

ANALYSIS OF CRUCIAL VARIABLES FOR THE SUSTAINABLE DEVELOPMENT OF RED RICE CULTIVATION IN JATILUWIH VILLAGE, TABANAN REGENCY

Made Ayu Vivi Lianita¹, Ida Ayu Nyoman Saskara²

Faculty of Economics and Business; e-mail: vivilianita55@gmail.com

Corresponding Author: Made Ayu Vivi Lianita

Abstract

This study focuses on identifying the crucial variables that contribute to the sustainability of red rice cultivation, with the research conducted in Jatiluwih Village, Tabanan Regency. Crucial variables were identified through Focus Group Discussions (FGDs) involving 19 stakeholders and were further validated using questionnaires distributed to 30 respondents as a control measure against the FGD findings. The collected data were analyzed using the MICMAC method (Matrix of Cross-Impact Multiplications Applied to Classification) to determine the variables that influence and/or depend on the sustainability of red rice farming. The analysis results identified several key variables among the 11 assessed, including input prices (production facilities), social capital, availability of agricultural labor, and traditional agricultural rituals.

Keywords: Agriculture, Red Rice, Sustainability, MICMAC

INTRODUCTION

Rice is a staple food for the Indonesian population and comes in various forms and colors, including white, red, and black rice. Although industrialization is currently prioritized by the government and society to advance the national economy, the agricultural sector must be preserved, as it plays a vital role in ensuring domestic food security and generating community income (Gisani et al., 2023).

The agricultural sector has multiple functions encompassing food production, poverty alleviation, and environmental conservation. For Indonesia, these multifunctional roles must be considered in agricultural policy and incentive structures. The development of sustainable agricultural land can be achieved if agriculture provides tangible benefits for farmers' welfare and poverty reduction (Kusumaningrum, 2019).

The sustainability of agricultural enterprises aims to increase income and community welfare through improved farming performance while maintaining ecological balance. This ensures long-term production sustainability by minimizing environmental degradation (Hidayah et al., 2022).

Bali, an island rich in natural and cultural heritage, features a distinct sociocultural identity embedded in its agricultural practices. These practices reflect the

adaptation to nature and are guided by sustainability principles. Bali Province remains deeply rooted in agricultural traditions (Nediari, 2014). Among Bali's regencies, Tabanan is known as the island's and even the nation's rice granary, as well as a national tourism destination. It is recognized for its globally acknowledged traditional irrigation system.

Jatiluwi Village in Tabanan, Bali, was designated a UNESCO World Cultural Heritage site in June 2012. This recognition requires strict adherence to preserving the natural and cultural landscape, with potential sanctions if violated. Jatiluwi, along with three other locations in Bali (Taman Ayun Temple, Pakerisan Watershed, and Ulun Danu Batur Temple), was announced as a UNESCO World Heritage Site in St. Petersburg, Russia, on June 20, 2012. The village is famed for its scenic mountain views and terraced rice fields (Sukanteri et al., 2024).

Though relatively small in area, Jatiluwi is a major producer of red rice, with products reaching international markets. The success of its red rice production is closely linked to its specific cultivation methods, which affect the rice's quality.

Jatiluwi red rice is categorized as a *short-grain* variety, characterized by short, thick grains. Its cultivation takes longer than that of regular rice, making it a high-quality product. It is rich in vitamins and minerals, has strong antioxidant properties, and is high in fiber. These qualities make it a highly promising commodity for development (Gisani et al., 2023). With the rising trend of healthy living, red rice has gained popularity for its health benefits, including support for a nutritious diet. Food choices are increasingly viewed as reflections of personal lifestyle.

Red rice is a whole grain that undergoes minimal processing, thus retaining most of its nutrients, making it healthier than white rice. It offers various health benefits such as helping regulate blood sugar, reducing the risk of heart disease, and improving digestion (Maharani et al., 2020). Despite increasing awareness, red rice consumption in Indonesia remains low due to its tougher texture and longer cooking time (DEWI et al., 2017).

Previous studies have explored red rice marketing strategies, such as the "Segmenting, Targeting, and Positioning Strategy of Organic Red Rice in Jatiluwi Bali" by Dewi, Antara, and Rantau (2017), which used 15 variables. Another study titled "Marketing Strategy of Organic Rice in Tempek Umadewi Subak, Jatiluwi" by Yastini (2022) highlighted obstacles such as limited knowledge, unstable prices, and insufficient capital. Meanwhile, Lestari's (2023) research on the "Key Variable Analysis for the Sustainability of the Simantri Program in Tabanan" applied the MICMAC method to identify influential variables.

RESEARCH METHOD

This study employed a mixed-method approach, combining qualitative and quantitative methods. The qualitative approach was used to formulate a shared understanding of variables among informants, while the quantitative approach measured the influence of each variable using the MICMAC analysis technique (Matrix of Cross Impact Multiplications Applied to Classification). This descriptive research involved surveys supported by Focus Group Discussions (FGDs) to obtain a comprehensive overview of the sustainability of red rice development. The main theoretical framework applied is sustainable development, particularly relevant to the agricultural sector in supporting productivity and the long-term viability of red rice farming in Tabanan, Bali (Sugiyono, 2016).

The research site was Jatiluwih Village, Penebel District, Tabanan Regency, Bali—one of the region's major red rice production centers. The study focused on analyzing the sustainability of red rice development using 11 key variables: input prices, marketing methods, income, financial capital, social capital, farmer cooperatives, labor availability, buyer availability, land area, agricultural rituals, and government involvement. Respondents were selected using purposive sampling, involving 30 participants representing farmers, subak organizations, cooperatives, traditional village leaders, agricultural agencies, and regional companies.

Data collection methods included observation, structured and in-depth interviews, and FGDs with relevant stakeholders (Sugiyono, 2015; Fauzi, 2019). The data comprised quantitative information such as agricultural production statistics and qualitative data in the form of narratives from interviews and FGDs. Primary data were obtained directly from respondents, while secondary data were sourced from agencies such as Statistics Indonesia (BPS) and the Agricultural Office.

The primary data analysis technique was the MICMAC method, which maps relationships among variables and identifies the most influential ones affecting the sustainability of the red rice farming system. This method is considered effective in capturing interdependencies within complex systems and facilitates strategic, data-driven decision-making (Godet, 1986; Singh, 2015).

RESULT AND DISCUSSION

This study employed structural analysis using the MICMAC method (Matrix of Cross Impact Multiplications Applied to Classification) to select factors relevant to sustainability. The MICMAC approach relies on analytical thinking through systematic problem-solving (Fauzi, 2019). According to Fauzi (2019), MICMAC serves the following purposes:

1. Identifying key variables that are influential and/or dependent within a system.
2. Mapping relationships among variables and assessing their relevance in explaining the system.
3. Revealing the causal chains within a system.

A core objective of this study was to identify variables that significantly affect the sustainability of red rice development in Jatiluwih Village, Tabanan Regency. Based on the findings, the following 11 variables were identified as crucial: production input prices, marketing methods, income, financial capital, social capital, availability of farmer cooperatives, availability of farm labor, buyer availability, land area, traditional agricultural rituals, and government support.

The MICMAC analysis was then applied to identify key variables that are influential and/or dependent within the system, to map inter-variable relationships, and to explain causal chains within the system. The detailed results of this analysis are presented in the following table.

Table 1. Sustainability Variables of Red Rice Development in Jatiluwih Village, Tabanan Regency

No	Variables	Definition
1	Price of production inputs (price of production facilities)	Costs that must be paid by farmers in agricultural production.
2	How to sell	Farmer partnerships in terms of sales and marketing with buyers of production results.
3	Income	The economic value obtained by farmers from the results of agricultural activities
4	Money capital	A sum of funds used by farmers to finance all agricultural production activities

5	Social capital	Cooperative relationships in agricultural groups or communities, for example mutual cooperation
6	Availability of farmer cooperatives	Providing agricultural facilities such as fertilizer and seeds
7	Availability of farm laborers	Availability of human resources to assist the agricultural process
8	Buyer availability	There are potential consumers or markets that are ready and able to buy agricultural products.
9	Land area	Land area affects farmer's income
10	Agricultural ceremony	A culture that must be preserved from generation to generation and is believed to be able to maintain harvest yields.
11	The role of government	The role of government in supporting and developing the agricultural sector

Source: Primary Data (processed data), 2025

Based on the results of the Focus Group Discussion (FGD), eleven elements (crucial variables) were agreed upon. Table 1 MDI (Matrix of Direct Influence)

Table 2. Identification of Crucial Variables

No	Long label	Short label
1	Price of Saprodi (production facilities)	Price of Sap
2	How to Sell	Cra Penjln
3	Income	Pndptn
4	Money Capital	M.Money
5	Social Capital	M.Social
6	Availability of Farmers' Cooperatives	K.Kop Tani
7	Availability of Farm Laborers	K.Brnh Tani
8	Buyer Availability	K. Buyer
9	Land area	L.Land
10	Agricultural Ceremony	Upc Prtnin
11	Role of Government	P.Prmtah

In conducting analysis related to the selection of important variables through analysis using MICMAC, the first stage is to fill in the MDI (Matrix of Direct Influence) table obtained from the results of the FGD (Focus Group Discussion). The FGD implementation was attended by 19 related stakeholders, which is presented in table 3.

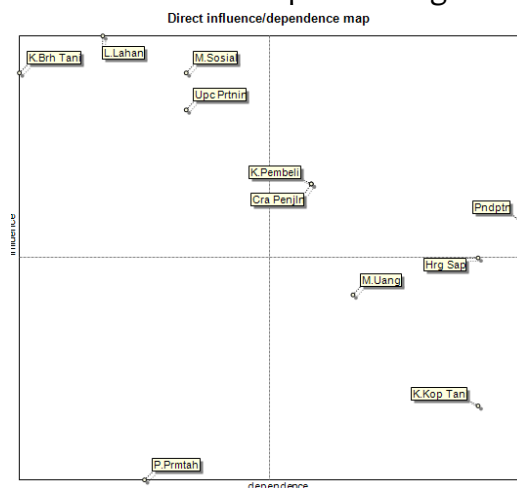
Filling in the table through numbers 0-3 which have the meaning 0: No influence, 1: Weak, 2: Moderate influence, 3: Strong influence, P: Potential influence.

Table 3. Identification of Direct Influence (MDI) Matrix Values

	1 : Hrg Sap	2 : Cra Penjln	3 : Pndptn	4 : M.Uang	5 : M.Sosial	6 : K.Kop Tani	7 : K.Brh Tani	8 : K.Pembeli	9 : L.Lahan	10 : Upc Prtnin	11 : P.Prmtah
1 : Hrg Sap	0	0	2	1	0	2	1	0	1	1	1
2 : Cra Penjln	2	0	2	1	0	0	1	2	0	1	2
3 : Pndptn	2	1	0	1	1	1	1	0	1	1	1
4 : M.Uang	1	0	1	0	1	2	0	1	1	1	0
5 : M.Sosial	2	2	2	2	0	2	0	2	1	1	0
6 : K.Kop Tani	0	1	0	1	0	0	0	1	0	1	1
7 : K.Brh Tani	2	1	2	3	2	2	0	1	1	0	0
8 : K.Pembeli	0	1	2	0	2	2	1	0	1	1	1
9 : L.Lahan	3	2	3	2	1	1	0	1	0	1	1
10 : Upc Prtnin	3	2	2	1	0	2	0	3	0	0	0
11 : P.Prmtah	P	1	0	0	1	1	0	0	0	0	0

© LIPSOR-EPITA-MICMAC

Based on the MDI (Direct Influence Matrix) table, using MICMAC software, it produces a mapping of variables into four squares in Figure 1.



Picture 1. Map of Sustainability Variables of Red Rice Development in Jatiluwih Village, Tabanan Regency, According to Influence and Dependence

Figure 1 shows quadrant I which is located in the upper left quadrant which is the variable influence quadrant or variable determinant quadrant, namely the variables of farm laborer availability, land area, social capital, and agricultural ceremonies, which describe variables that are very influential with little dependency and have the most crucial elements in the system because they can act as key factors in a system.

Furthermore, in quadrant II, located in the upper right, there are buyer availability, sales methods, and income, as relay variables, meaning variables that are highly dependent as factors that describe system instability where any change in these variables will have serious consequences on other variables. The variables of buyer

availability and sales methods are variables that influence and are dependent on farmers.

In quadrant III, which is characterized by variables with high dependency but little influence, the dependent variables located in the bottom right corner include the price of production inputs, capital, and the availability of farmer cooperatives. These variables are quite sensitive to changes in the variables in quadrants I and II.

In quadrant IV, called autonomous variables, the government plays a small role. These variables are considered excluded because they do not stop the system from operating.

The details of the quadrants above, where in quadrant I there are four variables (availability of farm laborers, land area, social capital, and agricultural ceremonies), are the four main factors that are the most influential variables in the sustainability of red rice development in Jatiluwih Village, Tabanan Regency. As we know, a shortage of laborers can cause delays in planting or harvesting, which ultimately impacts production results, food security and can hamper the sustainability of red rice development. Land area is a crucial factor in the sustainability of red rice development, because it greatly determines productivity, efficient use of resources, and the resilience of farming businesses. For example, narrow land often experiences limitations in inputs, access to technology, and profits.

Social capital refers to the networks, norms, and trust held by farming communities that enable them to work together to manage agriculture sustainably. Social capital is a crucial asset because it strengthens collaboration among farmers. The presence of social capital significantly assists the farming process. Mutual cooperation (gotong royong) is one form of social capital that influences agriculture, for example, helping build irrigation systems and assisting with planting and harvesting. Agricultural ceremonies are traditions or rituals performed by farming communities as a form of respect for nature, ancestors, and as an effort to maintain sustainable rice farming practices. By performing agricultural ceremonies, the community believes that the crops they plant will be safe and profitable.

There are four factors in quadrant II that are considered relay variables: buyer availability, sales method, and income. Relay variables have a high influence on other variables, but on the other hand, they also have a high degree of interdependence, so relay variables are often unstable.

Buyer availability refers to the availability and ease with which farmers can sell their produce to consumers, traders, collectors, processing industries, cooperatives, or other markets. This availability significantly impacts the sustainability of farming operations, as agricultural products cannot be stored for long and must be sold immediately after harvest. Selling methods are not only about securing high prices, but also about sales strategies that can ensure the future of farmers, the environment, and national food security. For example, if farmers lack knowledge of effective selling

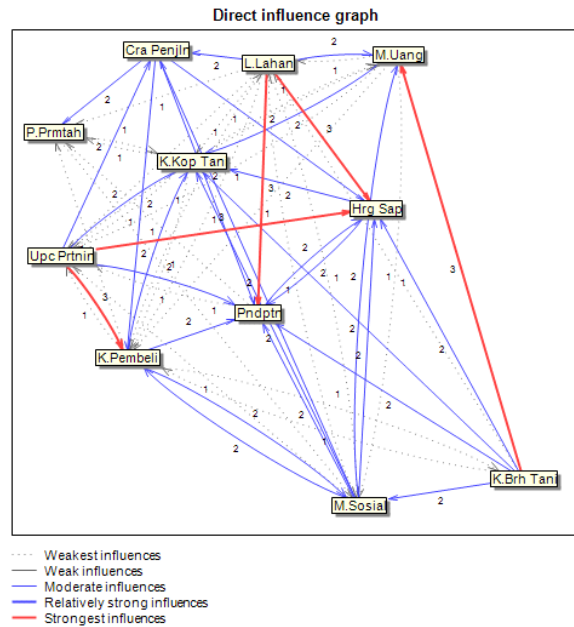
practices, they will not achieve high incomes. Sales methods have a significant impact on farmers, and the sustainability of red rice farming depends on the availability of buyers, which in turn impacts the farmers' sustainability.

Income is key to sustainable brown rice development. If farmers receive a fair and stable income, they are more likely to continue farming wisely and long-term. Therefore, farmer income is crucial to supporting a sustainable rice farming system.

Quadrant III represents variables with a low influence but highly dependent on other variables, and is therefore often referred to as outcome variables. Factors included in quadrant III include the price of production inputs (saprodi), capital, and the availability of farmer cooperatives. The price of inputs plays a crucial role in maintaining the sustainability of red rice cultivation. In this context, the price of inputs (saprodi) refers to the price of seeds, fertilizer, and other inputs. Meanwhile, the availability of farm laborers encompasses the continuity of agricultural production.

Monetary capital in agriculture is the funds or financial resources used by farmers to start, run, and develop farming activities. This capital is crucial for purchasing production inputs, paying labor, renting land, and financing post-harvest and marketing needs. Without sufficient capital support, farming will struggle to operate efficiently and sustainably. Regarding the availability of farmer cooperatives in the sustainable development of red rice, they provide fertilizer for communities lacking agricultural inputs.

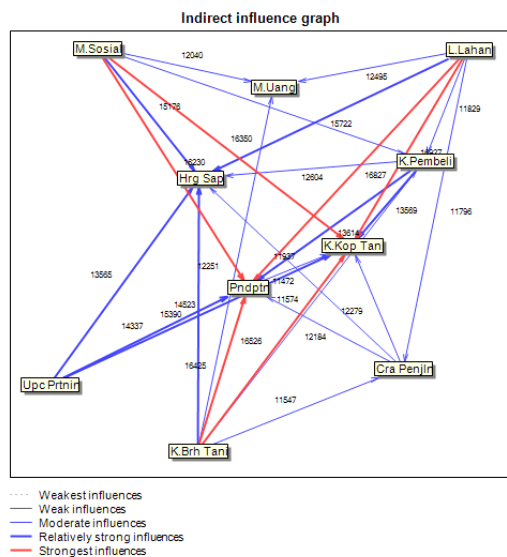
Finally, in quadrant IV, variables have very little influence or degree of dependence, and are therefore considered excluded. The factors in quadrant IV are the role of the government. The government's role is to establish policies that encourage environmentally friendly agriculture, such as limiting the use of hazardous chemical pesticides, incentivizing organic farming, and protecting agricultural land from land conversion. Furthermore, the government provides training and outreach to farmers to help them understand sustainable agricultural practices.



Picture2. Direct Influence Relationship Between Variables on the Sustainability of Red Rice Development in Jatiluwih Village, Tabanan Regency

As seen in Figure 2, almost all factors strongly influence each other. The factors with the strongest interactions are indicated by red arrows. Inward-pointing arrows indicate that the factor is influenced by other factors. Factors with inward-pointing red arrows are most often represented by factors such as agricultural ceremonies and land area. Only agricultural ceremonies have a relatively small influence on the role of government. Furthermore, outward-pointing arrows indicate that the factor influences other factors. The more outward-pointing arrows, the greater the influence of the factor on other factors.

PictureFigure 3 below shows the indirect relationship between variables. The number on each arrow in Figure 3 indicates the degree or rating of influence obtained through the Boolean matrix.



Picture3. Indirect Influence Relationship Between Variables of Sustainability of Red Rice Development in Jatiluwih Village, Tabanan Regency

Figure 4 and Figure 5 shows the ranking of variables based on influence and dependency. This change reflects the variable's ranking position in the initial conditions (MDI matrix) and after iteration with MDII. Shifts in variable ranking can be caused by changes in influence during the influence (MDI) and after iteration on the indirect influence (MDII).

Classify variables according to their influences

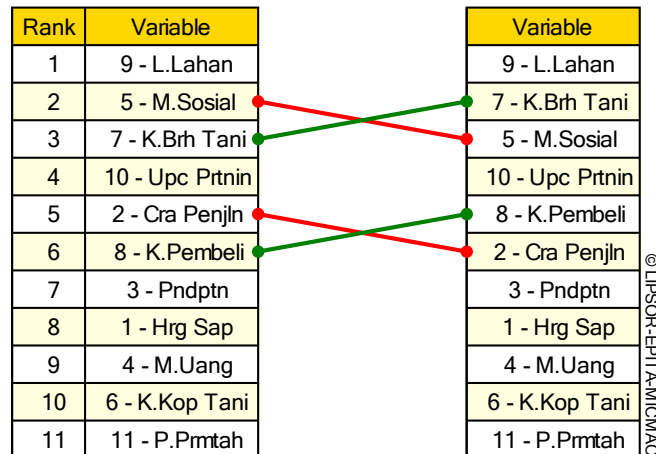


Figure 4. Variable Ranking Based on Influence

Figure 4 shows a shift in the order of influence of several variables. The social capital variable, previously ranked second in the MDI matrix, was ranked third after iterations taking into account indirect factors. Furthermore, the sales method variable, previously ranked fifth, became sixth. On the other hand, several variables experienced an increase in importance, such as the availability of farm laborers, previously ranked third, and now ranked second. Furthermore, the availability of buyers, which rose from sixth to fifth, was ranked fifth.

Classement par dépendance

Rank	Variable	Variable
1	3 - Pndptn	6 - K.Kop Tani
2	1 - Hrg Sap	3 - Pndptn
3	6 - K.Kop Tani	1 - Hrg Sap
4	4 - M.Uang	4 - M.Uang
5	2 - Cra Penjln	8 - K.Pembeli
6	8 - K.Pembeli	2 - Cra Penjln
7	5 - M.Sosial	10 - Upc Prtnin
8	10 - Upc Prtnin	11 - P.Pmtah
9	11 - P.Pmtah	5 - M.Sosial
10	9 - L.Lahan	9 - L.Lahan
11	7 - K.Brh Tani	7 - K.Brh Tani

© UPSOR-EPTAMICMAC

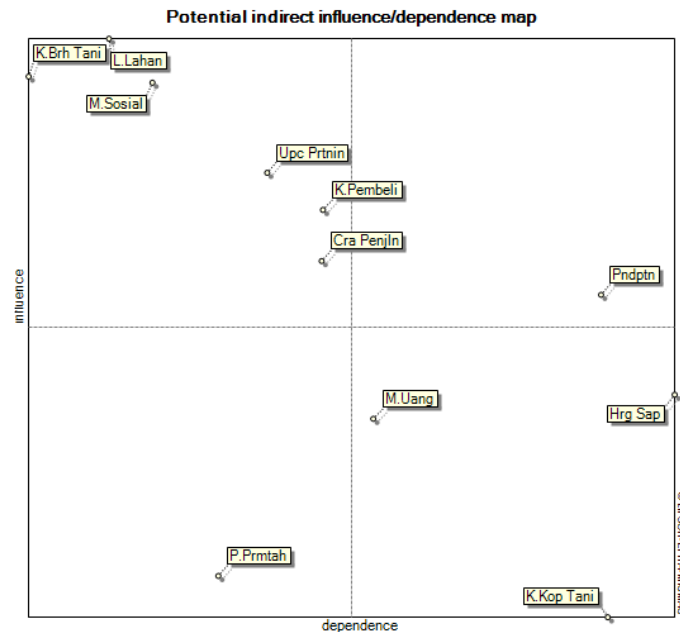
Picture4. Ranking of Variables Based on Dependence

Figure 5 shows a shift in the level of dependency of several variables. Several variables experienced an increase in their level of dependency, such as the availability of farmer cooperatives (from 3rd to 1st), the availability of buyers (from 6th to 5th), agricultural ceremonies (from 8th to 7th), and the role of government (from 9th to 8th).

There are also variables that have experienced a decrease in the level of dependency, such as income (previously ranked 1st to 2nd), price of production facilities (previously ranked 2nd to 3rd), sales method (previously ranked 5th to 6th), and social capital (previously ranked 7th to 9th).

The analysis revealed that the variable ranked by influence was land area, and despite iterations, the availability of farm labor remained the most influential factor. However, when viewed based on dependency, capital was the most consistently influential variable and did not influence the other variables.

The dotted lines in Figure 6 below show the change in position of variables from their initial to final positions after accounting for indirect influences. These shifts remain within the same quadrant but change in magnitude. For example, the variables selling method and buyer availability have seen a weakening of their dependency (shifting to the left). Furthermore, there are also variables whose influence has weakened (shifting downward), such as the role of government, but the availability of farmer cooperatives, the price of production inputs, and income have tended to shift to the right (increasing dependency). Meanwhile, other variables have tended to see an increase in their dependency (shifting upward).



Picture5. Displacement Map Between Variables from Direct Influence Between Variables from Direct to Indirect Influence

CONCLUSION

Based on the results of the data analysis described in the previous chapter, the following conclusions can be drawn.

1. The crucial variables for the sustainability of red rice development in Jatiluwih Village, Tabanan Regency, from the 11 identified variables have an influence and dependency on the variables of availability of farm laborers, land area, social capital, and agricultural ceremonies.

REFERENCES

- Ahmar, M., & Parawangi, A. (2016). The Role of Government in Empowering Rice Farmers in Parumpanai Village, Wasuponda District, East Luwu Regency. *Journal of Public Administration*, 2(2), 120-136.
- Ardika, I Wayan and Gede Suajana Budhiasa. (2017). Analysis of Farmer Welfare Levels in Bangli Village, Baturiti District, Tabanan Regency. *Journal of Population and Human Resource Development*. 8(2).
- Arifien, Y. (2022). CHAPTER 1 Agricultural Concepts. *Introduction to Agricultural Science*, 1.
- Arifin, B. (2007). Institutional Economics and Increasing Farm Business Income. *Journal of Agroecconomics*, 25(1), 32-45.
- Ayesha, I. (2017). THE IMPACT OF SUBSIDIZED FERTILIZER POLICY ON SUSTAINABLE RICE FARMING SUSTAINABILITY ON FARMERS LAND TREATERS: A Study Using the System Dynamics Method. THE IMPACT OF SUBSIDY FERTILIZER POLICY ON SUSTAINABLE RICE SUSTAINABILITY ON FARMERS LAND TREATERS: A. UNES *Journal of Sciencetech Research*, 2(2), 197–209. <http://journal.univ-ekasakti-pdg.ac.id>

- Bockish, J. 2012. Transportation Sustainability Rating Systems. Gresham Smith and Partners. Presentation.<http://www.gaite.org/wp-content/uploads/2012/07/GAITE-PresentationSustainability-July-2012.pdf>, (accessed January 10, 2025).
- Budiasa, IW (2018). Sustainable Agriculture: Theory and Modeling. Udayana University Press. Denpasar. 310 h
- Budimanta, A. 2005. Continuing Urban Development through Sustainable Development in the Anthology of Indonesian Urban Development in the 21st Century. Yogyakarta: Faculty of Architecture Gadjah Mada University.
- Coleman, J., 1990. Foundations of Social Theory. Cambridge Mass: Harvard University Press.
- DEWI, NPAY, ANTARA, M., & RANTAU, IK (2017). Segmenting, Targeting, and Marketing Positioning Strategies for Jatiluwih Bali Organic Red Rice in Bali Province. *Journal of Agribusiness and Agritourism*, 6(4), 596. <https://doi.org/10.24843/JAA.2017.v06.i04.p14>
- Erwin Hasudungan. (2009). The Influence of Farmers' Education and Experience on Coffee Crop Productivity Levels and Their Contribution to Regional Development in North Tapanuli Regency. Thesis. Postgraduate School, University of North Sumatra, Medan.
- Fauzi, Akhmad. 2019. Sustainability Analysis Techniques. Jakarta: PT. Gramedia Pustaka Utama
- Finger, R., & El Benni, N. (2021). Farm income in European agriculture: New perspectives on measurement and implications for policy evaluation. *European Review of Agricultural Economics*.
- Gaisani, FN, Tanius, B., & Widani, NN (2023). Innovation in Processing Red Rice into Roll Cake as a Typical Jatiluwih Souvenir. *INSPIRE: Journal of Culinary, Hospitality, Digital & Creative Arts and Event*, 1(2), 67-77.
- Gisani, FN, Tanius, B., & Widani, NN (2023). Innovation in Processing Brown Rice into Roll Cake as a Typical Jatiluwih Souvenir. *Journal of Culinary, Hospitality, Digital & Creative Arts and Event*, 1(1), 67-77. <https://ojs-inspire.pib.ac.id/index.php/inspire/article/view/10%0Ahttps://ojs-inspire.pib.ac.id/index.php/inspire/article/download/10/9>
- Hamakonda, UA, & Maria Clara Mau. (2023). Prospects of Organic Farming as a Concept. *Journal of Superior Agriculture*, 2(1), 28-39.
- Hanisy, A. (2013). Basic concepts of policy analysis. *Al Qodiri: Journal of Education, Social and Religious Affairs*, 4(1), 48-63.
- Haribawani, PN, & Saskara, IAN (2021). Analysis of Factors Influencing Unemployment in the Sarbagita Regency/City Region. *E-Journal of Economics and Business*, Udayana University, 10(09).
- Hidayah, AN, Sudrajat, J., & Fitrianti, W. (2022). Determinants of Rainfed Lowland Rice Farming Sustainability: The Case of Coastal Villages in West Kalimantan. *Journal of Environmental Sciences*, 20(2), 382-395. <https://doi.org/10.14710/jil.20.2.382-395>
- Khairur Razzi Sudarsana Arka. (2022). Kapongan District, Situbondo Regency, Java Province. *E-Journal of Economics and Business*, Udayana University, 11(11), 1437-1446.

- Khusna, K., Fadhilah Kurniati, R., & Muhaimin, M. (2019). Development of a Rice Farmer Empowerment Model through the Upstream and Downstream Agromaritime Program in the Agricultural Sector. *Matra Pembaruan*, 3(2), 99–98. <https://doi.org/10.21787/mp.3.2.2019.89-98>
- Kusumaningrum, SI (2019). Utilizing the Agricultural Sector to Support Indonesia's Economic Growth. *Transaction Journal*, 11(1), 80–89. <http://ejournal.atmajaya.ac.id/index.php/transaksi/article/view/477>
- Lawalata, GM (2013). Principles of sustainable road development. *Journal of Transportation*, 13(2).
- Lestari, DPDM, Saskara, IAN, & Setyari, NPW (2023). Analysis of key variables for the sustainability of the Simantri program in Tabanan District. *Indonesian Interdisciplinary Journal of Sharia Economics (IIJSE)*, 6(2), 758-775.
- Maharani, S., Taufik, Y., & Ikrawan, Y. (2020). Anthocyanin Stability of Instant Brown Rice Due to the Influence of Brown Rice Varieties (*Oryza Nivara*. L.) and Freeze-Drying Cooking Techniques. *Pasundan Food Technology Journal*, 7(3), 107–115. <https://doi.org/10.23969/pftj.v7i3.3031>
- Malik A, (2017) Prospects for Upland Rice Development: Policy Perspectives and Field Implementation. Jakarta. IAARD Press. 137 pp.
- Mubyanto, 1989. Introduction to agricultural economics, second printing, revised edition, LP3ES Jakarta
- Nediari, A. (2014). As an Effort to Conserve National Culture, Especially in Interior Design: Results and Discussion of Bali Province. *Humanities*, 5(1), 521–540.
- Parawangi, A., Major, M., Administration, I., Unismuh, N., Major, D., Administration, I., Unismuh, N., Major, D., Administration, I., & Unismuh, N. (2016). Constitution. 2.
- Paramarta, P. (2013). Contribution of Women's Resources in Organic Red Rice Agribusiness (In Jatiluwih Village, Penebel District, Tabanan Regency, Bali Province) (Doctoral dissertation, Brawijaya University).
- Portes, A., 1998. Social Capital: Its Origins and Applications in Modern Sociology. *Annual Review of Sociology*.
- Putnam, RD 1993. The Prosperous Community: Social Capital and Public Life. *American Prospect*, 13, Spring, 35- 42. In Elinor Ostrom and TK Ahn. 2003. *Foundations of Social Capital*. Massachusetts: Edward Elgar Publishing.
- Putri, D., & Kartika., N (2022). Comparative Study on Production Costs, Working Hours, Production Amount and Profit Between Organic and Non-Organic Rice Farmers in Jatiluwih Village, Penebel District, Tabanan. *E-Journal of Development Economics*, Udayana University. 11(1).
- Rasmikayati, E., & Saefudin, BR (2018). Analysis of Factors That Can Encourage Mango Farmers to Improve Their Agribusiness Behavior in the Era of Globalization. *Paradigma Agribisnis*, 1(1), 1–13.
- Rahman, A., Nuriadi, N., & Taufik, M. (2018). Controlling rice field rat pests using the rice-fish farming technique in Lara Village, Tirwuta District, East Kolaka. *Ngayah: IPTEKS Application Magazine*, 9(1).
- Razzi, K., & Arka, S. (2022). Analysis of Factors Influencing Rice Production in Kapongan District, Situbondo Regency, East Java Province. *E-Journal of Economics and Business*, Udayana University, 11(11).

- Royhana, I. (2024). Brown Rice Consumption Preferences as an Alternative Source of Calories in Malang City. <https://doi.org/10.33603/jpa.v1i1.1491>
- Soetriono, S. (2003). Introduction to General Agricultural Science. In Brawijaya University, Malang (Issue July 2023). <https://books.google.com/books?hl=en&lr=&id=rzOBDwAAQBAJ&oi=fnd&pg=PR3&dq=pertanian+berkelanjutan+1&ots=y18ReFhDhq&sig=nzPRacfA6xuOoXscILFOPjJUIEQ>
- Sugiana, IGN (2018). The Study on Farmers Welfare. International Journal of Life Sciences (IJLS), 2(1). <https://doi.org/10.29332/ijls.v2n1.92>
- Sugiono. (2013). Quantitative, Qualitative, and R&D Research Methods (Issue January).
- Sukanteri, NP, Putu, N., Pratiwi, E., & Carina, T. (2024). Socialization and Training to Improve Knowledge and Production Skills of Home Industry Red Rice Crackers in Jatiluwih Village, Tabanan, Bali. 07(02), 143–155.
- Saraswati, IGAP, Saskara, IAN, & Setyari, NPW (2023). Analysis of Key Variables for the Sustainability of the Geringsing Double Ikat Weaving Industry in Pegeringsingan Village. Journal of Social Sciences and Humanities, 12(1), 73-85.
- Soemarwoto, Otto. 2006. Sustainable Development: Between Concept and Reality. Department of National Education, Padjajaran University, Bandung.
- Sugiyono. 2013. Educational Research Methods: Quantitative, Qualitative, and R&D Approaches. Bandung: Alfabeta.
- Sukanteri, NP, Pratiwi, NPE, & Carina, T. (2024). Socialization and Training to Improve Knowledge and Production Skills of Home Industry Red Rice Crackers in Jatiluwih Village, Tabanan, Bali. Empowerment: Journal of Community Service, 7(02), 143-155.
- Suratiyah, Kaen. 2015. Agricultural Science. Revised Edition. Penebar Swadaya. East Jakarta
- Ulfa, D. ., & Mustadjab, M. . (2017). JEPA-Journal of Agricultural Economics and Agribusiness Volume I No. 1 November 2017 E-ISSN: 2598-8174. 1(2), 2598–8174. <https://www.neliti.com/id/publications/213751/analisis-penetapan-harga-pokok-produksi-unit-rumah-pada-perumahan-tambora-di-lamo>