West Science Interdisciplinary Studies
Vol. 02, No. 07, July and 2024: pp. 1490-1499

The Effect of Agricultural Extension and Post-Harvest Processing Technology in Increasing Farmers' Income and Farm Business Sustainability in Rural Bandung Regency

Eddy Silamat[1], Ari Permana Ginting[2], Eko Sutrisno[3]
[1] Program Studi Agribisnis, Fakultas Pertanian Universitas Pat Petulai and eddysilamat9@gmail.com
[2] Program Studi Agribisnis. Fakultas Pertanian. Universitas Darma Agung. Medan. Sumatra Utara and gintingari13@gmail.com
[3] Universitas Islam Majapahit and ekosudrun@yahoo.com

ABSTRACT

This study examines the impact of agricultural extension services and post-harvest processing technology on farmers' income and farm business sustainability in rural Bandung Regency. A quantitative analysis of 160 farmers' responses, measured using a Likert scale, revealed that agricultural extension services significantly enhance farm sustainability and increase farmers' income. Similarly, post-harvest processing technology positively impacts both farm sustainability and income. These findings underscore the importance of these interventions in promoting sustainable agricultural development and improving farmers' livelihoods, highlighting the need for continuous investment in agricultural extension programs and the promotion of post-harvest technologies to support rural agricultural communities.

Keywords: *Agricultural Extension Services, Post-Harvest Processing Technology, Farmers' Income, Farm Business Sustainability, Rural Agricultural Development*

1. INTRODUCTION

Agriculture plays a crucial role in the economy and livelihood of rural communities in Indonesia, including Bandung Regency, where small-scale farming predominates [1]. Farmers encounter challenges such as restricted access to modern farming methods and post-harvest technologies, leading to subpar productivity and income levels, ultimately impacting the sustainability of their agricultural enterprises [1]. To address these issues, it is essential to enhance agribusiness systems, as they are integral to economic development, GDP formation, and regional economic growth in Indonesia [2]. Moreover, promoting sustainable livelihoods through organic farming practices can be beneficial, as evidenced by the comparison of livelihood assets between organic and conventional paddy farmers in East Java [3]. By improving agricultural productivity sustainably, as seen in efforts to increase rice and chili production in Bali while maintaining environmental sustainability, rural communities can achieve food security and economic prosperity [4].

Agricultural extension services are pivotal in enhancing farm productivity and sustainability by disseminating knowledge and innovative practices to farmers [5]–[9]. These services, including training, workshops, and on-field demonstrations, play a crucial role in helping farmers adopt improved agricultural techniques, leading to better crop management, increased productivity, and enhanced income [7], [9]. Studies emphasize the positive impact of agricultural workshops, training, and access to government demonstration farms on farm productivity [7]. Furthermore, the success of extension services is influenced by the quality of human resources, such as well-trained extension agents, and the characteristics and communication abilities of farmers [8]. By strengthening farmers' organizations and providing access to essential knowledge and support services, agricultural extension services can significantly contribute to income growth and farm sustainability in regions like Bandung Regency [7].

The introduction of modern post-harvest technologies in rural Bandung Regency could indeed revolutionize traditional practices, significantly reducing post-harvest losses, improving product quality, and extending shelf life, ultimately enhancing marketability and increasing income for local farmers. Traditional food processing in rural areas often lacks quantitative measurements, hygiene sanitation programs, and efficient control over environmental conditions [10]. The utilization of post-harvest technologies, such as drying, sorting, grading, and storage, can address the prevalent issues of post-harvest losses in agricultural produce, particularly in cereals and legumes, due to poor infrastructure and handling practices [11]–[13]. By incorporating modern technologies to enhance traditional postharvest handling methods, farmers can mitigate losses, improve food security, and boost economic opportunities in Bandung Regency.

Despite the potential benefits of agricultural extension and post-harvest processing technologies, many farmers in rural Bandung Regency have not fully integrated these innovations into their farming practices. This gap raises questions about the effectiveness of current agricultural extension programs and the accessibility of post-harvest technologies. Understanding the impact of these factors on farmers' income and the sustainability of their farm businesses is crucial for developing targeted interventions. This study aims to investigate the effect of agricultural extension services and post-harvest processing technology on farmers' income and the sustainability of farm businesses in rural Bandung Regency. Specifically, the research seeks to evaluate the impact of agricultural extension services on farmers' income, assess the influence of post-harvest processing technology on the sustainability of farm businesses, and determine the combined effect of agricultural extension and post-harvest processing technology on both income and sustainability.

2. LITERATURE REVIEW

2.1 Agricultural Extension Services

Agricultural extension services play a crucial role in enhancing agricultural productivity and empowering farmers with knowledge and skills [7], [9], [14]. These services involve various components such as information dissemination, training programs, field demonstrations, and advisory services, which are essential for bridging the gap between research institutions and farmers [15]. Studies have shown that effective agricultural extension services lead to increased adoption of new technologies, improved crop management practices, and ultimately higher yields [14]. By providing farmers with access to valuable resources, training, and support, extension services contribute significantly to sustainable agricultural practices, poverty reduction, and overall economic development in rural areas [9]. Strengthening these services is vital for promoting innovation, improving agricultural outcomes, and ensuring food security in various regions worldwide [7].

2.2 Post-Harvest Processing Technology

Post-harvest processing technology plays a crucial role in minimizing post-harvest losses, enhancing product quality, and extending shelf life of agricultural products. Post-harvest losses in developing countries can range from 20% to 50%, highlighting the significance of adopting modern post-harvest technologies to reduce these losses and increase marketable surplus [16], [17]. Improving post-harvest practices not only contributes to better food security and sustainable agricultural systems but also leads to higher incomes for farmers [13], [17]. Studies have shown that implementing post-harvest technologies like improved storage facilities, packaging, and processing equipment can significantly enhance the value of agricultural products and increase farmers' profitability [11], [18]. By embracing these technologies, farmers can mitigate losses, improve product quality, and ultimately boost their economic outcomes.

Theoretical Framework

The study in rural Bandung Regency aims to analyze the adoption of agricultural extension services and post-harvest processing technologies among farmers by integrating the Diffusion of Innovations theory [19] with the Sustainable Livelihoods Framework [20]. The Diffusion of Innovations theory, as proposed by Rogers, emphasizes factors like perceived benefits, compatibility, and the role of change agents in technology adoption. On the other hand, the Sustainable Livelihoods Framework considers human, social, natural, physical, and financial assets' interactions to influence livelihood outcomes. By merging these theoretical perspectives, the study seeks to provide a comprehensive understanding of how these technologies impact farmers' income and farm business sustainability in Bandung Regency, offering a holistic view of agricultural interventions' effects on rural livelihoods [19], [20].

Empirical Studies

Agricultural extension services play a crucial role in enhancing farmers' productivity and income by providing essential information and technical support [7]. Studies in Pakistan have demonstrated that access to extension services and improved post-harvest technologies significantly increase farmers' income and crop quality [7]. Similarly, research in Indonesia has highlighted the positive impact of agricultural extension on the adoption of modern farming practices, leading to improved farmers' income levels [6]. These findings underscore the importance of continuous support and capacity-building initiatives to sustain the benefits derived from agricultural extension services, emphasizing the need for ongoing assistance to ensure long-term economic outcomes for farmers [6].

Gaps in the Literature

While existing studies have provided valuable insights into the benefits of agricultural extension and post-harvest technologies, several gaps remain. Firstly, there is a need for more region-specific research to understand the unique challenges and opportunities faced by farmers in different contexts. Secondly, the combined effect of agricultural extension and post-harvest technologies on both income and sustainability has been relatively underexplored. This study aims to address these gaps by focusing on rural Bandung Regency and employing a comprehensive analytical approach. Based on the literature review, the following hypotheses are formulated for this study:

H1: Agricultural extension services have a positive and significant impact on farmers' income.

H2: Post-harvest processing technology has a positive and significant impact on the sustainability of farm businesses.

H3: The combined effect of agricultural extension services and post-harvest processing technology has a positive and significant impact on both farmers' income and farm business sustainability.

3. METHODS

3.1 Research Design

This study employs a quantitative research design to investigate the impact of agricultural extension services and post-harvest processing technology on farmers' income and farm business sustainability in rural Bandung Regency. Utilizing a cross-sectional survey method, data was collected from a sample of farmers at a single point in time. The population comprises all farmers in rural Bandung Regency engaged in agricultural activities, with a sample size of 160 farmers selected using a purposive sampling technique to ensure adequate representation. The selection criteria included farmers who have participated in agricultural extension programs and have had some exposure to post-harvest processing technologies.

3.2 Data Collection

Data were collected through a structured questionnaire administered to the selected farmers. The questionnaire was designed to capture information on the variables of interest, including agricultural extension services, post-harvest processing technology, farmers' income, and farm business sustainability. The questionnaire consisted of two main sections:

1. Agricultural Extension Services: Measured by items assessing the frequency, quality, and usefulness of extension services received by farmers.
2. Post-Harvest Processing Technology: Measured by items evaluating the extent of adoption, perceived benefits, and challenges associated with post-harvest technologies.
3. Farmers' Income: Measured by items assessing changes in income levels before and after the adoption of extension services and post-harvest technologies.
4. Farm Business Sustainability: Measured by items assessing practices related to environmental sustainability, economic viability, and social responsibility.

3.3 Data Analysis

The collected data were analyzed using Structural Equation Modeling-Partial Least Squares (SEM-PLS 3), a robust statistical technique suitable for analyzing complex relationships between multiple variables. SEM-PLS 3 allows for the estimation of both measurement models (the relationships between observed variables and their underlying latent constructs) and structural models (the relationships between latent constructs). Descriptive statistics, including means, standard deviations, and frequencies, were computed to summarize the demographic characteristics of the sample and the main variables. The reliability and validity of the measurement instruments were assessed using Cronbach's alpha for internal consistency and confirmatory factor analysis (CFA) for construct validity. The measurement model was evaluated by examining factor loadings, composite reliability (CR), and average variance extracted (AVE) to ensure that the constructs were reliably measured. Finally, the structural model was assessed by examining path coefficients, t-values, and R-squared values to test the hypotheses and determine the strength and significance of the relationships between the variables.

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

The sample comprised 160 farmers from rural Bandung Regency, with the demographic breakdown as follows: 62% male and 38% female, with an average age of 45 years. Most respondents had primary education (45%), followed by secondary education (35%), and tertiary education (20%). The average farming experience among respondents was 20 years, and the majority were engaged in rice and vegetable farming. The means and standard deviations for the main variables are presented in Table 1.

Table 1. Descriptive Statistics

Variable	Mean	Standard Deviation
Agricultural Extension Services	3.85	0.75
Post-Harvest Processing Technology	3.67	0.82
Farmers' Income	3.95	0.68
Farm Business Sustainability	3.89	0.73

Source: Data Processing Results (2024)

4.2 Reliability and Validity Testing

The measurement model was evaluated to ensure the reliability and validity of the constructs used in this study. The evaluation involved examining factor loadings, Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE) for each construct.

Table 2. Measurement Model

Variable	Code	Loading Factor	Cronbach's Alpha	Composite Reliability	Average Variant Extracted
Agricultural Extension	AET.1	0.922	0.895	0.934	0.826
	AET.2	0.916			
	AET.3	0.888			
Post-Harvest Processing Technology	PPT.1	0.818	0.849	0.898	0.688
	PPT.2	0.817			
	PPT.3	0.859			
	PPT.4	0.825			
Increasing Farmers' Income	IFI.1	0.815	0.849	0.899	0.690
	IFI.2	0.863			
	IFI.3	0.857			
	IFI.4	0.784			
Farm Business Sustainability	FBS.1	0.835	0.856	0.897	0.635
	FBS.2	0.784			
	FBS.3	0.814			
	FBS.4	0.787			
	FBS.5	0.762			

Source: Data Processing Results (2024)

Overall, the measurement model demonstrates strong reliability and validity across all constructs, ensuring that the indicators used in this study are robust measures of the underlying constructs. These results provide a solid foundation for further analysis of the structural model and hypothesis testing.

Table 3. Discriminant Validity

	Agricultural Extension	Farm Business Sustainability	Increasing Farmers' Income	Post-Harvest Processing Technology
Agricultural Extension	0.809			
Farm Business Sustainability	0.467	0.797		
Increasing Farmers' Income	0.511	0.656	0.830	
Post-Harvest Processing Technology	0.429	0.635	0.547	0.830

Source: Data Processing Results (2024)

Overall, the analysis using the Fornell-Larcker criterion shows that each construct in the study has strong discriminant validity. This means that the constructs of agricultural extension, post-harvest processing technology, increasing farmers' income, and farm business sustainability are distinct and measure different aspects of the phenomena under study. These results provide a robust foundation for further structural model evaluation and hypothesis testing, ensuring that the relationships observed between constructs are not due to measurement overlap.

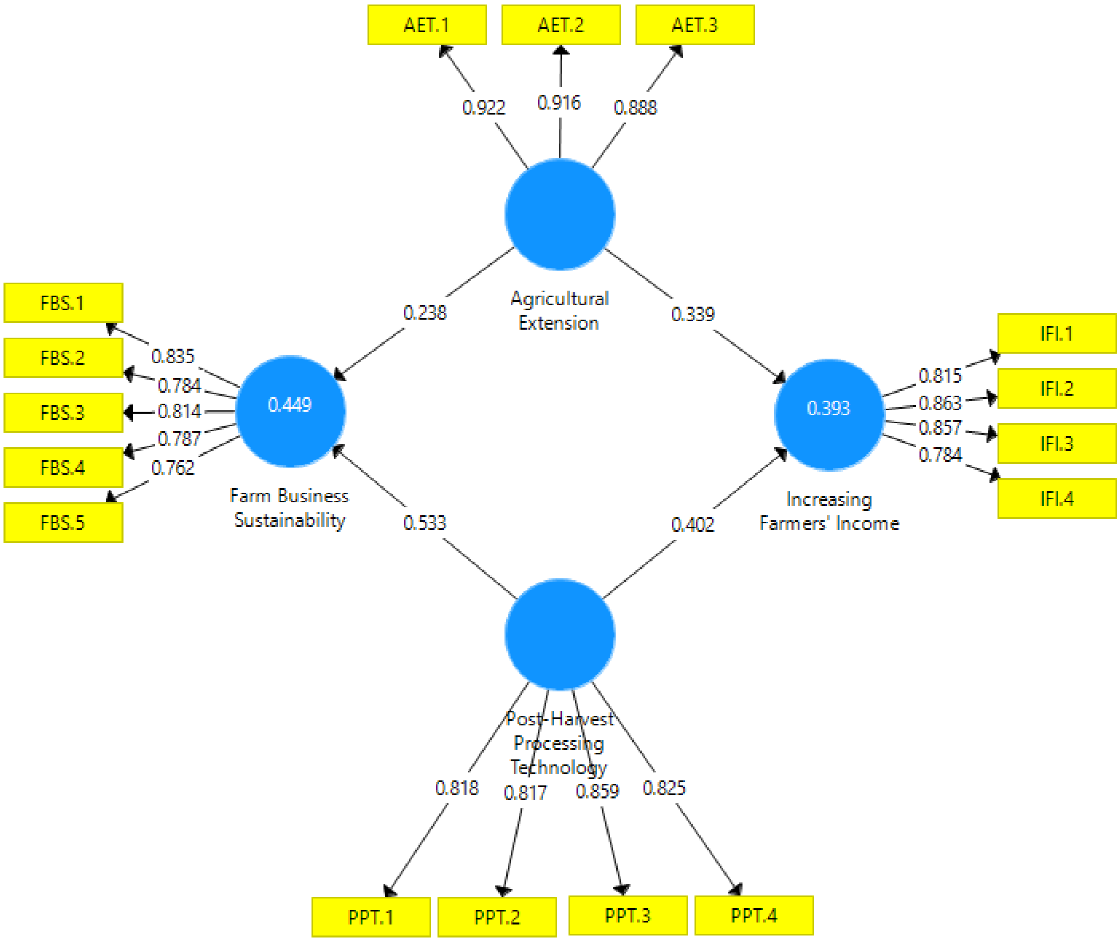

Figure 1. Model Results

Source: Data Processed by Researchers, 2024

4.3 Model Fit

Model fit indices are used to assess how well the proposed model represents the data. The evaluation of model fit is essential to ensure that the model adequately captures the relationships among the constructs. The key fit indices used in this study include the Standardized Root Mean Square Residual (SRMR), the squared Euclidean distance (d_ULS), the geodesic distance (d_G), the Chi-Square value, and the Normed Fit Index (NFI).

Table 4. Model Fit Results Test

	Saturated Model	Estimated Model
SRMR	0.073	0.094
d_ULS	0.719	1.201
d_G	0.350	0.393
Chi-Square	364.027	389.829

NFI	0.797	0.782

Source: Process Data Analysis (2024)

The Standardized Root Mean Square Residual (SRMR) measures the difference between the observed and predicted correlations, with values below 0.08 considered a good fit. In this study, the SRMR values are 0.073 for the saturated model and 0.094 for the estimated model, indicating a good fit for the saturated model and an acceptable fit for the estimated model. The Squared Euclidean Distance (d_ULS) and Geodesic Distance (d_G) measure the discrepancy between the empirical and model-implied covariance matrices, with lower values indicating a better fit. For the saturated model, d_ULS is 0.719 and d_G is 0.350, while for the estimated model, d_ULS is 1.201 and d_G is 0.393, indicating a slightly better fit for the saturated model but acceptable values for the estimated model. The Chi-Square statistic measures the overall fit of the model, with lower values indicating a better fit, though it is sensitive to sample size. The Chi-Square values are 364.027 for the saturated model and 389.829 for the estimated model, which are relatively high due to the large sample size but do not necessarily imply poor fit. The Normed Fit Index (NFI) assesses the improvement of the proposed model over a null model, with values closer to 1 indicating a better fit. The NFI values are 0.797 for the saturated model and 0.782 for the estimated model, both approaching acceptable levels and indicating a considerable improvement over the null model, though there is room for model improvement.

Table 5. Coefficient Model

	R Square	Q2
Farm Business Sustainability	0.449	0.443
Increasing Farmers' Income	0.393	0.386

Source: Data Processing Results (2024)

R Square (R^2) is a measure of the proportion of variance in the dependent variables that is explained by the independent variables in the model, with higher R^2 values indicating a better fit of the model to the data. For farm business sustainability, $R^2 = 0.449$, indicating that approximately 44.9% of the variance in farm business sustainability is explained by agricultural extension services and post-harvest processing technology, suggesting a moderate to substantial explanatory power. For increasing farmers' income, $R^2 = 0.393$, suggesting that about 39.3% of the variance is explained by the independent variables, indicating a moderate level of explanatory power. Predictive relevance (Q^2) is assessed through blindfolding procedures in PLS-SEM and measures the model's ability to predict the endogenous constructs. For farm business sustainability, $Q^2 = 0.443$, indicating strong predictive relevance and suggesting that the model has good predictive capability for this construct. For increasing farmers' income, $Q^2 = 0.386$, indicating good predictive relevance and demonstrating the model's effectiveness in predicting income levels based on the independent variables.

4.4 Hypothesis Testing

Hypothesis testing in this study evaluates the relationships between the independent variables (agricultural extension services and post-harvest processing technology) and the dependent variables (farm business sustainability and increasing farmers' income). The hypotheses are tested using the path coefficients, standard deviations, t-statistics, and p-values derived from the Structural Equation Modeling-Partial Least Squares (SEM-PLS 3) analysis.

Table 6. Hypothesis Testing

	O	M	STDEV	T	P
Agricultural Extension -> Farm Business Sustainability	0.238	0.239	0.067	3.560	0.000
Agricultural Extension -> Increasing Farmers' Income	0.339	0.340	0.068	4.971	0.000

Post-Harvest Processing Technology -> Farm Business Sustainability	0.533	0.537	0.064	8.332	0.000
Post-Harvest Processing Technology -> Increasing Farmers' Income	0.402	0.404	0.072	5.612	0.000

Source: Process Data Analysis (2024)

The path coefficient of 0.238 signifies a favorable correlation between agricultural extension services and the sustainability of farm businesses. The t-statistic of 3.560 and p-value of 0.000 indicate that this link is statistically significant. This validates the notion that agricultural extension services have a substantial role in improving the long-term viability of farm businesses. The path coefficient of 0.339 signifies a direct and positive correlation between the provision of agricultural extension services and the augmentation of farmers' income. The t-statistic of 4.971 and p-value of 0.000 indicate that this link is statistically significant. This illustrates the essential significance that agricultural extension services have in augmenting farmers' revenue.

The path coefficient of 0.533 signifies a robust and favorable correlation between post-harvest processing technology and the sustainability of agricultural businesses. The t-statistic of 8.332 and p-value of 0.000 suggest that this link is extremely significant. These findings indicate that implementing post-harvest processing technologies significantly improves the long-term viability of agricultural enterprises. The path coefficient of 0.402 signifies a direct and positive correlation between the use of post-harvest processing technologies and the augmentation of farmers' revenue. The t-statistic of 5.612 and p-value of 0.000 provide strong evidence that this link is statistically significant. This illustrates that the utilization of post-harvest processing technology plays a substantial role in augmenting the income of farmers.

Discussion

The results of this study underscore the significant impact of agricultural extension services and post-harvest processing technology on farmers' income and farm business sustainability in rural Bandung Regency. The hypothesis testing revealed that all relationships were positive and significant, confirming the crucial role of these interventions in enhancing agricultural outcomes.

Impact of Agricultural Extension Services

Farm Business Sustainability: The path coefficient of 0.238 (t = 3.560, p = 0.000) indicates a positive and significant effect of agricultural extension services on farm business sustainability. This finding aligns with previous research, suggesting that agricultural extension services provide essential knowledge and skills that help farmers adopt sustainable practices [9], [14]. By participating in extension programs, farmers are better equipped to manage their resources efficiently, implement environmentally friendly practices, and improve the overall resilience of their farm businesses.

Increasing Farmers' Income: The positive and significant relationship between agricultural extension services and increasing farmers' income (path coefficient = 0.339, t = 4.971, p = 0.000) highlights the economic benefits of these services. Extension services facilitate the adoption of improved farming techniques, better crop management, and access to market information, all of which contribute to higher productivity and income [7], [15]. This finding reinforces the need for continuous investment in agricultural extension programs to support income growth among small-scale farmers.

Impact of Post-Harvest Processing Technology

Farm Business Sustainability: The path coefficient of 0.533 (t = 8.332, p = 0.000) demonstrates a strong positive impact of post-harvest processing technology on farm business sustainability. This result is consistent with studies that emphasize the importance of post-harvest technologies in reducing losses, improving product quality, and extending shelf life [11], [16]. By adopting these technologies, farmers can enhance the marketability of their produce, reduce waste, and achieve more sustainable agricultural practices.

Increasing Farmers' Income: The positive and significant relationship between post-harvest processing technology and increasing farmers' income (path coefficient = 0.402, t = 5.612, p = 0.000) underscores the economic benefits of these technologies. Improved post-harvest processes enable farmers to capture higher value for their products, access new markets, and increase their profitability [13], [17], [18]. This finding highlights the critical role of technology adoption in boosting farmers' incomes and improving their livelihoods.

Practical Implications

The findings of this study have several practical implications for policymakers, agricultural practitioners, and development agencies:

1. There is a clear need to strengthen agricultural extension services to ensure that farmers have access to the latest knowledge and techniques. This can be achieved through increased funding, training of extension workers, and the use of modern communication tools to reach a wider audience.
2. Efforts should be made to promote the adoption of post-harvest processing technologies among farmers. This could involve providing subsidies, facilitating access to credit, and organizing training programs to demonstrate the benefits and usage of these technologies.
3. A holistic approach that integrates both agricultural extension services and post-harvest processing technologies can maximize the impact on farmers' income and sustainability. Policies and programs should be designed to address both pre-harvest and post-harvest challenges, ensuring a comprehensive support system for farmers.
4. Building the capacity of farmers through continuous education and training is essential for sustainable agricultural development. Extension programs should focus on practical, hands-on training that addresses the specific needs and challenges faced by farmers in different regions.

Theoretical Contributions

This study contributes to the existing literature by providing empirical evidence on the combined effects of agricultural extension services and post-harvest processing technology on farmers' income and farm business sustainability. The findings support the Diffusion of Innovations Theory (Rogers, 2003) and the Sustainable Livelihoods Framework (Chambers & Conway, 1992), highlighting the importance of knowledge dissemination and technology adoption in agricultural development.

Limitations and Future Research

While this study provides valuable insights, it is not without limitations. The cross-sectional design limits the ability to infer causality, and the sample size, while adequate, may not fully capture the diversity of farming practices in different regions. Future research could employ longitudinal designs to examine the long-term effects of agricultural interventions and explore additional variables that may influence farmers' income and sustainability.

Moreover, expanding the sample to include farmers from other regions would enhance the generalizability of the findings. Future studies could also investigate the role of other factors, such as market access, infrastructure, and government policies, in shaping agricultural outcomes.

CONCLUSION

This study highlights the significant positive impact of agricultural extension services and post-harvest processing technology on farmers' income and farm business sustainability in rural

Bandung Regency. The findings show that agricultural extension services are crucial for enhancing farm sustainability and income by providing essential knowledge, training, and resources, necessitating continuous investment in these programs. Additionally, adopting post-harvest processing technologies significantly improves farm sustainability and boosts income, highlighting the need for promoting these technologies through training, subsidies, and credit access. A holistic approach combining both interventions can maximize benefits for farmers, and policymakers should prioritize these strategies to enhance farm sustainability and profitability. Future research should consider long-term effects, additional influencing variables, and a more diverse sample to improve generalizability and understanding of agricultural development factors.

REFERENCES

[1] W. Waluyo, Y. A. Nurohman, R. S. Qurniawati, A. Waluyo, and F. A. Ahzar, "PENINGKATAN EKONOMI PETANI DAN KOMUNITAS PETERNAK MELALUI POLA SYIRKAH DI KECAMATAN KALORAN KABUPATEN TEMANGGUNG," *ABDI MAKARTI*, vol. 3, no. 1, pp. 65–72, 2024.

[2] R. Feni, E. Marwan, E. Efrita, N. Kesumawati, and R. Efendi, "Analysis of the Role of Agribusiness in the Indonesian Economy," *Int. J. Soc. Sci. Res. Rev.*, vol. 7, no. 4, pp. 106–113, 2024.

[3] R. W. SIBARANI and B. SOMBOONSUKE, "Analysis of the level of livelihood assets ownership of farmers in conventional and organic paddy farming in two adjoining villages," *J. Sustain. Sci. Manag.*, vol. 19, no. 1, pp. 96–112, 2023.

[4] S. Hirakawa, H. Masuyama, I. P. Sudiarta, D. N. Suprapta, and F. Shiotsu, "Initiatives and Prospects for Sustainable Agricultural Production in Karangasem Regency, Bali, Indonesia," *Sustainability*, vol. 16, no. 2, p. 517, 2024.

[5] K. K. Sahu *et al.*, "A Comprehensive review on role of agricultural extension services in the sustainable development of global agriculture," *Int. J. Environ. Clim. Chang.*, vol. 13, no. 10, pp. 3514–3525, 2023.

[6] A. K. Rai, B. V. Singh, S. D. Bharti, and D. R. K. Saikanth, "Agricultural Extension's Key Role in Modern Farming: A Review," *Asian J. Agric. Extension, Econ. Sociol.*, vol. 41, no. 9, pp. 475–485, 2023.

[7] S. Kalogiannidis and D. Syndoukas, "The impact of agricultural extension services on farm output: A worldwide viewpoint," *Res. World Agric. Econ.*, vol. 5, no. 1, pp. 96–114, 2024.

[8] E. Irdiana, N. Nurliza, and D. Kurniati, "Keberhasilan Penyuluhan Melalui Karakteristik Penyuluh dan Petani," *J. Agribisnis Indones. (Journal Indones. Agribusiness)*, vol. 11, no. 2, pp. 247–261, 2023.

[9] A. OA, "EFFECTIVENESS OF AGRICULTURAL EXTENSION SERVICES IN REDUCING POVERTY AMONG FISH FARMERS IN THE COASTAL REGION OF ONDO STATE, NIGERIA," 2024.

[10] N. M. A. S. Singapurwa *et al.*, "Post-harvest processing of agricultural products supporting local wisdom in the 2022 matching fund program," *Asian J. Community Serv.*, vol. 2, no. 2, pp. 209–216, 2023.

[11] J. Kigozi and T. Mibulo, "Post-Harvest Technology Utilization in Uganda: An Overview," *Res. Highlights Agric. Sci.*, p. 83, 2023.

[12] O. Adewoyin, A. Ibidapo, L. Babatola, F. Fayose, A. Ekeocha, and T. Apata, "Indigenous and Improved Postharvest Handling Methods and Processing of Fruits," in *Fruit Industry*, IntechOpen, 2022.

[13] T. M. Ikegwu, C. C. Ezegbe, C. A. Okolo, and C. E. Ofoedu, "Postharvest preservation technology of cereals and legumes," in *Postharvest Technology-Recent Advances, New Perspectives and Applications*, IntechOpen, 2022.

[14] P. Wang, D. Liu, and Y. Huang, "From Technology Adoption to Scientific Application: Can Agricultural Extension Services Effectively Promote Farmers' Scientific Fertilization?," *Polish J. Environ. Stud.*, vol. 33, no. 4, pp. 4747–4758, 2024.

[15] F. F. G. Hensel, M. M. Fien, and M. N. Martial, "Adoption of Management Tools by Farmers in the Context of Agricultural Extension and Advisory Services in Menoua Division, West Cameroon," *Asian J. Agric. Extension, Econ. Sociol.*, vol. 42, no. 5, pp. 290–300, 2024.

[16] P. Budhathoki, S. kumar Pandey, and P. D. Magar, "Review On Post-Harvest Handling Of Fruits And Vegetables To Minimize Loss," *Food Agri Econ. Rev.*, vol. 2, no. 1, pp. 37–40, 2022.

[17] R. Oishi, "Challenges and Measures to Recapitalise Handling of Postharvest Crops in Developing Countries," in *Postharvest Technology-Recent Advances, New Perspectives and Applications*, IntechOpen, 2022.

[18] P. S. Keerthana *et al.*, "Post-harvest losses in the fisheries sector-facts, figures, challenges and strategies," *Int. J. Fish. Aquat. Stud.*, vol. 10, no. 4, pp. 101–108, 2022.

[19] A. R. A. RIZAL, S. M. D. NORDIN, and R. ABD RASHID, "Adoption of Sustainability Practices by Smallholders: Examining Social Structure as Determinants".

[20] A. Kumar, A. Kumar, S. Kumari, N. Kumari, S. Kumari, and P. Mishra, "Sustainable Livelihoods a foundation for rural development leads to sustainability," *Probl. Ekorozwoju*, vol. 18, no. 2, pp. 128–140, 2023.