Indonesian Annual Conference Series, Vol. 3, 2024
International Hybrid Conference on Revitalizing Global Economy for Sustainable National Development (*IHCRGESND*), Nigeria

Sustainable Agriculture Development and Food Security: A Systematic Review

Muhammad Ihsan Mattalitti[1], Jamaluddin Hos[2], Sulsalman Moita[2], Ambo Upe[2], Charles N. Kariuki[3]

[1]Universitas Muhammadiyah Kendari, Indonesia
[2]Department of Sociology, Universitas Halu Oleo, Indonesia
[3]Department of Geography and Environmental Studies, Catholic University of Eastern Africa, Kenya
***Corresponding Author**, Email: ihsan.mattalitti@umkendari.ac.id

Abstract

Sustainable agriculture is essential for food security, particularly in regions with significant agricultural potential such as Southeast Sulawesi. This review synthesizes existing research on sustainable agricultural practices in Southeast Sulawesi, focusing on their impact on food security. The review identifies key themes, including the integration of local agricultural practices with modern sustainable methods, the role of local institutions in supporting sustainable agriculture, and the economic and social factors influencing these practices. Financial constraints and labor shortages are highlighted as major barriers to scaling up sustainable agricultural practices. By examining the methodologies employed in the studies and the socio-economic and institutional factors, this review provides a comprehensive understanding of how sustainable agriculture can contribute to a stable food supply in Southeast Sulawesi, offering valuable insights for policymakers and practitioners aiming to implement sustainable agricultural strategies.

Keywords: *Food Security; Southeast Sulawesi; Sustainable Agriculture; Systematic Review.*

INTRODUCTION

Sustainable agriculture is essential for food security, particularly in regions with significant agricultural potential such as Southeast Sulawesi (Kelley, 2020; Ma'mun et al., 2021). Sustainable agriculture covers the practices that maintain or enhance the economic viability of agricultural operations, the quality of the environment, and the quality of life for farmers and society as a whole (Gomiero et al., 2011; Pretty, 2008). In an agricultural landscape like Southeast Sulawesi, where agriculture plays a crucial role in the local community and sustenance (Kelley, 2016), sustainable practices implementation is important to ensure the establishment of agricultural productivity and sustainable improvement (Pandey & Pandey, 2023).

Given its global significance, the issue of sustainable agriculture is increasingly recognized as a critical response to the challenges of climate change, biodiversity loss, and food insecurity (Ericksen et al., 2009; Umesha et al., 2018). The global population is projected to reach nearly 10 billion by 2050, intensifying the demand for food and placing unprecedented pressure on agricultural systems (FAO, 2017). Climate change exacerbates these pressures by altering weather patterns which in turn increases the frequency of extreme weather events and disrupts water availability. Sustainable agricultural practices, such as crop diversification (Hufnagel et al., 2020), conservation tillage (Kuhn et al., 2016), and integrated pest management (Singh et al., 2020), are vital for building resilient food systems that can adapt to these changes (Worstell & Green, 2017). Additionally, sustainable agriculture supports the preservation of biodiversity, which is crucial for ecosystem health and the resilience of agricultural landscapes (Tahat et al., 2020).

Meanwhile, the national prevalence of agricultural challenges, including land degradation, deforestation, and food insecurity, has prompted researchers to address the issues (Nugroho et al., 2022; Widyati et al, 2022). Indonesia's rapid economic development has often come at the expense of its natural resources, with extensive deforestation for palm oil plantations and other agricultural uses leading to severe environmental degradation (Anderson et al., 2016; Kubitza, 2018; Petrenko et al., 2016). Indonesia's agricultural sector must transition to more sustainable practices to address these issues and ensure long-term food security for its population (Duffy et al., 2021). Policies promoting sustainable land management, reforestation, and the use of organic fertilizers are essential for reversing

environmental damage and enhancing agricultural productivity (Sanz et al., 2017). Moreover, Indonesia's commitment to the Sustainable Development Goals (SDGs), in particular Goal 2 (Zero Hunger), highlights the importance of sustainable agriculture in achieving national food security and nutrition targets (Bappenas, 2019).

Locally, Southeast Sulawesi's agricultural sector faces unique challenges and opportunities (Kelley & Prabowo, 2019). The region's diverse agricultural landscapes, which includes wetland areas for crops like sago palm, offers significant potential for sustainable agriculture (Van Noordwijk et al., 2020). However, farmers in Southeast Sulawesi often encounter financial and labor constraints that limit their ability to adopt sustainable practices (Flor et al., 2016). Studies conducted in Southeast Sulawesi context (such as Ehara, 2009; Hasada, 2015; Rampisela et al., 2018) highlight the potential of sago starch production to enhance food security and rural development, yet also point to the need for better access to capital and labor resources. Additionally, local institutions such as the Parabela play a crucial role in managing land rights and supporting sustainable practices (Husain et al., 2013; Mappa et al., 2018; Nalefo et al., 2013). Despite extensive research on Southeast Sulawesi's agricultural sector, there remains a lack of studies on synthesizing the existing research on sustainable agricultural practices pertaining to food security.

To fill this void, this review aims to synthesize existing research in Southeast Sulawesi, focusing on food security. By navigating, identifying, and mapping findings from various studies in the Southeast Sulawesi context, this review seeks to provide a comprehensive understanding of how sustainable agriculture can contribute to a stable and sufficient food supply in this region. The focus of this review will be on understanding the methodologies employed in the studies, the role of local institutions, and the economic and social factors influencing sustainable agricultural practices in Southeast Sulawesi. By addressing these aspects, this review aims to offer a holistic perspective on such factors which in turn will provide valuable insights for policymakers and practitioners aiming to implement sustainable agricultural strategies in enhancing food security in Southeast Sulawesi.

METHODS

This review employs a systematic approach to empirical research publications to ensure a comprehensive, scientific-based, and unbiased understanding of sustainable agricultural development and food security in Southeast Sulawesi. The initial step involved sourcing articles from various reputable academic databases. Each article was meticulously filtered based on several criteria, including relevance to the topic, specific geographic focus on Southeast Sulawesi, and recent publication dates to capture the most current trends and findings. This methodical approach allowed the inclusion of a diverse range of studies, ensuring that the review covers a broad spectrum of perspectives and insights.

To provide a robust analysis, the review includes both qualitative and quantitative studies. Qualitative studies offer in-depth insights into the socio-cultural and institutional dynamics of sustainable agriculture in Southeast Sulawesi, while quantitative studies provide empirical data on economic impacts and agricultural productivity. This dual approach ensures that the review not only addresses the numerical aspects of agricultural development but also understands the underlying human and institutional factors that influence these numbers. By integrating both types of studies, the review achieves a balanced and holistic perspective on the topic.

Key themes identified in the literature include local agricultural practices, institutional roles, and economic impacts. Local agricultural practices focus on the specific methods and crops used by the farmers in Southeast Sulawesi both traditional and modern techniques. Institutional roles encompass the influence of local governance and traditional institutions, such as Parabela in Buton, on agricultural practices and land management (Husain et al., 2013; Nalefo et al., 2013). Meanwhile, economic impacts highlight the financial challenges and opportunities associated with sustainable agriculture, such as the constraints faced by sago starch producers due to a lack of capital for machinery (Hasada, 2015; Saediman et al., 2021). These themes were systematically analyzed to draw comprehensive conclusions about the current state and future directions of sustainable agriculture in Southeast Sulawesi.

RESULTS AND DISCUSSION

Local Agricultural Practices

Local agricultural practices in Southeast Sulawesi play a crucial role in advancing sustainable agriculture and ensuring food security. This region, characterized by its diverse agricultural landscape and significant rural populations, relies heavily on traditional farming practices and local knowledge (Kelley, 2020). These practices have been crucial in maintaining ecological balance and enhancing agricultural productivity, which are essential for the region's food security. According to Altieri (1999), traditional agriculture systems are often more sustainable due to their reliance on local resources and ecological processes. Studies have highlighted that integrating local wisdom with modern sustainable practices can lead to improved crop yields and better resource management. For example, Sudirman et al.'s (2021) study emphasizes the importance of Corporate Social Responsibility (CSR) initiatives in promoting sustainable development goals (SDGs) through agricultural practices in Southeast Sulawesi. With such a provision of essential financial and technical support, the farmers are aided in adopting sustainable practices that could enhance productivity and food security.

Table 1. Local agricultural practices

Crop Cultivation	Livestock Farming	Agroforestry & Integrated Systems
1. Saragih et al. (2003): Influence of transmigration on agriculture	1. Aku et al. (2012): Production system of Bali cattle	1. Marwah (2013): Feasibility of agroforestry systems
2. Ehara (2009): Sago palm as carbohydrate resource	2. Witjaksono (2013): Bali cattle farming system	2. Darwis et al. (2015): Integrated farming system
3. Aslan et al. (2015): Mariculture practices and socio-economic aspects	3. Saili (2020): Cattle production management	3. Mulyoutami et al. (2015): Gender roles in plant species selection
4. Saediman et al. (2015): Cassava processing practices	4. Sulfiar et al. (2020): Semi-intensive cattle production systems	4. Kikuta et al. (2016): Slash-and-burn rice farming
5. Karimuna et al. (2016): Use of bokashi for marginal soils	5. Munadi (2021): Potential development of Bali cattle	5. Limi et al. (2022): Water resource management participation
6. Sadimantara et al. (2018): Local upland rice genotypes performance	6. Munadi et al. (2022): Integrated farmer-livestock business	6. Hidrawati et al. (2023): Traditional agricultural techniques
7. Kandari et al. (2019): Spatio-temporal optimization of food cropland	7. Rahadi et al. (2022): Siompu goat production system	7. Purbaningsih. (2023): Development model of sago agroindustry SMEs
8. Nuryadi et al. (2019): Developing seaweed agribusiness	8. Sulfiar et al. (2022): Sustainability of beef cattle farming	
9. Taridala et al. (2019): Potential of upland rice agribusiness	9. Dahya et al. (2023): Maize and Beef cattle integrated farming system	
10. Estiningtyas et al. (2020): Adaptation strategies for food sovereignty	10. Silistiyani et al. (2023): Feed management in broiler farming	
11. Surni et al. (2020): Small-scale tomato production		
12. Ma'mun et al. (2021): Sustainable irrigation practices		
13. Maretta et al. (2021): Taro utilization for food diversification		
14. Saediman et al. (2021b): Crop shifting practices		
15. Widayati et al. (2022): Sustainable cocoa farming		

16. Fitriani et al. (2023): Local sago food for food security
17. Syahrun et al. (2023): Use of organic fertilizers

One notable study by Hasada (2015) highlights the potential of sago starch production to contribute to rural development and food security in Southeast Sulawesi. Sago palm is particularly well suited to the region's wetland areas and has a high starch yield, making it a promising crop for enhancing food security. Hasada's research emphasizes that sago starch can provide a stable source of food for rural communities. The production of sago starch involves relatively low input costs and can be managed sustainably with proper practices. Moreover, sago palm's ability to thrive in less fertile soils where other crops might fail further highlights its importance in the local agricultural landscape. However, the full potential of sago starch production is yet to be realized due to several challenges, including financial and labor constraints that need to be addressed to scale up production and fully realize its benefits.

Institutional Roles

Local institutions significantly influence sustainable agriculture in Southeast Sulawesi. They play a pivotal role in shaping agricultural practices and policies that enhance food security and environmental sustainability. Traditional governance structures, such as the Parabela in Buton, are instrumental in managing land rights and resource use, ensuring that agricultural activities are conducted in a manner that aligns with cultural traditions and sustainable principles (Husain et al., 2013; Mappa et al., 2018; Nalefo et al., 2013). These institutions facilitate the integration of local knowledge with modern sustainable practices, thereby fostering agricultural resilience. The Parabela's involvement in communal land management and support for local farmers through various initiatives exemplifies how traditional institutions can effectively contribute to sustainable agriculture.

Table 2. Institutional roles

Policy & Governance	Educational & Extension Services
1. Armitage et al. (2007): Political ecology of sustainable livelihoods	1. Marwah (2013): Feasibility of agroforestry systems
2. Nalefo et al. (2013): Institutional sustainable agriculture	2. Arpai (2019): Institutional innovation strategies for rice farming
3. Patulak et al. (2013): Organizational commitment in irrigation management	3. Muthalib et al. (2019): Empowerment model for seaweed farmers
4. Iswandi (2016): Institutional strategies in sustainable agriculture	4. Baka et al. (2023): Teachers' perceptions of sustainable agriculture
5. Patanda et al. (2017): Sustainability of reef fish resources	5. Hidrawati et al. (2023): Traditional agricultural techniques
6. Rahutami (2017): Gender on development and food security	6. Shelindina et al. (2023): Pineapple farming development strategy
7. Limi et al. (2018): Local institutions' roles in food access	7. Syahrun et al. (2023): Use of organic fertilizers
8. Rampisela et al. (2018): Local community-based sago forest development	
9. Susanto et al. (2019): Managed access approach for fisheries	
10. Kilowasid et al. (2020): Sustainability status of watershed management	
11. Nalefo (2020): Cooperative sustainability for beef cattle	
12. Sudirman et al. (2021): CSR contribution to SDGs	
13. Sufrianto (2021): Agribusiness models during Covid-19	
14. Limi (2022): Water resource management participation	
15. Adidharma et al. (2023): Impact of nickel mining on vegetation	
16. Asis et al. (2023): Local community resilience	
17. Ramadhan et al. (2023): Deforestation and flood events	
18. Tambunan (2023): MSMEs role in sustainable	

development
19. Nurniati et al. (2024): Food security status among coastal households

Studies have shown that strengthening local institutions can significantly enhance the effectiveness of sustainable agricultural practices. For instance, Ma'mun et al. (2021) highlight the critical role of local governance in promoting sustainable irrigation practices in Southeast Sulawesi. By supporting infrastructure development and facilitating access to water resources, local institutions help farmers implement more efficient and sustainable irrigation methods. This support not only improves agricultural productivity but also conserves water resources, which are vital for the region's long-term agricultural sustainability. Moreover, local institutions can provide a platform for knowledge sharing and capacity building, enabling farmers to adopt innovative practices that enhance their resilience to environmental challenges.

The economic role of local institutions in sustainable agriculture is also noteworthy. Sudirman et al.'s (2021) study emphasizes the importance of CSR initiatives led by local institutions in achieving SDGs. By channeling resources and support from the corporate sector into sustainable agricultural projects, local institutions can help bridge the financial gaps that often hinder the adoption of sustainable practices. These CSR initiatives can fund the purchase of necessary machinery, support the development of local markets, and provide training for farmers on sustainable practices. This economic support is crucial for overcoming the financial constraints that many smallholder farmers face, thereby enabling them to invest in and sustain more productive and environmentally friendly agricultural practices.

Local institutions also play a vital role in addressing social factors that influence sustainable agriculture. Baka et al. (2023) discuss how vocational schools in Southeast Sulawesi incorporate sustainable agriculture into their curricula, guided by local institutional frameworks. This educational approach not only equips students with the knowledge and skills needed for sustainable farming but also fosters a culture of sustainability within the community. By promoting sustainable agriculture through education, local institutions help cultivate a new generation of farmers who are committed to environmental stewardship and food security. This social investment is essential for ensuring long-term success and sustainability of agricultural practices in Southeast Sulawesi.

Furthermore, local institutions can help mitigate the environmental impacts of agricultural activities. Witjaksono et al. (2020) examine the role of innovation systems supported by local institutions in reducing harvesting losses and promising sustainable agricultural production in Southeast Sulawesi. By encouraging the adoption of advanced technologies and practices, local institutions can help minimize the environmental footprint of agriculture. This includes promoting soil conservation techniques, reducing the use of chemical fertilizers and pesticides, and enhancing biodiversity through agroforestry practices. These environmental initiatives, supported by local institutions, are critical for maintaining the ecological balance and ensuring the sustainability of agricultural systems in Southeast Sulawesi.

Economic and Social Factors

Economic constraints are a major barrier to sustainable agriculture in Southeast Sulawesi. They significantly hinder the region's potential to achieve long-term food security and environmental sustainability. Financial limitations affect farmers' ability to invest in necessary agricultural inputs, such as quality seeds, fertilizers, and modern machinery, which are essential for improving productivity and implementing sustainable practices. According to Hasada (2015), one of the critical challenges faced by farmers in the region is the lack of funds to purchase machinery for sago starch production. This financial barrier prevents farmers from expanding their operations and adopting more efficient, sustainable practices that could enhance both productivity and environmental outcomes.

The lack of access to credit and financial services further exacerbates the economic challenges faced by farmers in Southeast Sulawesi. Studies such as those conducted by Saediman et al. (2015) emphasize that limited financial resources restrict farmers' ability to invest in improved agricultural technologies and infrastructure. This situation is particularly problematic for smallholder farmers who often operate on thin profit margins and cannot afford the upfront costs associated with sustainable agricultural practices.

Without access to credit, these farmers are unable to make necessary investments to transition to more sustainable farming methods, thereby perpetuating a cycle of low productivity and environmental degradation.

Market access is another significant economic constraint impacting sustainable agriculture in Southeast Sulawesi. The study by Sulfiar et al. (2022) on beef cattle farming highlights that poor market infrastructure and lack of reliable market access reduce farmers' incentives to invest in sustainable practices. When farmers cannot secure fair prices for their produce, they are less likely to adopt practices that might initially reduce yields or require additional labor and financial inputs. Improving market access through better infrastructure, such as roads and market facilities, and establishing cooperative societies can help farmers achieve better prices and more stable incomes, thus encouraging the adoption of sustainable practices.

The economic viability of sustainable agriculture is also influenced by external financial support and subsidies. According to Nuryadi et al. (2019), the development of seaweed agribusiness in South Konawe has been significantly aided by government subsidies and financial support programs. These programs help alleviate the financial burden on farmers, making it more feasible for them to adopt sustainable practices. By providing subsidies for sustainable agricultural inputs and practices, governments and local institutions can lower the economic barriers that prevent farmers from transitioning to more sustainable farming methods. Such financial incentives are crucial for promoting sustainable agriculture and ensuring that farmers can afford to make the necessary changes to their practices.

Table 3. Economic impacts

Profitability & Economic Performance	Market Dynamics & Household Economics	Environmental & Resource Management
1. Saediman (2015): Profitability and value addition in cassava processing 2. Saediman (2015): Prioritizing commodities using AHP 3. Leomo et al. (2019): Amelioration on ex-nickel mine soil 4. Saediman et al. (2019): Food security status in cassava-growing village 5. Effendy et al. (2020): Nutrition education impact 6. Saediman et al. (2020): Comparative profitability of melon and watermelon production 7. Surni et al. (2020): Profitability and constraints of small-scale tomato production 8. Saediman et al. (2021): Comparative profitability of rice and horticultural farming 9. Stacey et al. (2021): Sustainable small-scale fisheries livelihoods 10. Tamburaka (2021): Organic rice farming income 11. Fitriani et al. (2023): Local sago food for food security 12. Shelindina et al. (2023): Pineapple farming development strategy	1. Armitage et al. (2007): Political ecology of sustainable livelihoods 2. Pilgrim et al. (2007): Local resource use in remote region 3. Montagnini et al. (2017): Agroforestry and sustainable development 4. Rahim et al. (2019) - Livelihood features of seaweed farming households 5. Zani et al. (2019) - Household food expenditure in cassava-growing village 6. McWilliam et al. (2021): Poverty and prosperity among fishing communities	1. Ido (2015) - Impact of gold mining on water quality 2. Musaruddin M. et al. (2016) - Greenhouse gas emission reduction strategy 3. Rahutami A. I. (2017) - Gender on development and food security 4. Leomo et al. (2019) - Amelioration on ex-nickel mine soil 5. Alam et al. (2020) - Land cover types on soil quality and carbon storage 6. Adidharma et al. (2023) - Impact of nickel mining on vegetation 7. Kilowasidet al. (2023) - Quality of acid soils treated with biochar

Lastly, economic constraints are not only a matter of immediate financial resources but also of long-term economic planning and stability. Saediman et al. (2021) discuss how shifting from rice to horticultural production in Landono Sub-regency has been driven by economic considerations. Farmers in the region are increasingly turning to crops that promise higher economic returns despite the challenges of sustainable farming practices. This shift indicates that economic incentives play a crucial role in farmers' decision-making processes. Sustainable agriculture initiatives need to consider these economic realities and provide long-term economic benefits to encourage widespread adoption among farmers.

CONCLUSION

This review synthesizes existing research on sustainable agricultural practices and their impact on food security in Southeast Sulawesi. Integrating traditional practices with modern sustainable methods can enhance productivity, maintain ecological balance, and improve farmers' quality of life. This review highlights the potential of crops like sago palm, well-suited to the local environment, significantly contributing to food security and rural development. However, financial and labor constraints hinder the scaling up of these practices. Addressing these challenges through improved access to credit, financial services, and market infrastructure is essential for farmers to adopt and sustain efficient land rights, facilitating resource access, and providing knowledge-sharing platforms, strengthening these institutions and integrating them with modern policies can enhance their effectiveness in promoting sustainable practices. Collaboration between local institutions and government agencies is vital for overcoming financial and labor challenges faced by farmers. Economic and social factors significantly influence the adoption and success of sustainable agricultural practices. Ensuring reliable market access, financial support, and community engagement in sustainable initiatives are critical for long-term agricultural sustainability. These efforts will help build resilient food systems capable of adapting to environmental and economic challenges, in conclusion, sustainable agriculture holds great promise for enhancing food security and environmental sustainability in Southeast Sulawesi. By addressing the identified barriers and leveraging local institutions and practices, policymakers and practitioners can develop effective strategies to promote sustainable agricultural development in the region. Future research should continue exploring the integration of traditional and modern practices, the role of local institutions, and the socio-economic factors influencing sustainable agriculture to provide deeper insights and practical solutions for achieving food security in Southeast Sulawesi.

REFERENCES

Adidharma, M. A., Supriatna, S., & Takarina, N. D. (2023). The impact of nickel mining on vegetation index in Molawe Sub-district, North Konawe District, Southeast Sulawesi, Indonesia. *Biodiversitas Journal of Biological Diversity*, *24*(8).

Aku, A. S., Hafid, H., Saili, T., Pagala, M. A., Bain, A., Zulkarnain, D., ... & Libriany, R. (2022, March). Production system of Bali cattle on smallscale farms in Muna Regency. In *International Conference on Improving Tropical Animal Production for Food Security (ITAPS 2021)* (pp. 197-201). Atlantis Press.

Alam, S., Ginting, S., Hemon, M. T., Leomo, S., Kilowasid, L. M. H., Karim, J. K., ... & Wirabuana, P. Y. A. P. (2022). Influence of land cover types on soil quality and carbon storage in Moramo Education Estate, Southeast Sulawesi, Indonesia. *Biodiversitas Journal of Biological Diversity*, *23*(9).

Altieri, M. A. (1999). The ecological role of biodiversity in agroecosystems. *Agriculture, Ecosystems & Environment, 74*(1-3), 19-31.

Anderson, Z. R., Kusters, K., McCarthy, J., & Obidzinski, K. (2016). Green growth rhetoric versus reality: Insights from Indonesia. *Global Environmental Change*, *38*, 30-40.

Armitage, D., & Tam, C. L. (2007). A political ecology of sustainable livelihoods in coastal Sulawesi, Indonesia. *Canadian Journal of Development Studies/Revue canadienne d'études du développement*, *28*(1), 39-57.

Arpai, L. O. (2019). Institutional innovation strategies in raising the income of a rice farming community: A study of Duriaasi Village, Wonggeduku District, Konawe Regency,

Southeast Sulawesi. *Masyarakat, Jurnal Sosiologi*, *24*(2), 5.

Asis, P. H., Surya, R. A., Afiat, M. N., Mattalitti, M. I., & Ekadayanti, W. (2023, December). Seeing the resilience of local communities established: Evidence from the local community in Southeast Sulawesi. In *SSIK 2023: Proceedings of the Regional Seminar on Community Issues, SSIK 2023, 20 September 2023* (p. 212).

Aslan, L. O. M., Iba, W., Ridwan, L. O., Ingram, B. A., Gooley, G. J., & de Silva, S. S. (2015). Mariculture in SE Sulawesi, Indonesia: Culture practices and the socio economic aspects of the major commodities. *Ocean & Coastal Management*, *116*, 44-57.

Baka, W. K., Rianse, U., Hos, J., Salam, I., Fitriani, R., Rianse, I. S., & Munadi, L. O. M. (2023). Southeast Sulawesi Vocational High School (SMK) teachers' perceptions of sustainable agriculture. *Nongye Jixie Xuebao/Transactions of the Chinese Society of Agricultural Machinery*, *54*(10), 94-102.

Bappenas. (2019). *National action plan for the sustainable development goals (SDGs)*. Ministry of National Development Planning/National Development Planning Agency (Bappenas).

Dahya, D., Rusdin, R., Bungati, B., Tando, E., Imran, I., Bananiek, S., ... & Saediman, H. (2023, June). Developing maize and beef cattle integrated farming system and its sustainability. In *AIP Conference Proceedings* (Vol. 2628, No. 1). AIP Publishing.

Darwis, Zaeni, A., Suaib, & Taridala, S. A. A. (2013). Strengthening food and energy security by integrated farming system in Indonesia (Case study of Sindang Kasih Village, South Konawe Regency). *The 8th International Conference on Innovation and Collaboration towards ASEAN Community 2015,* (pp. 62-65).

Duffy, C., Toth, G. G., Hagan, R. P., McKeown, P. C., Rahman, S. A., Widyaningsih, Y., ... & Spillane, C. (2021). Agroforestry contributions to smallholder farmer food security in Indonesia. *Agroforestry Systems*, *95*(6), 1109-1124.

Effendy, D. S., Prangthip, P., Soonthornworasiri, N., Winichagoon, P., & Kwanbunjan, K. (2020). Nutrition education in Southeast Sulawesi Province, Indonesia: A cluster randomized controlled study. *Maternal & child nutrition*, *16*(4), e13030.

Ehara, H. (2009). Potency of sago palm as carbohydrate resource for strengthening food security program. *Indonesian Journal of Agronomy*, *37*(3), 209-219.

Ericksen, P. J., Ingram, J. S., & Liverman, D. M. (2009). Food security and global environmental change: Emerging challenges. *Environmental Science & Policy*, *12*(4), 373-377.

Estiningtyas, W., & Rahman, A. (2020, April). Adaptation strategy for sustainable food sovereignty based on vulnerability and climate risk assessment: a case study of Sulawesi Island. In *IOP Conference Series: Earth and Environmental Science* (Vol. 484, No. 1, p. 012072). IOP Publishing.

FAO. (2017). *The future of food and agriculture: Trends and challenges*. Food and Agriculture Organization of the United Nations.

Fitriani, F., Limi, M. A., & Fyka, S. A. (2023). The role of local sago food in realizing food security of sago farmers in Lasolo District North Konawe Regency in the Covid-19 Pandemic. *JIA (Jurnal Ilmiah Agribisnis): Jurnal Agribisnis dan Ilmu Sosial Ekonomi Pertanian*, *8*(1), 49-56.

Flor, R. J., Singleton, G., Casimero, M., Abidin, Z., Razak, N., Maat, H., & Leeuwis, C. (2016). Farmers, institutions and technology in agricultural change processes: Outcomes from adaptive research on rice production in Sulawesi, Indonesia. *International Journal of Agricultural Sustainability*, *14*(2), 166-186.

Gomiero, T., Pimentel, D., & Paoletti, M. G. (2011). Is there a need for a more sustainable agriculture?. *Critical Reviews in Plant Sciences*, *30*(1-2), 6-23.

Hasada, K. (2015). Economics and constraints of sago starch production at cottage industry level: Case study of Konawe Regency of Southeast Sulawesi Province, Indonesia. *Proceedings of the 12th International Sago Symposium*.

Hidrawati, H., Rianse, U., Iswandi, R. M., & Arafah, N. (2023). The extrinsic motivation of underlying traditional agricultural techniques for coastal and small islands communities in Southeast Sulawesi. *Journal of Tropical*

Industrial Agriculture and Rural Development, *1*(2), 57-64.

Hufnagel, J., Reckling, M., & Ewert, F. (2020). Diverse approaches to crop diversification in agricultural research. A review. *Agronomy for Sustainable Development*, *40*(2), 1-17.

Husain, M. N., Haryadi, F. T, & Wastutiningsih, S. P. (2013). The influence of Parabela's leadership towards society's attitudes in preserving Kaombo forest in Buton regency. *Academic Research International*, *4*(5), 287-309.

Iswandi, R. M. (2016). Institutional strategies in sustainable agricultural development at mining rim area. *Research Journal of Fisheries and Hydrobiology*, *11*(6), 12-17.

Kandari, A. M., Baja, S., Ala, A., Kasim, S., & Taufik, Y. (2019, November). Promoting sustainable agricultural management through spatio temporal optimization of food crop land based on pedo-agroclimate at Kalalasi region, Southeast Sulawesi, Indonesia. In *IOP Conference Series: Earth and Environmental Science* (Vol. 383, No. 1, p. 012005). IOP Publishing.

Karimuna, L., Rahni, N. M., & Boer, D. (2016). The use of bokashi to enhance agricultural productivity of marginal soils in Southeast Sulawesi, Indonesia. *Journal of Tropical Crop Science*, *6*.

Kelley, L. C. (2016). *Politics and policy along an Indonesian commodity frontier: Reconstructing four decades of land use, land cover and livelihood change in Southeast Sulawesi* (Doctoral dissertation, UC Berkeley).

Kelley, L. C. (2020). Explaining the limitations of agricultural intensification initiatives in Sulawesi, Indonesia. *Frontiers in Sustainable Food Systems*, *4*, 529074.

Kelley, L. C., & Prabowo, A. (2019). Flooding and land use change in Southeast Sulawesi, Indonesia. *Land*, *8*(9), 139.

Kikuta, M., Yamamoto, Y., Pasolon, Y. B., Rembon, F. S., Miyazaki, A., & Makihara, D. (2016). How growth and yield of upland rice vary with topographic conditions: A case of slash-and-burn rice farming in South Konawe Regency, Southeast Sulawesi Province, Indonesia. *Tropical Agriculture and Development*, *60*(3), 162-171.

Kilowasid, L. M. H., & Sabaruddin, L. (2020). The sustainability status of Lahumoko watershed management, North Buton Regency, Southeast Sulawesi, Indonesia. *Journal of Environmental Science and Management*, *23*(2).

Kubitza, C. A. (2018). *Land-use change and rural development in Indonesia: Economic, institutional and demographic aspects of deforestation and oil palm expansion* (Doctoral dissertation, Niedersächsische Staats-und Universitätsbibliothek Göttingen).

Kuhn, N. J., Hu, Y., Bloemertz, L., He, J., Li, H., & Greenwood, P. (2016). Conservation tillage and sustainable intensification of agriculture: regional vs. global benefit analysis. *Agriculture, Ecosystems & Environment*, *216*, 155-165.

Leomo, S., Tufaila, M., Adawiyah, R., Rakian, T. C., Alam, S., Mudi, L., & Sutariati, G. A. K. (2019, May). The effectiveness of cover crop and rhizobacteria as amelioration on ex-nickel mine soil Southeast Sulawesi. In *IOP Conference Series: Earth and Environmental Science* (Vol. 260, No. 1, p. 012146). IOP Publishing.

Limi, M. A., Arimbawa, P., Rahmah, N., & Cahyono, E. (2018). The roles of local institutions to improve farmer access to foods and production capacities. *WSEAS Transactions on Business and Economics*, *15*, 488-494.

Limi, M. A., Fyka, S. A., Taridala, S. A. A., & Dewi, H. S. (2022, December). The relationship of the participation of rice farmers in managing water resources to rice production during the Covid 19 pandemic. In *IOP Conference Series: Earth and Environmental Science* (Vol. 1107, No. 1, p. 012071). IOP Publishing.

Ma'mun, S. R., Loch, A., & Young, M. D. (2021). Sustainable irrigation in Indonesia: A case study of Southeast Sulawesi Province. *Land Use Policy*, *111*, 1-12.

Mappa, N., Salman, D., Siregar, A. R., & Arsyad, M. (2018). Institutional land mastery rotating, pattern of purchase right land tenure. *Scientific Research Journal (SCIRJ)*, *7*(3), 78-82.

Maretta, D., Helianti, I., & Santosa, E. (2021, November). Current status of taro (Colocasia esculenta) utilization as local food

diversification toward climate resilience in Indonesia. In *IOP Conference Series: Earth and Environmental Science* (Vol. 913, No. 1, p. 012027). IOP Publishing.

Marwah, S. (2013). Physical feasibility study of agroforestry farm systems to support sustainable agriculture in Konaweha sub watershed of southeast Sulawesi. *Journal of Tropical Soils*, *17*(3), 275-282.

Montagnini, F., & Metzel, R. (2017). The contribution of agroforestry to sustainable development goal 2: end hunger, achieve food security and improved nutrition, and promote sustainable agriculture. *Integrating landscapes: Agroforestry for biodiversity conservation and food sovereignty*, 11-45.

Mulyoutami, E., Roshetko, J. M., Martini, E., & Awalina, D. (2015). Gender roles and knowledge in plant species selection and domestication: a case study in South and Southeast Sulawesi. *International Forestry Review*, *17*(4), 99-111.

Munadi, L. M. (2021). Potential development of Bali cattle in Muna Regency in efforts to support national meat self-sufficiency. *International Journal of Scientific Research in Science, Engineering and Technology, 7*(1), 193-203.

Munadi, L. M., Sandiah, N., Aku, A. S., Aka, R., & Napirah, A. (2022). Integrated farmer-livestock business in Opaasi Village, West Ranomeeto District, South Konawe Regency. *International Journal of Community Service*, *2*(1), 46-57.

Muthalib, A. A., Putera, A., Rumbia, W. A., Adam, P., Nuryadi, A. M., Wawo, A. B., & Nur, M. (2019). An empowerment model of seaweed farmers in coastal area of Southeast Sulawesi, Indonesia. *Aquaculture, Aquarium, Conservation & Legislation*, *12*(6), 2252-2260.

Nalefo, L., Jusoff, K., Ali, M. S. S., Salman, D., Demalino, E. B., Meisanti, Muhidin, Ismail, I. Y., Kamaluddin, M., & Nurwati. (2013). Towards an institutional sustainable agriculture in Parabela. *World Applied Sciences Journal*, 26, 55-59.

Nugroho, H. Y. S. H., Indrawati, D. R., Wahyuningrum, N., Adi, R. N., Supangat, A. B., Indrajaya, Y., ... & Hani, A. (2022). Toward water, energy, and food security in rural Indonesia: A review. *Water*, *14*(10), 1-25.

Nurniati, N., Saediman, H., & Sadimantara, F. N. (2024). Assessing food security status among coastal households in Sambuli Village in Southeast Sulawesi. *International Journal of Research in Engineering, Science and Management*, *7*(4), 101-104.

Nuryadi, A. M., Sara, L., Rianda, L., & Bafadal, A. (2019). A model for developing seaweed agribusiness in South Konawe, Southeast Sulawesi, Indonesia. *AACL Bioflux, 12*(5), 1718-1725.

Pandey, P. C., & Pandey, M. (2023). Highlighting the role of agriculture and geospatial technology in food security and sustainable development goals. *Sustainable Development*, *31*(5), 3175-3195.

Patanda, M., Wisudo, S. H., Monintja, D. R., & Wiryawan, B. (2017). Sustainability for reef fish resource based on productivity and susceptibility in Wangi-Wangi Island, Southeast Sulawesi, Indonesia. *Aquaculture, Aquarium, Conservation & Legislation*, *10*(4), 861-874.

Patulak, M. E., Thoyib, A., & Setiawan, M. (2013). The role of organizational commitment as mediator of organizational culture and employees' competencies on employees' performances (A study on Irrigation Area Management in Southeast Sulawesi). *Journal of Economics and Sustainable Development*, *4*(5), 166-175.

Petrenko, C., Paltseva, J., & Searle, S. (2016). *Ecological impacts of palm oil expansion in Indonesia.* Washington (US): International Council on Clean Transportation.

Pilgrim, S., Cullen, L., Smith, D., & Pretty, J. (2007). Hidden harvest or hidden revenue-A local resource use in a remote region of Southeast Sulawesi, Indonesia. *Indian Journal of Traditional Knowledge*, *6*(1), 150-159.

Pretty, J. (2008). Agricultural sustainability: Concepts, principles and evidence. *Philosophical Transactions of the Royal Society B: Biological Sciences, 363*(1491), 447-465.

Purbaningsih, Y., Prihantini, C. I., Abd Karim, A. T., & Sejati, A. E. (2023). Development model of sago agroindustry small and medium enterprises

(SMEs) in Southeast Sulawesi Province: Income and strategy analysis. *HABITAT*, *34*(1), 60-71.

Rahadi, S., Isnaini, N., Hakim, L., Ciptadi, G., Susilawati, T., & Nurgiartiningsih, V. M. A. (2022, March). Typology and characterization of Siompu goat production systems in Siompu Island, Southeast Sulawesi, Indonesia. In *International Conference on Improving Tropical Animal Production for Food Security (ITAPS 2021)* (pp. 213-219). Atlantis Press.

Rahim, M., Aslan, L. O. M., Ruslaini, Taridala, S. A. A., Wianti, N. I., Nikoyan, A., ... & Hafid, H. (2019, November). Livelihood features of seaweed farming households: A case study from Bungin Permai Village, South Konawe, South East (SE) Sulawesi, Indonesia. In *IOP Conference Series: Earth and Environmental Science* (Vol. 370, No. 1, p. 012025). IOP Publishing.

Rahutami, A. I. (2017). Ensuring food security and reducing poverty through gender on development: Indonesian case. *Journal of Business and Economic Studies, 11*(1), 1-21.

Ramadhan, C., Dina, R., & Nurjani, E. (2023). Spatial and temporal based deforestation proclivity analysis on flood events with applying watershed scale (case study: Lasolo watershed in Southeast Sulawesi, Central Sulawesi, and South Sulawesi, Indonesia). *International Journal of Disaster Risk Reduction*, *93*, 103745.

Rampisela, D. A., Sjahril, R., Lias, S. A., & Mulyadi, R. (2018, May). Transdisciplinary research on local community based sago forest development model for food security and marginal land utilization in the coastal area. In *IOP Conference Series: Earth and Environmental Science. 157*(1), p. 012065). IOP Publishing.

Sadimantara, G. R., Kadidaa, B., & Safuan, L. O. (2018, February). Growth performance and yield stability of selected local upland rice genotypes in Buton Utara of Southeast Sulawesi. In *IOP Conference Series: Earth and Environmental Science* (Vol. 122, No. 1, p. 012094). IOP Publishing.

Saediman, H. (2015). Prioritizing commodities in Southeast Sulawesi Province of Indonesia using AHP based Borda count method. *Asian Social Science*, *11*(15), 171-179.

Saediman, H., Aisa, S., Zani, M., Limi, M. A., & Yusria, W. O. (2019). Food security status of households in a cassava-growing village in Southeast Sulawesi, Indonesia. *Journal of Agricultural Extension*, *23*(1), 199-209.

Saediman, H., Alwi, L. O., Rianse, I. S., Taridala, S. A. A., Salahuddin, Indarsyih, Y., & Astuti, R. W. (2020). Comparative profitability of melon and watermelon production in South Konawe District of Southeast Sulawesi. *WSEAS Trans. Bus. Econ*, *17*, 933-939.

Saediman, H., Amini, A., & Basiru, R. (2015). Profitability and value addition in cassava processing in Buton district of Southeast Sulawesi Province, Indonesia. *Journal of Sustainable Development*, *8*(1), 226-234.

Saediman, H., Helviani, Said, L. R., Sarinah, S., Taridala, S. A. A., Alwi, L. O., & Rianse, I. S. (2021). Market structure of sago starch in Southeast Sulawesi, Indonesia. *WSEAS Transactions on Business and Economics*, *18*, 628-635.

Saediman, H., Indarsyih, Y., Abdullah, S., Fyka, S. A., & Mboe, I. S. (2021, April). Assessing major drivers of crop shifting from rice to horticultural production: A case of Landono sub-regency in Southeast Sulawesi. In *IOP Conference Series: Earth and Environmental Science, 724*(1), p. 012006). IOP Publishing.

Saili, T. (2020, March). Production and reproduction performances of Bali cattle in Southeast Sulawesi-Indonesia. In *IOP Conference Series: Earth and Environmental Science* (Vol. 465, No. 1, p. 012004). IOP Publishing.

Sanz, M. J., De Vente, J., Chotte, J. L., Bernoux, M., Kust, G., Ruiz, I., ... & Akhtar-Schuster, M. (2017). Sustainable land management contribution to successful land-based climate change adaptation and mitigation: A report of the science-policy interface. In *Bonn, Germany: United Nations Convention to Combat Desertification (UNCCD)*.

Saragih, H., Okuhira, H., & Yoshida, S. (2003). Influence of transmigration on sustainable agriculture in Southeast Sulawesi, Indonesia. *Micronesica Supplement*, *7*, 17-40.

Shelindina, S., Bahari, B., Rosmawaty, R., & Saediman, H. (2023). Strategy for developing

pineapple farming in South Konawe District of Southeast Sulawesi. *International Journal of Research in Engineering, Science and Management*, *6*(8), 83-88.

Silistiyani, N., Bahari, B., Fyka, S. A., & Saediman, H. (2023). Feed management and net returns in broiler farming in South Konawe District of Southeast Sulawesi. *International Journal of Research in Engineering, Science and Management*, *6*(8), 138-141.

Singh, A., Dhiman, N., Kar, A. K., Singh, D., Purohit, M. P., Ghosh, D., & Patnaik, S. (2020). Advances in controlled release pesticide formulations: Prospects to safer integrated pest management and sustainable agriculture. *Journal of Hazardous Materials*, *385*, 121525.

Stacey, N., Gibson, E., Loneragan, N. R., Warren, C., Wiryawan, B., Adhuri, D. S., ... & Fitriana, R. (2021). Developing sustainable small-scale fisheries livelihoods in Indonesia: Trends, enabling and constraining factors, and future opportunities. *Marine Policy*, *132*, 104654.

Sudirman, F. A., Upe, A., & La Ode Herman, F. T. S. (2021, March). Corporate social responsibility (CSR) contribution to achieve sustainable development goals (SDGs) in Southeast Sulawesi. In *Proceedings of the 11th Annual International Conference on Industrial Engineering and Operations Management Singapore* (pp. 7-11).

Sufrianto, S., & Danggi, E. (2021). The improvement agribusiness models on cashew nut production based integrated farming systems at South East Sulawesi Province during Covid 19 pandemic. *International Journal of Management and Education in Human Development*, *1*(01), 38-45.

Sulfiar, A. E. T., Atmoko, B. A., Guntoro, B., & Budisatria, I. G. S. (2020, March). The profiling of the farmers with semi-intensive and intensive cattle production systems in South Konawe District, Southeast Sulawesi Province. In *IOP Conference Series: Earth and Environmental Science,* 465(1), p. 012061. IOP Publishing.

Surni, Saediman, H., Wulandari, F., Zani, M., Yunus, & Taridala, S. A. A. (2020). Profitability and constraints of small-scale tomato production in Baubau municipality of Southeast Sulawesi. *WSEAS Transactions on Environment and Development*, *16*, 219-225.

Susanto, H. A., Hotra, L., & Alfian, M. (2019). A managed access approach to sustain small-scale fisheries management in southeast Sulawesi, Indonesia. In *Global Conference on Tenure and User Rights in Fisheries 2018: Achieving Sustainable Development Goals by 2030*.

Syahrun, Niampe, L. Suraya, R. S., Jers, L. O. T., Alias, & Aso, L. (2023). Local knowledge of farmer communities in the use of organic fertilizers to increase cashew production in Buton Utara Regency, Southeast Sulawesi Province, Indonesia. *Sociology*, *13*(4), 188-195.

Tahat, M., M. Alananbeh, K., A. Othman, Y., & I. Leskovar, D. (2020). Soil health and sustainable agriculture. *Sustainability*, *12*(12), 4859.

Tambunan, T. (2023). Sustainable development goals and the role of MSMEs in Indonesia. *OIDA International Journal of Sustainable Development*, *16*(01), 51-72.

Tamburaka, I. P. (2021, June). Analysis of organic rice farming income in Kulisusu North Buton District, Southeast Sulawesi. In *IOP Conference Series: Earth and Environmental Science* (Vol. 782, No. 2, p. 022005). IOP Publishing.

Taridala, S. A. A., Abdullah, W. G., Tuwo, M. A., Bafadal, A., Fausayana, I., Salam, I., & Wahyuni, S. (2019, May). Exploration of the potential of upland rice agribusiness development in South Konawe District, Southeast Sulawesi. In *IOP Conference Series: Earth and Environmental Science* (Vol. 260, No. 1, p. 012011). IOP Publishing.

Umesha, S., Manukumar, H. M., & Chandrasekhar, B. (2018). Sustainable agriculture and food security. In *Biotechnology for sustainable agriculture* (pp. 67-92). Woodhead Publishing.

Van Noordwijk, M., Ekadinata, A., Leimona, B., Catacutan, D., Martini, E., Tata, H. L., ... & Zulkarnain, T. (2020). Agroforestry options for degraded landscapes in Southeast Asia. *Agroforestry for Degraded Landscapes: Recent Advances and Emerging Challenges, 1*, 307-347.

Widayati, W., Abdullah, W. G., Romantiaulia, W. I., & Mihrad, E. S. (2022, June). Sustainable cocoa farming to face environmental changes. In *IOP*

Conference Series: Earth and Environmental Science (Vol. 977, No. 1, p. 012055). IOP Publishing.

Widyati, E., Nuroniah, H. S., Tata, H. L., Mindawati, N., Lisnawati, Y., Darwo, ... & van Noordwijk, M. (2022). Soil degradation due to conversion from natural to plantation forests in Indonesia. *Forests*, *13*(11), 1-21.

Witjaksono, J. (2013). The potential of local feed sources to enhance the performance of Bali cattle farming system in southeast Sulawesi. *International Journal of Agricultural Science and Research, 3*(2), 149-154.

Witjaksono, J., Rawung, J. B. M., Indrasti, R., & Tan, S. S. (2020). Role of the innovation system in supporting regional agriculture development: Evidence from Southeast Sulawesi Province Indonesia. *Academic Journal of Interdisciplinary Studies*, *9*(5), 78-89.

Worstell, J., & Green, J. (2017). Eight qualities of resilient food systems: Toward a sustainability/resilience index. *Journal of Agriculture, Food Systems, and Community Development*, *7*(3), 23-41.

Zani, M., Saediman, H., Abdullah, S., Daud, L., & Yunus, L. (2019). Determinants of household food expenditure in a cassava growing village in southeast Sulawesi. *Academic Journal of Interdisciplinary Studies*, *8*(3), 302-310.