Formosa Journal of Science and Technology (FJST)
Vol. 5, No. 7, 2026: 2011-2030

Study of Pineapple Farming Sustainability on Dry Land in East Lombok Regency

Syafira Rifalya Pratiwi[1]*, IGL Parta Tanaya[2], Hayati[3]
Master Program of Dryland Agriculture, Postgraduate, University of Mataram
Corresponding Author: Syafira Rifalya Pratiwi syafirarifalyapratiwi@gmail.com

A R T I C L E I N F O

Keywords: Pineapple, Pineapple Farming Sustainability, Sensitive Indicators, Sustainability Dimensions.

Received : 27, May
Revised : 29, June
Accepted: 25, July

A B S T R A C T

This study aims to determine the sustainability status of pineapple farming in East Lombok Regency and to identify sensitive indicators affecting its sustainability. A descriptive method with a mixed-methods approach (qualitative and quantitative) was used. The unit of analysis was individual farmers as the main actors, along with stakeholders such as agricultural extension workers, farmer-group leaders, traders/collectors, and relevant agencies. The research area was determined by purposive sampling in Masbagik District (Lendang Nangka and North Lendang Nangka Villages) and Pringgasela District (Jurit and Pringgasela Induk Villages), East Lombok Regency, West Nusa Tenggara. A quota sampling technique was applied to 40 respondents (28 male, 12 female), using primary and secondary, qualitative and quantitative data. The Multi-aspect Sustainability Analysis (MSA) results show that the pineapple farming system is generally sustainable, with an overall index of 67.46 which happened to be the strongest is cultural dimension. Furthermore, leverage analysis identifies women's participation and farmer regeneration is also the key cultural factors

ISSN-E: 2964-6804
DOI: https://doi.org/10.55927/fjst.v5i7.135
https://journalfjst.my.id/index.php/fjst

INTRODUCTION

The agricultural sector holds a strategic position in Indonesia's development structure and economic growth. Beyond being the main source of livelihood for much of the population, it continues to safeguard food security, generate employment, and drive regional economic growth (Azizah & Trilaksana, 2017). Among its five main sub-sectors; such like, food crops, horticulture, plantations, fisheries, and forestry. Moreover, horticulture makes a significant contribution to economic development, and fruit commodities such as mango, mangosteen, banana, and pineapple carry high economic value and competitiveness in both domestic and international trade. Pineapple (*Ananas comosus* L. Merr.) is one of the leading horticultural commodities, valued for its high nutritional content; such like, vitamin C, manganese, and the enzyme bromelain. Moreover, for its versatility, as it can be consumed fresh or processed into juice, jam, syrup, and other value-added products (Junita, 2024).

The sustainability of pineapple farming is not confined to the economic dimension; whereas rising farmer income and production efficiency, but also spans social dimensions (farmer empowerment, community welfare, and preservation of local cultural values), environmental dimensions (soil and water conservation, biodiversity protection, and control of negative ecosystem impacts), technological dimensions (adoption of efficient, environmentally friendly innovations), and institutional dimensions (the strength of farmer institutions, policy support, and partnerships among farmers, government, and the private sector). A comprehensive evaluation of these dimensions is therefore needed to understand the factors that determine the success of pineapple, this study addresses two questions: how sustainable is pineapple farming on dry land in East Lombok Regency across the economic, social, cultural, environmental, technological, and institutional dimensions, and which indicators act as the sensitive, leverage factors shaping that sustainability with the corresponding aims of determining the sustainability status of pineapple farming in East Lombok Regency and identifying the sensitive indicators that influence it.

THEORETICAL REVIEW

Sustainable Development

Sustainable development is the process of expanding the opportunities of individuals and communities to fulfil their aspirations and potential over time, while maintaining the resilience of economic, social, environmental, and institutional systems. It involves aligning resource use, investment direction, technological orientation, and institutional change so that present and future potential can both be realised (Munasinghe, 2010).

Sustainable Development Goals (SDGs)

The SDGs operationalise the concept of sustainable development into 17 goals adopted in 2015 as part of the 2030 Agenda, following the 1987 Brundtland Report. If sustainable development is the ultimate goal of a balanced and just world, the SDGs are the agreed "task list" which encompassing poverty eradication, reduced inequality, and environmental protection, in order for achieving it within roughly fifteen years.

Sustainable Agriculture

Sustainability, in general, is the effort to keep an activity or system running continuously. Sustainable agriculture reflects a farming system's capacity to remain productive without degrading the natural resources on which that productivity depends (Aditya et al., 2022), maintaining productivity while preserving or even improving environmental quality (Puspitasari, 2017).

Challenges of Sustainable Agriculture

Implementing sustainable agriculture still faces considerable obstacles. Easy access to chemical inputs that deliver instant results often remains farmers' preferred choice despite negative environmental consequences. Uncontrolled land conversion, excessive use of chemical fertilizers and pesticides, and deforestation contribute to soil degradation, declining water quality and availability, also biodiversity loss.

Characteristics and Farming Systems of Dry Land

Dry land refers to areas situated in dry climatic zones, with annual rainfall below 2,000 mm and a dry period exceeding seven months a year, whereas its months in which rainfall falls below 100 mm (Nursyamsi et al., 2014).

Multi-aspect Sustainability Analysis (MSA)

Multi-aspect Sustainability Analysis (MSA) is a rapid, effective, and efficient sustainability assessment method built on the Rapid Appraisal Process (RAP) principle, making it comparatively economical to apply. MSA evaluates a system, sector, or activity across interrelated aspects; such like, economic, environmental, social, and governance, which enabling stakeholders to understand sustainability conditions holistically and to identify areas requiring improvement (Firmansyah, 2022).

METHODOLOGY

This study used a descriptive method with a mixed-methods (qualitative and quantitative) approach. The unit of analysis was not limited to individual farmers as the principal actors in pineapple farming, but also encompassed stakeholders involved in the pineapple agribusiness system, including agricultural extension workers, farmer-group administrators, traders/collectors, and relevant government agencies.

The research was conducted in Masbagik District (Lendang Nangka and North Lendang Nangka Villages) and Pringgasela District (Jurit and Pringgasela Induk Villages), East Lombok Regency, West Nusa Tenggara Province, with the research area determined through purposive sampling.

Sampling used the quota sampling technique by determining sample size on the basis of a set number of respondents while considering characteristics relevant to the study's objectives (Rachman et al., 2016). This sample size was based on the requirements of the MSA approach, which emphasises the completeness and representativeness of sustainability indicators rather than a large sample size.

RESEARCH RESULTS

Respondent Characteristics

Respondent profiles provide an empirical picture of the social, economic, and human-resource conditions of pineapple farmers as the principal actors in the farming system, reflecting their capacity to manage resources, adopt innovation, sustain productivity, and respond to environmental and market change (Sukayat et al., 2023). Field data from 40 pineapple farmers in East Lombok Regency are summarised in Table 1.

Table 1. Characteristics of Pineapple Farmer Respondents in East Lombok Regency

Characteristic	Category	n	%
Gender	Male	28	70.0
	Female	12	30.0
Age	30–39 years	14	35.0
	40–49 years	16	40.0
	50–59 years	8	20.0
	≥60 years	2	5.0
	Mean age: 43 years	–	–
Education	No formal schooling	1	2.5
	Elementary school	25	62.5
	Junior high school	8	20.0
	Senior high school	6	15.0
Farming experience	<10 years	8	20.0
	10–19 years	18	45.0
	20–29 years	8	20.0
	≥30 years	6	15.0
	Mean experience: 16 years	–	–
Land area	<20 are	8	20.0
	20–39 are	24	60.0
	40–59 are	5	12.5
	≥60 are	3	7.5
	Mean area: 29.50 are	–	–

Respondents were dominated by male farmers (70.0%), reflecting the physically demanding nature of cultivation activities, although women's involvement remained significant in maintenance and post-harvest tasks as part of family labour. The average age of 43 years places most respondents within the productive age range, providing an important asset for the continuity of farming activity, although the presence of a sizeable group aged 50 years and above signals a potential regeneration challenge should younger generations show limited interest in the sector (Oktaviani & Rozci, 2023). Formal education was dominated by elementary-level attainment, which tends to constrain farmers' capacity to absorb new technology, modern farm management, and market information (Munte, 2025). Average farming experience of 16 years indicates strong local ecological knowledge, though prolonged experience unaccompanied by innovation can also entrench inefficient traditional practices. Average land holding of 29.50 are (about 0.30 ha) reflects the smallholder character typical of Indonesian

agriculture, a structural constraint on economic efficiency and technology investment (Suardi, 2019), although small-scale pineapple farming can still be economically viable when intensively managed and market-oriented (Tohiroh et al., 2025).

Sustainability Indicators by Dimension

Field data on each sustainability indicator werw presented as the modal (most frequently chosen) category for each dimension form the descriptive basis for the subsequent MSA analysis. Table 2 summarises the key indicators across the six dimensions.

Table 2. Summary of Key Sustainability Indicators by Dimension

Dimension	Key indicator	Mode	Interpretation
Economic	Production	4	Very high — all farmers produce ≥1,200 fruits
	Market access	2	Moderate — mostly sold within the district
	Farmer income	3	High income category
	Price stability	3	Relatively stable, mild increase
	Land area	1	Low — smallholding under 1 ha
	Financial management	2	Routine but incomplete bookkeeping
Social	Family involvement	3	Active but partial involvement
	Access to training	2	1–2 times a year
	Solidarity among farmers	3	Strong mutual cooperation
	Farming experience	4	>10 years, intergenerational
	Education	2	Mostly junior-high graduates
Cultural	Preservation of local pineapple	4	Fully local cultivar maintained
	Use of local knowledge	4	Strong traditional techniques
	Farmer regeneration	3	Young generation actively involved
	Women's participation	2	Limited to daily-wage tasks
Environmental	Waste management (peel/leaves)	4	Fully reused as feed/organic fertilizer
	Protective vegetation	4	Widely planted shade trees
	Fertilizer use	1	Dominantly inorganic
	Pesticide use	1	Dominantly chemical
	Pest control	2	Routine but unscheduled
Technological	Land preparation	3	Consistently done manually
	Technology availability	1	Limited, mostly traditional tools

	Post-harvest technology	1	Manual sorting/grading only
	Fertilizing action	4	Intensive and on schedule
Institutional	Farmer-group membership	2	Inactive participation
	Extension support	2	Moderate
	Access to government programs	2	Received 2–3 years ago
	Cooperation with other parties	3	Ongoing partnerships
	Role of extension workers	4	Perceived as very good

Overall, pineapple farming shows strong fundamentals but faces structural gaps limiting broader sustainability. Economically, high production and demand are undercut by limited market access beyond the district due to weak networks and competition from Javanese pineapple. Socially and culturally, strong farmer solidarity, experience, and preservation of local cultivars reflect deep-rooted traditional knowledge, though training access and women's participation remain limited to occasional sessions and low-wage tasks, respectively. Environmentally, effective waste reuse and protective vegetation are offset by heavy agrochemical dependence and reactive, unscheduled pest control. Technologically, while fertilizer application is well-managed, farmers lack modern tools and post-harvest technology. Institutionally, extension workers play a strong role, but farmer-group organization and support remain moderate, reflecting less institutional attention compared to staple crops like rice.

Multidimensional Sustainability Index

The Multi-aspect Sustainability Analysis produced an overall sustainability index of 67.46 for pineapple farming on dry land in East Lombok Regency, placing the system in the sustainable category. This composite index integrates the economic, social, cultural, environmental, technological, and institutional dimensions to reflect the actual condition of the farming system (Juhandi et al., 2023).

Table 3. Sustainability Index of Pineapple Farming by Dimension

No.	Dimension	Index value	Status
1	Economic	62.50	Moderately sustainable
2	Social	70.83	Sustainable
3	Cultural	85.00	Very sustainable
4	Environmental	71.43	Sustainable
5	Technological	50.00	Less sustainable
6	Institutional	65.00	Moderately sustainable
Overall average		67.46	Sustainable

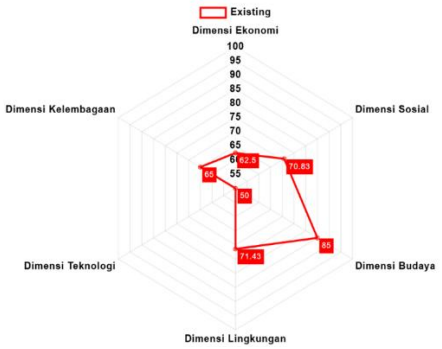

Figure 1. Kite Diagram of the Multidimensional Sustainability Index

In the kite diagram, values positioned further from the centre indicate higher sustainability for that dimension, while values closer to the centre indicate lower sustainability. Overall, pineapple farming in East Lombok is in a transitional phase toward higher sustainability, with cultural, social, and environmental dimensions as its main strengths, and technological and economic dimensions as its principal constraints pattern (Hasyim et al., 2025).

Status of Sustainability by Dimension

Individual ordination diagrams for each dimension (Figures 2–7) show the sustainability value on the x-axis and the projected future stability of that value on the y-axis; values near y = 50 indicate a relatively stable trajectory if current practices continue unchanged.

Economic Dimension

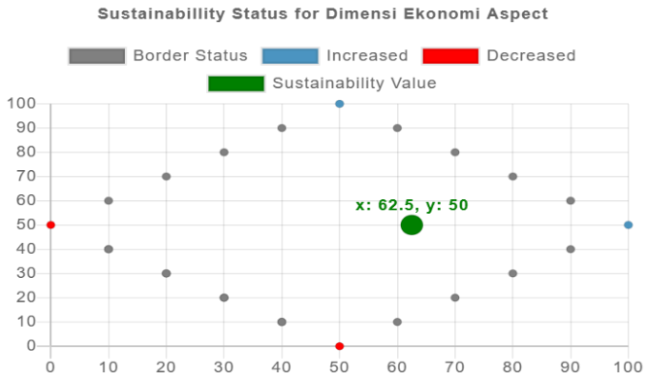

Figure 2. Ordination Diagram of the Economic Dimension

The economic dimension scored 62.5 (moderately sustainable), indicating that pineapple farming has not yet delivered optimal, stable benefits for farmers. Production is fairly good but still constrained by limited land area and cultivation technique, while limited market access weakens farmers' bargaining position and price fluctuation across seasons destabilises income.

Social Dimension

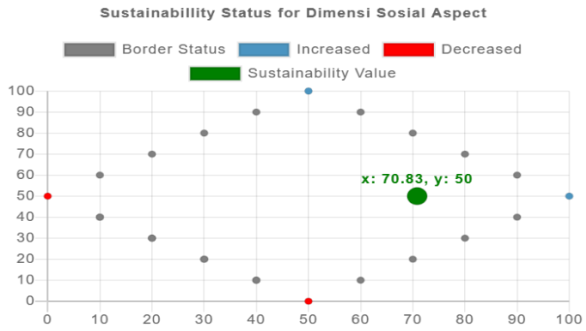

Figure 3: Ordination Diagram of the Social Dimension

The social dimension scored 70.83 (sustainable). Family involvement in farming activities signals internal household support, solidarity among farmers reflects cooperative interaction during cultivation, and relatively long farming experience provides an important asset for adaptive decision-making, although still-limited access to training and extension constrains innovation adoption.

Cultural Dimension

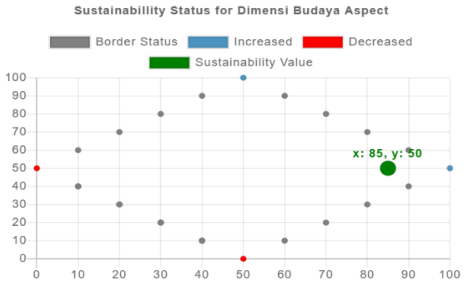

Figure 4. Ordination Diagram of the Cultural Dimension

The cultural dimension scored 85 (very sustainable), the highest of all dimensions, indicating that pineapple farming practices are deeply integrated with local values, social norms, and traditional wisdom. Farmers continue to apply inherited local knowledge in seed selection, planting patterns, and land management, while family involvement and women's participation further reinforce this dimension consistently.

Environmental Dimension

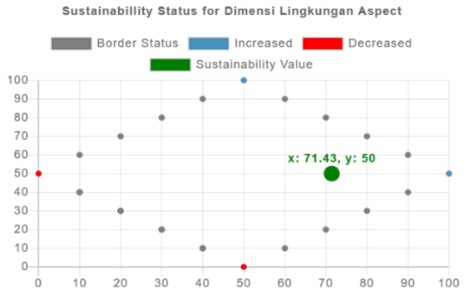

Figure 5. Ordination Diagram of the Environmental Dimension

The environmental dimension scored 71.43 (sustainable), indicating that pineapple cultivation activities have relatively maintained the ecological balance of the dryland system. Waste management, protective vegetation, and generally moderate fertilizer and pesticide use are the main contributing indicators given the vulnerability of dry land to degradation (Dadi, 2021).

Technological Dimension

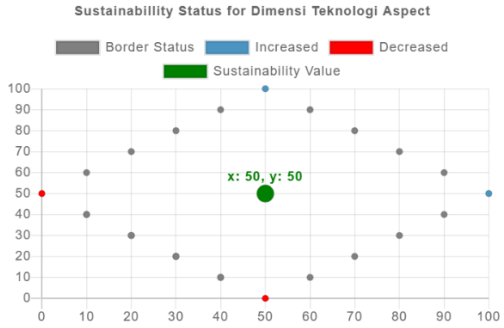

Figure 6. Ordination Diagram of the Technological Dimension

The technological dimension scored 50 (less sustainable), the lowest of all dimensions, indicating limited technology adoption. Most farmers still rely on traditional methods for land preparation, planting, and maintenance; the availability of modern equipment, use of supporting tools, and post-harvest technology.

Institutional Dimension

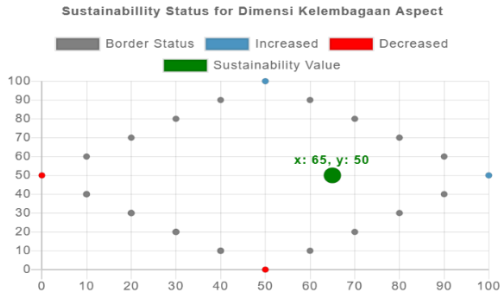

Figure 7. Ordination Diagram of the Institutional Dimension

The institutional dimension scored 65 (moderately sustainable), indicating that institutional support for pineapple farming remains sub-optimal. Farmer groups and extension services exist but their effectiveness is limited, both in terms of member participation and intensity of mentoring, while access to government programmes and cooperation with external parties also remain below their potential.

Sensitive Factor (Leverage) Analysis

Leverage analysis was conducted to identify the attributes exerting the greatest influence on changes in the sustainability index, based on the root mean square (RMS) change value the higher the RMS, the greater an attribute's influence on system sustainability (Firmansyah, 2022).

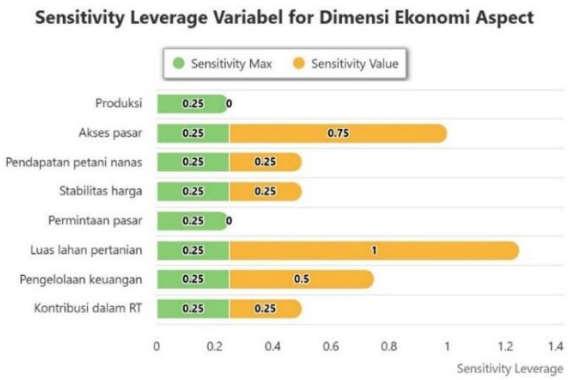

Figure 8. Leverage Sensitivity Diagram of the Economic Dimension

Land area emerged as the dominant leverage factor in the economic dimension (sensitivity value 1.25), followed by market access (1.0) and financial management (0.75); farmer income, price stability, and household contribution showed moderate sensitivity (0.5), while production and market demand, despite equal maximum sensitivity the data showed no actual sensitivity, indicating they are already in a favourable condition and not a priority for intervention.

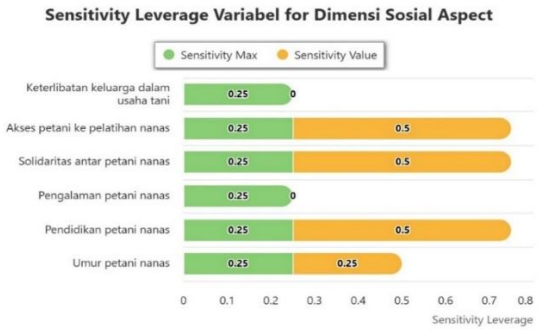

Figure 9. Leverage Sensitivity Diagram of the Social Dimension

Access to training, solidarity among farmers, and farmers' education level were the leading leverage factors in the social dimension (each 0.75), followed by age (0.5), while family involvement and farming experience showed no actual sensitivity. This is consistent with evidence that social capital promotes farmers' adoption behaviour (Ren et al., 2022) and that training strengthens farmers' readiness to apply sustainable practices (Luo et al., 2022).

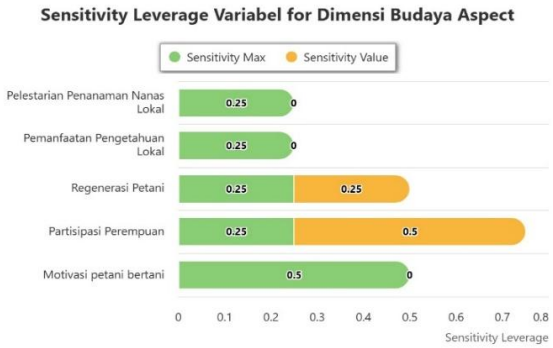

Figure 10. Leverage Sensitivity Diagram of the Cultural Dimension

Women's participation was the leading leverage factor in the cultural dimension (0.75), followed by farmer regeneration (0.5), while preservation of local pineapple, use of local knowledge, and farming motivation showed no actual sensitivity. Women's involvement in agriculture has been shown to strengthen household capacity and farming sustainability through improved access to information, competence, and decision-making (Juliana et al., 2023), while farmer regeneration remains crucial given the risk that declining youth interest poses to future production (Riptanti et al., 2026).

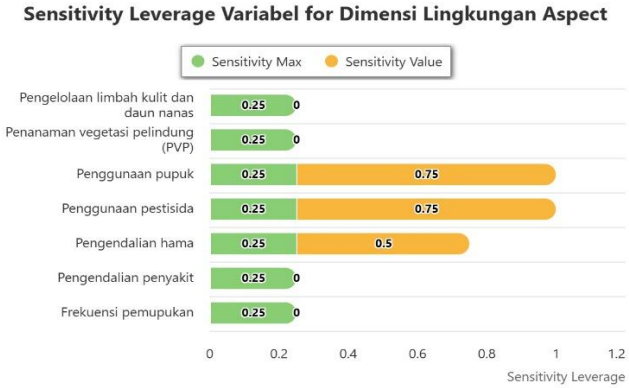

Figure 11. Leverage Sensitivity Diagram of the Environmental Dimension

Fertilizer use and pesticide use were the dominant leverage factors in the environmental dimension (each 1.0), followed by pest control (0.75), while waste management, protective vegetation, disease control, and fertilizing frequency showed no actual sensitivity, consistent with evidence that improper fertilizer and pesticide use accelerates environmental degradation and reduces soil and water quality (Penuelas et al., 2023), and that non-environmentally-friendly pest control raises pollution risk and disrupts ecosystem balance (Siregar, 2023).

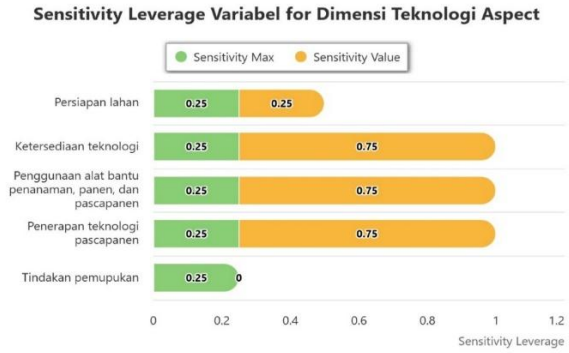

Figure 12. Leverage Sensitivity Diagram of the Technological Dimension

Technology availability, use of planting/harvest/post-harvest tools, and post-harvest technology application were the leading leverage factors in the technological dimension (each 1.0), followed by land preparation (0.5), while fertilizing action showed no actual sensitivity, reinforcing evidence that technology adoption significantly improves farm productivity and efficiency as critical components of sustainable agriculture (Pretty, 2018).

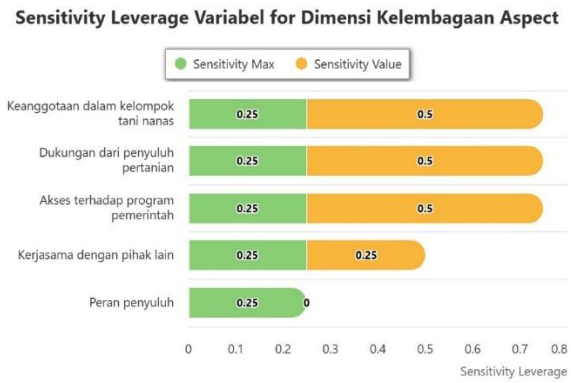

Figure 13. Leverage Sensitivity Diagram of the Institutional Dimension

Farmer-group membership, extension support, and access to government programmes were the leading leverage factors in the institutional dimension (each 0.75), followed by cooperation with other parties (0.5), while the perceived role of extension workers showed no actual sensitivity, consistent with evidence that strengthening farmer institutions through programme access and extension support is a key determinant of adaptive capacity and agricultural sustainability (Makmun et al., 2024).

DISCUSSION

Relationship between Respondent Characteristics and Sustainability Status

The socio-economic profile of respondents corresponds closely with the pattern of sustainability scores obtained. The predominance of productive-age farmers (mean 43 years) aligns with the sustainable rating of the social dimension (70.83), where household labour involvement and social experience are key strengths, although the sizeable share of farmers aged 50 and above signals a regeneration risk for the culture and institutional dimensions in the longer term. Relatively low formal education corresponds with the weaker technological (50) and moderately sustainable economic (62.5) dimensions, since limited formal schooling constrains understanding of new technology, modern farm management, and market information.

Interlinkages among Sustainability Dimensions

No single dimension of pineapple-farming sustainability stands alone; each interacts with the others to form a complex, interdependent system in which balance across dimensions is the key to overall sustainability. Strong ties between the social (70.83) and cultural (85) dimensions show that pineapple farming is deeply embedded in local values, farmer solidarity, and family involvement, providing a stable foundation even amid resource constraints.

Strategy and Policy Direction for Dryland Pineapple Development

Given the imbalance across dimensions, particularly the constraints in the technological, economic, and institutional dimensions. An integrated development approach is required, encompassing: (1) land conservation and water-use efficiency through organic mulching, simple terracing, cover-crop planting, rainwater harvesting, and efficient irrigation such as simple drip systems and optimised village reservoirs; (2) strengthening cultivation and post-harvest technology adoption to raise product value and competitiveness; (3) strengthening farmer institutions through revitalised farmer groups, improved organisational management capacity, stronger extension roles, and broader partnerships with the private sector, cooperatives, and marketing bodies; (4) expanding market access and value chains through collective marketing systems. (5) strengthening access to farm financing, such as micro-credit schemes and group-based financing accompanied by financial-management mentoring; and (6) synergising local

government policy across the agriculture, trade, industry, and environment sectors, in collaboration with research institutions, universities, and the private sector to accelerate innovation.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Overall, the pineapple farming system on dry land in East Lombok Regency falls into the sustainable category, with an index value of 67.46, indicating that it functions reasonably well in supporting the economic, social, and environmental aspects even though it is not yet fully optimal and disparities remain among dimensions. The cultural dimension is the main strength (very sustainable), reflecting strong local wisdom, traditional knowledge, and family involvement; The economic and institutional dimensions remain moderately sustainable, reflecting limitations in income stability, market access, and institutional effectiveness, while the technological dimension is the weakest, reflecting low adoption of cultivation and post-harvest technology.

Leverage analysis shows that land area, market access, and financial management are the principal economic leverage factors; access to training, education level, and farmer solidarity are the principal social factors; women's participation and farmer regeneration are the principal cultural factors; fertilizer and pesticide use together with pest control are the principal environmental factors. Therefore, it requires strengthening the technological, economic, and institutional dimensions without neglecting the social, cultural, and environmental dimensions, which are already relatively strong.

Recommendations

For local government, policy should focus more sharply on strengthening the technological, economic, and institutional dimensions. Expanding farmers' access to agricultural technology, developing marketing infrastructure and networks, and strengthening farmer-group institutions and the extension role. Alongside improving access to farm financing such as micro-credit and capital assistance to encourage farmer investment.

For farmers, it is recommended to build capacity and self-reliance through adoption of more efficient, environmentally friendly cultivation technology and diversification of processed pineapple products to raise value added, together with more active participation in training, extension, and farmer groups, and more systematic financial management to maintain income stability.

For extension institutions and academics, more intensive, needs-based mentoring and training, together with development of appropriate technological innovation suited to dryland conditions, should be pursued, with stronger collaboration among government, academia, and farmers to accelerate innovation diffusion and sustainable pineapple agribusiness development.

FURTHER STUDY

This study is limited by its cross-sectional design and its focus on two districts within East Lombok Regency, which may not fully capture variation across the wider dryland areas of the region. Future research is encouraged to examine the development of the pineapple agribusiness value chain in greater depth, to analyze farmers' adaptation to climate change on dry land, and to apply more dynamic modelling approaches in formulating more effective policy strategies, so that pineapple farming in East Lombok Regency can continue developing into a more productive, adaptive, and thoroughly sustainable farming system.

ACKNOWLEDGMENT

The authors gratefully acknowledge the guidance and supervision of Ir. IGL Parta Tanaya, M. App.Sc., Ph.D. and Dr. Ir. Hayati, M. Hum. throughout this research, as well as the cooperation of farmer respondents, agricultural extension workers, farmer-group administrators, and local government agencies in Masbagik and Pringgasela Districts, East Lombok Regency, who generously provided their time and information during data collection.

REFERENCES

Aditya, R., Gustiawan, A., & Drikarsa, D. (2022). Kampung Nanasku: Implementasi Inovasi Budidaya Tanaman Nanas Oleh Kelompok Tani Mekarsari Maju Desa Sarireja. *Prospect: Jurnal Pemberdayaan Masyarakat*, *1*(1), 1–11.

Alfian, M. (2022). Analisis Usahatani Nanas Di Kelurahan Mundam Kecamatan Medang Kampai Kota Dumai. *Dinamika Pertanian*, *38*(1), 103–110.

ANTARA News. (2025, 14 Juli). *Curah hujan rendah di NTB diprediksi berlanjut hingga Oktober 2025*. https://www.antaranews.com/berita/4965949/curah-hujan-rendah-di-ntb-diprediksi-berlanjut-hingga-oktober-2025?utm_source=chatgpt.com

Antunes, P., Santos, R., Cosme, I., Osann, A., Calera, A., De Ketelaere, D., Spiteri, A., Mejuto, M. F., Andreu, J., Momblanch, A., & others. (2017). A holistic framework to assess the sustainability of irrigated agricultural systems. *Cogent Food \& Agriculture*, *3*(1), 1323542.

Ardianto, A., Zakaria, W. A., Murniati, K., Abidin, Z., & Asmara, S. (2024). Analisis Keberlanjutan Rencana Pengembangan Lahan Sawah Baru: Strategi Peningkatan Produksi Pangan di Kabupaten Lampung Tengah. *Agroteknika*, *7*(4), 460–478.

Arifin, Z., Suparwata, D. O., Rijal, S., & Ramlan, W. (2023). Revitalisasi ekonomi pedesaan melalui pertanian berkelanjutan dan agroekologi. *Jurnal Multidisiplin West Science*, *2*(09), 761–769.

Arsyad, S., & Rustiadi, E. (2008). *Penyelamatan tanah, air, dan lingkungan*. Yayasan Pustaka Obor Indonesia.

Astoko, E. (2019). Konsep Pengembangan Agribisnis Nanas (Ananas Comosus L. Merr.) Di Kabupaten Kediri Provinsi Jawa Timur. *Habitat*, *30*(3), 111–122. https://doi.org/10.21776/ub.habitat.2019.030.3.14

Azizah, J. I., & Trilaksana, A. (2017). Perkembangan Industri Marmer di Desa Besole Kabupaten Tulungagung Tahun 1990-1998. *Journal Pendidikan Sejarah*, *5*(3).

Bell, S., & Morse, S. (2012). *Sustainability indicators: measuring the immeasurable?*. Routledge.

BPS Kabupaten Lombok Timur. (2023). *Kabupaten Lombok Timur Dalam Angka 2023* (Pertama, Vol. 1). BPS Kabupaten Lombok Timur

BPS Kabupaten Lombok Timur. (2024). *Kabupaten Lombok Timur dalam Angka 2024*. Selong: BPS Kabupaten Lombok Timur.

BPS. (2024). *Luas Panen, Produksi, dan Produktivitas Jagung Menurut Provinsi, 2024*. BPS. https://www.bps.go.id/id/statistics-table/2/MjIwNCMy/luas-panen--produksi--dan-produktivitas-jagung-menurut-provinsi.html

Dadi, D. (2021). Pembangunan pertaniandansistem pertanian organik: bagaimana proses serta strategi demi ketahanan pangan berkelanjutan di indonesia. *Jurnal Education and Development*, *9*(3), 566–572.

Delfianto, R., Rayes, M. L., & Agustina, C. (2021). Morfologi dan klasifikasi tanah pada toposekuen lereng barat Gunung Kelud, Kediri, Jawa Timur. *Jurnal Tanah Dan Sumberdaya Lahan*, *8*(2), 539–552.

Desi Suryati, M. E., Rohmiati Amini, M. E., Meiyanti Widyaningrum, M. E., Musniasih Yuniati, M. E., Hadi, M. J., & Ed, M. (2020). Identifikasi Potensi Ekonomi Di Desa Jurit Baru Kecamatan Pringgasela Kabupaten Lombok Timur. *Jurnal Pengabdian Masyarakat*, *1*(1).

Djibran, M. M., Andiani, P., Nurhasanah, D. P., & Mokoginta, M. M. (2023). Analisis pengembangan model pertanian berkelanjutan yang memperhatikan aspek sosial dan ekonomi di Jawa Tengah. *Jurnal Multidisiplin West Science*, *2*(10), 847–857.

Dzikrillah, G. F., Anwar, S., & Sutjahjo, S. H. (2017). Analisis keberlanjutan usahatani padi sawah di Kecamatan Soreang Kabupaten Bandung. *Jurnal Pengelolaan Sumberdaya Alam Dan Lingkungan (Journal of Natural Resources and Environmental Management)*, *7*(2), 107–113.

Efendi, E. (2016). Implementasi sistem pertanian berkelanjutan dalam mendukung produksi pertanian. *Warta Dharmawangsa*, *47*.

Erisa, P. H. (2025). *Evaluasi Keberlanjutan Sistem Integrasi Sapi Dan Kelapa Sawit (Siska) Studi Di Kecamatan Abung Selatan Kabupaten Lampung Utara*. UNIVERSITAS LAMPUNG.

Fatkhullah, M., Mulyani, I., & Imawan, B. (2021). Strategi pengembangan masyarakat petani lahan gambut melalui program tanggung jawab sosial perusahaan: Analisis pendekatan penghidupan berkelanjutan. *Journal of Social Development Studies*, *2*(2), 15–29.

Firmansyah, I. (2022). Multiaspect sustainability analysis. *Expert Simulation Programme Article*, *1*, 1–14.

Firmansyah, I. (2022). Multiaspect sustainability analysis. *Expert Simulation Programme Article*, *1*, 1–14. https://exsimpro.com/wp-content/uploads/2025/02/Multiaspect-Sustainability-Analisys-Exsimpro-Article-2022.pdf

Galushasti, A. (2024). Assessing the Sustainability and Performance of Local Soybean Production in Indonesia: A Multidimensional Scaling Analysis. *International Journal of Sustainable Development and Planning*.

Hadiati, S. (2008). *Budidaya nanas*. Sri Hadiati.

Hafidz, T. A., Permana, P. H., Efendi, S., & Rusmana, F. D. (2024). Pendampingan Pemanfaatan Platform E-Commerce Dalam Meningkatkan Akses Pasar Bagi Petani Nanas. *Jurnal Karya Inovasi Pengabdian Masyarakat (JKIPM)*, *2*(1), 18–27.

Hani, F., Braga, F. S., Stampfli, A., Keller, T., Fischer, M., & Porsche, H. (2003). RISE, a tool for holistic sustainability assessment at the farm level. *International Food and Agribusiness Management Review*, *6*(4), 78–90.

Hanipah, H. S. H., & Tambunan, R. P. (2020). *Increasing local farmers sustainability index status to preserve agricultural sustainability*.

Harsya, E. P., Safitri, I., Riniarti, M., Wulandari, C., & Kaskoyo, H. (2025). Efektifitas Kebijakan Daerah Dalam Pengelolaan Hutan Berbasis Agroforestri. *Makila*, *19*(1), 27–42.

Hasyim, A., Riniwati, H., Atikawati, D., & others. (2025). Climate Smart Agriculture Sustainability: A Multidimensional Assessment. *The Journal of Indonesia Sustainable Development Planning*, *6*(3), 428–447.

Hikmat, M., Hati, D. P., & Sukarman, S. (2022). Kajian lahan kering berproduktivitas tinggi di Nusa Tenggara untuk pengembangan pertanian. *Jurnal Sumberdaya Lahan*, *16*(2), 119–133.

Hikmat, M., Hati, D. P., & Sukarman, S. (2022). Kajian lahan kering berproduktivitas tinggi di Nusa Tenggara untuk pengembangan pertanian. *Jurnal Sumberdaya Lahan*, *16*(2), 119-133.

Jayaputra, J., Nurrachman, N., & Santoso, B. B. (2021). Peningkatan pendapatan petani melalui diversifikasi dan intensifikasi tanaman hortikultura di lahan kering Desa Gumantar Kabupaten Lombok Utara. *Jurnal Gema Ngabdi*, *3*(1), 29–39.

Juhandi, D., Darwanto, D. H., Masyhuri, M., Mulyo, J. H., Sasongko, N. A., Anda, M., & Martini, T. (2023). Farm sustainability assessment and model: achieving food security through the Food Estate Program in North Sumatra. *Land*, *12*(10), 1833.

Juliana, E., Gantini, T., Maria, E. R., Samantha, Y., & others. (2023). Analisis faktor-faktor yang mempengaruhi tingkat keberdayaan perempuan. *Agrivet: Jurnal Ilmu-Ilmu Pertanian Dan Peternakan (Journal of Agricultural Sciences and Veteriner)*, *11*(1), 66–76.

Junita, D. E. (2024). Sosialisasi Pengembangan Inovasi Produk Olahan Buah-Buahan. *Jurnal Pengabdian Kepada Masyarakat Ungu (ABDI KE UNGU)*, *6*(3), 235–242.

Kossi, M. G. E., Djonko, H. B., Chotangui, A. H., Boukong, A., & Awono, J.-P. M. (2023). Typologies of pineapple-based farming systems in Centre-Cameroon. *African Journal of Agricultural Research*, *19*(3), 247–259.

Luo, L., Qiao, D., Tang, J., Wan, A., Qiu, L., Liu, X., Liu, Y., & Fu, X. (2022). Training of farmers' cooperatives, value perception and members' willingness of green production. *Agriculture*, *12*(8), 1145.

Makmun, L., Kameo, D. D., Sunaryanto, L. T., & Mubarokah, W. W. (2024). Dukungan

kelembagaan pertanian bagi petani millenial di era disrupsi pertanian cerdas (Smart Farming)(Kajian keberlanjutan pembangunan pertanian di Provinsi Jawa Tengah). *Jurnal Pengembangan Penyuluhan Pertanian*, *21*(1), 29–41.

Mappasere, S. A., & Suyuti, N. (2019). Pengertian penelitian pendekatan kualitatif. *Metode Penelitian Sosial*, *33*.

Matheus, R., Basri, M., Rompon, M. S., & Neonufa, N. (2017). Strategi pengelolaan pertanian lahan kering dalam meningkatkan ketahanan pangan di Nusa Tenggara Timur. *Partner*, *22*(2), 529–541.

Mokodompit, N. M., Tambas, J. S., & Lumingkewas, J. R. D. (2021). Pengaruh Luas Lahan, Modal Dan Tenaga Kerja Terhadap Produksi Usahatani Nanas (Studi Kasus: Desa Bulud Kecamatan Passi Barat Kabupaten Bolaang Mongondow). *Agri-SosioEkonomi Unsrat*, *17*(3), 2063–2685.

Monica, P. (2025). *Faktor-Faktor Yang Berhubungan Dengan Pengambilan Keputusan Petani Dalam Keberlanjutan Budidaya Nanas Di Desa Astomulyo Kecamatan Punggur Kabupaten Lampung Tengah*.

Mulyani, A., & Suwanda, M. H. (2019). Pengelolaan lahan kering beriklim kering untuk pengembangan jagung di Nusa Tenggara. *Jurnal Sumberdaya Lahan*, *13*(1), 41–52.

Mulyani, A., Nursyamsi, D., & Syakir, M. (2017). Strategi pemanfaatan sumberdaya lahan untuk pencapaian swasembada beras berkelanjutan. *Jurnal Sumberdaya Lahan*, *11*(1), 11–22.

Mulyono, J. (2023). Implementasi program pengembangan food estate di Kalimantan Tengah. *Jurnal Analis Kebijakan*, *7*(1), 13–28.

Munte, S. T. U. A. (2025). Pengaruh Tingkat Pendidikan Petani terhadap Adopsi Teknologi Pertanian. *Circle Archive*, *1*(7).

Nursyamsi, D., Mulyani, A., & Las, I. (2014). Percepatan pengembangan pertanian lahan kering iklim kering di Nusa Tenggara. *Pengembangan Inovasi Pertanian*, *7*(4), 30894.

Oktaviani, D. A., & Lidyana, N. (2023). Peran dan fungsi kelembagaan agribisnis sebagai upaya pembangunan pertanian serta peningkatan kesejahteraan petani. *Jurnal Ilmiah Sosio Agribis*, *23*(2), 101–107.

Oktaviani, D. A., & Rozci, F. (2023). Analisis Penyebab Menurunnya Minat dan Partisipasi Generasi Muda dalam Sektor Pertanian: Analysis of the Causes of Decreasing Interest and Participation of Young Generation in the Agricultural Sector. *Jurnal Ilmiah Manajemen Agribisnis*, *11*(1), 48–56.

P2K STEKOM. (2024). *Kabupaten Lombok Timur*. https://p2k.stekom.ac.id/ensiklopedia/Kabupaten_Lombok_Timur?utm_source=chatgpt.com

Parmila, I. P., Suardike, P., & Prabawa, P. S. (2022). Kajian pertanian organik dalam upaya menyusun kebijakan pembangunan pertanian yang berkelanjutan di kabupaten buleleng. *Jurnal Pertanian Agros*, *24*(3), 1156–1169.

Penuelas, J., Coello, F., & Sardans, J. (2023). A better use of fertilizers is needed for global food security and environmental sustainability. *Agriculture \& Food Security*, *12*(1), 5.

Pretty, J. (2018). Intensification for redesigned and sustainable agricultural systems. *Science*, *362*(6417), eaav0294.

Primasari, C., Saam, Z., & Putra, R. M. (2021). Pengendalian Alih Fungsi Lahan Sawah yang Berkelanjutan di Kecamatan Tambang, Kabupaten Kampar, Riau. *Jurnal Ilmu Lingkungan*, *15*(2), 152.

Puspitasari, Nurmalina, R., Hariyadi, & Agustian, A. (2024). Systems thinking in sustainable agriculture development: a case study of garlic production in Indonesia. *Frontiers in Sustainable Food Systems*, *8*, 1349024.

Puspitasari, T. (2017). *Analisis Keberlanjutan Good Agriculture Practice (Gap) Usahatani Buah Naga Di Desa Jambewangi Kecamatan Sempu Kabupaten Banyuwangi*.

Quintero-Angel, M., & González-Acevedo, A. (2018). Tendencies and challenges for the assessment of agricultural sustainability. *Agriculture, Ecosystems \& Environment*, *254*, 273–281.

Rachman, A., Yochanan, E., Samanlangi, A. I., & Purnomo, H. (2016). Metode Penelitian Kuantitatif Kualitatif dan R&D. *Alfabeta, Bandung*.

Ramadani, A. H., Rosalina, R., & Ningrum, R. S. (2019). Pemberdayaan Kelompok Tani Dusun Puhrejo dalam Pengolahan Limbah Organik Kulit Nanas sebagai Pupuk Cair Eco-enzim. *Prosiding Seminar Nasional HAYATI*, *7*, 222–227.

Ren, Z., Fu, Z., & Zhong, K. (2022). The influence of social capital on farmers' green control technology adoption behavior. *Frontiers in Psychology*, *13*, 1001442.

Riftyan, E. (2024). Pendampingan Pengolahan Permen Jelly Nanas Untuk Penguatan Ekonomi Masyarakat Desa Pagaruyung Provinsi Riau. *Budimas: Jurnal Pengabdian Masyarakat*, *6*(3).

Rini, F., Adhiatma, N., & Porowati, H. (2020). Peningkatan Usaha Kelompok Umkm Dodol Nanas Masagena Di Desa Tangkit Lama. *Suluh Abdi*, *2*(2), 59–65.

Riptanti, E. W., Tammy, H. T., Ani, S. W., & others. (2026). Analisis Faktor-Faktor yang Memengaruhi Regenerasi Petani Padi di Kabupaten Serang. *Agrifo: Jurnal Agribisnis Universitas Malikussaleh*, *11*(1), 98–111.

Sanjaya, M. F., Arham, I., Irlan, I., Mahendra, Y., & Irwansyah, I. (2024). KARAKTERISASI INDIKATOR KESESUAIAN LAHAN KOMODITI NANAS LOKAL (Ananas comosus) KABUPATEN MAJENE. *JTSL (Jurnal Tanah Dan Sumberdaya Lahan)*, *11*(1), 223–232.

Santoso, M. S. (2023). *Harmonisasi Islam Dalam Budaya Masyarakat Tradisional (Ekspresi Berislam pada Kaum Mualaf Suku Anak Sungai Raghwa)*. CV. DOTPLUS Publisher.

Sari, S., & Zahrosa, D. B. (2022). *Lahan Marginal Menyimpan Ragam Potensi*. Polije Press.

Scialabba, N. (2014). SAFA guidelines: sustainability assessment of food and agriculture systems. *Food and Agriculture Organization of the United Nations*.

Sekaranom, A. B., Nurjani, E., & Nucifera, F. (2021). Agricultural climate change adaptation in Kebumen, central Java, Indonesia. *Sustainability*, *13*(13), 7069.

Selvia, S. I. (2022). Penentuan Komoditi Unggulan Dan Potensi Diversifikasi Produk Sub Sektor Hortikultura Dalam Pengembangan Pertanian Di Kabupaten Lombok Timur. *Journal of Agri Rinjani Social Agricultural Economics-Faculty of Agriculture Ugr. Https://Doi. Org/10.53952/Jar. V2i2*, *199*.

Siregar, F. A. (2023). *Pengembangan sistem pertanian berkelanjutan untuk mencapai keberlanjutan pangan*.

Struik, P. C., & Kuyper, T. W. (2017). Sustainable intensification in agriculture: the richer shade of green. A review. *Agronomy for Sustainable Development*, *37*(5), 39. https://doi.org/10.1007/s13593-017-0445-7

Suardi Bakri, M. P. (2019). *Reforma Agraria dan Dinamika Pergeseran Pola Penguasaan Lahan Sawah di Indonesia*. Bukuta CIpta Litera.

Suhartini, S., Ishaq, R. M., Lasitya, D. S., Mujaddid, M. A., Jihad, B. N., Harun, A. A. Y. P., Bahiyah, K. N., & Arcelia, D. Y. (2024). Evaluasi keberlanjutan usahatani sayuran dalam sistem agroforestry di daerah aliran sungai (DAS) brantas hulu, jawa timur, indonesia dengan metode multi dimensional scaling (MDS). *Jurnal Ekonomi Pertanian Dan Agribisnis*, *8*(1), 427–437.

Sukayat, Y., Setiawan, I., Suharfaputra, U., & Kurnia, G. (2023). Determining factors for farmers to engage in sustainable agricultural practices: A case from Indonesia. *Sustainability*, *15*(13), 10548.

Surono, A., & Hidayati, M. N. (2024). Peran Perguruan Tinggi dalam Harmonisasi Kebijakan Pengelolaan SDA Berbasis Kearifan Lokal untuk Ketahanan Nasional. *National Conference on Law Studies (NCOLS)*, *6*(1), 15–55.

Suryanto, A. (2019). *Pola tanam*. Universitas Brawijaya Press.

Syaifudin, S. M. (2020). Budidaya pakan lebah trigona sp. dengan apiculture agroforestry system di kelurahan Anjungan Melancar, Kecamatan Anjungan Kabupaten Mempawah. *Jurnal Ilmiah Pangabdhi*, *6*(1), 17–24.

Tanjung, F. M. (2025). *KOPI TIMBO ABU Pemanfaatan dan Pengelolaan Hutan Berkelanjutan oleh Kelompok Tani Tekad Berkarya Untuk Menunjang Usaha Budidaya Kopi di Kabupaten Pasaman Barat*. Universitas Andalas.

Taoumi, H., & Lahrech, K. (2023). Economic, environmental and social efficiency and effectiveness development in the sustainable crop agricultural sector: A systematic

in-depth analysis review. *Science of the Total Environment*, *901*, 165761.

Taqiuddin, M., Yanuartati, B. Y. E., & Nursalim, I. (2025). Pendampingan Aksi Adaptasi Perubahan Iklim melalui Sekolah Lapangan bagi Petani Lahan Kering di Desa Segala Anyar, Pujut, Lombok Tengah. *Jurnal Pengabdian Magister Pendidikan IPA*, *8*(2), 625–631.

Tesfamichael, D., & Pitcher, T. J. (2006). Multidisciplinary evaluation of the sustainability of Red Sea fisheries using Rapfish. *Fisheries Research*, *78*(2–3), 227–235.

Thamrin, M., Herison, C., & Sabiham, S. (2007). Analisis keberlanjutan wilayah perbatasan Kalimantan Barat-Malaysia untuk pengembangan kawasan agropolitan. *Jurnal Agro Ekonomi*, *25*(2), 103–124.

Toansiba, M., Katmo, E. T. R., Krisnawati, K., & Wambrauw, Y. L. D. (2021). Pengelolaan tanah dalam pengetahuan lokal dan praktik pertanian berkelanjutan pada masyarakat Arfak, Papua Barat. *Jurnal Ilmu Pertanian Indonesia*, *26*(3), 370–378.

Tohiroh, T., Noor, M. A., Mulasih, S., & Sukardi, S. (2025). Strategi Keberlanjutan Bisnis Untuk Usaha Kecil Di Sektor Pertanian. *Jurnal Ilmiah Ekonomi Manajemen \& Bisnis*, *3*(1), 1–7.

Tresnawati, D. (2010). *Analisis pengembangan agroindustri dodol nanas di Kabupaten Subang*.

Ulfa, M., Yuani, E., Dharmayani, N. K. T., & Hadi, S. (2022). Produk Olahan Buah Nenas-Upaya Peningkatan Daya Tarik Wisata dan Ketahanan Pangan di Desa Jurit Baru, Lombok Timur, Nusa Tenggara Barat. *Jurnal Pengabdian Magister Pendidikan IPA*, *5*(3), 64–68.

Wahyudi, T. (2020). *Pengelolaan komoditas hortikultura unggulan berbasis lingkungan*.

Widianto, N. W., & Suprayogo, D. (2003). Pengelolaan dan Pengembangan Agroforestri. *Bahan Ajaran Agroforestri*, *6*, 24.

Yusuf, R., Tang, U. M., Karnila, R., Fuadi, I., & Pato, U. (2020). Ecological sustainability of rice farms in Siak District, Riau, Indonesia. *Biodiversitas*, *21*(8), 3797–3804.