are high of dis-adoption (abandonment) rates [3-5]. Studies on SRI have been mainly concerned with determinant of adoption bahaviour of famers (farmer's decision whether or not to adopt SRI). However, little empirical evidence exists on the post-adoption behaviour of farmers (farmer's decision whether or stop with SRI after it is adopted) [6,7]. This study differs from the previous studies by focusing on post adoption behavior of small scale farmers. Our study is to explain factors that determine of post-adoption behaviour of small scale farmers in SRI practices. Therefore, the our study objective is to give an alternative solution for small scale farmers in improving adoption of technology such as SRI.

Concept and benefits of SRI

The system of rice intensification or SRI is an agro-ecological methodology for increasing the productivity of irrigated rice by changing the management of plants, soil, water and nutrients. SRI originated from Madagascar in the 1980s and it is based on the cropping principles of significantly reducing plant, improving soil conditions and irrigation methods for root and plant development, and improving plant establishment methods [8]. SRI is one of the rice cultivation practices approach that focutilized on soil, crop, and water management based on environmentally sound activities through group empowerment and local wisdom [9]. Namara et al. [3] mentione that all definitions of SRI emphasize on importance of conceptualizing it as a system rather than as technology because it is not fixed set of practices. Therefore, SRI is not package of fixed technical specifications; but it is rather a system of production formulated on certain core principles from soil chemistry and biology, rice physiology and genetics and the principles of sustainability with the possibility of adjusting the exact technical components based on the prevailing biophysical and socioeconomic realities of an area.

***Corresponding author:** Palmarudi Mappigau, Chairman of Magister in Agribusiness Study, Postgraduate Program, Hasanuddin University, Tamalanrea campus, Makassar, PO Box 90245, South Sulawesi, Indonesia, Tel: +62 411 586200; E-mail: rudipal@yahoo.com

Received July 01, 2016; **Accepted** September 28, 2016; **Published** October 04, 2016

Citation: Mappigau P, Musa Y, Amraeni (2016) Determinant of the Post Adoption Behaviour of Small Scale Farmers: Evident of System of Rice Intensification (SRI) Practices in Indonesia. Arabian J Bus Manag Review 6: 263. doi: 10.4172/2223-5833.1000263

The beneficial of SRI practice had been documented in 28 countries, mainly in agronomy and soil science. From literature review, Laksana and Damayanti [10] identify that SRI practices in many developing countries such as in Myanmar, Cambodia, Sri Lanka, India, Tamil Nadu have increased rice production from 2 to 2.8 ton/ha on average, and reduced input utilized in terms of irrigation 24%, seeds 85%, and herbicide 95%. In Indonesia, Mediana (2010) found that SRI method was able to increase rice production compared to conventional method, (2) increase household income, improve production and farm efficiency, and (4) increase price of rice. Then, Kurniadiningsih (2011) report that revenue of SRI practice was IDR. 12.2778 million per acre per growing season, while the conventional method was only IDR. 7.3422. On farm business analysis, R/C ratio of SRI was 2.95 while the conventional method was 2.13.

Post-adoption technology

Adoption is a farmer decision to accept the innovation and utilize in the practice of his farming business. The decision to accept innovation is a change in behaviour which includes areas of knowledge, attitude and skills of a person to know the innovation to take the decision to accept it [11]. Rogers [12] defines the adoption process of technology as decision to accept or reject of an innovation and a confirmation such decisions is a process mentally. The adoption process innovation requires a mental attitude and a confirmation of every decision taken by someone of the adopter. Throughout literature review, Arimi and Adekoya [13] mention that adoption is concerned with the behaviour of individual with relation to the utilizof technology, more particularly their reason for taking to technology at a point in time. Adoption behaviour of farmer requires consistency and steadfastness of farmer to the adopted practiced. Farmers' adoption behaviour is the pattern of reaction displayed to ward technology and which determine acceptance and continuous utilization of individual component in the recommended package introduced to them. The adoption behaviour of farmers is expressed in terms of farmers' awareness, interest, trial, adoption, continued utilize, abandoned or total rejection of a technology with respect to time of putting the innovation into trial after their awareness, Rogers and Shoemaker [14] state the post adoption behaviour of farmer has two possibilities, namely: (1) continues adoption or retention; and (2) not continue adoption or dis-adoption or abandonment. Uematsu et al. [15] mentione that a farmer faces two sequential decisions retione ngarding technology: whether to adopt a technology or not and whether to retain or abandon the technology. The two decisions are correlated with each other becautilize the probability of technology retention (or abandonment) is contingent upon the probability of technology adoption. It is obvious that the second decision is post adoption behaviour and only relevant to those farmers who have previously adopted the technology. According to Pedzisa et al. [16], adoption decisions of technology by farmers are inherently dynamic because the decisions in one period critically depend on the decisions made in previous periods. For example, farmers do not simply to decide whether to adopt an technology permanently, but instead of make a series of decisions about whether to continue using it. Farmer's adoption decisions need to be followed over a period, becautilize ex-post information on technology adoption, such as its continued profitability, are important determinants of continued utilize of the technology. Kolawole et al. [17] examine dis-adoption technology to describe discontinued utilize of previously adopted technology and report the varying degrees of discontinuance among farmers to be immediate, gradual and rapid based on the nature of technology and farmers situation. Neill and Lee [1] examine adoption and dis-adoption maize-mucuna farming systems in Honduras. They found that road access, farmer's experiences, good management practices had a positive correlation with dis-adoption. Moser and Barrett [7] study dis-adoption of SRI in Madagascar. They reported that dis-adoption rate among adopters was high (40%). There were no differences in yields between those who continued practicing the technology and those who dis-adopted. Dis-adopters did not cite disappointment with the new rice system as an abandonment reason. The most commonly cited problems were related to time pressures, especially surrounding transplanting and weeding of the new technology.

Conceptual framework

Farmers'post adoption behaviour is decisions about whether continue or stop with SRI are conditioned by characteristics of the technology [12], characteristics of internal farmers [17], and characteristics of external farmers [1]. From literature review, Pedzisa et al. [16] note that farmer's decisions in adoption of technology are inherently dynamic because their decisions in one period critically depend on the decisions made in previous periods. Farmers do not simply decide whether or not adopt an technology, but instead make a series of decisions about whether or not continue practicing the technology. Therefore, post adoption behaviour may be determined by many of the same factors that influence adoption behaviour. The factors are classified as characteristic of technology variables (perceived benefits of the SRIs and perceived ease of use the SRItechnology) and characteristics of internal farmer variables (resources endowment, skills, knowledge, and experience; entrepreneurship attitude), and external farmer variable (social culture) [18]. Therefore, conceptual framework of this study shown in Figure 1.

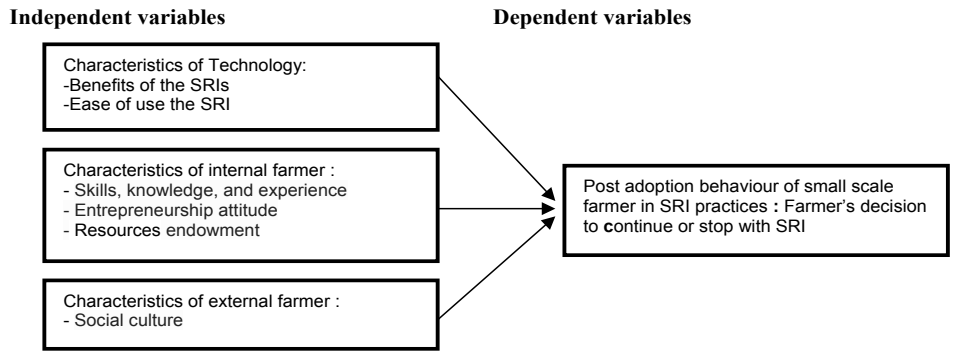

Figure 1: Conceptual model for this study.

Its based on literature review and conceptual framework that we described earlier, so that our hypothesis is benefits of SRI, ease of use SRI, skills and knowledge and experience, entrepreneurship attitude, resources endowment and social cultural are important determinant of post adoption behaviour for small scale farmers. Thus, perceive benefits of SRI, ease of use SRI, skills and knowledge and experience, entrepreneurship attitude, resources endowment, and social cultural are increasing farmers' propensity to continue with SRI.

Material and Methods

Population and sample

This study was conducted over five months in 2014, with area of the study was in South Sulawesi, one province of the centre rice production in Indonesia. Pinrang and Maros regencies ware purposively selected. In the second stage, two villages was purposively selected from each regency based on land area of rise cultivation with SRI. The list of the land area obtained from the Department of Agriculture and Horticulture in the regencies. The target population was small scale farmers who have land hold less than one acre and they had practiced of SRI at least once growing season. Total of small scale farmer respondents ware 125 respondents who were selected radomly, consisted of 75 respondents from two villages in the Pinrang Regency and 50 respondents from one village in the Maros Regency that each selected randomly.

Data collection method

The data collected from primary and secondary sources. The primary data collected through observation and direct interviewed using a questionnaire. The primary data included age, farming experience, education level, SRI training, household labor, and perception for variables relating to the post adoption. Secondary data obtained from the Department of Food Agriculture and Horticulture of South Sulawesi included such as list of rice area cultivated by SRI, government policy and strattgy relating to organic rice development program.

Analytical techniques

This study using the binary logit to explain factors which determine of small scale farmers' post adoption behaviour in SRI practices. Logit binary regression is chosen over probit regression in this study because of it's mathematical convenience and simplicity to analyze post adoption behavour for small scale farmers [19]. It has also been applied to study factors influencing the post-adoption behaviour of farmers [3,15]. The logit regression model of this study is specified as follows:

$$z_i = \log \frac{p_i}{1-p_i} = \alpha + \beta X_i + \varepsilon_i$$

Where, Zi is the odds ratio for post adoption behaviour called the logit, Pi is probability of farmer's decisions to continue with SRI while 1-Pi is a probability of farmer's decision to stop with SRI, Xi is explanatory variables that influence post adoption behaviour. β is parameter to be estimated and u is a stochastic term. The Zi can take the value from -∞ to +∞ thus the Logit is not bounded. The positive value of Zi indicates the value of the regression equals to 1 increase as the value of the regressor X increase while the negative value of Z indicates, the odds of the regression equals 1 decrease as the value of X increases. In binary logit regression, the expected signs of coefficient and practical significant of variables are important. The coefficients are tested by using standard error and p-value.

The dependent variable in this study is defined as post adoption behaviour variable (Z) were empirically measured by using dummy variable, 1 if farmer's decision to continue with SRI and 0 if farmer's decision to stop with SRI. Independent variables were empirically measured by using categorical variables. Benefits of SRI variable (X1) was measured by degree to which a farmer perceive gained benefit from SRI in enhancing rice production and incomes. Ease of use SRI variable (X2) was measured by degree to which a farmer perceive that SRI would be easy to practiced. Skills and knowledge and experience variable (X3) was measured by degree to which a farmer perceives needed skills, knowledge and experience to SRI practices. Entrepreneurship attitude variable (X4) was measured by degree to which a farmer perceives needed willingness to take risks and self-confidence to SRI practices Resources endowment variable (X5) was measured by degree to which a farmer perceive needed resources endowment such as capital for cash, organic fertilizer, household labor, machinery and equipment from government's incentive and subsidies to SRI practices. Social culture variable (X6) was measured by degree to which a farmer perceive needed social culture supported to SRI practices.

Results and Discussion

Table 1 gives the estimate of the logistic regression coefficients (B) corresponding to the independents variables and relatives odds calculated for each category of the categorical variables.

Table 1 it is observed that benefit of SRI (X1), ease of use SRI (X2), entrepreneurship attitude (X3), skills, knowledge and experience (X5), and social culture (X6) variables have a significant influence on post adoption behavior ($P<0.05$). Contrarily, resources endowment (X4) variable has not a significant influence on post adoption behavior ($P>0.05$).

From the results of the logistic regression analysis, it appears that benefits of the SRI variable is important determinant of post adoption behavior, when the other variables are controlled. It has been observed that farmers, who perceive gained benefit from SRI is 1.573 times more likely to continue with SRI than those who perceive did not gain it. This indicated that the level gained benefit from SRI has increased farmer's propensity to continue with SRI. This result is consistent with literature, Lambrecht et al. [20] who argues that an important element in the decision about continues use of a technology is whether farmers' benefit expectations are met or not. Even if realized benefits are positive, if they are far below expected benefit, farmers may be disappointed and abandon the technology. In this regard, Ishak and Afrizon [21], and Natawidjaja et al. [4] found that farmers in West Java Indonesia who continue practicing SRI have a good perception of the SRI in enhancing the rice yield productivity and income, although in the early stages of adoption decrease productivity and increase production costs. Similar result has also reported in Myanmar by Kabir [22] who found that farmers who make decision to use the SRI practice

No	Variables	Coefficient	S E	P value	Odd Ratio
1	Benefit of SRI (X1)	0.670*	0.066	0.046	1.573.
2	Ease of use SRI (X2)	0.953*	0.078	0.034	1.484.
3	Entrepreneurship attitude (X3)	0.341*	0.062	0.030	2.135.
4	Resources endowment (X4)	0.203ns	0.08	0.143	0.630.
5	Skills, knowledge and experience(X5)	0.280*	0.036	0.000	1.606.
6	Social culture (X6)	0.805*	0.035	0.034	1.884.
7	Constant	8.511	0.021	0.994	

Note: * The coefficients are significant at 5 %.

Sources : Author Data analysis, 2014

Table 1: Result of logistic binary regression analysis: determinants of post adoption behavior of small scale farmers in SRI practices.

on their own field simultaneously believe that SRI is most effective to improve rice yield and consequently raises the economic benefits than conventional method.

The analysis indicates that ease of use SRI is important determinant of post adoption behavior, when the other variables are controlled. The odd ratio for ease of use SRI shows that farmers who perceive eased of use SRI is 1.484 times more likely to continue with the SRI than those who perceive did not ease of use it. This indicated that the level ease of use SRI has increased farmer's propensity to continue with the SRI. This result is consistent with literature, SRI is a relatively complex to practices by farmers, and they must be learned and applied simultaneously [7]. Furthermore, Natawidjaja et al. [23] state that SRI cultivation technique is not different from the conventional cultivation technique, the SRI given by input organic fertilizer since conventional such as chemical fertilizers. However, SRI is perceived complicate by farmers just only at initial adoption. Its caused at the initial adoption, SRI method is not only need more attention and much of production cost, but also a lot of time. This result is also supported with the findings of Sugarda et al. [5], who study of constraint practicing of SRI in Indonesia, They found that the most farmers have difficulty to continue with the SRI due to they necessarily changes in mixing and allocating of inputs, in particular of water, seeds, fertilizer and labour.

The analysis indicates that skills, knowledge and experience variable is important determinant of post adoption behavior, when the other variables are controlled. The odd ratio for skills, knowledge and experience shows that farmers who perceive needed skills, knowledge and experiences to SRI practices is 1.606 times more likely to continue with the SRI than those who perceive did not need it. This result indicated that the level skill, knowledge and experiences have increased farmer's propensity to continue with the SRI. This because farmers who have adopted SRI usually less experience and knowledge with SRI and they used the method just for getting financial support from government. This result is supported by Uker et al. [24] who argue that the adoption of SRI by small-scale farmers in Indonesia are more determined by the incentive and subsidies from the government rather than the advantages/advantages contained in SRI innovation itself. This result is also consistent with the findings of Namara et al. [3] who reported that access to training, formal education, and counseling program have a significant effect on the farmers' decision to keep practicing SRI. Moreover, Devi and Ponnarasi [25] who study of SRI adoption of farmers in Tamil Nadu found that lack of skilled labor, training on new technology and experience have been opining as the main problems in adoption of this technology. Thus, Uphoff and Kassam [26] emphasize that farmers need a certain amount of skill and knowledge to practices SRI techniques successfully.

The analysis further shows that entrepreneurship attitude is important determinant of post adoption behavior, when the other variables are controlled. The odd for entrepreneurship attitude shows that farmers who perceive needed willingness to take risks and self-confidence to SRI practices is 2.135 time more likely to continue using SRI than those who perceive did not need it. This indicates that the level of self-confidence and willingness to take risks has increased farmer's propensity to continue with the SRI. This is because the SRI method is high risk to practices due to higher seedling mortality and selling price of rice more volatile than the conventional method. This result is consistent with the literature, Barham et al. [27] argue that under framing of the adoption choice, risk-averse and ambiguity-averse farmers would be less likely to adopt new technologies. Thus, farmers choose the technology that provides the highest expected utility conditional on their aversion to risk. Similarly, Ishak and Afrizon [21], who study of factor affecting dis-adoption SRI in Indonesia found that dis-adoption is caused by the high risk to be faced by farmer such as seeds moved into the field is still too young (age 8-15 days after seedling), and pest and disease threats to the plant that only one seed per planting hole. Moreover, Mappigau and Jusni [28] point out that the farmers who have entrepreneurship characteristic such as willingness to take risks and self-confidence would always be responsive to the new technology compared to whom that have not, and therefore, the farmers who have entrepreneurship attitude will continue to practice of the new technology. According to Uphoff and Kassam [26] farmers needs perceiving willingness to take risks and confidence in practicing of SRI in order to reduce their abandonment.

Then, the analysis also shows that social and culture is important determinant of post adoption behavior, when the other variables are controlled. The odd for social and culture shows that farmers who perceive needed social and culture support to SRI practices is 1.884 time more likely to continue with SRI than those who perceive did not need it. This result indicates that level of social and culture supported has increased farmer's propensity to continue with SRI. This is because the farmers who expected that adopted the SRI would improve their social status and the SRI practice matched with the local custom. This result is supported by Burkey [29] and Suparlan [30] who argues that the reason many farmers not practice SRI is not only technical aspect but also social and culture aspects. Natawidjaja et al. [4], who study of SRI adoption in Indonesia found that social and cultural factors are very influential on the level of adoption of SRI in Indonesia. Because farmers are mostly accustomed to the way conventional agriculture, which have relatively high dependence on inputs and chemicals from the outside, so that the presence of innovative rice cultivation SRI is contrary to the habits of the majority of farmers, and hence, anyone who developed it, he would have difficulties and may be opposed, either by family members, neighbors and the local village elite. This can be seen from the attitude of ridicule from family members and other farmers against farmers practicing SRI. The other socio-cultural issues in the post adoption of SRI was also come from consumers. In the perception of the consumers, organic products relatively expensive, physically unattractive and difficult to obtain. Partially consumers do not understand the dangers of pesticides or the presence of residue pesticides in food they consume, so in real terms has reduced the motivation of farmers to continuously practices of SRI.

Finally, the analysis indicates that resources endowment is less important determinant post adoption behavior, when the other variables are controlled. The odd for resources endowment shows that farmers who perceive needed resources endowment from government to SRI practices is more likely to stop practicing of SRI than those who perceive did not need it. This result show that level dependence of resources endowment to government's incentive and subsidies has increased farmer's propensity to stop with SRI. This is because small scale farmers were very depending on the government' incentive and subsidies. Hence, the famers would stop using SRI when the incentive and subsidies from the government was absence. This result is supported by literature, Kabir [22] and Oladele and Wakatsuki [6] mentions that farmers need much resource endowment, particularly in land, capital, labor, and livestock to SRI practices successfully.

Conclusion

The regression logit analysis in this study results that benefits of SRI, ease of use SRI, skills and knowledge and experience, entrepreneurship

attitude and social culture were important determinant of post adoption behavior. While resources endowment was less important determinant. The odd ratio shows that farmers who perceive gained benefits from SRI, eased of use SRI, needed skills and knowledge and experience, needed willingness to take risks and self-confidence (entrepreneurship attitude), and needed social and culture supported to SRI practices have increased farmer's propensity to continue with SRI, while farmers who perceive needed resources endowment from government has increased farmer's propensity to stop with SRI. Findings from this study offer significant information to policy-makers for a better formulation of sustainable agriculture development programs. This finding has the potential for further improvement SRI adoption, particularly in reducing dis-adoption at the small scale farmers. However, the limiting the study was not capture a big sample and many areas of SRI cultivation, and hence, we suggest similar study with big sample in other regencies, provinces and countries.

Acknowledgment

The authors gratefully acknowledge the Department of Agriculture and Horticulture of South Sulawesi Province. Supporting for collection of data was provided by the students of Magister Agribusiness Study Program at Hasanuddin University.

References

1. Neill S, Lee DR (2001) Explaining the adoption and disadoption of sustainable agriculture: the case of cover crops in Northern Honduras. Econ Devel Cult Change 49: 793-820.
2. Sato S (2006) An evaluation of the system of rice intensification (SRI) in Eastern Indonesia for its potential to save water while increasing productivity and profitability.
3. Namara RE, Weligamage P, Barker R (2003) Prospects for adopting system of rice intensification in Sri Lanka: A socioeconomic assessment. Research Report 75. International Water Management Institute, Colombo, Sri Lanka.
4. Natawidjaja RS, Djuwendah E, Mukti GWS (2008) The economic and social impact assessment of SRI rice cultivation for farmer and communities in Tasikmalaya Regency.
5. Sugarda TJ, Charina A, Lisye, Setiawan I (2008) Study of organic rice farming development of SRI (System of Rice Intensification) insightful agribusiness in supporting sustainable food security program.
6. Oladele IO, Wakatsuki T (2011) Replacement adoption: a case of varietal substitution among farmers adopting Sawah rice production technology in Nigeria and Ghana. South African Journal of Agricultural Extension 39: 79-90.
7. Moser CM, Barrett CB (2002) The system of rice intensification in practice: explaining the low adoption and high disadoption farmer in Madagascar. Cornell Department of Applied Economics and Management Working Paper.
8. Rappocciolo F (2012) Spreading the system of rice intensification across East and Southern Africa, Case Study.
9. Mediana S (2010) Impact of SRI (System of Rice Intensification) method practices. Journal of Environmental.
10. Laksana S, Damayanti A (2013) Determinants of the adoption of system of rice intesification in Tasikmalaya District, West Java Indonesia.
11. Adjid DA (2001) Penyuluhan Pertanian. Yayasan Pengembangan Sinar Tani. Jakarta.
12. Rogers EM (1995) Difusion of innovation. The Free Press, New York.
13. Arimi K, Adekoya AE (2013) Determinants of rice farmers' technology utilization in Ekiti and Ogun States, Nigeria. New York Science Journal 6: 15-21.
14. Rogers EM, Shoemaker FF (1971) Communication of innovations: A cross culture approach. The Free Press, Collier Macmillan Publishing Inc.
15. Uematsu H, Mishra AK, Roberts RK, Lambert DM, Burton CE (2011) Motivation for technology adoption and its impact on abandonment: A case study of U.S. cotton farmers.
16. Pedzisa T, Rugube L, Winter-Nelson A, Baylis K, Mazvimavi K (2015) Abandonment of conservation agriculture by smallholder farmers in Zimbabwe. Journal of Sustainable Development 8: 69-82.
17. Deressa TT (2007) Measuring the economic impact of climate change on Ethiopian Agriculture: Ricardian Approach.
18. Luarn P, Lin HH (2005) Toward an understanding of the behavioural intention to utilize mobile banking. Computers in Human Behaviour 21: 873-891.
19. Greene WH (2008) Econometric analysis. New York University.
20. Lambrecht I, Vanlauwe B, Merckx R, Maertens M (2014) Understanding the process of agricultural technology adoption: mineral fertilizer in eastern DR Congo. World Development 59: 132-140.
21. Ishak A, Afrizon (2011) Perception and adoption rates of farmers on the application of the system of rice intensification (SRI) in Bukit Peninjauan I, Talbot Sub district, Seluma District. Journal of Agricultural Informatics 20: 76-80.
22. Kabir H (2006) Adaptation and adoption of the system of rice intensification (SRI) in Myanmar using the farmer field school (FFS) approach.
23. Mutakin J (2005) Rice organic farming methods and advantages SRI (System of Rice Intensification).
24. Uker D, Zuki M, Dani Y, Syafnil (2013) Adoption of innovation strategy and policy of the system of rice intensification (SRI) in the province of Bengkulu. BOPT Fundamental Research Report.
25. Devi KS, Ponnarasi T (2009) An economic analysis of modern rice production technology and its adoption behaviour in Tamil Nadu. Agricultural Economics Research Review 22: 341-347.
26. Uphoff N, Kassam A (2009) Case Study: The system of rice intensification. Agricultural Technologies for Developing Countries.
27. Barham BL, Chavas JP, Fitz D, Rios-Salas V, Schechter L (2014) The roles of risk and ambiguity in technology adoption. Journal of Economic Behavior and Organization.
28. Mappigau P, Jusni (2012) Entrepreneurship quality of smale scale broiler farming with independent business model in Maros Regency of South Sulawesi Provence, Indonesia.
29. Burkey S (1993) People First: A guide to self-reliant, participatory, rural development. ZED Books, London.
30. Suparlan (1981) IP human, culture and environment.