

## **Green Economy Based Agriculture Extension in Klaten Regency: A Literature Study on Evaluation and Strategy**

**\*Lukman Efendi, Sri Suharsih**

Department of Economics, Faculty of Economics & Business, UPN "Veteran" Yogyakarta

*\*Corresponding Author: efendilukman072@gmail.com*

### **ABSTRACT**

*The agricultural sector has become a potential sector in Klaten Regency. This cannot be separated from the role of agricultural extension workers. Nonetheless, the environment has become a major issue in the development of the agricultural sector and it makes a tradeoff. The aim of this study to provide recommendations for agricultural extension strategies through a green economy approach. This study uses a qualitative approach and supported quantitatively through weighting and scoring. Data analysis techniques using literature review (library) with SWOT analysis. The agricultural extension program in Klaten Regency has been running in accordance with statutory regulations and technical instructions from the local government. However, the problem that occurs at this time, most of the agricultural extension pay less attention and do not include environmental elements in the agricultural extension process. The agricultural extension model through a green economy-based curriculum is one of the solutions offered in this study. The results of the SWOT analysis in the development of green economy-based agricultural extension agents through the empowerment curriculum is in quadrant I (progressive). In its implementation, a four-actor collaboration model (quadruple helix) is recommended in this study.*

**Keywords:** *Agriculture Extension, Empowerment Model, Green Economy, Literature Study*

#### **How to cite?**

Efendi, L. & Suharsih, S. (2023). Green Economy Based Agriculture Extension In Klaten Regency: A Literature Study on Evaluation and Strategy, *Jurnal Social Economic of Agriculture*, 12(1), 33-41. <https://doi.org/10.26418/j.sea.v10i2.66230>

### **INTRODUCTION**

Indonesia is an agricultural country, in which the agricultural sector has played an important role in increasing income for the people's economy, especially providing a large contribution to the workforce. In its development, the agricultural sector in Indonesia has various problems, one of which is environmental problems arising from the agricultural sector. Kanter et al., (2018) stated that the growing development of the agricultural sector affected environmental conditions through pollution such as gas residues (CO<sub>2</sub>, CH<sub>4</sub>, SO<sub>2</sub> and others) and other contaminants. The results of the production process and biodiversity cannot stand alone, each has both positive and negative influences, as well as reciprocal relationships. This has created a tradeoff between agricultural development and environmental functions. According to (Smith et al., 2014) states that the agricultural sector is one of the important drivers of global climate change, as a result of land use and greenhouse gas emissions. In line with this statement, Vermeulen et al., (2012) stated that the agricultural sector is one of the sectors that is vulnerable to environmental impacts.

The consequence of this tradeoff is to implement a green economy-based agricultural extension strategy through agricultural extension institutions. The flow of knowledge and information between farmers and technology is an important component in agricultural development (Gomanee et al., 2005). Thus, the agricultural extension system is an important tool in providing knowledge and disseminating agricultural technology that plays a role in the process of agricultural development. As an important component, agricultural knowledge and information play an important role in the growth of the agricultural sector to achieve

sustainable agricultural development goals through farmer assistance systems for knowledge transfer and adoption of modern technology (Kahan, 2011; Labarthe and Laurent, 2013; Davis and Sulaiman, 2016). Further regarding the role of agricultural extension, Prajanti (2013) argues that the role of agricultural extension agents is very important in efforts to support the agricultural development process as well as being a facilitator in transferring knowledge and technology to farmers.

The role of agricultural extension is indispensable in supporting sustainable agriculture and minimizing environmental impacts through education and empowerment of farmers. The problem that occurs at this time, most of the agricultural extension pay less attention and do not include environmental elements in the agricultural extension process. The results of Emeana (2019), show that the current focus of agricultural extension workers is on intensive farming practices and ignores the principles of organic farming. Thus, a strategy is needed to overcome this problem, an agricultural extension model with a green economy model approach. According to UNEP (2011a), a green economy is defined as one that can result in increased well-being and social equity, while significantly reducing environmental risk and ecological scarcity. In simple terms, green economy is also defined as the concept of low carbon, resource efficiency, and social inclusion (UNEP, 2011a). Besides that, agriculture-based green economy is also referred to as green agriculture which is defined as agriculture based on sustainable practices and technology which has five main principles, namely: (1) The use of nutritional inputs that are produced naturally and sustainably; (2) Diverse crop rotation; (3) Livestock and crop integration; (4) Environmentally friendly pest and weed management practices; and (5) Reduction of waste through the use of post-harvest storage and processing facilities (Herren, 2011).

The focus of this study is (1) to evaluate agricultural extension in Klaten Regency; (2) Provide recommendations for agricultural extension strategies through a green economy approach; (3) Internal Factors and External Factor Analysis using SWOT analysis. This agricultural extension study is important because there is a tendency that currently farmers do not yet have the knowledge capacity, appropriate problem solving, or appropriate information technology to support their business. These tend to cause errors or confusion in receiving information due to lack of education, literacy, and ability to use information technology. Research conducted by Prajanti (2013) in Klaten Regency, Magelang Regency, and Grobogan Regency, shows that there are agricultural extension workers' obstacles in solving information problems, communication barriers between agricultural extension agents and stakeholders with farmers and trading communities and the government.

## **METHODS**

This research focuses on evaluating and recommending strategies in sustainable agricultural extension with a green economy approach. This study uses a qualitative approach supported quantitatively through weighting and scoring. Data analysis techniques using literature review (library). Library research was conducted to obtain secondary data with materials in the form of books, articles, research results, and expert opinions related to agricultural extension workers and the green economy concept. Strength, Weakness, Opportunity, and Threat (SWOT) analysis was also used in this study to identify internal factors and external factors in the strategy for developing a green economy-based agricultural extension model.

The data collected in this study was then analyzed descriptively qualitatively, namely by conducting an analysis which basically returned to three aspects, namely classifying, comparing, and connecting (Asy'ari, 2021).

## RESULTS AND DISCUSSION

Klaten Regency is one of the regencies in Central Java Province which has a large potential for the agricultural sector, especially the food crop sub-sector, namely rice. Klaten is also known as a national food barn, because it has fertile soil with abundant rice production. Until 2021, Klaten Regency has 31 village food storage facilities with warehouse facilities and drying floors. Each of these food barns contains 8 (eight) tons to 10 (ten) tons of grain which is managed by a group of farmers (DKPP, 2021).

The development of the agricultural sector in Klaten Regency, especially for food crops, cannot be separated from the role of agricultural extension workers in providing knowledge, information and training to farmers. Based on the results of a literature study the agricultural extension program in Klaten Regency has been running in accordance with statutory regulations and technical instructions from the local government. In practice agricultural extension workers already have sufficient resource capacity, sufficient program budget and have prepared an annual program plan. However, the agricultural extension program in Klaten Regency still tends to be top down, there has been no continuous program improvement, and there is still no innovation. In addition, rice cultivation carried out by farmers still tends to be conventional. Implementation of organic farming is still difficult to implement because farmers do not have adequate knowledge about organic farming, and the environmental impacts that will result from conventional farming. The age of the farmer is also a factor in the difficulty in implementing an organic farming system.

The counseling model carried out by agricultural extension workers is an important component in overcoming these problems. Agricultural extension workers should change the approach model used in providing counseling to farmers, namely counseling with an environmental approach through an agricultural extension curriculum based on green economy.

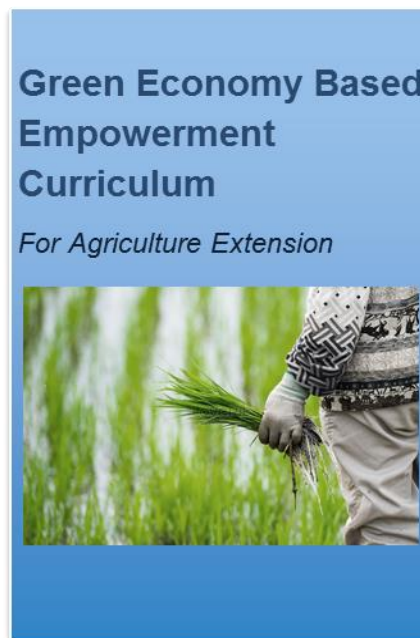


Figure 1. Green Economy Based Curriculum Guideline

The Green Economy Based Empowerment Curriculum can be one of the innovations in developing sustainable agricultural extension model. This curriculum can be used as a reference for agricultural extension workers in carrying out agricultural extension in terms of transfer of knowledge, information, technology and training. This curriculum is structured based on a study of regional potential, namely a geographical description of the region, regional superior commodities, as well as the main issues in agricultural development in the

region. The concept of green economy in the agricultural sector is also included in this empowerment curriculum, so that agricultural extension workers always use environmental approach in accordance with the concept of green economy namely low carbon, resource efficiency, and social inclusion. Through the agricultural extension model using a green economy-based curriculum, the agricultural extension process will be more planned, upgraded, effective and sustainable.

Based on the results of identification of problems and strategic issues for agricultural extension workers in Klaten Regency, which are supported by various data from the Agricultural Extension Center Website ([www.dkpp.klaten.go.id](http://www.dkpp.klaten.go.id)), Government Agencies Performance Report (DKPP, 2022) Food Security and Agriculture Agency Work Plan (DKPP 2023) by Agriculture and Food Security Office of Klaten Regency, and information from several articles and journals from Prajanti (2013), Sucihatingsih (2015), Khairunnisa (2016), and Prajanti (2022) which have been collected, compared, linked, and analyzed, there are several internal factors that have become strengths in the development of a green economy-based agricultural extension model including government regulation, formal education, fund programs, and number of agriculture extensions. Meanwhile, the internal factors that have become weaknesses are facilities & infrastructure, top-down programs, age, and green economy literacy.

Table 1. Internal Factors Analysis Summary ( IFAS)

Identification	Factors	Weight	Rating	Score
<b>Strength (S)</b>				
S1	Government Regulation	0.16	4	0.64
S2	Formal Education	0.14	4	0.56
S3	Programs Fund	0.10	3	0.3
S4	Number of agriculture extension	0.10	2	0.2
<b>Total</b>		<b>0.50</b>		<b>1.7</b>
<b>Weakness (W)</b>				
W1	Facilities & Infrastructure	0.05	-4	-0.15
W2	Top down-programs	0.05	-3	-0.15
W3	Age	0.15	-2	-0.3
W3	Green Economy Literacy	0.25	-4	-1
<b>Total</b>		<b>0.50</b>		<b>-1.6</b>
<b>Grand Total</b>		<b>1</b>		<b>0.1</b>

Source: Data Processed, 2023

Internal factor analysis shows that government regulation is a strength with a total score of 0.64, while green economy literacy has the highest score in terms of weakness with a total score of -1.

Then, from the results of the analysis of external factors based on identification of problems and strategic issues for agricultural extension workers in Klaten Regency, which are supported by various data from the Agricultural Extension Center Website ([www.dkpp.klaten.go.id](http://www.dkpp.klaten.go.id)), Government Agencies Performance Report (DKPP, 2022) Food Security and Agriculture Agency Work Plan (DKPP 2023) by Agriculture and Food Security Office of Klaten Regency, and information from several articles and journals from Prajanti (2013), Sucihatingsih (2015), Khairunnisa (2016), and Prajanti (2022) which have been collected, compared, linked, and analyzed the opportunities include marketing & business partnerships, and the Implementation of farmers counseling curriculum. Meanwhile, external factors that pose a threat are farmer participation in programs, farmers' understanding of materials, traditional mindset of farmers, development of information and technology, and environmental effects.

Table 2. External Factors Analysis Summary ( EFAS)

Identification	Factors	Weight	Rating	Score
<b>Opportunity (O)</b>				
O1	Marketing & business partnership	0.25	4	1
O2	Implementation of farmers counseling curriculum	0.25	4	1
<b>Total</b>		<b>0.50</b>		<b>2</b>
<b>Threat (T)</b>				
T1	Farmer participation in program	0.10	-2	-0.20
T2	Farmers' understanding of the material	0.10	-3	-0.30
T3	Environment Effect	0.15	-3	-0.45
T4	Development of information and technology	0.10	-2	-0.20
T5	Traditional mindset of farmers	0.05	-2	-0.10
<b>Total</b>		<b>0.5</b>		<b>-1.25</b>
<b>Grand Total</b>		<b>1</b>		<b>0.75</b>

Source: Data Processed, 2023

Based on the results of the analysis of external factors, it shows that marketing and business partnership and implementation of farmers counseling curriculum are both opportunities with the highest total score of 1. Meanwhile, the environment effect is a threat with the highest score of -0.45. The coordinate points resulting from internal and external factors are (0.1 and 0.75). Based on these numbers, the resulting coordinate points are in quadrant I, which means the point is in a progressive area.

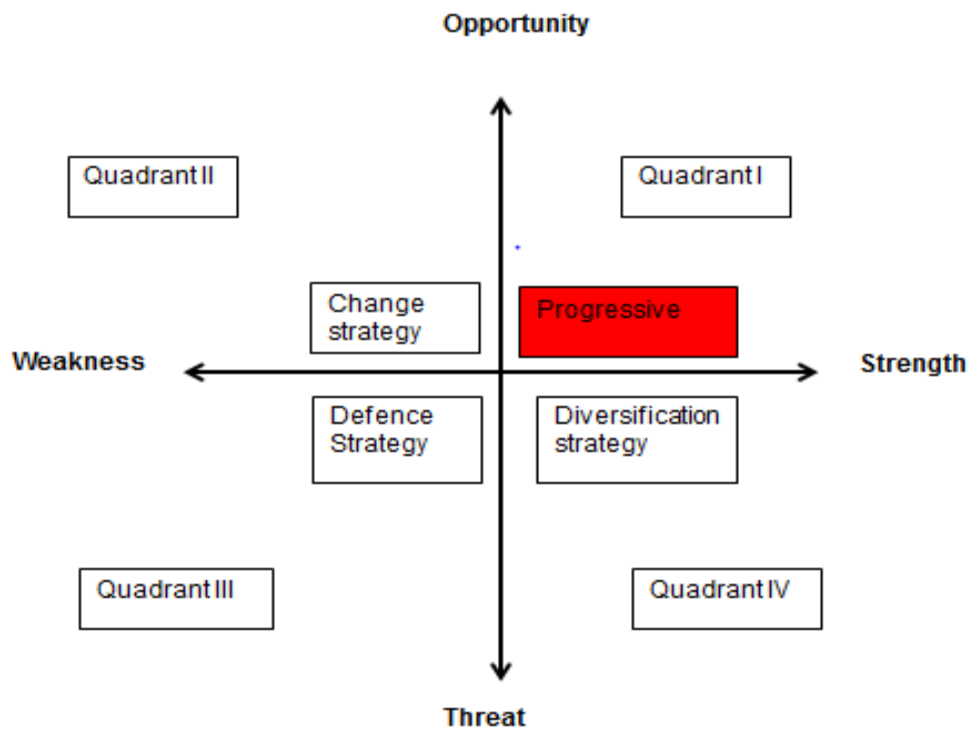


Figure 2. SWOT Quadrant

Quadrant I shows that agricultural extension institutions in Klaten Regency are in a very favorable situation. Agricultural extension workers in Klaten Regency have opportunities and strengths so they can take advantage of existing opportunities. The strategy that must be applied in this condition is to support an aggressive growth policy (growth oriented strategy). However, to deal with the threat of environmental impacts, it is necessary to apply a green economy based agricultural extension model.

Table 3. SWOT Matrix Strategies

IFAS EFAS	Strength (S)	Weakness (W)
	<ol style="list-style-type: none"> <li>1. Government Regulation</li> <li>2. Formal Education</li> <li>3. Programs Fund</li> <li>4. Number of agriculture extension</li> </ol>	<ol style="list-style-type: none"> <li>1. Facilities &amp; Infrastructure</li> <li>2. Top down-programs</li> <li>3. Age</li> <li>4. Green Economy Literacy</li> </ol>
<b>Opportunity (O)</b> <ol style="list-style-type: none"> <li>1. Marketing &amp; business partnership</li> <li>2. Implementation of farmers counseling curriculum</li> </ol>	<ol style="list-style-type: none"> <li>1. Increasing the intensity of counseling and strengthening farmer participation.</li> <li>2. Institutional collaboration through the quadruple helix approach.</li> <li>3. Development and updating of institutional systems.</li> </ol>	<ol style="list-style-type: none"> <li>1. Enhancing environmental-based facilities and infrastructure.</li> <li>2. Application of organic farming and use of eco-technology, and eco products.</li> <li>3. Training and education on the concept of green economy</li> </ol>
<b>Threat (T)</b> <ol style="list-style-type: none"> <li>1. Farmer participation in program</li> <li>2. Farmers' understanding of the material</li> <li>3. Environment Effect</li> <li>4. Development of information and technology</li> <li>5. Traditional mindset of farmers</li> </ol>	<ol style="list-style-type: none"> <li>1. Increasing supervision and control of agricultural extension programs with a regular and continuous system through digital media.</li> <li>2. Application of a green economy-based curriculum as a model in agricultural extension.</li> <li>3. Implementation of information and technology systems</li> </ol>	<ol style="list-style-type: none"> <li>1. Application of environmentally friendly production facilities.</li> <li>2. Designing a structured program plan in the form of a farmer empowerment curriculum.</li> </ol>

Source: Data Processed, 2023

Strenght-Opportunity (SO) Strategy is a priority strategy in the development of a green economy based agricultural extension model. These strategies include increasing the intensity of counseling and strengthening farmer participation, multi-actor collaboration through the quadruple helix approach, and developing institutional systems.

The first strategy, the government can implement a periodic and continuous extension system through monitoring by utilizing information and technology systems. Periodic and continuous extension systems enable intense communication between farmers and agricultural extension workers.

The second strategy, the government can collaborate with multiple actors through the quadruple helix approach. The role of multi-actor is very important in the successful development of agricultural extension agents through the green economy based curriculum. The multi-actor role in question is through the quadruple helix collaboration model. Quadruple Helix is a collaboration model of four sectors at once namely government, business, academia (knowledge source institution), and civil society. Quadruple Helix is a development of the previous model, namely Triple Helix. The expansion of the Triple Helix model into the Quadruple Helix innovation model has resulted in several definitions of the fourth helix, such as innovation users, consumers, media and culture-based publics, the public

as users in the context of innovation drivers, and citizens, as well as society (Arnkil et al. 2010; Carayannis and Campbell 2009; Foray et al. 2012; Yawson 2009). According to Mavroeidis & Tarnawska, (2017) The Quadruple Helix concept encourages considering social and democratic perspectives to support, promote, and advance knowledge production (research) and knowledge application (in the form of innovation).

The third strategy, the government can implement an agricultural extension guidance system through a curriculum to strengthen agricultural institutions. With this curriculum, institutional strengthening programs will be more structured and sustainable. Implementation of this curriculum of course also requires the role of multiple actors.

## CONCLUSION

The success of Klaten Regency as one of the national food storages cannot be separated from the role of agricultural extension workers. even so, there are still some problems such as environmental aspects that are not given enough attention in the implementation of agricultural extension. The Green Economy Based Empowerment Curriculum can be one of the innovations in developing an environmentally based agricultural extension model. This curriculum can be used as a reference for agricultural extension workers in carrying out agricultural extension in terms of transfer of knowledge, information, technology and training. From the results of the SWOT analysis in the development of green economy-based agricultural extension agents through the empowerment curriculum is in quadrant I (progressive). The Quadrant I shows that agricultural extension institutions in Klaten Regency are in a very favorable situation. Agricultural extension workers in Klaten Regency have opportunities and strengths so they can take advantage of existing opportunities

In its implementation, a four-actor collaboration model (quadruple helix) is recommended in this study. Quadruple Helix is a collaboration model of four sectors at once namely government, business, academia (knowledge source institution), and civil society. In the Quadruple Helix, each institution is tasked with advancing innovation and development whatever it has. Synergy between all actors is an important note for this concept. The four helix must be able to work together in order to form an innovative situation.

## REFERENCES

- Arnkil, R., Järvensivu, A., Koski, P., & Piirainen, T. (2010). Exploring quadruple helix outlining user-oriented innovation models. <https://trepo.tuni.fi/bitstream/handle/10024/65758/978-951-44-8209-0.pdf>
- Asy'ari, R., Dienaputra, R. D., Nugraha, A., Tahir, R., Rakhman, C. U., & Putra, R. R. (2021). Kajian konsep ekowisata berbasis masyarakat dalam menunjang pengembangan pariwisata: Sebuah studi literatur. *Pariwisata Budaya: Jurnal Ilmiah Agama Dan Budaya*, 6(1), 9-19. <https://doi.org/10.25078/pba.v6i1.1969>
- Carayannis, E., & Campbell, D. (2009). Mode 3 and Quadruple Helix: toward a 21st century fractal innovation ecosystem. *International Journal of Technology Management*, 46(3), 201-234. <https://doi.org/10.1504/IJTM.2009.023374>
- Davis, K., & Sulaiman, R. (2016). Overview of extension philosophies and methods. In *Note 0. Lausanne, Suiza: Global Forum for Rural Advisory Services (GFRAS)*. [www.scielo.org.za/scielo.php?script=sci\\_nlinks&ref=5047616&pid=S0301-603X202200020000800018&lng=en](http://www.scielo.org.za/scielo.php?script=sci_nlinks&ref=5047616&pid=S0301-603X202200020000800018&lng=en)
- DKPP, (2021). Kabupaten Klaten Sebagai Lumbung Pangan Nasional. <https://dkpp.klaten.go.id/compro/berita-dkpp/balai-penyuluhan-pertanian>

- DKPP, (2022). Laporan Kinerja Instansi Pemerintah Tahun 2022. [https://drive.google.com/file/d/1T8DGtV2BgIUwtChbj1n4\\_1NupXI\\_OkA/view](https://drive.google.com/file/d/1T8DGtV2BgIUwtChbj1n4_1NupXI_OkA/view)
- DKPP, (2023). Rencana Kerja Dinas Ketahanan Pangan dan Pertanian. <https://drive.google.com/file/d/1gmTXzMY10eXGulKNYRkykH0xhzCdL81m/view>
- Emeana, E. M., Trenchard, L., Dehnen-Schmutz, K., & Shaikh, S. (2019). Evaluating the role of public agricultural extension and advisory services in promoting agro-ecology transition in Southeast Nigeria. *Agroecology and Sustainable Food Systems*, 43(2), 123-144. <https://doi.org/10.1080/21683565.2018.1509410>
- Foray, D., Goddard, J., Beldarrain, X. G., Landabaso, M., McCann, P., Morgan, K., ... & Ortega-Argilés, R. (2012). Guide to research and innovation strategies for smart specialisations. <https://apo.org.au/sites/default/files/resource-files/2012-05/apo-nid90736.pdf>
- Gomanee, K., Morrissey, O., Mosley, P., & Verschoor, A. (2005). Aid, government expenditure, and aggregate welfare. *World Development*, 33(3), 355-370. <https://doi.org/10.1016/j.worlddev.2004.09.005>
- Herren, H. R., Atapattu, S., Bassi, A., Binns, P., Ching, L. L., Fernandez, M., ... & Treyer, S. (2011). Agriculture: investing in natural capital. *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication*, 30-77. [http://www.unep.org/greeneconomy/Portals/88/documents/ger/GER\\_2\\_Agriculture.pdf](http://www.unep.org/greeneconomy/Portals/88/documents/ger/GER_2_Agriculture.pdf)
- Kahan, D. (2011). Market-oriented advisory services in Asia-a review and lessons learned. *RAP Publication (FAO)*. <https://doi.org/10.13140/2.1.3690.4005>.
- Kanter, D. R., Musumba, M., Wood, S. L., Palm, C., Antle, J., Balvanera, P., ... & Andelman, S. (2018). Evaluating agricultural trade-offs in the age of sustainable development. *Agricultural Systems*, 163, 73-88. <https://doi.org/10.1016/j.agsy.2016.09.010>
- Khairunnisa, K. (2016). Optimalisasi tugas pokok dan fungsi penyuluh dalam kerangka pelaksanaan Undang-undang Nomor 16 tahun 2006. DOI: <https://doi.org/10.20961/agritexts.v4i1i1.18072>
- Labarthe, P., & Laurent, C. (2013). Privatization of agricultural extension services in the EU: Towards a lack of adequate knowledge for small-scale farms?. *Food policy*, 38, 240-252. <https://doi.org/10.1016/j.foodpol.2012.10.005>
- Mavroeidis, V., & Tarnawska, K. (2017). Toward a new innovation management standard. Incorporation of the knowledge triangle concept and quadruple innovation helix model into innovation management standard. *Journal of the Knowledge Economy*, 8, 653-671. <https://doi.org/10.1007/s13132-016-0414-4>
- Prajanti, S. D. W., & Soesilowati, E. (2013). Evaluation on benefits and development of information and communication technology (ICT) to improve the performance of agricultural extension in Central Java. *International Journal of Organizational Innovation (Online)*, 6(2), 243. DOI: <https://doi.org/10.15294/jejak.v15i1.33492>
- Prajanti, S. D. W., Pratama, B. R., Amelia, D. R., & Adzim, F. (2022). Analyzing Agricultural Trade-Off and Composing Strategies to Advance Sustainable Development. *JEJAK*, 15(1), 44-62. DOI: <https://doi.org/10.15294/jejak.v15i1.33492>
- Smith, P., Bustamante, M., Ahammad, H., Clark, H., Dong, H., Elsiddig, E. A., ... & Bolwig, S. (2014). Agriculture, forestry and other land use (AFOLU). In *Climate change 2014: mitigation of climate change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (pp.811-922). Cambridge University Press. [https://rucforsk.ruc.dk/ws/portalfiles/portal/81002708/ipcc\\_wg3\\_ar5\\_chapter11.pdf](https://rucforsk.ruc.dk/ws/portalfiles/portal/81002708/ipcc_wg3_ar5_chapter11.pdf)
- Sucihatningsih, D. W. P., & Waridin, W. (2015). Model Penguatan Kapasitas Kelembagaan Penyuluh Pertanian Dalam Meningkatkan Kinerja USAhatani Melalui Transaction Cost Studi Empiris Di Provinsi Jawa Tengah. *Jurnal Ekonomi Pembangunan: Kajian Masalah Ekonomi Dan Pembangunan*, 11(1), 13-29. DOI: 10.23917/jep.v11i1.332



- UNEP, 2011a. Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication. <http://dx.doi.org/10.1063/1.3159605>.
- Vermeulen, S., Zougmore, R., Wollenberg, E., Thornton, P., Nelson, G., Kristjanson, P., ... & Aggarwal, P. (2012). Climate change, agriculture and food security: a global partnership to link research and action for low-income agricultural producers and consumers. *Current Opinion in Environmental Sustainability*, 4(1), 128-133. <https://doi.org/10.1016/j.cosust.2011.12.004>
- Yawson, R. M. (2009). The Ecological System of Innovation: A New Architectural Framework for a Functional Evidence-Based Platform for Science and Innovation Policy. The Future of Innovation Proceedings of the XXIV ISPIM 2009 Conference, 21–24. *arXiv preprint arXiv:2106.15479*. <https://doi.org/10.31124/advance.7367138.v1>