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## The reasons for farmers not to adopt System of Rice Intensification (SRI) as a sustainable agricultural practice: an explorative study

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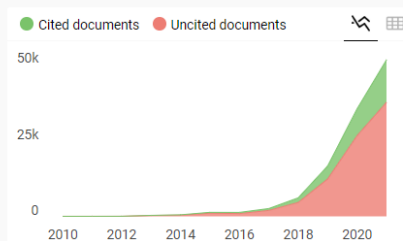
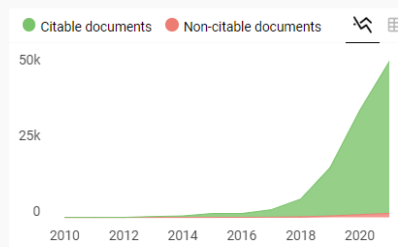
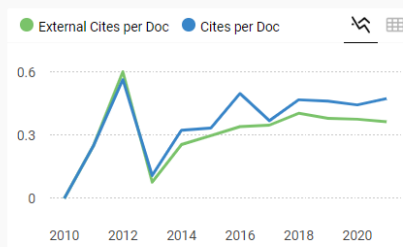
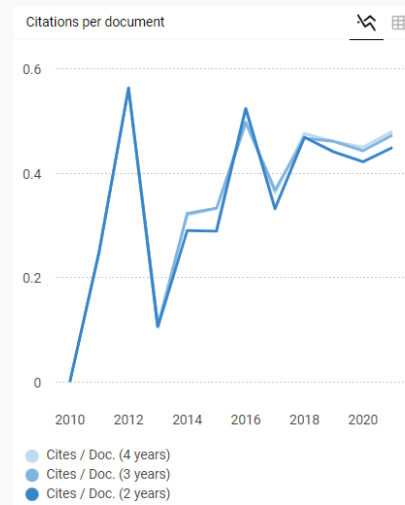
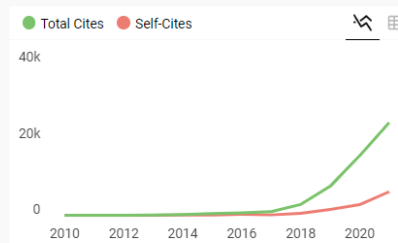
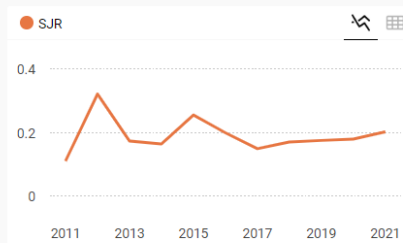
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# The reasons for farmers not to adopt System of Rice Intensification (SRI) as a sustainable agricultural practice: an explorative study

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**Abstract.** This study explored perceived attributes of farmers adoption on the System of Rice Intensification (SRI) as a sustainable agricultural practice in Indonesia. Roger's theory of diffusion innovation was used as a conceptual framework for this study. A focus group was conducted with farmers who decided to discontinue the practice of SRI in the Banyumas Regency, Central Java Province. The price and yield were expected to be the most important consideration when adopting the SRI system, followed by the complexity of farming practices. However, environmental benefits such water conservation, agronomic benefits and land fertility were found to be less important considerations for dis-adopter farmers. In conclusion, the price of rice is still the dominant attribute in the adoption of SRI.

## 1. Introduction

Rice is the main staple food in Indonesia. It has been reported that Indonesia is the highest consumer of rice in the world. About 60% of the total cropland area of Indonesia is devoted to rice. Because of its importance, rice is the strategic commodity of highest priority and has received the most attention from the Indonesian Government through the food production program since 1968 [1]. The demand for rice increases in accordance with population growth, which was approximately 1.17% in the year 2016. The population of Indonesia is expected to reach 285 million in 2025 [2].

The System of Rice Intensification (SRI) is one solution to increase rice production by applying more efficient agronomic practices [3, 4]. This approach could potentially be applied in small-scale farming to make the more affordable cost production by reducing chemical inputs, water usage and seed requirements [5]. Many studies pointed out that the SRI approach also corresponds to resource conservation and positive environmental effects due to fewer external inputs and the use of organic fertilizer and pesticide [4, 6]. Therefore, the SRI may also be suitable as a farming practice working towards sustainable agriculture.

Although some studies reported no significant increase in paddy yields [7, 8], a significant increase in rice yield using SRI was reported in many locations. In Indonesia, rice yield also increased by up to 6.2-ton ha<sup>-1</sup> during the dry season and 8.2-ton ha<sup>-1</sup> during the wet season in Indonesia [3]. An increase in rice yield of 158% was obtained with the reduced cost production about 20% in Gorontalo, eastern Indonesia [9].

SRI also promises many environmental benefits, such as reduction of water usage by up to 50% due to intermittent flooding, as well as improvements in soil structure and nutritional value as the



consequences of organic fertilizer application [3]. Kassam et al. [10] evaluated irrigation water reduction and water productivity in 8 countries and reported that irrigation water reduction varied considerably from 10 to 86%. As a result, water productivity increased from 51 to 633%. Although SRI is widespread in many countries around the world, the adoption rate was still low in some locations, including Indonesia [11-14].

Most studies regarding farmers' attitudes towards SRI adoption have focused on socio-economic and social aspects [13]. Other scholars investigated the performance of important attributes of SRI in Indonesia [12]. This study investigated the determinant factors that influence farmers to discontinue the adoption of SRI methods.

## 2. Methods

A focus group discussion was conducted in Banyumas regency in February 2018, which focused on the households of farmers who had experience with SRI methods. The sampling technique used in this study was judgmental sampling. In total 20 participants were selected purposively based on the consideration given by the leader of the farmers' group in the Somagede sub-district. Those considered as respondents were dis-adopters (farmers who formerly adopted the practices of SRI but discontinuing the practice anymore) [23]. Most respondents were male, aged between 41 and 60 years old and graduates of high school. The average duration of SRI application was 2.4 years.

Table 1. Respondents' characteristics of focus group discussion.

Characteristics	Banyumas (n = 20)
Age (years old)	
≤40	20
41-≤60	55
≥60	25
Gender: Male (%)	70
Education (%)	
Elementary school	40
High School	55
University	5
Main occupation	
Farmer	75
Housewife	20
Pensioner	5
Average duration SRI application (years)	2.4
Duration being a farmer (years)	
≤20	60
>20	40

## 3. Results

Three factors were identified as barriers to SRI adoption, namely 'relative advantage', 'complexity' and 'compatibility'.

### 3.1. Relative advantages

*3.1.1. Production costs.* Some studies stated that SRI can provide greater returns to farmers as this system can reduce the production costs of chemical fertilizer, seed and, in some cases, labor. However, some farmers mentioned that SRI is labor intensive, particularly in terms of weeding, fertilization and water control activities. The operational costs for compost and labor are quite high when SRI methods are applied. Compost costs around 2.5 million IDR /ha, which is higher than the cost of chemical fertilizer—only 0.8 million IDR /ha. A farmer said that "We need more money to buy organic

materials such as chicken manure, which increased from 2500 IDR/kg to 8000 IDR/kg. Rice husks have also increased from 1000 IDR/sack to 3000-5000 IDR/sack. The same with sawdust, which previously we could get for free, but now we need to buy it. This is due to the effect of many farmers moving to the organic SRI system". Another mentioned that "We need to hire more workers to control weeds due to the wide spaces between rows and the high use of organic fertilizer. That costs a lot". Another hinderance to farmers continuing SRI is that many workers are interested in working in the industrial area rather than on farms. Most farmers agree that seed costs are believed to be lower than those of conventional methods.

*3.1.2. Yield.* Almost all farmers in the study area agreed that SRI promises a high production level. The average yield per ha is 7-8-ton dry grain/ha higher than that of conventional systems, which is 5 tons dry grain/ha. However, good results can be achieved if farmers used good seed varieties. According to the farmers, they cannot afford high quality seed and therefore use local varieties. The average yield of SRI in their fields is around 8 ton/ha and not significantly different from that of a previous system called Legowo, which ranges from 7 to 7.8 ton/ha. Legowo is a row planting system by adjusting the paddy's distance between crops in order to increase the population of plants [24]. As both systems produce almost similar results, farmers tend to use the Legowo method because this method is easy for them in terms of technical instructions and time spent on maintenance of the paddy.

*3.1.3. Price.* The price of rice seems to be the most important consideration for farmers when deciding to adopt or not to adopt SRI practices. One farmer mentioned that he has less bargaining power in the market. Although SRI rice can be sold through cooperative farmers' groups, the price of SRI rice is only slightly higher than that of conventional rice methods. SRI practices were technically efficient in term of water and seed used, allowing farmers to save up to 70% of the cost compared with the conventional method, it requires more effort and time for weeding, water control and making and applying organic fertilizer [18]. As mentioned by one farmer, "Selling SRI Rice at a premium price is still difficult. The rice prices are not significantly different from those of rice produced using a conventional farming system. However, we need to put more effort into weeding. Two to four rounds of weeding are needed during the planting season. Making organic fertilizer is also time consuming and needs more effort." The price of dry grain at the farmer level ranges from IDR 5000 to 6000 in the area under study. This is the major obstacle to farmers continuing with the SRI farming system. Profit was identified as the major important attribute for SRI adoption [12].

### *3.2. Complexity*

*3.2.1. Machinery.* One participant mentioned that rice farming faces a lack of machine operator skills. The tractor is an important piece of machinery during tillage preparation before the planting season. Farmers stated that they were sometimes on a waiting list to use a tractor but needed to plant younger seeds.

*3.2.2. Technical difficulties.* As SRI is a new farming technique, some technical instructions are difficult for farmers to adopt, such as planting seeds in a tray, shallow planting and land preparation. Previous farming practices applied deep planting, planting seedlings aged greater than 15 days and planting two or more plants per hole. Some respondents mentioned that these SRI practices may become barriers to farmers continuing to adopt SRI.

*3.2.3. Weeds and pests.* One farmer mentioned that he faces problems with weeds and snails. The SRI system involves cultivating rice with wide spacing between plants, organic fertilizer and less water, and these result in rapid growth of weeds and snails. Farmers may need to use labor to reduce weedy plants and manage snails, causing an increase in production costs. When snails eat young plant, they

need to replant the seed, as SRI practices apply only one seed per hole. This creates an obstacle to continuing to adopt SRI.

**3.2.4. Organic matter.** There are few field schools and little training in making organic fertilizer and pesticides to increase farmers' skills and capacity with regard to organic farming; this was another reason to discontinue SRI practices.

### 3.3. Compatibility

**3.3.1. Personal condition.** Low motivation of farmers is one of the obstacles to SRI adoption. It was mentioned that about 50% of farmers who attend SRI training program do not continue to practice SRI. Low motivation of participants is also occurred who use land for profit. They believe that this system does not promise high short-term benefits during the application. A culture of instant results is also often mentioned by farmers.

**3.3.2. Farmers' attitudes.** Farmers' attitudes have changed: farming was normally a daily habit, but then they began to learn recording and agribusiness management in order to obtain organic land certification. They also started to classify organic and inorganic waste in order to process it into compost.

## 4. Conclusions and policy implications

Three factors have been identified as barriers to SRI adoption, namely 'relative advantage', 'complexity' and 'compatibility'. The main barrier was identified, such as the price of rice which are similar to those of the conventional system, but greater effort is required from farmers than in the previous farming practice. To increase farmers' profits, rice can be promoted as a high-value product that contains organic pesticides or no chemical. Empowerment of farmers' groups is also crucial in promoting and expanding the market for SRI rice. To increase farmers' motivation, it is need to optimize education, training and fieldwork to increase farmers' knowledge. The advantage of SRI might be observable through a success story of SRI farmers.

## Acknowledgement

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# CERTIFICATE


Awarded to

**Poppy Arsil**

as

**Presenter**

in International Conference on Sustainable Agriculture for Rural Development 2018  
(ICSARD 2018) on 23 - 24 October 2018 at Java Heritage Hotel, Purwokerto, Indonesia



**Dr. Ir. Anisur Rosyad, M.S.**  
Dean of Faculty of Agriculture  
Jenderal Soedirman University

 **icsard**  
International Conference on Sustainable Agriculture  
for Rural Development



**Susanto Budi Sulistyo, S.TP., M.Si., Ph.D**  
Chairman of ICSARD 2018

## ICSARD 2018 notification for Paper ID\_079

1 message

ICSARD Committee <icsard@unsoed.ac.id>  
 To: poppy.arsil@gmail.com  
 Cc: susanto.sulistyo@gmail.com>

22 September 2018 at 07:33

Dear Author(s),

Paper ID: 079

Title: The reasons why farmers not to adopt SRI (System of Rice Intensification) as sustainable agricultural practices: An exploration study

### Congratulations!

Based on the reviewers' recommendation, we are pleased to inform you that your abstract submitted to the International Conference on Sustainable Agriculture for Rural Development (ICSARD 2018) has been accepted for presentation at the conference.

Please submit your full paper with revised abstract based on the reviewer's suggestions and comments (if any) by October 7, 2018 and always state the paper ID number of your paper in the paper submission and any correspondence with the Organizing Committee as it will be used to identify your paper. You also need to pay the conference fee to complete the registration process. The detail of the payment procedure can be found in the attached flyer.

ICSARD 2018 will be held in Purwokerto, Indonesia during October 23-24, 2018. ICSARD 2018 aims to promote scientific and educational activities towards the advancement of knowledge by improving the theory and practice of various disciplines and areas of sustainable agriculture. The conference will feature plenary speeches given by world renowned scholars and regular sessions with broad coverage on cutting-edge developments in the fields of Agro-technology, Soil science, Agronomy, Horticulture, Plant protection, Plant breeding and biotechnology, Agroecology, Food science and technology, Agricultural and biosystems engineering, as well as Socio-economics of agriculture and agribusiness.

As a part of the conference program, we also offer you an excursion tour on Thursday, October 25, 2018. The destinations of the excursion are Tambi Agrotourism and Dieng Plateau, Wonosobo, Indonesia. The detail of the excursion program can be seen in the following link:  
<http://icsard2018.faperta.unsoed.ac.id/2018/09/21/excursion-program-3/>

If you are interested in joining the excursion tour, please fill in the following online registration form and submit it as soon as possible  
<http://icsard2018.faperta.unsoed.ac.id/2018/09/21/excursion-program-2/>

We would like to see you in Purwokerto, Indonesia at the conference and to hear about your most recent research results.

Yours sincerely,  
 Susanto Budi Sulistyo  
 Chairman of ICSARD 2018 Committee

### 3 attachments



Flyer ICSARD - new.jpg  
342K

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LOA Paper ID\_079 Poppy Arsil.pdf  
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poppy arsil <poppy.arsil@gmail.com>

## Letter of Acceptance for Oral Presentations

2 messages

ICSARD Committee <icsard@unsoed.ac.id>

2 October 2020 at 05:22

To: amihardjo@yahoo.com, hardanto.unsoed@gmail.com, agussuroto@unsoed.ac.id, bfaridahmad.k@gmail.com, albari@live.undip.ac.id, aldeansyah.p@mail.ugm.ac.id, aldhayusfra@gmail.com, ali\_pramono@yahoo.com, amsetyo242@gmail.com, Andi Ishak <ishakandi48@gmail.com>, Andri Prima Nugroho <andrew@ugm.ac.id>, anella retna kumala sari <anellaretna@gmail.com>, anggunprasetyo@mail.ugm.ac.id, anisur.rosyad@unsoed.ac.id, Ansita Gupitakingkin Pradipta <ansita.pradipta@ugm.ac.id>, "Ar. Rohman Taufiq Hidayat" <a.r.taufiq.h@ub.ac.id>, ariabdrouf@gmail.com, arief.sudarmaji@unsoed.ac.id, arifanshori@yahoo.com, arlynabudi@gmail.com, aryanacitra@yahoo.co.id, asihkk@yahoo.com, Azizahputrik@gmail.com, "Baiq Nurul Hidayah, SP. MP. M.Sc" <baiqnurul@pertanian.go.id>, bamsusanto40@gmail.com, nasutionmanis@gmail.com, banun.utm@gmail.com, budhy4r@gmail.com, budiprakoso30316@gmail.com, wariyah@mercubuana-yogya.ac.id, condro.wibowo@unsoed.ac.id, d.setiawan@mail.ugm.ac.id, dewisahara.ds@gmail.com, krisnansari@gmail.com, chalildiana@gmail.com, dimasrahadian@staff.uns.ac.id, dindy.putri@unsoed.ac.id, donaldsitoru@yahoo.com, dwil.rahayu@gmail.com, Elfi Rahmadani <elfirahmadani@yahoo.co.id>, korlinae@yahoo.co.id, eliana.wulandari@unpad.ac.id, elmikamsiati@gmail.com, nurwahyuni.endah@gmail.com, eny wahyuning purwanti <enywah17@gmail.com>, Erminawati.w@gmail.com, erysupriyadi354e@gmail.com, saragihhafiz@gmail.com, fen\_aceh@yahoo.com, geminimalelak@yahoo.com.au, goen.itp@gmail.com, hepi.hapsari@unpad.ac.id, hepihapsari63@gmail.com, hertiyananurannisa@gmail.com, hidayah\_unsoed@yahoo.com, hisyam.alhakim@ulm.ac.id, ardana\_1992@yahoo.com, budaraga1968@gmail.com, Imron Rosyadi <imron.rosyadi@unsoed.ac.id>, intan.ratna@unpad.ac.id, irmaca\_lista@yahoo.com, "isti.handayani Isti Handayani, Faperta Unsoed" <isti.handayani@unsoed.ac.id>, jakasumarno@gmail.com, jknugroho@ugm.ac.id, karseno@unsoed.ac.id, kendri.w@pertanian.go.id, ratri.noorhidayah@unsoed.ac.id, kirana.sanggrami@gmail.com, kunttd@yahoo.com, lelyfitriana343@gmail.com, rencang.hakim@gmail.com, meinarti.ns@gmail.com, m\_ariyanti@yahoo.com, mdp.miranti@gmail.com, mnbudiono@gmail.com, affan\_tip@ugm.ac.id, m.rifan.unsoed@gmail.com, mujirahayu@staff.uns.ac.id, mustaufik71@yahoo.co.id, natrisna@yahoo.co.id, nandari.dyah@yahoo.co.id, nenigunaeni@yahoo.com, rismayani.queen@gmail.com, nita kuswardhani <nita8994@yahoo.com>, nov106@yahoo.com, "nur.aini 1" <nur.aini@unsoed.ac.id>, nur.prihatiningsih@unsoed.ac.id, lindaguno@yahoo.com, trisilawati03@gmail.com, paramitamaris@yahoo.com, pepita.haryanti@unsoed.ac.id, poppy.arsil@gmail.com, mststiti84@gmail.com, primaluna305@gmail.com, purwanto.unsoed@gmail.com, rahmiyatikasim@ung.ac.id, ryususufus@yahoo.com, "ratna.satriani 1" <ratna.satriani@unsoed.ac.id>, r\_wylis@yahoo.co.id, redynew6@gmail.com, retno.unsoed@gmail.com, Rifah Ediat 1 <rifah.ediat@unsoed.ac.id>, rida.naufalin@unsoed.ac.id, Rini Murtiningsih <rini.murtiningsih.rm@gmail.com>, Rose Tirtalistyani <rose.tirtalistyani@ugm.ac.id>, rossa\_yunita@yahoo.com, tatikdjoey@yahoo.com, Rudiat Evi Masithoh <eviumg2019@gmail.com>, ruly.kurniawan@unsoed.ac.id, sakhidin1207@yahoo.com, saktyanuadi@yahoo.com, Samijan Hadisiswoyo <samijan\_btptjg@yahoo.com>, santi.rosniawaty@unpad.ac.id, Agroedu Project <snhadi@gmail.com>, Setyadjitpascapenen@gmail.com, retnomuslim@yahoo.com, sigitsoeb@yahoo.com, silvia.oktavia@polije.ac.id, siswantos2002@yahoo.com, sitiapri47@gmail.com, hesti.khrisnawijaya@gmail.com, sri\_wahyuni\_64@yahoo.co.id, maloleyayuk@yahoo.com, sri.waluyo@fp.unila.ac.id, Suci Wulandari <suciwulandari@hotmail.com>, astro\_btpt@yahoo.co.id, "Susanto B. SULISTYO" <susanto.sulisty@unsoed.ac.id>, susi\_tip@ulm.ac.id, syamsu bahar <syamsubahar@yahoo.com>, tanwirulmillati@gmail.com, purwanto0401@unsoed.ac.id, tri\_budiyanti@yahoo.com, 3manstppmkw@gmail.com, tuti.karyani@unpad.ac.id, warji1978@gmail.com, haliza2013@gmail.com, abdilawini@gmail.com, wiyanpamungkas.wp@gmail.com, woro\_esti@yahoo.com, y.surdianto@yahoo.com, Yudha Dwi Prasetyatama <yudha\_dwi\_prasetyatama@ugm.ac.id>, zumi.saidah@unpad.ac.id, yuvindapiindrasari06@gmail.com, thvtkiet@ctu.edu.vn, agungbiotech@gmail.com, hafidzfadjri@gmail.com, s204885x@st.go.tuat.ac.jp, zyx840156750@yahoo.co.jp, pankaj@squ.edu.com, "Dr. Yousif Yakoub Hilal" <yousif.yakoub@uomosul.edu.iq>, ibrahim.sudann@gmail.com

Dear Authors,

Thank you for your abstracts and registration payments for the 2<sup>nd</sup> ICSARD.

Please find the Letter of Acceptance (LoA) for your oral presentation in the following link <http://bit.ly/LOA-ICSARD-1>. If there are any mistakes on the LoA regarding the name and/or abstract title, please let us know.

The conference is just around the corner. Please prepare your presentation according to the following guidance:

1. Virtual presentations for the 2<sup>nd</sup> ICSARD can be delivered using an MS-PowerPoint, presentation video, or PowerPoint with voice-over.
2. The time allocated for a presentation is 7 minutes, with a further 3 minutes allowed for discussion.
3. Authors are requested to upload the presentation files (max 100 MB for each file) through this following link <http://bit.ly/presentation-ICSARD> no later than **October 14, 2020**.
4. Authors are not allowed to open their own presentation files. All presentations will be operated by the committee.
5. More details can be found in the Virtual Conference Guidelines and Book of Program that will be sent to you before the conference.

Thank you and look forward to seeing you in the virtual conference.

Kind Regards  
ICSARD Committee

Chatarina Wariyah <wariyah@mercubuana-yogya.ac.id>

2 October 2020 at 05:27

To: ICSARD Committee <icsard@unsoed.ac.id>

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I accept the invitation.

[Quoted text hidden]