



# Training on the Use of Appropriate Technology to Increase Agricultural Production in Villages in Indonesia

Agus Siswanto<sup>1\*</sup>, Wachyu Hari Haji<sup>2</sup>, Dikky Suryadi<sup>3</sup>, Sultan Hady<sup>4</sup>, Zunan Setiawan<sup>1</sup>

<sup>1</sup> Universitas Ahmad Dahlan, Indonesia

<sup>2</sup> Universitas Bina Nusantara, Indonesia

<sup>3</sup> STMIK Al Muslim, Indonesia

<sup>4</sup> Universitas Dayanu Ikhsanuddin, Indonesia

Received: July 30, 2024

Revised: August 28, 2024

Accepted: September 26, 2024

Published: September 30, 2024

Corresponding Author:

Agus Siswanto

[agus.siswanto@mm.uad.ac.id](mailto:agus.siswanto@mm.uad.ac.id)

DOI: [10.29303/ujcs.v5i3.673](https://doi.org/10.29303/ujcs.v5i3.673)

© 2024 The Authors. This open access article is distributed under a (CC-BY License)



**Abstract:** This Community Service activity aims to improve the knowledge and skills of farmers in Indonesia's villages by using appropriate technology through online training. In this series of activities, villages with adequate internet infrastructure and a low rate of technology adoption are identified. The training was conducted online using the Zoom application and attended by farmers from various regions. The results of the pre-test show that the majority of farmers have limited knowledge about agricultural technology. After participating in the training, the final assessment (post-test) showed a significant improvement in farmers' knowledge and skills, with an average increase in knowledge scores of 60% and skills of 55%. High participation and positive feedback from participants indicate the effectiveness of online training as a method to increase farmers' capacity. However, challenges such as limited access to equipment and cost remain obstacles to implementing appropriate technology in the field. In conclusion, online training has improved farmers' knowledge and skills. Still, additional support is needed to ensure the sustainability of the application of technology in the field. These findings make an important contribution to the development of farmer capacity-building programs in Indonesia, especially in the context of the adoption of modern agricultural technology.

**Keywords:** Appropriate technology; Online training; Farmers; Community service; Agriculture

## Introduction

Agriculture is the main sector that supports the economy in many countries, including Indonesia. This sector contributes to Indonesia's GDP and helps reduce poverty by creating jobs (Gina et al., 2023). Agribusiness, which includes sub-sectors such as plantations and fisheries, collectively increases regional economic development (Feni et al., 2024). Agriculture has also shown resilience during economic downturns, such as the 1997-1998 crisis and the COVID-19 pandemic, by maintaining its contribution to the national economy (Junaidi & Jannah, 2020). In addition, the growth of the agricultural sector is closely related to the improvement of farmers' welfare, where fluctuations in farmers' trade reflect broader economic trends (Junaidi & Jannah,

2020). Agricultural development is also an integral part of rural economic growth, with initiatives such as agrotourism and integrated agrarian systems being explored to improve the rural economy further (Sedana, 2022). While agriculture is critical to Indonesia's economy, challenges such as resource management and market access remain, requiring a focused strategy for sustainable development.

Increasing agricultural productivity is essential to improve food security and the well-being of rural populations, especially in developing areas. Integrating sustainable farming practices, technological advancements, and effective policy frameworks can contribute significantly to this goal. Implementing sustainable farming technologies has improved productivity and food security, with farmers often

## How to Cite:

Siswanto, A., Haji, W. H., Suryadi, D., Hady, S., & Setiawan, Z. (2024). Training on the Use of Appropriate Technology to Increase Agricultural Production in Villages in Indonesia. *Unram Journal of Community Service*, 5(3), 149-154. <https://doi.org/10.29303/ujcs.v5i3.673>

achieving higher yields and better resistance to pests and diseases. However, challenges such as limited access to technology and high costs hinder widespread adoption (Rasyid & Mumpuni Ningsih, 2024). Research shows that increasing Total Factor Productivity (TFP) is essential for improving food security and reducing livelihood vulnerability among farmer households, where higher TFP correlates with better food diversity and lower vulnerability indexes. Policies to increase TFP can significantly improve household welfare and food security outcomes (Sarma et al., 2024).

Foreign Direct Investment (FDI) in agriculture has also positively impacted food security in sub-Saharan Africa, increasing food consumption and energy levels. However, effective land tenure reforms and an investment environment are needed to maximize these benefits (Menson et al., 2023). On the other hand, climate change poses a significant threat to agricultural productivity and food security, with rural communities adopting various strategies to address them, although often inadequate. Therefore, investment in climate research and adaptation strategies is crucial (Rusmayandi et al., 2023). In conclusion, while increasing agricultural productivity is essential for food security, a multifaceted approach is needed that includes sustainable practices, increased TFP, strategic investments, and climate adaptation efforts.

In Indonesia, although several efforts have been made to implement appropriate technologies in the agricultural sector, adopting these technologies still faces various obstacles. Factors such as low levels of farmers' education, lack of access to information technology, and limited funds are often the main obstacles (Megawati & Adianto, 2021). Previous studies have shown that effective training and counseling can improve farmers' understanding and ability to apply appropriate technology, ultimately increasing agricultural production. Previous research has shown that structured programs significantly increase productivity by bridging the gap between theoretical knowledge and practical application (Raji et al., 2024). Another study shows that areas with strong extension services report higher productivity levels, as these services effectively disseminate innovative agricultural techniques (Kalogiannidis & Syndoukas, 2024).

However, there is still a significant gap in the literature on how training on the use of appropriate technology can be adapted to the local context in villages in Indonesia. Most previous studies focused more on technology in general without considering the specific adjustments needed for each region with different geographical, social, and economic conditions (Habib, 2021). In addition, there is a lack of studies that evaluate the effectiveness of online training in overcoming limited access to information in remote areas.

This PKM article aims to fill this gap by exploring the effectiveness of training on the use of appropriate technology to increase agricultural production through online methods in villages in Indonesia. This training is expected to improve farmers' understanding of technologies relevant to their local needs and offer solutions to the limited access to information and education often faced by village communities (Nasution & Fauzi, 2021). Through this approach, this article contributes to developing a more effective and adaptive training model for local conditions, which ultimately supports the sustainability of the agricultural sector in Indonesia.

Thus, this article aims to evaluate the impact of online training in improving the knowledge and skills of farmers in Indonesia's villages in using appropriate technologies to increase agricultural production. Hopefully, this article can guide the government and related organizations in designing more effective and targeted training programs.

## Method

To achieve the purpose of this Community Service (PKM) activity, which is to evaluate the impact of online training in improving the knowledge and skills of farmers in Indonesian villages using appropriate technology, the method of implementing this activity is carried out through several stages. First, the identification and selection of village locations with adequate internet infrastructure and a low rate of technology adoption are carried out. The selected villages are expected to represent various geographical and social conditions in Indonesia (Rusydi & Rusli, 2022).

Furthermore, an initial assessment or pre-test is carried out on farmers' knowledge and skills regarding appropriate technology. This assessment is carried out through questionnaires and structured interviews to understand farmers' initial level of understanding and needs related to agricultural technology. The results of this assessment will be used as a basis for developing training materials and modules based on local needs (Tanuwijaya, 2023).

The training was carried out online using video conferencing applications such as Zoom. The training consisted of several sessions, including introducing the technology, practical demonstrations, and discussion sessions to deepen participants' understanding. After the training, a final assessment or post-test is carried out to measure the improvement of farmers' knowledge and skills. Evaluation is also carried out by collecting feedback from participants regarding the training that has been provided (Piryani et al., 2024).

To ensure the sustainability of implementing appropriate technology in the field, continuous assistance and monitoring are carried out by the PKM team. This assistance includes online consultations and field visits to support farmers' application of technology. With this structured method, it is hoped that PKM activities can increase agricultural production through appropriate technology and contribute to the literature on the effectiveness of online training in the farm sector (Cândido & Santos, 2019).

## Result and Discussion

### Result

Implementing Community Service (PKM) activities that focus on online training on the use of appropriate technology in villages in Indonesia has resulted in several key findings that reflect the success of this program.

#### 1. Pre-Test and Post-Test Assessment

The results of the pre-test show that most farmers have limited knowledge about appropriate technology in agriculture. Before the training, 75% of farmers had only a basic understanding of agricultural technology, while another 25% had almost no knowledge. This shows an urgent need to provide better education about the use of technology in agriculture.

After the training, the post-test showed a significant improvement in farmers' knowledge and skills. The average knowledge score increased by 60%, while the skill in using appropriate technology also increased by 55%. The trainees felt more confident and had better abilities in applying the technology they had learned. Some farmers have even begun to apply newly learned techniques in their daily agricultural operations, such as automated planting tools and modern irrigation systems.

#### 2. Participant Participation and Engagement

Participation in the online training session was quite high, with the attendance rate reaching 85% of the total registered participants, namely 233. Participants also actively participated in question-and-answer sessions and discussions, which showed great interest and enthusiasm in learning new technologies. In addition, feedback from participants indicated that they found this training very beneficial and relevant to their needs.

#### 3. Training Evaluation and Impact

The training evaluation showed that most participants were satisfied with the material and teaching methods. As many as 90% of participants felt the training materials suited their needs and could be

implemented in their agricultural practices. In addition, 80% of participants reported improved crop yields after applying the learned technologies, such as using organic fertilizers and more efficient irrigation techniques.

### Discussion

The findings from this PKM activity show that online training can be an effective method to improve the knowledge and skills of farmers in villages in Indonesia by using appropriate technology. The significant improvement in knowledge and skills scores after training confirms that online training methods can overcome geographical access limitations and provide quality education for farmers in rural areas. This is in line with the findings of Arrywiwibowo et al., 2023 and Djaja et al., 2023 which show that online training can effectively overcome limited access to information in rural areas.

Other studies also highlight the effectiveness of digital platforms in improving educational and professional development opportunities for rural communities. A web-based training platform for rural preschool teachers in China showed that 95% of participants were satisfied, with 65% reporting improved teaching skills, demonstrating the potential of online training to improve educational standards in rural settings (Wan, 2023). In addition, establishing an Internet-based art education platform can overcome geographical barriers by providing rural areas with access to quality arts education resources, thereby helping revitalize local culture (Gong & Li, 2024). Despite challenges such as limited internet access, rural students actively seek solutions to engage in online learning, demonstrating a strong desire for educational advancement. Their efforts include finding a stable internet connection and learning collaboratively (Deviana et al., 2022). In India, e-learning initiatives have shown promise in bridging educational gaps, improving skills acquisition, and improving job prospects, ultimately driving overall rural development (Hans, 2024). Although online training offers significant benefits, challenges such as digital literacy and infrastructure remain important obstacles that must be addressed to maximize their potential in rural areas.

The success of this training can also be attributed to a focused approach tailored to local needs. Training materials designed based on the initial assessment (pre-test) results allow participants to understand and apply new technology more easily. This approach aligns with research that states that relevant and appropriate training in the local context tends to be more effective in increasing technology adoption among farmers (Apidana & Pradita, 2024).

In the context of abroad, another study in Tanzania found that training significantly increased KAP and the

adoption of hermetic storage technology among smallholders, showing a direct link between training and technology uptake (Mbesa et al., 2024). In Malawi, donor-funded training focused on increasing the use of potato seeds increased market participation among farmers, highlighting the importance of context-specific training in improving productivity and market access (Kangogo et al., 2024). Research from China shows that formal technical training effectively increases farmers' willingness to adopt conservation technologies, while informal online learning does not have the same impact; however, combining the two provides additional benefits (Xue et al., 2022).

In Tunisia, intensive agricultural training approaches combined with gender-sensitive programs led to higher adoption rates of barley varieties, emphasizing the importance of inclusive training strategies (Dhehibi et al., 2022). In addition, a study in China revealed that training provided by agricultural cooperatives significantly increased the adoption of biopesticides, especially among farmers with certain socioeconomic characteristics, underscoring the important role of local organizations in facilitating technology transfer (Liu et al., 2022). While local training is essential for increasing technology adoption, it is also important to consider broader socioeconomic factors affecting farmers' willingness to adopt new technologies.

However, some challenges remain, such as barriers to access to technology equipment and the costs required to implement such technology. Some participants reported that although they understood the concepts of technology being taught, financial limitations and access to tools and materials were the main barriers to adopting new technologies. This indicates the need for additional support, such as access to financing and the provision of affordable equipment, to ensure the sustainable implementation of appropriate technologies.

Overall, this PKM activity successfully shows that online training is an effective tool in increasing the capacity of farmers in Indonesia's villages. With the right support, this training can help overcome challenges in adopting agricultural technology and contribute to Indonesia's sustainable increase in agricultural production.

## Conclusion

Community Service Activities (PKM), which focuses on online training for the use of appropriate technology in Indonesia's villages, have yielded positive and significant results. This training improved farmers' knowledge and skills in adopting modern agricultural technology, reflected in the average increase in knowledge scores of 60% and abilities by 55% after

training. The participants' high participation and positive feedback showed that online training can effectively reach farmers in remote areas and overcome the limitations of physical access to training and information.

An approach tailored to local needs and based on the initial assessment results has succeeded in increasing the relevance and effectiveness of training. However, there are still several challenges in implementing appropriate technology in the field, especially related to limited access to equipment and the necessary costs. Therefore, additional support in the form of access to financing and the provision of affordable equipment is essential to ensure the sustainability of implementing appropriate technologies in villages.

Overall, the results of this PKM activity confirm that online training can be a potential alternative to increase farmers' capacity and productivity by adopting appropriate technology. This success can be a model for other farmer capacity-building programs in Indonesia, with the right adjustments to overcome existing challenges. It is hoped that this training will improve agricultural yields and contribute to the welfare of farmers in the countryside as a whole.

## References

- Apidana, Y. H., & Pradita, N. (2024). Faktor Penentu Adopsi Pemasaran Media Sosial di Kalangan Petani Milenial Kabupaten Banyumas: Pendekatan Technology Acceptance Model. *Journal of Agribusiness Science and Rural Development (JASRD)*, 3(2), 1-26.
- Arrywibowo, I., Nurlia, & Mongan, C. J. (2023). Pelatihan Keuangan Dan Pengelolaan Usaha Bagi Komunitas Berpendapatan Rendah. ... *Journal: Jurnal* ....  
<https://doi.org/https://doi.org/10.31004/cdj.v4i6.22317>
- Cândido, C. J. F., & Santos, S. P. (2019). Implementation obstacles and strategy implementation failure. *Baltic Journal of Management*, 14(1), 39-57.  
<https://doi.org/10.1108/BJM-11-2017-0350>
- Deviana, A. D., Rusydi, A., Azizah, N., Muradi, A., & Hafiz, A. (2022). Student Efforts in Rural Areas to Face Problems Nahwu Mobile Learning Online. *Jurnal Al Bayan: Jurnal Jurusan Pendidikan Bahasa Arab*, 14(1), 176-190.  
<https://doi.org/10.24042/albayan.v14i1.11531>
- Dhehibi, B., Dhraief, M. Z., Ruediger, U., Frijja, A., Werner, J., Straussberger, L., & Rischkowsky, B. (2022). Impact of improved agricultural extension approaches on technology adoption: Evidence from a randomised controlled trial in rural Tunisia.

- Experimental Agriculture*, 58, e13. <https://doi.org/10.1017/S0014479722000084>
- Djaja, D. K., Qodir, A., Siminto, Suprpto, Amri, N., & Ikhlas, A. (2023). Pelatihan Optimalisasi Sumber Daya Manusia Melalui Pelatihan Manajemen Terkini. *Community Development Journal*, 4(6), 13325–13331.
- Feni, R., Marwan, E., Efrita, E., Kesumawati, N., & Efendi, R. (2024). Analysis of the Role of Agribusiness in the Indonesian Economy. *International Journal of Social Science Research and Review*, 7(4), 106–113. <https://doi.org/10.47814/ijssrr.v7i4.2014>
- Gina, G. A., Ana Mariya, Charita Natalia, Sirat Nispuana, M. Farhan Wijaya, & M. Yoga Phalepi. (2023). The Role of The Agricultural Sector on Economic Growth in Indonesia. *Indonesian Journal of Multidisciplinary Sciences (IJoMS)*, 2(1), 167–179. <https://doi.org/10.59066/ijoms.v2i1.325>
- Gong, W., & Li, J. (2024). Analysis of the Advantages of Online Platforms in Rural Art Education. *Education Reform and Development*, 6(4), 190–196. <https://doi.org/10.26689/erd.v6i4.6989>
- Habib, M. A. F. (2021). Kajian Teoritis Pemberdayaan Masyarakat Dan Ekonomi Kreatif. *Journal of Islamic Tourism Halal Food Islamic Traveling and Creative Economy*, 1(2), 82–110. <https://doi.org/10.21274/ar-rehla.v1i2.4778>
- Hans, V. B. (2024). E-Learning for Rural Development in India: Closing Disparities and Empowering Communities. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.4702168>
- Junaidi, E., & Jannah, M. (2020). Dynamics of economic growth in agriculture sector and farmer's term of trade in Indonesia. *Journal of Applied Economics in Developing Countries*, 5(2), 60–67.
- Kalogiannidis, S., & Syndoukas, D. (2024). The Impact of Agricultural Extension Services on Farm Output: A Worldwide Viewpoint. *Research on World Agricultural Economy*, 5(1), 96–114. <https://doi.org/10.36956/rwae.v5i1.999>
- Kangogo, E., Otieno, D. J., Okello, J., Mwenye, O., & Kapalasa, E. (2024). Effect of uptake of improved seed potato and donor-funded training on smallholder farmers' market participation. *Crop Science*, 64(3), 1432–1441. <https://doi.org/10.1002/csc2.21118>
- Liu, Y., Shi, R., Peng, Y., Wang, W., & Fu, X. (2022). Impacts of Technology Training Provided by Agricultural Cooperatives on Farmers' Adoption of Biopesticides in China. *Agriculture*, 12(3), 316. <https://doi.org/10.3390/agriculture12030316>
- Mbesa, B., Makindara, J., Kadigi, M., Majubwa, R., & Madege, R. (2024). Effect of Training on Knowledge, Attitude, and Practice on the Use of Hermetic Storage Technologies among Smallholder Farmers in Tanzania. *African Journal of Empirical Research*, 5(2), 881–893. <https://doi.org/10.51867/ajernet.5.2.79>
- Megawati, & Adiarto. (2021). Best Practice Pengembangan dan Penerapan Teknologi Tepat Guna. *Jurnal Ilmu Administrasi Negara (JUAN)*, 9(1), 61–73. <https://doi.org/10.31629/juan.v9i1.3173>
- Menson, A. E., Lolo, S. L., Nkom, J., Dogara, M., & Ibrahim, M. (2023). Foreign Direct Investment, Agricultural Productivity And Food Security In Sub-Saharan Africa. *Gusau Journal Of Economics And Development Studies*, 3(1), 14. <https://doi.org/10.57233/gujeds.v3i1.7>
- Piryani, R. M., Ali Afsar, N., Zebe, N., & Piryani, S. (2024). Training Workshop on Teaching/Learning in Health Professions Education for Medical Teachers: Feedback of the Participants. *Medical Journal of Eastern Nepal*, 3(01), 35–40. <https://doi.org/10.3126/mjen.v3i01.67447>
- Raji, E., Ijomah, T. I., & Eyeyien, O. G. (2024). Improving agricultural practices and productivity through extension services and innovative training programs. *International Journal of Applied Research in Social Sciences*, 6(7), 1297–1309. <https://doi.org/10.51594/ijarss.v6i7.1267>
- Rasyid, H., & Mumpuni Ningsih, G. (2024). Application of Sustainable Agricultural Technology to Increase Productivity and Food Security. *Journal of World Science*, 3(4), 500–506. <https://doi.org/10.58344/jws.v3i4.594>
- Rusmayandi, G., Indriyani, Hertini, E. S., Harahap, M. A. K., & Nugroho, R. J. (2023). Climate Change, Agricultural Production, Food Security, and Livelihoods of Rural Communities in Rural Districts: A Qualitative Approach. *West Science Interdisciplinary Studies*, 1(02), 9–17. <https://doi.org/10.58812/wsis.v1i02.43>
- Rusydi, B. U., & Rusli, M. (2022). Pemanfaatan teknologi pertanian dan pengaruhnya terhadap pendapatan petani. *Journal of Regional Economics*, 01, 1–11.
- Sarma, P. K., Alam, M. J., Begum, I. A., & McKenzie, A. M. (2024). The effect of total factor productivity on the food security and livelihood vulnerability of farm households in Bangladesh. *Frontiers in Sustainable Food Systems*, 8. <https://doi.org/10.3389/fsufs.2024.1395897>
- Sedana, G. (2022). Rural Development on the Agricultural Institution Basis: Case of the Agricultural Development in Bali Province, Indonesia. In *Rural Development - Education, Sustainability, Multifunctionality*. IntechOpen. <https://doi.org/10.5772/intechopen.97243>
- Tanuwijaya, A. (2023). Implementasi Kebijakan Penerapan Teknologi Tepat Guna Melalui Pos Pelayanan

*Teknologi Tepat Guna (Posyantek) Di Kota Jambi ....*  
<http://eprints.ipdn.ac.id/14018/>

Wan, C. (2023). Construction of a Web-Based Remote Training Platform for Rural Preschool Teachers in China. *2023 International Conference on Educational Knowledge and Informatization (EKI)*, 43-47.  
<https://doi.org/10.1109/EKI61071.2023.00017>

Xue, Z., Li, J., & Cao, G. (2022). Training and Self-Learning: How to Improve Farmers' Willingness to Adopt Farmland Conservation Technology? Evidence from Jiangsu Province of China. *Land*, 11(12), 2230.  
<https://doi.org/10.3390/land11122230>