The Forest Management Partnership Modelling to Prevent the Conflict in Production Forest of Meranti, South Sumatera, Indonesia

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ABSTRACT

Conflict resolution in forestry sector has become the main issue in Indonesia which is initiated by the disharmony between the community living in the neighborhood and the company which have the authority to utilize the natural resource or making it as the production forest. However, the conflict potentially initiates forest destruction and is detrimental to the community. Therefore, there should be a way to interconnect the community and company to build a similar understanding to obtain sustainable forestry management. The proper communication could be fulfilled by knowing what is the pretension of all the stakeholders including the community. This present research proposed a partnership model of forest management partnership which potentially obtains the successful way in forest management. The study was conducted on the Production Forest area as an Industrial Plantation Forest (HTI) concession of PT Sentosa Bahagia Bersama (SBB) in Musi Banyuasin Regency, South Sumatra Province, Indonesia. To obtain the data, the study was conducted using a pragmatic approach using a combination of qualitative and quantitative methods where qualitative was gone through in-depth interviews with predetermined informants and the quantitative method by distributing questionnaires to randomly assigned respondents and tested using the Structural Equation Modelling (SEM) test. The results showed that community welfare has an important role in determining the success of social forestry partnerships. The further investigation using SEM obtained 5 aspects that played the main parameters which were openness, trust, legal certainty, profit, and participation. The proposed model was generated using those important aspects to achieve both parties goals and made it clear that the sustainable production forest management can be achieved.

Introduction

The natural resources in the forest play an important role in maintaining environmental balance since most of the oxygen needed by living organisms was produced in the forest, and this function made the forest the lung of the world. The important role of the forest was fragile since the forest has most of the natural resource which has high-value things and potentially produces high profit by utilizing the re-

source. The government of Indonesia has developed a policy in forest management within the framework of forest management concession policies through the development of power networks to control forest benefits (Poudyal *et al.,* 2020). However, the community as the main party involved in the management of production forests has a small frequency in forest management policies and results in disharmony between forest managers and the surrounding environment (Ayana *et al.,* 2017).

In the last few decades, production and forest management has faced many obstacles and threats to forest sustainability and productivity because of the majority of permit disputes for mining, industrial plantations, or oil palm plantations (Abram *et al.,* 2017; Pasaribu *et al.,* 2020). In forest management, the unclear status of forest areas, legal uncertainty over forest areas, unlimited forest area boundaries, changes in land use, and encroachment are the most common reason which initiates the conflict. (Phromma *et al.,* 2019; Tajuddin *et al.,* 2018). Furthermore, according to expert opinion, conflict in forest management is somehow formed by a community to achieve goals by weakening the opposing party without paying attention to the prevailing norms and values (Franke and Foerstl, 2019; Tennøy *et al.* 2016). The main goal of the conflict was the unwise exploration of forest which was unsustainable and potentially destroyed the forest and exploitative the natural resource (Zinda and Zhang, 2019). The high complexity of the conflict in the forest could not be easily solved through the law since many parties have made efforts to resolve the conflict but are facing failure. Most of the conflict management was only sporadic which did not touch the root of the problem.

The complex problem on the forest conflict integer us to contribute by proposing a model which can be used to prevent the conflict between the company and community. Furthermore, the research aims to offer an effective way of resolving the existing conflicts in forests through linking forestry partnership models. The integration between benefits of any party, dependencies, and business ethics were applied as the approach to obtain the proper modeling (Jones *et al.,* 2018; McNamara *et al.,* 2018). The concept of modeling is providing an interconnection between the company and the community where the company will provide production facilities and do the marketing and production processes. On the other hand, The community in a partnership pattern

has a role as farm implementers which is important in forest management (Skaalsveen *et al.,* 2020). This concept will then be modeled and discussed in depth in this study as an effort to minimize and prevent land grabbing conflicts in the study area.

Materials and Methods

Research Method

The research area was conducted in the production forest of Musi Banyuasin sub-district, South Sumatera, Indonesia, under the concession of PT. Sentosa Bahagia Bersama. The detailed location of the studied area was explained in our previous work journal (Hidayat *et al.,* 2021). The study area has a map of government administration covering five villages and two sub-districts, namely Sako Suban Village, Lubuk Bintialo Village, Pangkalan Bulian and Talang Buluh Village, Batanghari Leko and Pagar Desa Districts, Bayunglencir Regency, Musi Banyuasin Regency, South Sumatra Province.

To obtain the data, the research used the pragmatic approach which emphasized the problem solving and uses all existing approach to understand the problem (Cresswell, 2016). The combination of qualitative and quantitative methodology was used by focus group discussion with the community leader of each village in the studied area and spreading the questionnaire. After obtaining the initial information, a deep interview was done with some potential community members which could give us the information. The participant used in the interview should cover all the community members' thoughts. Therefore, the recommendation from the leader from each village was needed as the main consideration before choosing the participants. After conducting the interview, the questionnaire which design to get all the community need was spread and analyzed. Furthermore, the obtained data was proceeded and tested using Structural Equation Modelling (SEM).

The sampling method to determine the size participant

The slovin formula was applied to determine the size of the population (equation 1). The participant was chosen using a random sampling method to ensure an equal probability of being chosen. Each participant would be interviewed, and all the obtained data would be analyzed and tested using

Structural Equation Modelling (SEM). To be more specific, the test would be focused on checking several assumptions obtained during the study and see if the assumption fulfills the analysis requirement of the SEM test. If the proposed model does not fit the tests, some improvement would be made by reducing the standard of a requirement made by the participant. The normalization of data, multicollinearity, confirmatory factor analysis would be also used to harmonize the data. Furthermore, the design model of forest management partnership was made using the structural modeling fit test. The test was aimed to reanalyze the obtained model to ensure that all observed variables are proven valid and reliable for their latent variables. Finally, the conclusion was generated using confirmation of a hypothetical model using empirical data or direct field observation (Kusnendi, 2008).

$$n = \frac{N}{1 + Ne^2} \qquad\qquad .. (1)$$

where: n = number of samples, N = total population, and e = error tolerance.

Result and Discussion

Company and community characterization

The research was conducted in the production forest under the concession of PT.Sentosa Bahagia Bersama. The total area of production forest is approximately 52,160.11 ha located in 5 villages, namely Lubuk Bitialo, Sako Suban, Pangkalan Bulian, Talang Buluh, and Pagar Desa with a total of the population was 7.823 which consist of 1.799 families. The ratio between men and women was 50:50. However, most of the women stayed at home as housewives where only men worked to support the household. The detailed number of population and household in the studied area is shown in Table 1.

The population profile of the community near the studied area is important in determining the characteristics of the community that will be partners in cooperation in forest management. In this study, 60% of the community are farmers and 20-25% are an employee of plantation near the village. The other 10-15% of the community has a job as a teacher, government employee, entrepreneur, etc. The majority of farmer proved that the forest area becomes the important sector for the community where the dependence on forest was high as a strategic asset for the survival and livelihoods of the community.

The results of the preliminary analysis contained several potential aspects that influence the partnership pattern of forestry companies with local communities which were the trust, norms, legal certainty, profit/benefits for company and community, awareness, justice, participation, inclusivity, corporate business sustainability, community welfare, and social forestry partnership sustainability. The initial proposed model made by Structural Equation Model (SEM) is shown in Figure 1. The normality of obtained model was tested to see the skewness and kurtosis of the data. The test was run using the critical ratio with a cut-off in ± 2.58 and a significance of

Table 2. The percentage of community occupation eighbourhood PT. Sentosa Bahagia Bersama (Central Bureau Statistics of Musi Banyuasin, 2018)

No	Village Name	Occupation (%)		
		Employee	Farmer	Other
1	Lubuk Bintialo	20	60	10
2	Sakosuban	20	75	5
3	Pangkalan Bulian	25	70	5
4	Talang Buluh	20	75	5
5	Pagar Desa	40	50	10

Table 1. The size of population and household neighbourhood PT. Sentosa Bahagia Bersama (Central Bureau Statistics of Musi Banyuasin, 2018)

Village Name	Population			Household	n*
	Man	Woman	Total		
Lubuk Bintialo	1.327	1.274	2.601	525	127
Sako Suban	732	614	1.346	344	65
Pangkalan Bulian	1.217	1.148	2.365	506	115
Talang Buluh	271	244	515	114	25
Pagar Desa	538	458	996	310	48

*The data was obtained from the calculation using Slovin equation

0.01 (α = 1%). The result showed the obtained model had the kurtosis of 2.481 which less than the cut-off, indicating the data fulfilled the multivariate normality (Table 3). However, the variable of Y32 found the critical ratio of -3.411 indicating the variable did not meet the univariate normality. Furthermore, the outliers test confirmed that the variables used in the study were deemed free from the outliners since the

Mahalanobis D-square (D2) value had a p-value < 0.001.

The data was further tested using the multicollinearity assumption test by calculating the value of the Pearson bivariate correlation coefficient between the observed variables (indicators) measuring the same construct. The results observed that the construction gauge did not find any

Table 3. The normality of initial proposed model (Figure 1)

| Variabel	Min	Max	Skew	c.r	Kurtosis	c.r
X96	3,000	7,000	-0,050	-0,379	-0,491	-1,865
X86	3,000	7,000	-0,216	-1,637	-0,504	-1,914
X76	4,000	7,000	0,178	1,349	-0,245	-0,929
X66	3,000	7,000	-0,049	-0,375	-0,252	-0,956
X56	3,000	7,000	0,034	0,261	-0,238	-0,904
Y43	1,000	7,000	-0,302	-2,290	0,057	0,218
Y33	1,000	7,000	-0,165	-1,257	0,022	0,083
Y23	1,000	7,000	-0,104	-0,791	0,256	0,971
Y13	1,000	7,000	-0,298	-2,260	-0,021	-0,079
X16	3,000	6,000	-0,195	-1,483	-0,342	-1,300
X26	3,000	7,000	-0,142	-1,078	0,220	0,835
X36	3,000	7,000	0,084	0,640	0,177	0,672
X46	3,000	7,000	0,096	0,730	-0,217	-0,824
X15	1,000	7,000	-0,272	-2,064	0,180	0,682
X25	1,000	7,000	-0,196	-1,486	-0,444	-1,685
X35	1,000	7,000	-0,255	-1,937	-0,285	-1,081
X45	1,000	7,000	-0,201	-1,529	0,237	0,901
X13	4,000	7,000	0,273	2,075	-0,476	-1,808
X23	3,000	7,000	0,044	0,332	0,020	0,077
X33	3,000	7,000	-0,046	-0,349	-0,024	-0,092
X43	3,000	7,000	0,240	1,821	-0,179	-0,681
X14	4,000	7,000	-0,270	-2,051	-0,616	-2,337
X24	3,000	6,000	-0,250	-1,896	-0,090	-0,341
X34	3,000	7,000	-0,032	-0,242	-0,230	-0,875
X44	3,000	7,000	-0,168	-1,273	-0,036	-0,138
X11	2,000	7,000	0,063	0,476	0,401	1,524
X21	3,000	7,000	0,075	0,572	-0,311	-1,180
X31	4,000	6,000	0,027	0,206	-0,202	-0,766
X41	3,000	7,000	-0,019	-0,144	-0,222	-0,842
X12	4,000	7,000	0,062	0,470	-0,211	-0,801
X22	3,000	7,000	-0,083	-0,634	0,047	0,177
X32	3,000	6,000	-0,144	-1,090	-0,158	-0,598
X42	3,000	6,000	-0,110	-0,835	-0,136	-0,517
Y51	3,000	7,000	-0,080	-0,611	-0,009	-0,035
Y41	3,000	7,000	-0,017	-0,130	0,111	0,420
Y31	3,000	7,000	-0,152	-1,153	-0,245	-0,929
Y21	3,000	7,000	-0,015	-0,117	0,017	0,065
Y11	3,000	7,000	-0,010	-0,078	-0,129	-0,490
Y12	1,000	7,000	-0,240	-1,824	-0,257	-0,974
Y22	1,000	7,000	-0,042	-0,317	-0,140	-0,531
Y32	1,000	7,000	0,251	1,909	-0,898	-3,411
Y42	1,000	7,000	-0,209	-1,588	-0,654	-2,484
Multivariate					16,217	2,481
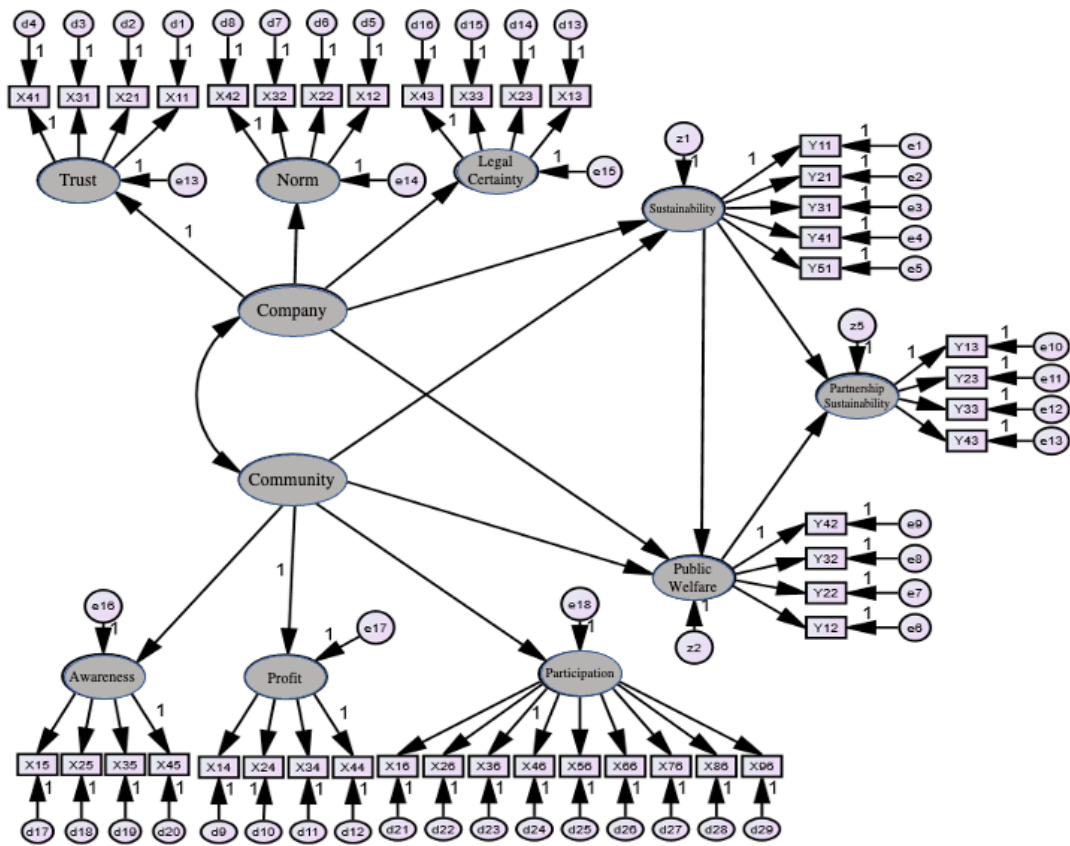
Fig. 1. The proposed initial modelling of forest management partnership obtained from SEM test.
The detail captions from Figure 1 were shown below.

X11 : Company opens in partnership and information to the community
X12 : Law and rules agreement made by company and community
X13 : Written welfare that explains the status of social forestry membership before the implementation of the partnership
X14 : Economic benefit from community social forestry partnerships
X15 : Public awareness about the benefits of the company existence
X16 : Community ideas about partnership business
X21 : The honesty of the company in the partnership
X22 : Mutually agreed on rules regarding the obligations of each party
X23 : A written agreement specifying the boundaries of the land to be cultivated in social forestry
X24 : Social forestry partnerships create environmental sustainability
X25 : Public awareness about the importance of good cooperation with companies
X26 : The community plans activities and designs a form of social forestry partnership with the company.
X31 : The partnership is based on a sense of concern for the community
X32 : The rules can change at any time according to the agreement
X33 : A written agreement explaining the time limit for a business in social forestry activities
X34 : Social forestry partnerships improve social value in society
X35 : The awareness of each party in building a commitment to the sustainability of the social forestry partnership
X36 : The implementation of the social forestry partnership form design
X41 : The company is fair in making partnerships with farmers
X42 : Partnership commitments are agreed upon based on a certain period
X43 : A written agreement specifying social forestry institutions
X44 : Social forestry partnerships increase the value of positive relationships between communities and companies
X45 : Awareness to safeguard company assets and partnership assets
X46 : The community played the social forestry partnership based on the operational plan established with the company
X56 : The community monitors the implementation of the partnership
X66 : The community and the company conduct the activity evaluation
X76 : The community and company improve the partnership based on the evaluation

X86 : The community is actively increasing the ability of partnerships
X96 : The parties maintain the sustainability of the social forestry partnership
Y11 : Social forestry partnerships increase company productivity
Y12 : Social forestry partnerships increase community income
Y13 : Social forestry partnerships provide added value for the company
Y21 : Social forestry partnerships enhance the success of company crops
Y22 : Social forestry partnerships reduce dependence on needs from outside the region
Y23 : Social forestry partnerships create business comfort for the community
Y31 : Social forestry partnerships reduce company investment failures
Y32 : Social forestry partnerships add to the workforce requirements of companies
Y33 : Social forestry partnerships reduce the level of social vulnerability
Y41 : Social forestry partnerships improve the ecology of the area
Y42 : Social forestry partnerships improve area accessibility
Y43 : Social forestry partnerships create sustainability for mutual benefits
Y51 : Social forestry partnerships enhance regional security

multicollinearity, meaning the measurement results were suitable for use as the model. The confirmatory factor analysis (CFA) was carried out to see whether the manifest variables could explain the latent variables (constructs). The latent variables and their indicators are displayed in a measurement model and tested to see how properly the indicators can measure a construct of the latent variable. The result showed that several variables satisfy the model requirement, whereas several variables including the variable of trust, norms, community welfare, and sustainability were not satisfied the model requirements. The fit model was made to fit the variable by conducting several tests shown in Table 4.

In Table 4, the construct reliability based on the CR value was 0.904 or greater than the minimum value of 0.7 indicating the obtained model has good reliability. The AVE value showed 0.229 or smaller than the based value of 0.5 indicating the AVE value of the measurement model was marginal. Furthermore, several tests showed the smaller value than based value/minimum value such as p-value < α = 0.05, CFI = 0.738 ≤ 0.9, RMSEA = 0.075 < 0.1, GFI = 0.750 ≤ 0.9, AGFI = 0.718 ≤ 0.9, TLI = 0.719 ≤ 0.9 and NFI = 0.653 ≤ 0.9 which confirmed that all the fit indicators have been fulfilled. Several marginal results have the possibilities to be fitted by reducing the factors which made the model were not fit by reconstructing the description and model.

The model fit was used to further observe the correlation between each variable to perform the forest management partnership. Based on the results of calculations on the fit model, the results show that all observed variables are proven to be valid and reliable to the latent variable.However, two indicators/variables observed a smaller R2 value than the base value (0.4) but based on the p-value and chi-squared, the obtained model for those indicatorswas fit/good. The proposed fit model for the forest management partnership was shown in Fig. 2.

To test the obtained model,the residual standard test with a limit less than 2.58 was obtained (Hair *et al.,* 1995). The residual standard test proved whether

Table 4. Index Fit Model of Confirmatory Factor Analysis (CFA) in initial and final test.

Test	Minimum Value	Initial Result	Description	Result	Description
Chi-square	Minimum	2361,280	Fit*	136.784	Fit*
p-value	P ≥ 0,005	0.000	Marginal**	0.127	Fit*
GFI	≥ 0.90	0.750	Marginal**	0.958	Fit*
AGFI	≥ 0.90	0.718	Marginal**	0.940	Fit*
RMSEA	≥ 0.10	0.075	Fit*	0.021	Fit*
CFI	≥ 0.90	0.738	Marginal**	0.990	Fit*
TLI	≥ 0.90	0.719	Marginal**	0.988	Fit*
NFI	≥ 0.90	0.653	Marginal**	0.932	Fit*
CR	≥ 0.60	0.904	Fit*	0.934	Fit*
AVE	≥ 0.40	0.229	Marginal**	0.625	Fit*

Note: *Satisfy the model requirement; ** Possibly satisfy the model requirement
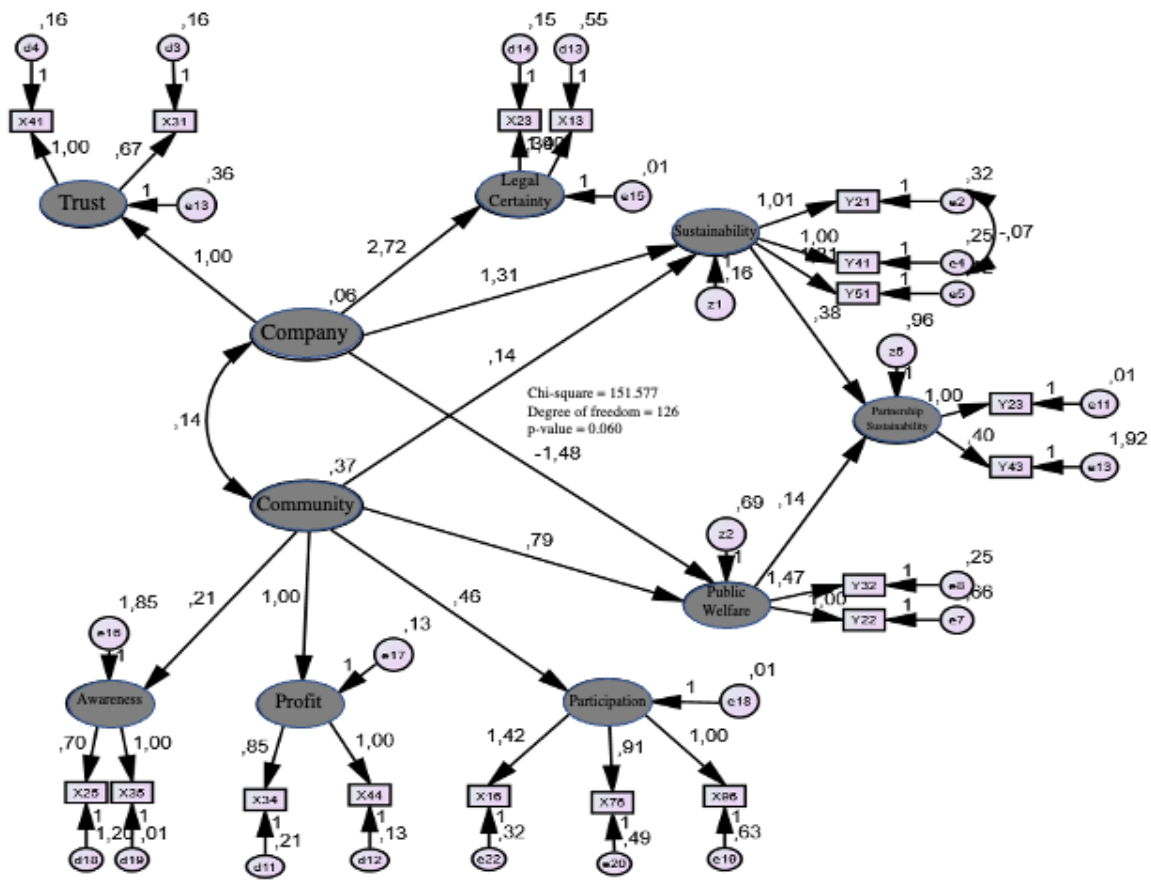
Fig. 2. The fit model of forest management partnership
Details of Image 2:

X13 : The agreement of social forestry membership in the implementation of forest management
X16 : The independence of the community in choosing a partnership business
X23 : The agreement of land boundaries and social in the forest
X31 : Partnership based on the concern for community
X34 : Partnership improved the social value in the society
X35 : Awareness in building a commitment to the sustainability of social forestry partnership
X41 : Fairness from company to farmer (community)
X44 : Partnership increases the value of the positive relationship between company and community
X76 : Togetherness in improvement and development
X96 : Maintaining the sustainability of forest management and partnership
Y21 : Social forestry partnerships increase the success of corporate production
Y22 : Partnership generates independence on the company and community
Y23 : Social forestry partnerships create business comfort for the community
Y32 : Social forestry partnerships hire more employees
Y41 : Social forestry partnerships improve the ecology awareness of community and company employee
Y43 : Social forestry partnerships create mutually beneficial sustainability
Y51 : Social forestry partnerships improve regional security

or not the model was necessary to repair the structural model from the results of the repair (model fit). In Table 1S, the test of the residual value identified that the model was acceptable because of no residual value greater than 2.58. As the recapitulation, the result of validation and reliability of the fit test was shown in Table 2.

After obtaining the model, the results obtained

five key aspects as determinants of the success of forestry partnerships. The five key aspects are:

Openness

In this study, the openness factor is found as the first key factor in building the social forestry partnerships implemented by both sectors of company and community. To be specific, the company should make a transparent system especially in the information about the policy and progress. Fernando (Bintialo Village Secretary) stated that openness was the base and most important factor for the success of the forest partnership built by the company and the community. Nguyen and Watanabe (2017) and Zhu and Sun (2020) supported by saying that the openness between company and community was an important factor in the successful implementation of the partnership program. Openness can foster harmony and build trust between the company and the community (Selim and ElGohary 2020). The principle of transparency is one of the principles of partnership needed. Therefore, there will be no suspicion of one party against another party, both economically and in terms of performance (Gardner *et al.,* 2019). In the development planning process, the transparency aspect must be built based on the freedom of opportunity to participate in policy formulation (Robinson, 2020).

Trust

The second key factor was trust and this factor correlated to the first factor of openness. Communication in building mutual trust was also expressed by Aji (Secretary of the Village of Pagar Desa): "We, the village community, are generally happy if the com-

pany invites us". The main purpose was the two ways discussion where the discussion initiates the understanding between both parties and builds trust. The other community leader from Sako Suban Village supported the statement by saying that the community has waited for the company to initiate the discussion with us to build trust between the company and the community. The open discussion also prevents the suspicious feeling, especially from the community. Trust is one of the crucial things in the partnership process (Wan *et al*. ,2020). Trust is a mutually beneficial relationship between two or more parties through good interaction and communication (Subrahmanian *et al*. ,2021). Like the openness factor, the trust factor also requires good communication between interconnected actors.

In the process of trust-building between the company and the community, the company should show a caring attitude towards the community's needs. All aspects of the needs and interests of the community are the main considerations in designing the partnership program. As a start process, the company should be a good listener at the beginning of the partnership plan. The failure of listening to what the community needs generates the crisis of trust as the result of their failure to respond to public needs and interests (Ece, Murombedzi, and Ribot 2017).

Legal Certainty

Legal certainty is determined as the law which can control what has been agreed upon between the company and community. In general, the community-made both parties (company and community) feeling safe because the further problem would be

Table 2. Fit Index of Structural Model of Partnership between Forestry Company and Community in Production Forest Areas based on Social Forestry

Test	Minimum value	Value	Description
Chi Square	Minimum	151,577	Fit*
p-value	P ≥ 0,005	0.060	Fit*
GFI	≥ 0.90	0.953	Fit*
AGFI	≥ 0.90	0.937	Fit*
RMSEA	≤ 0.10	0.024	Fit*
CFI	≥ 0.90	0.986	Fit*
TLI	≥ 0.90	0.983	Fit*
NFI	≥ 0.90	0.924	Fit*
CR	≥ 0.60	0.952	Fit*
AVE	≥ 0.40	0.551	Fit*

Note: * Satisfy the criteria of model assessment; ** Possible satisfy the criteria of model assessment

prevented as early as possible (Muhdar *et al.,* 2019). In the interview process, Sunarto (The headman of Bintialo Village) stated that the community was open for any party to build a relationship with us to manage our forest with clear legal certainty. The legal certainty made the partnership has a legal basis. Furthermore, the legal certainty showed that the partnership would not violate the government law.

The legal certainty was formed into two forms. First, the legal certainty was written as the agreement which has imperfect evidentiary power. Second, the legal certainty was also written as the agreement which a strong evidentiary power, normally as the authentic deed of partnership certificate. Furthermore, the principle of contract freedom, the focus of legal certainty, the principle of mutual agreement, and the principle of good faith were used as the legal basis to realize the legal certainty in the forest management partnership (Dianita *et al.,* 2016).

Profit

Profit was placed as the purpose of the agreement where the community welfare as the economic reason should be improved by the partnership. The profit was not only about money where the development of infrastructure such as road and transportation as the result of the partnership was considered as the profit. The principle of partnership to build welfare and prosperity can be realized if the partnership program provides benefits to all parties based on mutual need, mutual strengthening, and mutual benefit (Fieldsend *et al.,* 2020). In principle, a partnership is a mutually beneficial cooperation based on a written or unwritten contract or agreement accompanied by fostering and partner development efforts (Raharja *et al.,* 2020).

The mutually beneficial factor is an absolute requirement for running partnership activities between the company and the community (Fieldsend *et al.,* 2020) and both parties must obtain benefits in a partnership. Therefore, Partnership is a business strategy carried out by both parties within a certain period to gain mutual benefits with the principle of mutual need and mutual growth (Flanagan *et al.* 2020). Partnerships that fail to build benefits for one or all parties will have an impact on the weak participation of the implementing partners.

Participation

The last key factor obtained during the is participa-

tion. The participation tends to be sensitive for the community where the community was forced to actively participate in the partnership program. Good communication built by both parties must lead to the formulation of the form and objectives of the sustainable partnership program. The company should provide a space for the participation of business actors to play an active role in partnership activities and policymaking (Busscher, *et .al* , 2018). The reason was the fact that the local people as 'indigenous people' have more knowledge about their territory compared to the company which signed as the new alien. The company should respect the local community especially for the local wisdom as an important component in the development of community (Ife and Tesoriero, 2008). The low community participation initiates the non-compliance of agreements which made the failure of partnership (Pasaribu *et al.,* 2020).

Conclusion

The result showed that there was a combination effort from the company and community in the form of forestry management partnerships. Structural Equation Modelling showed that the community welfare become the most important sector in the community part where the norms and participation was seen as the requirement from the company to the community to support the forest management. Furthermore, the other variables such as openness, trust, and profit were seen as the variable that both parties should be considered as the goal to be achieved during the implementation of forest management partnership.

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