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EXAMINING THE RELATIONSHIP BETWEEN INNOVATION CHARACTERISTICS AND EXTENSION SUPPORT WHEN USING JAJAR LEGOWO AS AN AGRICULTURAL INNOVATION

Kajian Hubungan Antara Karakteristik Inovasi dan Dukungan Penyuluhan dalam Penerapan Jajar Legowo sebagai Inovasi Pertanian

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ABSTRACT

The Jajar Legowo, as an agricultural technique innovation, has been introduced to farmers in Pangkal Jaya Village for quite some time. However, its implementation has not consistently followed the recommendations despite its proven ability to increase rice production. This research aims to review the adoption of the "Jajar Legowo" innovation in Pangkal Jaya Village, Bogor Regency, by analyzing the relationship between extension support and the farmer's perception of the innovation characteristics with implementing the innovation system. The research uses a survey method to collect quantitative data, supplemented by qualitative data obtained through in-depth interviews, observations, and literature review. The study found that the level of Jajar Legowo innovation implementation in Pangkal Jaya Village is relatively high and significantly related to extension support and farmers' perceptions of the characteristics of the Jajar Legowo planting technique. The effectiveness of the extension methods and content makes farmers quickly understand how to use the Jajar Legowo planting system, even though the extension media is less varied and the intensity of the extension is relatively low. Farmers assess Jajar Legowo as an agricultural innovation that is profitable, simple, and follows farmers' needs, and the results can be observed. However, Jajar Legowo is challenging to implement because of the limited land available to farmers, requiring several adaptation strategies.

Keywords: *extension, innovation, jajar legowo, planting system*

ABSTRAK

Jajar Legowo sebagai salah satu inovasi teknik pertanian sudah cukup lama diperkenalkan kepada para petani di Desa Pangkal Jaya. Namun penerapannya belum konsisten mengikuti rekomendasi meskipun terbukti mampu meningkatkan produksi padi. Penelitian ini bertujuan untuk mengkaji adopsi inovasi “Jajar Legowo” di Desa Pangkal Jaya Kabupaten Bogor dengan menganalisis hubungan dukungan penyuluhan dengan persepsi petani terhadap karakteristik inovasi dengan penerapan sistem inovasi. Penelitian dilakukan dengan menggunakan metode survei untuk mengumpulkan data kuantitatif, dilengkapi dengan data kualitatif yang diperoleh melalui wawancara mendalam, observasi, dan tinjauan pustaka. Hasil penelitian menemukan bahwa tingkat implementasi inovasi Jajar Legowo di Desa Pangkal Jaya relatif tinggi dan berhubungan signifikan dengan dukungan penyuluhan dan persepsi petani terhadap karakteristik teknik penanaman Jajar Legowo. Efektivitas metode dan konten penyuluhan membuat petani cepat memahami cara menggunakan sistem tanam Jajar Legowo, meskipun media penyuluhan kurang bervariasi dan intensitas penyuluhan relatif rendah. Petani menilai Jajar Legowo merupakan inovasi pertanian yang dinilai menguntungkan, sederhana, dan sesuai dengan kebutuhan petani, serta dapat diamati hasilnya. Namun Jajar Legowo sulit diterapkan karena terbatasnya lahan yang tersedia bagi petani sehingga memerlukan beberapa strategi adaptasi.

Kata Kunci: *inovasi, jajar legowo, penyuluhan, sistem tanam*

INTRODUCTION

The continuous global population increase poses food supply challenges, necessitating meticulous planning and implementation to avert shortages (Tranggono et al., 2023). Addressing this, one proposed action involves boosting food crop production (Meyers & Kalaitzandonakes, 2015; Aji et al., 2020). The Indonesian government advocates agricultural intensification, notably for staple crops like rice (Ahmadi & Rahaju, 2018).

Agricultural intensification boosts yields and farmer income by maximizing input usage (Hidayati et al., 2019; Pretty, 2018), aligning with Indonesia's law (Undang-undang Republik Indonesia Number 41 of 2009). This commitment entails policies like Integrated Crop and Resource Management known as PTT, fostering Sustainable Food Crop Agricultural Areas.

Integrated Crop and Resource Management (PTT) amalgamates synergistic technological elements to boost plant growth and productivity while preserving land quality and the environment, aiming to enhance farmer income (Aprilia et al., 2020). PTT optimizes agricultural inputs, employs advanced technology, and emphasizes environmental conservation to elevate harvests' quantity and quality (Ismilaili, 2015). Among PTT's technological

facets is spacing management (Astuti et al., 2019), inspiring innovations like the "Jajar Legowo" rice planting system.

The "Jajar Legowo" planting system involves alternating rows of rice plants with empty rows, typically two or four, to optimize space and reduce pest vulnerability (Balitbangtan, 2013). In the Bahasa, the word "jajar" is interpreted as rows, lines, or rows. Meanwhile, the word "legowo" comes from the Javanese language, "lego" means wide, and "dowo" means long. Meanwhile, the word "legowo" comes from the Javanese language, where "lego" means wide, and "dowo" means long (Balitbangtan, 2013; Ikhwan et al., 2013; Usman et al., 2021). This technique adjusts clump and row spacing, densifying rice clumps within rows while widening row spaces, so that the plants get benefits as border plants (Aprilia et al., 2020). This system is claimed to reduce the probability of pest attacks and increase the weight of the rice grains and the length of the rice stalks (Balitbangtan, 2013).

In Pangkal Jaya Village, Nanggung District, Bogor Regency, West Java, the "Jajar Legowo" planting system was introduced through the Integrated Crop and Resource Management Field School (SL-PTT) in 2009, its use was stopped, and was reinvigorated in 2017 after there was a change in the head of the farmer group and agricultural extension worker, and the implementation still ongoing today. Despite this continuous training, some farmers remain hesitant to adopt this system or adopt with some change, due to apprehension towards new innovations or its contradiction with traditional rice farming practices. Interestingly, this still happens despite proven benefits such as decreased pest attacks and increased crop yields associated with the system (Diah & Umi, 2022; Maisura et al., 2020). This intriguing contradiction prompts discussion on the motivational factors for farmers, particularly when innovations offer clear advantages (Anggreany, 2015).

Meanwhile, the success of adopting the Jajar Legowo planting system is measured by how accurately farmers apply the technique. According to Ilham (2022), there are at least six aspects used to assess the success of the Jajar Legowo system's use, namely: (1) seed preparation, which is examined based on the seed varieties used and the procedures for sowing them; (2) land preparation, which is evaluated in terms of water depth, duration of inundation, plowing intensity, and pest control measures; (3) planting techniques, which are assessed based on spacing, seedling age, the use of ticklers, the number of planted seedlings, water conditions during planting, and the number of rows; (4) fertilization, which is reviewed based on straw utilization, the use of organic fertilizers, and chemical fertilizer usage; (5) maintenance, which is examined in terms of weeding and transplanting timing; and (6) plant pest and disease control, which is assessed based on natural and chemical-based control methods.

Regarding implementing Jajar Legowo as an innovation, the characteristics of innovation cannot be separated from being one of the factors that influence it. Based on Rogers (1983), adopting an innovation is related to the characteristics of the innovation, consisting of relative advantage, complexity, compatibility, triability, and observability. Mardikanto & Pertiwi, 2019 added that extension support is also why farmers easily accept agricultural innovations. So, this research aims to review the adoption of the "Jajar Legowo" innovation in Pangkal Jaya Village, Bogor Regency, by analyzing the relationship between extension support and the farmer's perception about the characteristics innovation with the implementation of the system. That's crucial to report because even though the benefits have been proven, there are still challenges in optimizing the application of the Jajar Legowo planting technique by farmers.

Since the introduction of Jajar Legowo in Pangkal Jaya in 2017, there has not been a single research evaluating its successful implementation. This research is crucial to assess the system's adoption, particularly in the unique context of Pangkal Jaya, characterized by steep and narrow land. Despite the proven effectiveness of 'Jajar Legowo' elsewhere, its implementation in Pangkal Jaya faces challenges. Furthermore, apart from that, previous research only partially evaluated the aspects that support the implementation of innovation, namely only the extension support (Faqih et al., 2015; Nurfathiyah & Rendra, 2020) and farmers' perceptions of the innovation (Gunawan et al., 2017; Malahayatin & Cahyono, 2017; Setiawan et al., 2020; Usman et al., 2021). This makes it possible to carry out further research regarding extension support, strategies to increase farmer perception, and the sustainability of the implementation of innovation. The significant contribution of this research lies in the analysis of psychological factors such as perception about innovation, social factors such as extension support, and economic factors such as profit and benefit that influence farmer adoption, especially in Pangkal Jaya Village.

RESEARCH METHOD

The research conducted in Pangkal Jaya Village, Nanggung District, Bogor Regency, West Java, spanned from October 2022 to February 2023. This area was purposively chosen due to its significant rice production in 2020 and the comprehensive guidance on the "Jajar Legowo" system received by all farmer groups since 2009. Employing a mixed-method approach, the study integrated quantitative surveys with qualitative data gathered from detailed interviews, observations, and literature reviews.

In social science research, ensuring the validity and reliability of questionnaire instruments is imperative (Taherdoost, 2016). Before the study, validity and reliability tests were conducted in Bantar Karet Village, Bogor Regency, involving ten farmer group members with characteristics similar to

the research population. Validity was assessed using the Pearson Product-Moment correlation coefficient, with a threshold of 0.632 set for a sample size of 10 individuals at a 95% confidence level. Instrument reliability was evaluated using the Cronbach Alpha test, necessitating a coefficient exceeding 0.7 to establish instrument reliability. If an instrument fell short, adjustments such as modifying questionnaire questions, improving the questioning method, or reducing certain questions were proposed.

The research encompasses 626 individuals from four farmer groups (Poktan) in Pangkal Jaya Village, constituting the homogeneous research population due to their uniform exposure to and application of the "Jajar Legowo" system. A sample of 40 individuals was selected based on the principle that in a homogeneous population, like molecules, any sample size can aptly represent the entire population, with a minimum of 30 respondents in correlational research (Sugiyono, 2017). From four Poktans, ten people were selected from each Poktan. Each Poktan comprised three core management members (chief, secretaries, and treasurer), and seven regular farmer group members were randomly chosen from each Poktan. It is hoped that taking respondents from management and non-management will be able to illustrate differences in the level of implementation of innovation. Table 1. showcases the distribution of research respondents and sampling.

Table 1. Distribution of Research Respondents and Sampling

No	Name of Farmer Group	Number of Members (people)	Sample		
			Management	Member	Total
1	Beringin	131	3	7	10
2	Hegar Manah	109	3	7	10
3	Pangaduan Kuda	140	3	7	10
4	Wates	246	3	7	10
	Total	626	12	28	40

Source: Processed from RDKK Pangkal Jaya Village, 2022

The data collected through questionnaires underwent analysis using the Rank Spearman correlation test, chosen in alignment with the research objective to evaluate relationships between variables. Significance was determined with a level of $\alpha < 0.05$ indicating a notable relationship between variables, while $\alpha > 0.05$ suggested no significant relationship. This study assessed the connections between independent variables (X), encompassing extension support and farmers' perceptions of the "Jajar Legowo" planting system's characteristics, and their link to the dependent variable (Y), representing the adoption of the system. Conversely, qualitative data were analyzed using techniques such as data reduction (Sugiyono, 2017; Watkins, 2017).

RESULT AND DISCUSSION

General Description of Location and Respondent

Pangkal Jaya Village is an agricultural area in Nanggung District, Bogor Regency with a hilly contour with details of around 80% hills, 10% slopes and 10% flat land. This village has fertile land with an average daily temperature of 28°C and rainfall of 3,500-4,000 Mm/year. However, water sources that depend on rivers and wells make it difficult for some areas to get water supplies, especially northern areas. The land is used optimally for agriculture, especially rice fields and gardens. Rice fields are the main agricultural sector, planted with rice throughout the year with production for personal consumption and local sales. The moorland is used for various consumption crops and vegetables, while the garden land is used for wood and fruit plants, some sold outside the village.

Meanwhile, respondents in this study consisted of farmers who had received counseling about Jajar Legowo and were members of farmer groups. Most of them are over 50 years old, have between 4 to 6 years of education, and support around 4-5 people in their household. The rice fields owned by most respondents are relatively small, ranging from only 0.2-0.5 hectares. However, they have more than 10 years of farming experience and high motivation in gardening. The majority of respondents are not yet cosmopolitan and have an income of around IDR 4,583,000.00-13,747,500.00 per harvest, with an average of around IDR 6,650,185.00.

Extension Support

Extension support in this research is assessed based on the effectiveness of the extension methods, media, and materials, as well as the frequency of meetings between extension officers and farmers. Table 2. shows the number and percentage of respondents based on the level of extension support in Pangkal Jaya Village.

In Pangkal Jaya Village, extension methods for teaching farmers the "Jajar Legowo" technique are relatively effective. The demonstration method is the quickest way to convey this technique, taking place in the fields to help farmers understand proper rice planting, tickler usage, and efficient fertilizer application. However, it demands thorough preparation in terms of funding, materials, and farmer readiness. It is the same with Mardikanto & Pertiwi (2019) and Ramadhana & Subekti (2021) finding that the demonstration method in agricultural extension is effective in increasing farmer knowledge, but it will increase the cost is increase too about serving the program.

Table 2. Number and Percentage of Respondents Based on the Level of Effectiveness Extension Support

No	Level of Effectiveness Extension Support	Indicator					
		Low		Medium		High	
		n	%	n	%	n	%
1	Extension Methods	8	20.00	17	42.50	15	37.50
2	Extension Media	15	37.50	19	47.50	6	15.00
3	Extension Material	0	0.00	6	15.00	34	85.00
4	Extension Intensity	24	60.00	10	25.00	6	15.00
	Extension Support	1	2.50	33	82.50	6	15.00

Note: n = amount; % = percentage

Source: Primary Data Processed, 2023

The lecture method is commonly used, involving theoretical information about "Jajar Legowo." While it may not be as practical as the demonstration method, it's more accessible and can be conducted in various conditions, making it a widely used approach in the village. Farmers might not fully grasp the content and tend to practically implement only what they recall.

In Pangkal Jaya Village, extension media is less effective. Commonly used media, such as chalkboards and flip charts, are not very diverse. Chalkboards can help with understanding but lack interactivity. Projectors although more interactive, are rarely used for extension due to limited infrastructure like low electric power, such as limited electric power below 900VA and limited space to accommodate farmers. The projector is used during meetings of the Combined Farmer's Group (Gapoktan) which is based in the village office with a limited quota. Brochures are the least effective as many farmers are illiterate. Based the phenomenon, Mardikanto & Pertiwi (2019) state that the use of extension media needs to consider the readiness of the location where it will be used.

Extension materials in Pangkal Jaya Village are relatively effective and designed with guidance from the Indonesian Agency for Agricultural Research and Development (Balitbangtan). Extension workers tailor their material selection to address farmers' specific needs, prioritizing topics such as planting techniques over pests and diseases. They also permit minor modifications to methods, like adjusting the size of the tickler (caplak), as long as the fundamental spacing between plant clumps and rows is maintained. This phenomenon like Anggini et al. (2019) and Mardikanto & Pertiwi (2019) state that the focus of extensions should lean towards addressing farmers' issues through problem-solving rather than solely imparting knowledge or modifying their behaviors.

Lastly, In Pangkal Jaya Village, the extension intensity remains relatively low, targeting at least two sessions per month but often occurring once a month or less. However, during government programs, the frequency can increase up to four sessions a week. Extension officers are cautious, believing excessive sessions could cause farmer fatigue and boredom. Interestingly, some farmers

prefer less frequent extensions, making managing their schedules easier. It is in line with Maharani & Laksmono (2021) research, states that the more often the extension is carried out, the more reluctant farmers will feel to take part in the next extension.

Farmers' Perceptions about The Characteristics of the Jajar Legowo Planting System Innovation

Adoption of innovation hinges on farmers' perceptions of its characteristics. The stronger the perception of these characteristics (relative advantage, complexity, compatibility, trialability, and observability), the higher the likelihood of adoption (Rogers, 1983). Table 3. shows the number and percentage of respondents based on farmers' perceptions about the characteristics of the Jajar Legowo planting system.

Table 3. Number and Percentage of Respondents Based on Farmers' Perceptions About the Characteristics of the Jajar Legowo Planting System

No	Farmers' Perceptions	Indicator					
		Negative		Ambivalent		Positive	
		n	%	n	%	n	%
1	Relative advantage	0	0.00	5	12.50	35	87.50
2	Complexity	0	0.00	5	12.50	35	87.50
3	Compatibility	2	5.00	17	42.50	21	52.50
4	Trialability	0	0.00	12	30.00	28	70.00
5	Observability	0	0.00	3	7.50	37	92.50
	Farmers' perceptions about the characteristics of the Jajar Legowo planting system	0	0.00	5	12.50	35	87.50

Note: n = amount; % = percentage

Source: Primary Data Processed, 2023

Farmers in Pangkal Jaya Village perceive the "Jajar Legowo" planting system positively, considering it advantageous for rice farming. It significantly reduces seed usage by planting only 1 to 3 seedlings per hole compared to the previous 6 to 7. The system is also able to streamline fertilizer use. The phenomenon is in line with the guideline from Balitbangtan (2013) that Jajar Legowo can decrease farming costs in seed and fertilizer. Due to the open field appearance, this system effectively deters pest attacks, particularly from rats. Moreover, it boosts yields by allowing more space for rice plants to grow and capture sunlight, resulting in more tillers per planting hole. The system can produce yields that are equivalent to the tile system but at a fraction of the cost of that system.

Farmers embrace the Jajar Legowo system as it aligns with their cultural values and needs. While not overly complex, its implementation presents challenges due to the terraced nature of their 20-degree sloped rice fields,

leading to non-uniform shapes. However, farmers have adapted by adjusting planting stick sizes (caplak) and adding row numbers to optimize land use. In Pangkal Jaya Village, farmers perceive similarities between Jajar Legowo and the "Tegel" system as a past planting system, emphasizing planting distances. Farmers perceive the system as compatible with their established farming practices despite a slight variation. The phenomenon contradicts research by Malahayatin & Cahyono (2017) that farmers do not use Jajar Legowo because it is not in line with their farm behavior.

Farmers perceive trialability is positive. In the trialability aspect, they believe it can be tested on small plots of land. However, adapting it to the non-uniform land in Pangkal Jaya Village requires adjustments at planting distance, because Jajar Legowo usually needs a wide distance. Farmers find that implementing the system can be done by a single farmer without requiring multiple farmers to work simultaneously on a large area.

Then, in the observability aspect observability of Jajar Legowo, they believe it increases tillers, boosts yield, reduces pest damage compared to traditional methods, and simplifies field maintenance due to open pathways among rice plants. That contradicts Malahayatin & Cahyono's (2017) research that farmers did not use Jajar Legowo because that system results in noticeably smaller harvests.

Suitability of Implementing the Jajar Legowo Planting System Innovation in Pangkal Jaya Village

Jajar Legowo encompasses multiple technological aspects, including seed preparation, land preparation, planting techniques, fertilization, maintenance, and pest control (Ilham, 2022). Table 4. shows the number and percentage of respondents based on the suitability implementation of the Jajar Legowo planting system innovation in Pangkal Jaya Village.

In general, implementing the Jajar Legowo planting system in Pangkal Jaya village is good and in accordance with the standards stated in the research by Ilham (2022). Farmers in Pangkal Jaya Village implement the Integrated Planting Program (PTT), rotating rice seedlings annually to prevent pest attacks. Seedlings are used for two cycles, soaked for 24-48 hours before planting in the nursery, and grown for 15-20 days before transplantation to maintain harvest quality. Deviating from this cycle or having varied seedling ages during planting can impact rice growth quality.

For the Jajar Legowo method, farmers follow specific land preparation steps. Fields mustn't be excessively waterlogged (2-5 cm of water) or in local terminology called "*mancak-mancak*" or "*macak-macak*." No more than that, so that line from tick (caplak) can be seen. Soaking fields for 2-3 days ensures adequate moisture without being too dry for planting. Plowing is done twice, first to eradicate weeds and mix them with soil before planting rice. Weeds are

crushed and blended with soil during plowing, serving as organic fertilizer according to farmers.

Table 4. Number and Percentage of Respondents Based on Suitability Implementation of The Jajar Legowo Innovation

No	Suitability of Implementing the Jajar Legowo Innovation In Pangkal Jaya Village	Indicator					
		Low		Medium		High	
		n	%	n	%	n	%
1	Seed preparation	0	0.00	6	15.00	34	85.00
2	Land preparation	0	0.00	3	7.50	37	92.50
3	Planting technique	0	0.00	4	10.00	36	90.00
4	Fertilization	2	5.00	12	30.00	26	65.00
5	Maintenance	0	0.00	13	32.50	27	67.50
6	Pest and disease control	2	5.00	11	27.50	27	67.50
Suitability implementation of the Jajar Legowo innovation		0	0.00	0	0.00	40	100.00

Note: n = amount; % = percentage

Source: Primary Data Processed, 2023

Farmers in Pangkal Jaya village adhere to Jajar Legowo planting principles but adjust spacing due to field conditions. They use 15 to 20-day-old seeds, planting 1-3 seedlings per hole in well-balanced soil moisture. Some use a 2:1 Jajar Legowo type, leaving one row empty, while limited land prompts others to use the 4:1 type the harvest looks more abundant. Planting using Jajar Legowo is done in a forward direction so that the tick line is not lost.

Fertilization follows the Jajar Legowo system using organic fertilizer from weeds and straw mixed into the soil when plowing. Barn manure is less common due to limited livestock numbers. Furthermore, farmers' concerns that it will cause skin irritation problems align with research from Zuroida & Azizah (2018). However, all farmers still use chemical fertilizers. Fertilizer application is not uniform, as it is applied only at the base of the rice or plants, which is different from the previous system.

Farmers in the village of Pangkal Jaya practice maintenance by weeding and replanting damaged plants with new ones. The advice from agricultural extension workers is to carry out this maintenance at least 20 days after the rice is planted. However, some farmers may not always follow this recommendation due to the desire to maintain the old practices that they have been accustomed to for a long time. The phenomenon in line with research Malahayatin & Cahyono (2017) and Farid et al., (2018) that farmer tend to maintain their planting culture for fear of failure.

In Pangkal Jaya village, farmers employ pest and disease control methods, including simultaneous planting to curb pest spread. However, water scarcity poses challenges to implementation. Not all farmers can plant simultaneously. all that can be done is for farmers to have fields near rivers. In

addition to this technique, farmers resort to pesticides preventively to combat potential pest infestations that threaten their harvests.

The Relationship Between Extension Support and the Implementation of the Jajar Legowo Planting System Innovation

Mardikanto & Pertiwi (2019) mention that at least four aspects are considered when evaluating the support of agricultural extension, there are the effectiveness of methods, media, materials, and the intensity of the extension efforts. Table 5. shows the coefficient value between extension support and suitability implementation of the Jajar Legowo planting system innovation in Pangkal Jaya Village.

Table 5. The Correlation Coefficient Value Between Effectiveness Extension Support and The Suitability Implementation of the Jajar Legowo Planting System Innovation

No	Effectiveness Extension Support	Suitability Implementation of Jajar Legowo Planting System	
		ρ	Sig.
1	Extension methods	0,354*	0,025
2	Extension medias	0,532**	0,001
3	Extension materials	0,512**	0,001
4	Extension intensity	0,462**	0,003
Effectiveness Extension Support		0,589**	0,000

Note: n = 40 people; ρ = Spearman Rank correlation coefficient; Sig. = Significance

* Significantly relationship at $\alpha \leq 0.05$; ** Significant relationship at $\alpha \leq 0.01$

Source: Primary Data Processed, 2023

Agricultural extension support is significantly linked to successfully implementing the Jajar Legowo planting system innovation in Pangkal Jaya Village. Increasing the level of agricultural extension support is correlated with improved implementation of the planting system, which contributes to the overall quality of the innovation's implementation.

Extension methods significantly impact the effectiveness of implementing the Jajar Legowo planting system innovation. It is the same with research finding that extension methods have a significant relationship toward success in implementing Jajar Legowo planting system (Faqih et al., 2015). Studies by Mardiyanto et al. (2020) support this, indicating that increased extension support enhances dissemination effectiveness. Practical demonstrations effectively convey the Jajar Legowo system but are infrequently used due to resource demands. Mardikanto & Pertiwi (2019) and Ramadhana & Subekti (2021) highlight the effectiveness of demonstrations but note limitations in cost and time. Extension workers involve farmer groups and field block leaders in demonstrations, followed by reinforcement through lectures and discussions.

Once farmers grasp the technique, the frequency of technical planting extension can gradually reduce but should not be eliminated entirely.

Extension media effectiveness significantly influences the successful implementation of the Jajar Legowo planting system. Improving media efficacy correlates with better innovation execution (Nurfathiyah & Rendra, 2020). Farmers perceive low media effectiveness in extension due to limited exposure beyond whiteboards. Farmer group leaders who perceive high media effectiveness attend diverse sessions, so it broadens their exposure. However, the application of the method is still in accordance with recommendations because the farmer group leader provides direct assistance to ensure farmers' understanding.

The effectiveness of extension materials is closely tied to the successful implementation of the Jajar Legowo planting system. Enhancing the effectiveness of extension materials leads to better innovation implementation. This result aligns with the research by Nurfathiyah & Rendra (2020) and Sirajuddin et al., (2021) which found a significant relationship between the content and media of extension and the implementation of the planting system innovation. Extension workers offer a range of content, including technical farming details, pest and disease information. All content is customized to meet farmers' needs and presented in an easily understandable way. The statement by Mardikanto & Pertiwi (2019) and Anggini et al., (2019) is in line with this phenomenon, emphasizing that extension should prioritize problem-solving for farmers rather than just adding to their knowledge or altering farmer's behavior.

Extension intensity is closely linked to the successful implementation of the "Jajar Legowo" planting system. Higher intensity in extension leads to improved innovation implementation, contradicting Farid et al., (2018) findings that intensity doesn't significantly impact the adoption of the Jajar Legowo system. Farmers in Pangkal Jaya Village typically attend monthly extension sessions to prevent fatigue and sustain interest, aligning with Maharani & Laksmono (2021) research. This highlights extension workers' pivotal role in innovation success but also raises concerns about potential overreliance among farmer groups.

The Relationship Between Farmers' Perceptions Regarding the Characteristics of The Jajar Legowo Innovation and the Implementation of the Jajar Legowo Planting System Innovation

Whether an innovation is considered suitable and feasible for adoption by farmers is influenced by their perception of the innovation's characteristics (Astuti et al., 2019). The characteristics of innovation are divided into five categories by Rogers (1983), there are relative advantage, complexity, compatibility, trialability, and observability. Table 6. shows the correlation

coefficients between farmers' perceptions of the characteristics of the Jajar Legowo planting system innovation and the suitability implementation of the Jajar Legowo planting system innovation in Pangkal Jaya Village.

Farmers' perception of the relative advantage of the Jajar Legowo planting system significantly influences its implementation. The better a farmer perceives the benefits of using Jajar Legowo, the more successful the innovation's implementation. This finding contradicts by Anggreany (2015) research, that farmers' perceptions of the relative advantage of innovation had an insignificant relationship with technical implementation. Pangkal Jaya Village farmers favor the Jajar Legowo planting system for its fertilization and seed use efficiency. This method permits controlled fertilizer distribution and planting up to three seedlings per hole resulting in higher yields and economical resource utilization. This phenomenon aligns with the research by Astuti et al., (2019) , which states that Jajar Legowo is perceived as an innovation that provides advantages to farmers.

Table 6. The Correlation Coefficients Between Farmers' Perceptions of the Characteristics of The Jajar Legowo Planting System Innovation and Suitability Implementation of the Jajar Legowo Planting System Innovation

No	Farmers' Perceptions of the Characteristics of the Jajar Legowo Planting System Innovation	Suitability Implementation of the Jajar Legowo Planting System	
		ρ	Sig.
1	Relative advantage	0.446**	0.004
2	Complexity	0.550**	0.000
3	Compatibility	0.431**	0.005
4	Observability	0.499**	0.001
5	Trialability	0.216	0.180
Farmers' perceptions of the characteristics of the Jajar Legowo planting system innovation		0.672**	0.000

Note:

n = 40 people; ρ = Spearman Rank correlation coefficient; Sig. = Significance

**significant relationship at $\alpha \leq 0.01$

Source: Primary Data Processed, 2023

Farmers' perceptions of the level of complexity, which in this study is defined as the ease of implementing the innovation, have a significant relationship with implementing the Jajar Legowo planting system innovation. This means that the better a farmer's perception that Jajar Legowo is easy to implement, the better the implementation of the innovation will be. Jajar Legowo provides ease across all aspects of farming from inputs to outputs. Farmers easily access tools, fertilizers, seeds, and pesticides locally, including those using Kartu Tani (farmer card). Harvesting is simpler due to neatly arranged rows. Yet, the process initially posed challenges as farmers had to drain water before plowing and follow "caplak" guidelines for planting. Despite

this, it aligns with extension recommendations. This phenomenon aligns with the research by Astuti et al., (2019) which states that Jajar Legowo is considered an innovation that is not overly complex.

The resulting study indicates a significant link between farmers' perceptions of compatibility with implementing the Jajar Legowo innovation. That means that the Jajar Legowo planting system is compatible with the farmer's culture and needs. A better perception of the similarity between Jajar Legowo and farmers' values and needs leads to improved implementation of this innovation. This result contradicts the findings of Anggreany et al., (2016), which stated that farmer's perceptions of the compatibility level of innovation are not related to farmer participation in the implementation of innovation. The steep and asymmetrical land in Pangkal Jaya village requires modifications in planting and land preparation by farmers for use in Jajar Legowo. Contrasting the Tegel system, Jajar Legowo proves more effective in fertilization and safeguarding crops against pests. Yet, the creation of empty rows is viewed as land wastage. That clashes with some farmers' rice cultivation traditions.

Farmers' perceptions about the observability of Jajar Legowo innovation have a significant correlation with the implementation of the Jajar Legowo planting system. When farmers perceive that observable changes from the Jajar Legowo innovation can be seen by themselves and others, it leads to better implementation of the innovation. This finding contradicts the research by Anggreany (2015) which stated that the level of observability does not have a significant relationship with the implementation of innovation, particularly in technical aspects. In the field, Jajar Legowo shows dense clustering of up to 40 rice seedlings, reduces pest and disease damage, and facilitates easier field maintenance with its empty rows for improved farmer mobility. This aligns with Astuti et al., (2019) which states that the Jajar Legowo planting system can be directly observed from seedlings' growth and productivity results.

Farmers' perception of trialability doesn't significantly relate to implementing the Jajar Legowo planting system. This suggests that a positive perception of trialability doesn't ensure the innovation's implementation. This result contradicts the research by Astuti et al., (2019) which stated that Jajar Legowo can be tried on a small scale. In Pangkal Jaya Village, trying Jajar Legowo as recommended poses challenges due to the steep, asymmetrical, and terraced land. Farmers adapt by adjusting peg sizes and increasing row numbers, enhancing Jajar Legowo's trialability. Despite modifications, farmers still adapt with Jajar Legowo.

CONCLUSION AND SUGGESTION

Conclusion

The successful implementation of the Jajar Legowo planting system in Pangkal Jaya Village correlates strongly with farmers' positive perceptions of

the innovation and the substantial support received from effective extension services. Statistical analysis indicates a significant relationship between farmers' perceptions of the innovation and the support provided by extension services with implementation (correlation values: 0.589 and 0.672, respectively at a 99% confidence level). This suggests that improved support from extension services and favorable farmer perceptions lead to better implementation of the innovation.

Balancing the methods, media, content, and intensity of extension services is pivotal for successful innovation implementation and farmers' skill development. Excessive extension services might disrupt farmers' schedules and diminish their interest, so finding an optimal intensity is crucial. Farmers and extension workers should mutually agree on a suitable frequency of extension services to sustain farmers' engagement in such programs.

Farmers generally view the Jajar Legowo innovation positively, appreciating its ease of implementation, observable benefits in process and results, and alignment with their traditional rice cultivation practices. However, their hesitation stems from Pangkal Jaya Village's narrow and steep terrain. They must adapt the "Caplak" planting guide to suit their land while implementing Jajar Legowo. This study concludes that differences in agricultural land pose challenges to the adoption of technical innovations. Standard agricultural innovations require modifications to suit farmers' specific conditions.

Suggestion

The successful implementation of the Jajar Legowo planting system in Pangkal Jaya Village is supported by positive perceptions and external backing from farmers. Extension workers are advised to diversify their teaching methods using visual aids like projectors, simple teaching tools, and colorful markers to engage farmers' senses. Increasing the frequency of extension services tailored to farmers' needs is crucial to enhance their understanding and skills in adopting agricultural techniques like Jajar Legowo.

The government, particularly the Ministry of Agriculture, should assess various farmer typologies before introducing innovations, as not all farmers can implement certain techniques on their land. Providing alternative innovations that are adaptable to different farmer typologies ensures higher trialability for these innovations.

REFERENCES

- Ahmadi, F. F., & Rahaju, T. (2018). Implementasi Program Intensifikasi Pertanian Sub Sektor Padi Kecamatan Kembangbahu Kabupaten Lamongan. *Publika*, 6(6), 1-8. Retrieved from

<https://doi.org/https://jurnalmahasiswa.unesa.ac.id/index.php/27/article/view/23544>

- Aji, S. B., Sutiknjo, T. D., & Dinawati, E. (2020). Peranan Penyuluh Pertanian Terhadap Keberhasilan Penerepan Sistem Tanam Padi Jajar Legowo Di Desa Pagung Kecamatan Semen Kabupaten Kediri. *Agrinika: Jurnal Agroteknologi Dan Agribisnis*, 4(2), 197-211. doi: 10.30737/agrinika.v4i2.1075
- Anggini, D., Hartono, R., & Anwarudin, O. (2019). Perilaku Petani Dalam Pemanfaatan Limbah Sayuran Sebagai Pupuk Bokashi Pada Tanaman Sawi Putih. *Jurnal Triton*, 10(1), 99-115. Retrieved from <https://jurnal.polbangtanmanokwari.ac.id/index.php/jt/article/view/16/18>
- Anggreany, S. (2015). Penerapan Peremajaan Kelapa Sawit Di Provinsi Jambi [Institut Pertanian Bogor, Jawa Barat, Indonesia]. In *Institut Pertanian Bogor*. Retrieved from <http://repository.ipb.ac.id/handle/123456789/79341>
- Anggreany, S., Muljono, P., & Sadono, D. (2016). Partisipasi Petani Dalam Replanting Kelapa Sawit Di Provinsi Jambi. *Jurnal Penyuluhan*, 12(1), 1-14. Retrieved from <https://journal.ipb.ac.id/index.php/jupe/article/view/11315>
- Aprilia, K., Kusnadi, D., & Harnianti. (2020). Persepsi Petani Padi Terhadap Sistem Tanam Jajar Legowo Di Desa Sukaharja Kecamatan Ciomas Bogor. *Jurnal Inovasi Penelitian*, 1(3), 435-444. Retrieved from <https://stp-mataram.e-journal.id/JIP/article/view/97>
- Astuti, Y., Astuti, S., & Arifin, M. (2019). Persepsi Petani Tentang Karakteristik Inovasi Sistem Tanam Jajar Legowo Padi Sawah (*Oryza sativa L.*). *Jurnal Ilmu-ilmu Pertanian*, 26(2), 64-71. doi: 10.55259/jiip.v26i2.198
- Balitbangtan. (2013). *Sistem Tanam Legowo*. Kementerian Pertanian Republik Indonesia. Retrieved from http://staffnew.uny.ac.id/upload/197408092008121001/pendidikan/Materi+Diskusi+Sej.Sosek_.pdf
- Diah, B., & Umi, B. (2022). Keragaan Varietas Unggul Baru Padi Sawah Dengan Sistem Tanam Jajar Legowo 4:1 Di Desa Grenggeng Kecamatan Karanganyar Kabupaten Kebumen. *Agronu: Jurnal Agroteknologi*, 1(1), 21-28. doi: 10.53863/agronu.v1i01.316
- Faqih, A., Dukat, & Susanti, R. (2015). Efektivitas Metode Dan Teknik Penyuluhan Pertanian Dalam Penerapan Teknologi Budidaya Padi Sawah (*Oryza Sativa L.*) Sistem Tanam Jajar Legowo 4:1 (Studi Kasus Di Kelompok Tani Silih Asih Desa Ciomas Kecamatan Ciawigebang Kabupaten Kuningan). *Jurnal Agrijati*, 28(1), 45-67. Retrieved from <https://jurnal.ugj.ac.id/index.php/agrijati/article/view/172#>

- Farid, A., Romadi, U., & Witono, D. (2018). Faktor-Faktor Yang Mempengaruhi Adopsi Petani Dalam Penerapan Sistem Tanam Jajar Legowo Di Desa Sukosari Kecamatan Kasembon Kabupaten Malang Provinsi Jawa Timur. *Jurnal Penyuluhan*, 14(1), 27-32. doi: 10.25015/penyuluhan.v14i1.19226
- Gunawan, G., Padillah, P., & Sule, S. (2017). Persepsi Petani Terhadap Peran Penyuluh Dalam Penerapan Pola Tanam Jajar Legowo Di Bogor. *Agriekstensia*, 16(2), 310-318. doi: 10.34145/agriekstensia.v16i2.149
- Hidayati, F., Yonariza, Y., Nofialdi, N., & Yuzaria, D. (2019). Intensifikasi Lahan Melalui Sistem Pertanian Terpadu: Sebuah Tinjauan. *Unri Conference Series: Agriculture And Food Security*, 1, 113-119. doi: 10.31258/unricsagr.1a15
- Ikhwani, Pratiwi, G. R., Paturrohman, E., & Makarim, A. K. (2013). Peningkatan Produktivitas Padi Melalui Penerapan Jarak Tanam Jajar Legowo. *Iptek Tanaman Pangan*, 8(2), 72-79. Retrieved from <https://garuda.kemdikbud.go.id/documents/detail/394912>
- Ilham, A. A. (2022). *Analisis Efisiensi Produksi Padi Sawah Sistem Tanam Jajar Legowo di Kecamatan Gunung Toar Kabupaten Kuantan Singingi* [Universitas Islam Riau, Riau, Indonesia]. Retrieved from <https://repository.uir.ac.id/13262/>
- Ismilaili. (2015). Tingkat Adopsi Inovasi Pengelolaan Tanaman Terpadu Padi Sawah Di Kecamatan Leuwiliang Kabupaten Bogor. *Jurnal Penyuluhan*, 11(1), 49-59. doi: 10.25015/penyuluhan.v11i1.9931
- Maharani, A., & Laksmono, B. S. (2021). Peran Gapoktan Karya Bersama Dalam Implementasi Program Peremajaan Sawit Rakyat (PSR) Di Bandar Durian, Aek Natas, Labuhan Batu Utara. *Jurnal Pembangunan Manusia*, 2(2), 1-12. doi: 10.7454/jpm.v2i1.1022
- Maisura, Jamidi, & Husna, A. (2020). Respon Pertumbuhan Dan Hasil Tanaman Padi (*Oryza sativa* L.) Varietas IPB 3S Pada Beberapa Sistem Jajar Legowo. *Jurnal Agrium*, 17(1), 33-44. doi: 10.29103/agrium.v17i1.2353
- Malahayatin, D. M., & Cahyono, E. D. (2017). Faktor Kesesuaian Dengan Kebutuhan Petani Dalam Keputusan Adopsi Inovasi Pola Tanam Jajar Legowo (Studi Kasus Petani Padi Di Kecamatan Widang, Kabupaten Tuban). *JEPA: Jurnal Ekonomi Pertanian Dan Agribisnis*, 1(1), 56-61. doi: 10.21776/ub.jepa.2017.001.01.6
- Mardikanto, T., & Pertiwi, P. R. (2019). *Metode Dan Teknik Penyuluhan Pertanian* (2nd Edision). Tangerang Selatan: Universitas Terbuka
- Meyers, W. H., & Kalaitzandonakes, N. (2015). World Population, Food Growth, And Food Security Challenges. *Frontiers Of Economics And Globalization*, 15(1), 161-177. doi: 10.1108/S1574-871520150000015019

- Nurfathiyah, P., & Rendra. (2020). Efektivitas Media Dan Materi Penyuluhan Dalam Penerapan Sistem Tanam Jajar Legowo Di Kecamatan Sakernan Kabupaten Muaro Jambi. *Jurnal Ilmiah Ilmu Terapan*, 4(1), 59-73. doi: 10.22437/jiituj.v4i1.9850
- Pretty, J. (2018). Intensification For Redesigned And Sustainable Agricultural Systems. *Science*, 362(6417), 1-7. doi: 10.1126/science.aav0294
- Ramadhana, Y. D., & Subekti, S. (2021). Pemanfaatan Metode Penyuluhan Pertanian Oleh Petani Cabai Merah. *Jurnal KIRANA*, 2(2), 113-133. doi: 10.19184/jkrn.v2i2.25410
- Rogers, E. M. (1983). *Diffusion Of Innovations*. London: Coller Macmillan Publisher
- Setiawan, I. G. B. D., Setiyaningrum, P. D. E., & Darmawan, I. M. D. (2020). Persepsi Petani Terhadap Inovasi Jajar Legowo 2:1 Di Subak Abang, Kecamatan Abang, Kabupaten Karangasem. *Agroland: Jurnal Ilmu-Ilmu Pertanian*, 27(3), 223-229. doi: 10.22487/agrolandnasional.v27i3.517
- Sirajuddin, A., et al. (2021). Peranan Media Penyuluhan Elektronik Terhadap Tingkat Adopsi Inovasi Petani Padi Sawah. *Jurnal Agrisistem: Seri Sosek Dan Penyuluhan*, 17(1), 42-48. doi: 10.52625/j-agr-sosekpenyuluhan.v17i1.183
- Sugiyono. (2017). *Metode Penelitian Kuantitatif, Kualitatif, Dan R&D*. Jakarta: Alfabeta
- Taherdoost, H. (2016). Validity And Reliability Of The Research Instrument; How To Test The Validation Of A Questionnaire/Survey In Research. *International Journal Of Academic Research In Management (IJARM)*, 5(3), 28-36. doi: 10.2139/ssrn.3205040
- Tranggono, et al. (2023). Krisis Ketahanan Pangan Penyebab Ketergantungan Impor Tanaman Pangan Di Indonesia. *AZZAHRA: Scientific Journal Of Science Humanities*, 1(2), 73-81. Retrieved from <https://journal.csspublishing/index.php/azzahra>
- Usman, M. Z., Rauf, A., & Boekoesoe, Y. (2021). Faktor-Faktor Yang Mempengaruhi Keputusan Petani Padi Sawah Dalam Menerapkan Sistem Tanam Jajar Legowo Di Kecamatan Limboto Barat Kabupaten Gorontalo. *Agrinesia*, 5(3), 207-214. doi: 10.37046/agr.v5i3.12317
- Watkins, D. C. (2017). Rapid And Rigorous Qualitative Data Analysis: The "Radar" Technique For Applied Research. *International Journal Of Qualitative Methods*, 16(1), 1-9. doi: 10.1177/1609406917712131
- Zuroida, R., & Azizah, R. (2018). Sanitasi Kandang Dan Keluhan Kesehatan Pada Peternak Sapi Perah Di Desa Murukan Kabupaten Jombang. *Jurnal Kesehatan Lingkungan*, 10(4), 434-440. doi: 10.20473/jkl.v10i4.2018.434-440