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A MODELLING FOR SUSTAINABLE OIL PALM DEVELOPMENT IN SOUTH HALMAHERA, INDONESIA: AN EVIDENCE FROM LOCAL COMMUNITY

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Abstract: Studies on sustainable development in Indonesia's palm oil industry hardly focus on local communities. This study aimed to examine the indicators of Sustainable Development Goals (SDGs) using Indonesian Sustainable Palm Oil (ISPO) principles and criteria in a sustainability model. It was conducted in Gane Dalam, Jibubu, and Yamli villages in South Halmahera District, North Maluku Province using a sample of 200 respondents. Data were analysed using Structural Equation Modelling-Partial Least Squares (SEM-PLS). SDG indicators were found to have a positive and significant effect on ISPO. These indicators include poverty alleviation, food security, gender equality, income, the processing industry, infrastructure, and conflict resolution. Other indicators include company consistency, overlapping interests, efficient natural resource use, land rehabilitation and conservation, and animal protection. Additionally, the sustainable development model moves from the social to environmental development pillar, impacting Indonesian Sustainable Palm Oil standards and criteria.

Keywords: Sustainability, Oil Palm, Local Community, Sustainable Development, Modelling.

Introduction

The rapid development of the palm oil industry in North Maluku Province was marked by the opening of 8,500 hectares for cultivation in 2008 in the South Halmahera District (North Maluku Statistics Agency, 2020). A study on oil palm sustainability focusing on rural communities is important for several reasons. First, rural communities determine the future of oil palm sustainability, especially on the social pillars (Pye, 2019). Second, they are long-term investments for plantation expansion and oil palm sustainability (Moreno-Peñaranda *et al*., 2015). Third, the SDGs and ISPO sustainability in the palm oil industry contributes to resolving social conflicts in rural communities by synergising the government and companies (Hidayat *et al*., 2018). The sustainable development theory covers (1) Natural resources managed to maintain non-declining future production opportunities, (2) Managing the production of natural resource services, (3) Balance and resilience for fulfilling ecosystems, and (4) Community utility and consumption that does not decrease over time. Therefore, this theory has been implemented in the government's strategy for SDGs and outlined in ISPO for palm oil companies.

Implementing strong palm oil sustainability indicators creates high internal and social coherence. This coherence is interconnected with community activities oriented toward plans and actions (Ruysschaert *et al*., 2019). The main goal of sustainable development (SDGs) is achieving transformative and inclusive change. Therefore, SDGs' ability should be strengthened with the

role of local communities supported by regional governments, institutions, and previously formed power relations (Siegel & Lima, 2020). The palm oil industry's sustainability should also be maintained to support the local communities livelihoods regarding socio-economic aspects, poverty alleviation, and food security (Hanafiah *et al*., 2021). The socio-economic aspects of oil palm SDGs are important for local communities, especially concerning food security and income generation. In Indonesia, local people's income could reach 36%-37% (Campbell, 2019). One of the world's largest sustainability standards in the palm oil industry is the Roundtable on Sustainable Palm Oil (RSPO), implemented in Sumatra and Papua. It has overcome the local communities' social problems, especially poverty (Santika *et al*., 2019).

Indonesia's oil palm plantations are required to be sustainable through the Regulation of the Minister of Agriculture of Indonesia Number 19 of 2015. The plantations must ensure sustainable production by being responsible to the surrounding community, individuals, and workers (Apriyanto *et al*., 2020). Therefore, this study aimed to (1) Assess the oil palm development sustainability in South Halmahera Regency using SDGs indicators and ISPO criteria from the local community perspective, (2) Build and evaluate a sustainable development model for oil palm development that integrates SDGs indicators and incorporates ISPO. This study complements the limitations of previous studies regarding (1) the use of selected SDGs indicators considered more inclusive of the local communities, (2) In integrating the indicators with ISPO from the local community perspective towards oil palm development in South Halmahera.

Therefore, this study proposed several hypotheses related to its objectives. First, the application of SDGs in the South Halmahera District is sustainable from a community perspective. Second, SDGs' pillars of social development (X1), economic development (X2), legal and governance development (X3), and environmental development (X4) positively and significantly impact the oil palm development sustainability (ISPO) in South Halmahera from a local community perspective. Third, the model is suspected to be precise and strong for predicting because it has fulfilled the goodness of fit rule. This study aimed to assess the sustainability of oil palm development using SDGs indicators and ISPO criteria by focusing on local communities. Furthermore, it aimed to build and evaluate an oil palm sustainable development model that integrates SDGs indicators and ISPO criteria.

The findings could help the government and related institutions formulate an oil palm development strategy that integrates the SDG's social, economic, environmental, legal, and governance pillars with ISPO criteria from the local community perspective towards sustainable prosperity.

Materials and Methods

Study Area

This study was conducted in Gane Dalam, Jibubu, and Yamli villages in South Halmahera District, North Maluku Province, Indonesia. The location was selected because (1) The palm oil industry's development activities are geographically close to the three villages, (2) Most of the workers active on the plantation come from the surrounding community, (3) At the beginning of the plantation development, the villages often interacted with companies, specifically regarding permits and land clearing. The study was conducted from 12 October to 9 November 2021. More details on the location are shown in Figure 1.

Data Collection

This study uses a survey method to collect verbal information from reporting respondents about situations that involve themselves. This facilitated generalising the data by only studying a small part of the population (Rea &

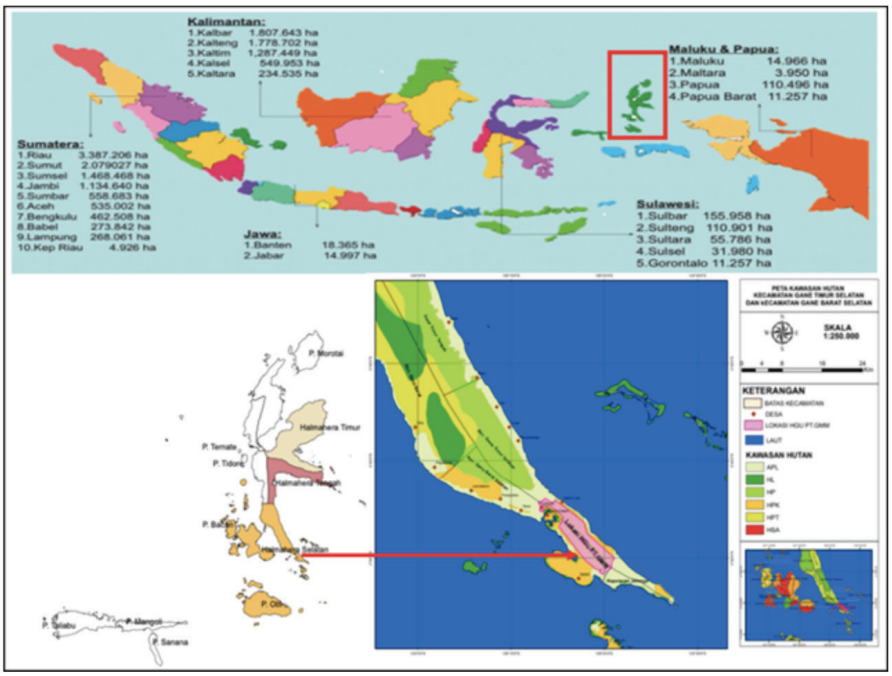

Figure 1: Location of study

Parker, 2014). Furthermore, interviews were used to analyse various issues from a diverse sample of respondents using a varied format of questions (Crano *et al*., 2015). This method helps obtain information about the study topic by observing the community. Table 1 provided the questionnaire using relevant and contextual variables and indicators related to SDGs and ISPO.

Sampling Method

A simple random sampling method was used to obtain samples from the population of rural communities living around the oil palm development area. The sampling method was selected because the community in the study location is homogeneous. According to Hair *et al*. (2011) and Peng and Lai (2012), the minimum number of samples used in Structural Equation Modeling (SEM) is ten times the number of indicators in the model, often called The 10-times rule method. There were 19 valid indicators in this study, meaning the minimum sample size is 190 rural communities. This study used 200 respondents to obtain the better result of SEM-PLS. The following in Table 2 explains the characteristics of the respondents.

Data Analysis

The SEM-PLS method begins with (1) theory formation, (2) model construction, (3) hypothesis formulation, and (4) development of a framework described through the relationship between latent and manifest variables, as shown in Figure 2. SEM-PLS is a strong analytical method that negates the assumptions of normality, heteroscedasticity, multicollinearity, and autocorrelation in Ordinary Least squares (Wang & Wang, 2012). Also, this approach does not require a large sample to test a theory's weaknesses (Kock & Hadaya, 2018). SEM-PLS explains the relationship between latent variables in a model and confirms the theory used in the model structure (Hair *et al*., 2018). A previous study used this approach to establish a policy integration model for palm-based biodiesel as a renewable commodity to support energy security in Indonesia (Zafriana *et al*., 2021). Rosanna *et*

Table 1: SDGs and ISPO Variables and Indicators and Empirical Basis

Variable	Indicator	Empirical Foundation
Social	Poverty Alleviation (G.1)	Mardiharini *et al.,* 2021; Ayompe *et al.,* 2021; Applanaidu *et al.,* 2021; Reed, 2018; Basnett *et al.,* 2016; Agbamu, 2016; Sarku, 2016
	Food Security (G.2)	
	Gender Equality (G.5)	
Economy	Income (G.8)	Syahza, 2019; Edwards, 2019; Mukti *et al.,* 2014; Davies *et al.,* 2020; Kushairi *et al.,* 2018; Widyatmoko, 2020; Tambi *et al.,* 2021
	Processing Industry (G.9)	
	Infrastructure (G.9)	
	Conflict (G.16)	
Law and Governance	Company Consistency towards Community Welfare (G.16)	Dhiaulhaq *et al.,* 2014; Mubin, 2019; Bhinekawati, 2017; Tamrin *et al.,* 2014
	Overlapping Interests (G.16)	
Environment	Efficient Utilisation of Natural Resources (G.15)	Khatun *et al.,* 2017; Meijaard *et al.,* 2018; Paoli, 2014
	Land Rehabilitation and Conservation (G.15)	
	Animal Protection (G.15)	
	Principles and Criteria	Empirical Foundation
ISPO	Compliance with Regulations and Legislation	Luttrell *et al.,* 2018; Kunene and Chung, 2020; Isharyadi *et al.,* 2021; Firdaus *et al.,* 2020
	Application of Good Plantation Practices	
	Management of the Environment, Natural Resources, and Biodiversity	
	Employment Responsibilities	
	Social Responsibility and Community Economic Empowerment	
	Transparency Applicator	
	Continuous Business Improvement	

al. (2021) used a longitudinal analysis through SEM-PLS to examine European countries' sustainable development systems (SDGs). In contrast, this study combined indicators in the four SDGs to examine oil palm development. It also used ISPO criteria for companies from the perspective of local communities in the South Halmahera District, North Maluku.

SEM-PLS analysis comprises the measurement of outer and structural or inner models. The outer model shows how the manifest variables represent endogenous and exogenous latent variables. In contrast, the inner model shows the estimation power between latent variables. The outer model is evaluated by assessing its validity and reliability. Validity is measured through loading factor, Average

Table 2: Characteristics of respondents

Village	Respondent	Percentage	Gender		Age
			Male	Female	
Gane Dalam	93	46.5%	49	44	17-76 years old
Jibubu	56	28%	25	31	15-65 years old
Yamli	51	25.5%	34	17	18-72 years old
Total	200	100%	108	92	-
Education					
Village	**No school**	**Elementary School**	**Junior High School**	**Senior High School**	**University**
Gane Dalam	2	26	16	31	18
Jibubu	5	20	15	10	6
Yamli	2	19	10	12	8
Total	9	65	41	53	32
The Main Occupation					
Village	**Not yet working**	**Farmers and Fishermen**	**Trader**	**Civil Servant**	**Others**
Gane Dalam	3	38	0	3	49
Jibubu	1	32	1	0	22
Yamli	1	29	2	1	18
Total	5	99	3	4	89

Variance Extracted (AVE), and cross-loading. Subsequently, reliability is measured by Cronbach's alpha and composite reliability. The loading factor, cross-loading, Cronbach's alpha and composite reliability must be > 0.7 as well the Average Variance Extracted (AVE) must be > 0.5 to fulfil the criteria of validity and reliability of SEM-PLS (Hair *et al*., 2011; Hair *et al*., 2018).

The inner model shows the relationship and the estimation power between latent variables or constructs. SEM-PLS is built for models with one-way causality, where the relationship between exogenous and endogenous variables is called a causal chain system. Moreover, the inner or structural model is reviewed through assessments, including the value of R^2, Q^2, and hypothesis testing or significance. Some criteria for inner model assessment are the R^2 at least must be ≥ 0,25 and the Q^2 must be > 0. It showed that the model has predictive relevance. The significance test must have a t-value of 1.96 (α = 5%) or 2.58 (α = 1%) (Hair *et al*., 2011; Hair *et al*., 2019).

The model built for developing the palm oil industry in North Maluku was evaluated using the Goodness of Fit (GoF) index. The index criteria for the SEM-PLS model were developed by Tenenhaus *et al*. (2004) and Henseler & Sarstedt (2013). The GoF must be ≥ 0.36. This

index evaluates the inner and outer models and provides information about the overall model's simple measurements. The GoF index is calculated through the square root of the average communality index and the average R-squares mathematically formulated as:

$$GoF = \sqrt{\overline{Com} \times \overline{R^2}} \quad \textbf{(1)}$$

where:

GoF = *Goodness of Fit*

$\overline{Com}$ = Average communality index

$\overline{R^2}$ = Average *R-squares*

The other indicator used to evaluate the SEM-PLS model is the standardised root mean square residual (SRMR) proposed by Henseler *et al*. (2014). It is a criterion to test the model fit in the SEM-PLS analysis. SRMR could validate a model by measuring the squared difference between its observed and implied correlation. Furthermore, it measures absolute fit, where zero indicates a perfect fit. The SRMR value was obtained through bootstrapping in PLS 3.0 software. An SRMR value < 0.08 indicates that the model on the SEM-PLS is acceptable (Hu & Bentler, 1999). However, Byrne (2008) found that the SRMR value must be < 0.05 to test the fit of a model in SEM-PLS.

Results and Discussion

This study analysed the sustainability of oil palm development in South Halmahera District, North Maluku Province, from the local community perspective. The results were divided into the measurement or outer model and the structural or inner model. A systematic explanation of the results is as follows:

Outer Model

An analysis was conducted to show that the measurement model built is valid and reliable for further use. The reliability of the analytical model is shown by the degree to which the latent variable explains the indicator variance based on the loading factor value. This study used a loading factor limit of 0.70. Figure 2 shows the results of the initial model loading factor.

The loading factor value in Figure 2 shows several indicators or constructions smaller than 0.70. Therefore, the model was modified by eliminating loading factor values less than 0.70. Figure 3 shows the new model after modification, where the indicators or constructions have a value of more than 0.70. Based on these findings, it is clear that the model developed in this study meets the criteria for validity and reliability.

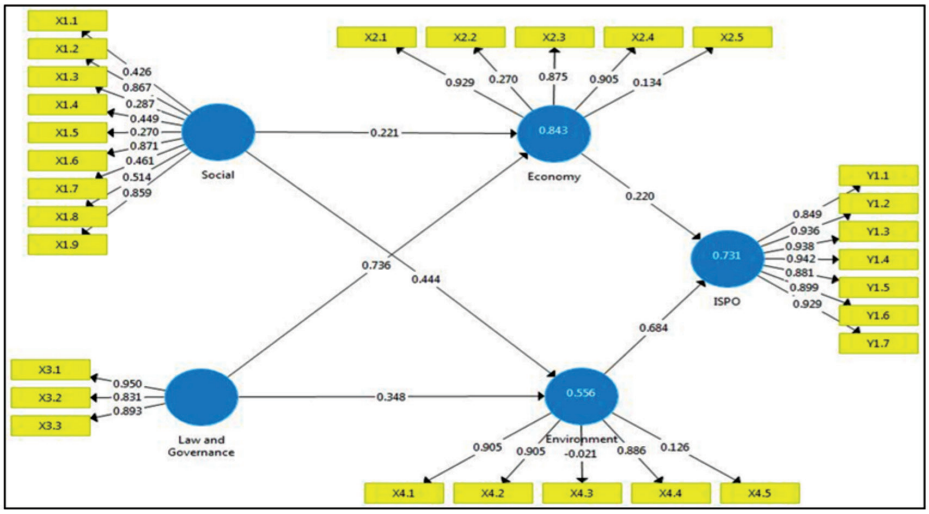

Figure 2: Initial model loading factor value

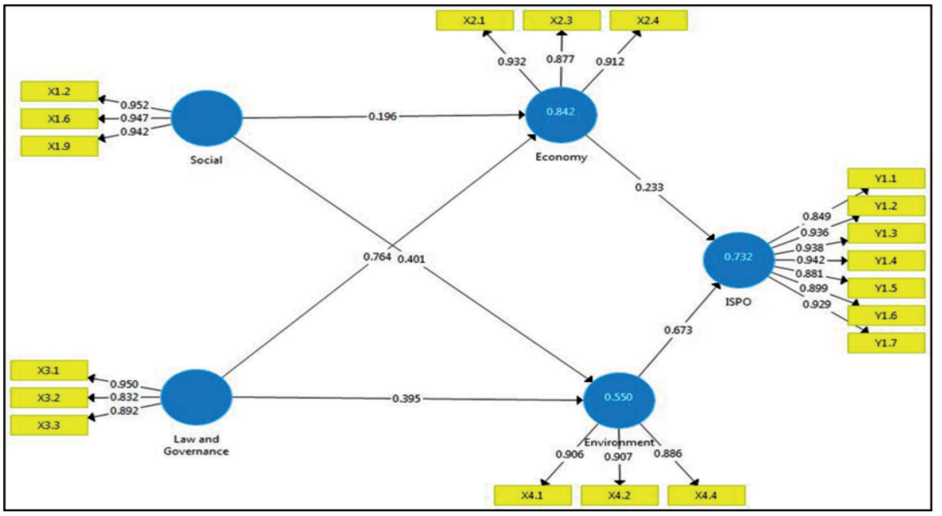

Figure 3: Loading factor value after model modification

The latent variables of the social development pillar explain the variance of poverty (X1.2), food security (X1.6), and gender (X1.9) indicators, each with a value of more than 95%. Similarly, the latent variables of the economic development pillar explain the variants of income (X2.1), processing industry (X2.3), and infrastructure (X2.4) indicators, each with a value exceeding 87%. The latent variables of the legal development and governance pillar explain the variance of conflict (X3.1), company consistency (X3.2), and overlapping interests (X3.3) indicators, each with a value exceeding 83%. Additionally, the latent variable of the environmental development pillar explains the variants of efficient natural resource use (X4.1), land rehabilitation and conservation (X4.2), and animal protection (X4.4) indicators, each with a value of more than 88%.

The ISPO latent variable explains the variance of compliance with laws and regulations (Y1.1), implementing good plantation practices (Y1.2), environmental management, natural resources and biodiversity (Y1.3), responsibility for employment (Y1.4), social responsibility and community economic empowerment (Y1.5), implementing transparency (Y1.6), and sustainable business improvement (Y1.7) indicators, each with a value more than 84%.

Table 3 showed the average variance extracted (AVE) of each variable was higher than 0.7. It implied no convergent validity in the model built. Similarly, the Cronbach alpha and composite reliability values were higher than 0.7. Since the indicator effectively measures the latent variables, it meets the reliability requirement.

Table 3: Average variance extracted (AVE), Cronbach alpha, and composite reliability

Variable	Average Variance Extracted (AVE)	Cronbach Alpha	Composite Reliability
Economic Development Pillar	0.823	0.892	0.933
Environmental Development Pillar	0.809	0.882	0.927
Social Development Pillar	0.830	0.966	0.972
Legal Development and Governance Pillar	0.797	0.871	0.922
ISPO	0.897	0.943	0.963

Inner Model

An analysis determined whether the structural model formed is accurate and robust. A structural model could describe the relationship between latent variables. The measurement indicators for evaluating structural models are the R^2, Q^2, and the Goodness of Fit Index (GoF). Additionally, the probability p-value of 5% was used to standardise hypothesis testing with a t-table value of 1.96.

The coefficient of determination (R^2), Q-Square (Q^2), and the Goodness of Fit Index (GoF) showed satisfactory results (Table 4). The variables' coefficients of determination exceeded 50%, ranging between moderate and strong. The Q-Square value was greater than 0, indicating that all variables had predictive relevance. Additionally, the variables' Goodness of Fit index exceeds 0.36, which is strong and useful as a predictive model.

Table 5 indicates the structural model and path analysis of SEM PLS. The path coefficient estimation results showed the Legal Development Pillar and Governance (X3) → Economic Development Pillar (X2) → ISPO (Y1) positively and significantly affect ISPO (P = 0.001 < 0.05). The path coefficient is 0.178, indicating that ISPO increases by 17.8% when implementing the Pillar of Legal Development and Governance and Economics.

The estimation of the Social Development Pillar (X1) → Economic Development Pillar (X2) → ISPO (Y1) positively and significantly affects ISPO (P = 0.008 < 0.05). The path coefficient of 0.046 implies that increasing the social and economic development pillar increases the ISPO by 4.6%. Furthermore, the estimation of the Legal Development Pillar and Governance (X3) → Environmental Development Pillar (X4) → ISPO (Y1) positively and significantly affects ISPO (P-Value = 0.000 < 0.05). Since

Table 4: Indicators of the measurement evaluation model

Variable	R-Square (R^2)	Q-Square (Q^2)	Communality (Com)	Goodness of Fit (GoF)
Economic Development Pillar	0.842	0.687	0.609	0.680
Environmental Development Pillar	0.550	0.439	0.583	
ISPO	0.732	0.599	0.769	
Mean	0.708	0.575	0.654	

Table 5: Structural model path coefficient

	Original Sample	Standard Deviation	T Statistics	P Values
Law Development and Governance Pillar -> Economic Development Pillar -> ISPO	0.178	0.055	3.243	0.001
Social Development Pillar -> Economic Development Pillar -> ISPO	0.046	0.017	2.655	0.008
Law Development and Governance Pillar -> Environmental Development Pillar -> ISPO	0.266	0.065	4.097	0.000
Social Development Pillar -> Environmental Development Pillar -> ISPO	0.270	0.066	4.083	0.000

the path coefficient is 0.266, ISPO increases by 26.6% when the legal development, governance, and environment increase. The pillar of Social development (X1) → Environmental Development (X4) → ISPO (Y1) could serve as a model for oil palm development in South Halmahera District, North Maluku Province. The largest path coefficient value is the path model that could be selected in the analysis, starting from the Social Development Pillar (X1). This model has a coefficient of 0.270 with P = 0.000 < 0.05, meaning ISPO increases by 27% when the Social and Environmental Development Pillar increases.

Social Development Pillar

Poverty, food security, and gender are the main indicators representing the social development pillars with the sustainable model of oil palm development in South Halmahera District, North Maluku Province, from the local community perspective. Communities in each village feel the company's regulations or poverty alleviation programs are not fully maximised. These programs include providing necessities, job training to improve skills, infrastructure, and village facility improvement. They are not fully maximised because poverty is a multidimensional phenomenon whose handling requires new partnerships. Such partnerships may be formed by companies, local governments, community social groups, and individuals to participate by using social resources fully (Qian-Qian *et al*., 2015). In the community's view, the yearly expansion of oil palm companies in the South Halmahera District supports poverty alleviation in the three villages. Oil palm expansion in rural areas has enabled 1.3 million people to escape poverty since 2000 (Mardiharini *et al*., 2021).

The community was also positively impacted when the development company cleared the oil palm land in South Halmahera. The company bought most of the community's land ownership for investment. Moreover, oil palm does not interfere with food consumption and insecurity in the villages. This is because the local community consumes staple foods such as bananas, cassava, and sweet potatoes, whose availability is guaranteed. It shows that oil palm guarantees food security and availability, contributing to people's livelihoods towards zero hunger for sustainable development goals (Ayompe *et al*., 2021). However, the local community has not directly enjoyed the nutritional value because the company is still in production. This has many benefits for consumption as a food ingredient for rural communities. It greatly contributes to the sustainable development goal of ending hunger to achieve food security and overcome malnutrition (Applanaidu *et al*., 2021).

Furthermore, oil palm development provides equal employment opportunities for women and men in the three villages. The division of labour does not discriminate based on education level, work experience, working hours, and type of work. In this case, gender equality policies in the palm oil industry could promote women to compete in the labour market and use their rights for active participation. There is little difference in resource use efficiency with men, especially in processing oil palm fruit and cultivation. (Agbamu, 2016; Basnett *et al*., 2016; Reed, 2019; Sarku, 2016).

Economic Development Pillars

From the local community perspective, the economic development pillars in the SDGs for oil palm development in South Halmahera District are affected by income, the processing industry, and infrastructure. Oil palm development increases the surrounding community's income more than other plantation crops (Syahza, 2019). Communities feel the development companies' contribution to increasing their incomes and improving their economic conditions. New business opportunities based on palm oil waste, such as cattle and chicken feed, organic fertiliser, fish pellets, plaiting, sticks, and other handicrafts, have prospects for development by the local community.

The upstream-downstream transformation of the innovation-based palm oil processing industry is the key to sustainable economic growth (Kushairi *et al.,* 2018). Furthermore, constructing new infrastructure, such as multi-purpose buildings or village halls, after the earthquake by the company benefitted the community. Other benefits resulted from other new infrastructure development plans prepared by the company. One positive effect of oil palm development is the construction and improvement of infrastructure. Another beneficial impact was fulfilling local communities' basic needs through programs launched by the company (Widyatmoko, 2020; Tambi *et al.,* 2021).

Legal Development and Governance Pillar

The oil palm development indicators from the local community perspective on the law and governance pillars are conflict, company consistency, and overlapping interests, forming part of SDGs. The initial opening of oil palm plantations reaped pros and cons from various levels of society. Fortunately, the conflict is not religious, group, ethnic or racial and does not create physical, psychological, verbal, or gender violence. There were also no casualties of men, women, children, or the elderly. Therefore, the best approach taken by the company, such as deliberation and a personal approach, is the key to handling the conflict. A well-designed transformation mechanism, including mediation, helps resolve palm oil conflicts (Dhiaulhaq *et al*., 2014).

In the community's view, overlapping interests between local governments, companies, customary institutions, and NGOs often occur at the beginning of plantation land clearing. The company often initiates dialogue and discussion efforts, gradually improving the condition. Therefore, a governance model involving multi-stakeholder partnerships and companies solves complex problems, including overlapping interests in the palm oil industry (Mubin, 2019). The consistency toward community welfare was reflected in the Corporate Social Responsibility (CSR) program, especially after the earthquake in South Halmahera District. One contribution to the sustainable development goals (SDGs) is building social capital through CSR programs. It shows that strategic goals to meet business needs should be accompanied by solving the social problems of the communities around plantations through CSR programs (Bhinekawati, 2017). In this case, the top priority is the employee's and the surrounding community's welfare. According to the community, the company protects employees through health insurance and uses local workers in plantation activities. This step is taken because employees work on plantations for nine hours daily, and the job is generally heavy (Tamrin, 2014).

Environmental Development Pillar

Efficient use of natural resources, land rehabilitation and conservation, and animal protection are the indicators explained by the environmental development pillars in the SDGs model concept for oil palm development. Palm oil has been developed well in the community by considering environmental security through strict chemical or waste management procedures and environmentally friendly technology. Additionally, the development has not caused the extinction of animals and has used critical agricultural land areas since the opening of oil palm plantations. This denotes that the palm oil industry's sustainability is a top priority and an urgent need. Therefore, there is a need to maintain ecological integrity, conduct ecosystem mapping, and improve waste management technology and plantation management practices on suitable land without deforestation (Khatun *et al*., 2017). Sustainable palm oil certification could improve biodiversity by avoiding deforestation in plantation expansion (Meijaard *et al*., 2018). The companies are subsequently responsible for maintaining biodiversity amid oil palm development. They should conduct reforestation programs and synergise the roles of local governments and communities in biodiversity conservation (Paoli *et al*., 2014).

Indonesian Sustainable Palm Oil (ISPO)

The basis for ISPO regulation is outlined through Minister of Agriculture Regulation Number 19/ Permentan/OT.140/3/2011 concerning guidelines for sustainable Indonesian palm oil plantations. This regulation was later updated through Minister of Agriculture Regulation Number 11/Permentan/OT.140/3/2015 concerning the coconut certification system of Indonesian sustainable palm oil. In 2020, the certification system was strengthened through Presidential Regulation Number 44 of 2020.

The ISPO criteria and principles in the sustainable palm oil development model in South Halmahera have been implemented well by the company from the community perspective. The criteria and principles used are complying with laws and regulations, good plantation practices, and managing the environment, natural resources, and biodiversity. Other principles include responsibility for the workforce, social responsibility and community economic empowerment, transparency, and continuous business improvement. Furthermore, the plantation management has obtained permits and land certificates and has complied with North Maluku Provincial Spatial Planning (RUTWP) and City/District General Spatial Planning (RUTWK). The management has obtained a permit from the Ministry of Forestry to release forest areas. It has complied with changes in the function of forest areas, cultivation, and building use rights.

Moreover, the plantation management has the right to use documents for land acquisition and has complied with the suitability of the number and pillar boundaries. It is the monitoring officer for maintaining the right to cultivate and use the building. The management has complied with proof of dispute-free plantation land, documents of identification of disputed land, a map of disputed land, a report on the completion process, and documents of the settlement process. Additionally, it meets the requirements of the Taxpayer Principal Value, Trading Business Permit, Business Place Permit, Company Registration Certificate, Building Construction Permit, Proof of tax payment, and environment-related permits (AMDAL).

The company has implemented good plantation practices according to the community. These practices include short, medium and long-term plans to produce sustainable palm oil and ensure that land clearing complies with the soil and water conservation principles. Furthermore, the company has an SOP in plantation land clearing and uses certified superior seeds. It has an SOP for mineral and peat land management, has implemented an integrated pest control system, and conducts the harvesting correctly. Additionally, the company ensures that the Fresh Fruit Bunches (FFB) are received to meet the stipulated requirements.

The company has implemented the management of the environment, natural resources, and biodiversity in the community's view. This is strengthened by the fact that the company has an environmental permit and ensures the factory waste management complies with applicable regulations. The plantation management also prevents and controls fires on oil palm land and has taken steps to conserve land and prevent erosion. Furthermore, biodiversity in managed areas is maintained and conserved, and sources of greenhouse gas emissions or global warming have been identified. The company also has a factory establishment permit that protects primary natural forests and peat.

Another ISPO criteria and principles that have received positive views from the community are the company's responsibility for employment. These include implementing an occupational health and safety management system and recruiting employees according to the applicable mechanism. Also, the company considers the employees' welfare, does not employ minors, and facilitates the formation of trade unions and cooperatives.

The local community appreciates the company's social responsibility and community economic empowerment. These include prioritising purchasing goods and services to communities around plantations, CSR management, and potential local development

for community empowerment. Furthermore, the company plays a role in the welfare of indigenous peoples. Its application of transparency also received good responses from the public because it provides information about the source of fresh fruit bunches. Information is also delivered to relevant agencies and other stakeholders regarding confidential matters. It declares an honest and corruption-free code of business ethics to the public. Additionally, the company implemented certain criteria and principles for sustainable business improvement from the local community's view. These include support for sustainable production improvement from economic, social, and environmental aspects, social responsibility, and community empowerment.

Licensing documents are required for development companies and are one of the ISPO principles and criteria. Resolving this legality issue requires cooperation from local governments and the private sector (Luttrell *et al.,* 2018). One key element of sustainable development is sustainable production. Therefore, the Indonesian government introduced a sustainable palm oil policy (ISPO) in 2011. It aimed to align international policies with the sustainability of the domestic palm oil industry (Kunene & Chung, 2020). Aspects of sustainability are important in assessing world consumers on palm oil demand. This necessitates the role of companies, communities, and governments as a value chain guided by sustainability standards and criteria (Isharyadi *et al*., 2021). Moreover, implementing palm oil industry sustainability standards requires strong collaboration with local governments and communities. An ISPO certificate from the government aims to prosper the company by increasing CPO exports and improving the local community's welfare (Firdaus *et al*., 2020).

Integration of SDGs and ISPO

The resulting path analysis model could be a policy recommendation to improve the sustainability of palm oil development from a community perspective based on SDGs and the ISPO criteria and principles. The strongest pathway link is achieving ISPO by improving the Social and Environmental Development Pillar. The Social Development pillar is supported by poverty, food security, and gender indicators. It implies that companies should solve social problems, especially poverty, to meet the ISPO criteria and principles. The poverty rate must be reduced by 0.75% annually according to the SDG's achievement by 2030. Therefore, sustainable palm oil must be maintained because it significantly contributes to overcoming social problems (Hasan & Hidayat, 2018).

Companies should also be careful in plantation expansion because production and cultivation contribute to food security. However, the expansion threatens the plantation production of local communities. This calls for sustainability rules and procedures (SDGs) to maintain community food security (Tobar, 2020). Furthermore, efforts to improve the ISPO criteria and principles should be made by implementing sustainable plantation practices. Such efforts should consider the principle of gender-based non-discrimination and implement gender-responsive sustainable programs or practices for communities around plantations (Tillah, 2020).

Improvements in the social pillar affect environmental development through efficient natural resource use, land rehabilitation, conservation, and animal protection. Environmental conservation measures affect ISPO certification. This is because companies are encouraged to conduct business activities oriented towards environmental care for communities around plantations (Sari *et al*., 2019). Moreover, synergising programs and company operational targets could achieve sustainable palm oil industry programs. This process should consider the impact on the landscape, high conservation land, and coordination between the central and local governments (Chalil & Barus, 2021). Companies should also improve biodiversity in the plantation environment through sustainable agriculture revitalisation and strategic forest

conservation policies (Tapia *et al*., 2021). In addition, the sustainable development goals of the companies through specific indicators could serve to improve the criteria and principles of the ISPO.

Conclusion

South Halmahera District's palm oil development model is sustainable based on SDGs, ISPO principles, and criteria from the local community's perspective. The indicators of sustainable development goals include poverty alleviation, food security, gender equality, income, processing industry. Other indicators are infrastructure, conflict resolution, company consistency, overlapping interests, efficient natural resource use, land rehabilitation and conservation, and animal protection. These indicators have a positive and significant impact on the ISPO criteria. The sustainable development model moves from the social to environmental development pillar, impacting the ISPO standards and criteria. Therefore, this study is in line with the objectives and hypotheses built.

The selected indicators in the SDGs and ISPO pillars should be strengthened through cooperation between the government, companies, and the local community. Institutional improvements and regional regulations should also take sides from the economic, social, environmental, legal, and governance sides. This would help to maintain the continuity and sustainability of the palm oil industry development for future generations.

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