

RESEARCH ARTICLE



Analysis of Factors Influencing Community Participation in Sustainable Forest Management in BKPH Mojoyayung, Madiun

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ABSTRACT

The success of sustainable forest management is inseparable from community participation as the leading actor in the Social Forestry Program. Various factors, including internal factors from the community and external factors, affect the participation of the community. Factors impacting community participation in sustainable forest management were analyzed in this study. The study was conducted at BKPH Mojoyayung, KPH Madiun, East Java Regional Division *Perum Perhutani*, from April to June 2022, using a survey method with 242 randomly selected respondents. Partial Least Squares (PLS) analysis was conducted with the SmartPLS software. Based on the results, it was found that three factors impact the community's participation in forest management: the empowerment process accuracy, the role of community empowerment workers, and the support of group leaders. The characteristics of the communities around the forest did not affect community participation in forest management. Community participation also affects the sustainability of forests.

Introduction

In recent years, Indonesian forests have faced several problems, such as forest degradation, the expansion of critical land, population growth, economy, and industrialization, which have caused pressure on forest resources to increase quality and quantity [1]. The villagers around the forest depend on natural resources for their livelihood, with low participation in forest conservation [2]. This condition affects various economic, social, and environmental issues, making it difficult to achieve sustainable forest management, including the State Forestry General Company (*Perum Perhutani*), Forest Management Unit Center (*Bagian Kesatuan Pemangkuan Hutan* or BKPH) Mojoyayung, and Forest Management Unit (*Kesatuan Pemangkuan Hutan* or KPH) Madiun. Before implementing the Social Forestry program at BKPH Mojoyayung in 2017, many people living around the forests of BKPH Mojoyayung stole woody trees. They damaged the forest environment, triggering flooding and forest fires. At that time, some programs to support forest conservation, such as community empowerment and participation, were relatively weak. Empowerment was achieved with only technical assistance, and the extension approach has yet to attempt to raise critical awareness of sustainable forest management [3,4].

Indonesia's government is trying to address social, economic, and environmental challenges through the social forestry program. It is regulated in the Minister of Environment and Forestry Regulation Number P.39/MENLHK/SETJEN/KUM.1/6/2017 about Social Forestry in the working area of *Perum Perhutani*. Moreover, the program was strengthened by Regulation Number 9 Year 2021 by the Minister of Environment and Forestry, Indonesia, about the management of social forests. These two regulations also followed the agrarian reform program. This ministerial decree authorizes using forests to develop social forestry in *Perum Perhutani*-managed regions. As a sustainable forest management system, social forestry is applied to national

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or private/customary forests under the management of local or customary law communities to improve their welfare and also their environmental quality [5]. The social forestry program will begin empowering the people near the forest; it can grant them forest utilization for 35 years. Through this authorization, they will be aware of participating in recognizing, overcoming, maintaining, protecting, and preserving the environment and improving welfare through forest management [6]. The government conducts this program to improve community participation in forest conservation and forest management activities. Forest security through a community-based development approach shows that people living around forest areas understand the characteristics of the potential of forest areas, live in harmony, and protect their homes from damage [7].

Some studies on civilian participation in forests have been reported, such as the level of participation affecting the sustainability of forest management [8]. Previous studies have shown that civilian participation in forest conservation is related to community characteristics [9], the accuracy of community empowerment [10], the role of empowering human resources, and the support of group leaders [11]. The community's knowledge of forest conservation will affect their behavior. Suppose that a community understands the concept and meaning of forest conservation. In that case, they will be motivated to maintain and protect forest areas to ensure the functions of forest areas, such as water and air support, produce timber, non-timber forest, and others (e.g., sustainability of economic, ecological, and social functions) [12]. The community empowerment process at the Mojoyayung Forest Management Unit Center is through a partnership scheme called *Kulin KK (Pengakuan dan Perlindungan Kemitraan Kehutanan)*, which is given through the Minister of Environment and Forestry Decree, Republic of Indonesia concerning recognition and protection of forestry partnerships Number: Decision Letter.5681 and Decision Letter.5682/MENLHK-PSKL/PKPS/PSL.0/10 of 2017. The permits granted (use of rights) of land rights are based on specific agreements between rights holders and third parties. The permit must be implemented based on the principle of sustainable forest management by the Forest Resources Management Community Institution or *Lembaga Masyarakat Pengelola Sumberdaya Hutan (LMPSDH)* and work together with *Perum Perhutani*, which facilitates the empowerment process so that it can run well.

With the *Kulin KK* scheme at BKPH Mojoyayung, LMPSDH members cultivated various types of plants. They developed various types of businesses to optimize the use of forest areas, including: (a) intercropping teak with corn (*Zea mays*), *kapulogo (Amomum compactum)*, and *porang (Amorphophallus muelleri)*; (b) planting green fodder such as elephant grass; (c) development and maintenance of fruit crops such as bananas, and nurseries of avocados, mangoes, and oranges; (d) the business of utilizing non-timber forest products in plantation forests such as cattle, raising bees to produce honey; and (e) developing biogas. This research was intended to reveal the indicators that influence community participation in sustainable forest management efforts in BKPH Madiun. By understanding the elements that influence the level of participation, this research provides deeper insight into how communities can be more active and play a role in maintaining forest sustainability. This information is important for designing effective strategies and policies to involve communities in sustainable forest conservation efforts in the region. This study aimed to analyze the participation of the community in sustainable forest management in BKPH Mojoyayung with the factors influencing it.

Material and Methods

Study Area

This research was conducted in the BKPH Mojoyayung forest area, KPH Madiun, East Java Regional Division *Perum Perhutani*. It involved three Forest Management Resorts (*Resort Pemangkuhan Hutan* or RPH): RPH Bribis, RPH Bludru, and RPH Temulus. Respondents were selected from six villages around the forest, specifically Nglاندuk, Sobrah, Nglambangan, Wungu, Mojoyayung, and Dempelan Villages. Data were collected between April and June 2022 (Figure 1).

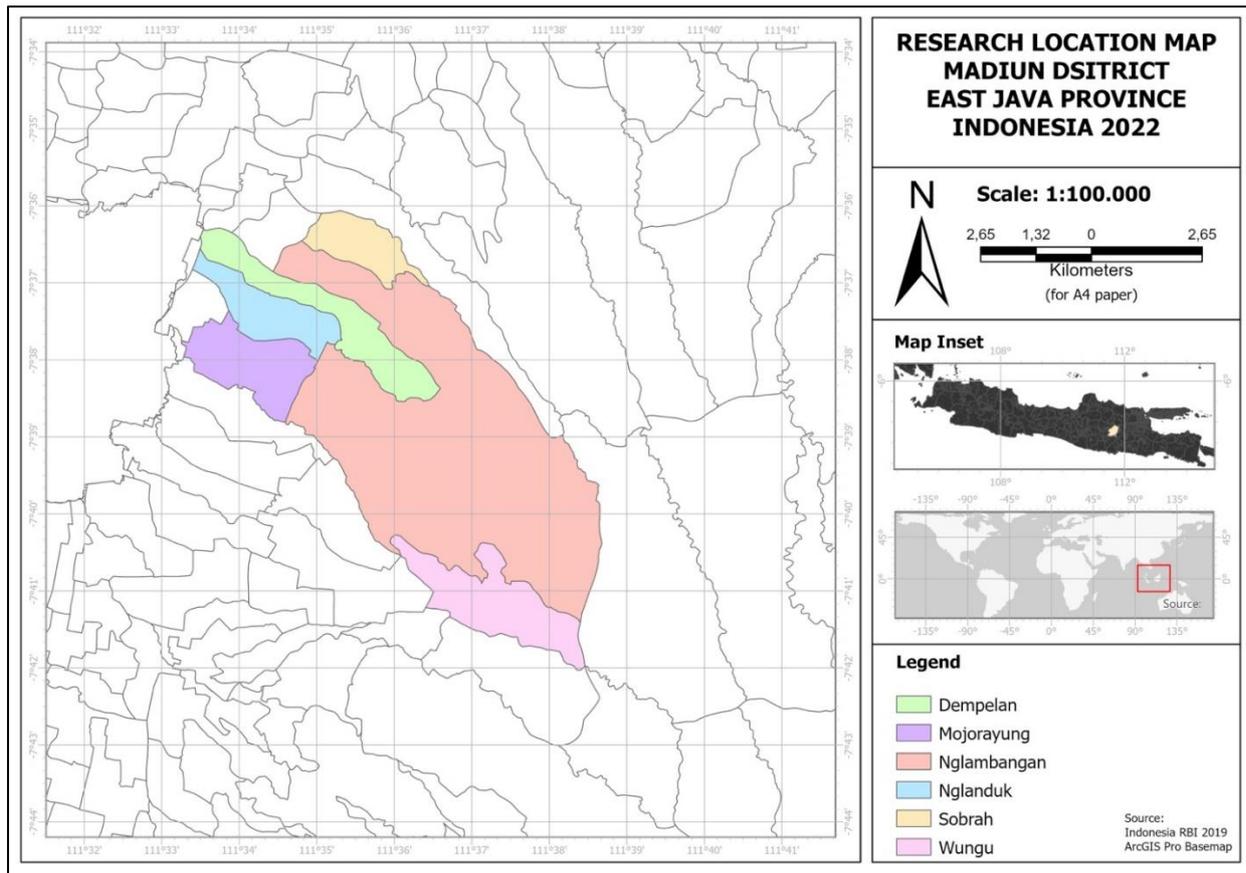


Figure 1. Research location map.

Data Collection

A survey taken by farmers of the LMPSDH at BKP Mojorayung KPH Madiun, with 616 families for the total population was done for this study. In this study, the samples were determined using the formula from [13], and a research sample of 1,100 (one thousand and one hundred) was obtained. Still, the number of samples exceeded the existing population (616 families), so it was then resampled with the assumption of a population of 5,000, which resulted in a total sample size of 242 respondents. The sample selection for each village was then randomly determined using the clustering method [14].

Data Analysis

Primary and secondary data make up the different sorts of data. A subset of respondents from the research sample provided the primary data. This study's goal is to use hypothesis testing to clarify the causal relationship between the variables. The heterotrait-monotrait ratio of correlation and construct reliability were tested as part of the discriminant validity technique of the instrument reliability test in this study. A composite reliability test had to be better than 0.70 and Cronbach's alpha had to be greater than 0.60 [15]. Descriptive and statistical techniques were used in the data analysis process. The processing of qualitative data was descriptive. The qualitative data were processed using a structural equation model (SEM) and a partial least squares (PLS) technique. The following formula is used to determine these variables' explanatory answers [16]:

$$\text{Interval class length (P)} = \frac{\text{Range (R)}}{\text{Total class (K)}} \quad (1)$$

Remark:

Range (R) = highest data – lowest data

Total class (K) = 5

Using the Partial Least Square (PLS) method and the SmartPLS Software, the factors impacting participation (Figure 2) were analyzed using structural equation modeling (SEM) and classified into first- and second-level confirmatory factor analyses. Convergent validity, discriminant validity, VIF of collinearity, and construct reliability were also examined in these analyses. The skewness and kurtosis data normality test were used to assess the quality of the study data. If the kurtosis value is not greater than 7 and the critical value (skewness) is less than ± 2.00 , the normality assumption is met [17].



Figure 2. Conceptual framework.

Results and Discussion

Characteristics of Communities Near the Forest

The characteristics of communities near the forests are related to various aspects of life and the surrounding environment [18]. The community character around the forest at BKPH Mojarayung were reviewed for 9 (nine) dimensions of community characteristics, presented in Table 1. Communities generally have a large, cultivated land area inside and outside the forest (Table 1). One approach to improve the prosperity of farmers to escape the poverty trap is to increase farmers' access to land authorization [9]. Farming in a limited field is less efficient in their production, and they generally prefer to farm on a large scale. These farmers have long cultivated their share of land in the forest and have experienced farming for a long time. The duration of engagement in farming can be viewed as a learning experience, preventing the repetition of past

errors and improving future practices. This aligns with the demographic profile of farmers, indicating that the majority belong to the elderly age group. Many farmers continue working during their senior years because they lack retirement benefits or pensions. Consequently, they were compelled to continue working without any assurance of financial security in their later years.

Table 1 shows that the average total income of LMPSDH BKPH Madiun farmers is IDR 2,773,926 per month or in the high category. Based on BPS [19], Madiun Regency as an agricultural area has a rice field area of 33,225.40 Ha and the Madiun Regency area has a minimum wage of IDR 1,958,410,31 per month (128,02 USD). Although farmers' incomes are relatively high, on average, they have many dependents with four people. Many dependents are one of the reasons a household becomes poor, especially if most family members are of non-productive age [1]. The average formal education level of the community was high school. Thus, the category of farmer education is relatively high (Table 1). The education level greatly determines farmers' competence in activities [20]. Competence refers to the embodiment of behavior in planning activities to achieve targets. However, farmers' non-formal education/training is in the moderate category, where they have attended only three training sessions on average. Farmers' training experience will affect the speed of making decisions because of the training, additional knowledge, and skills obtained in farming [7].

Table 1 shows that people's group motivation is moderate because they tend to judge neutral/ordinary in groups. This study showed that to fulfill social needs, which interact with other communities, they tend to be moderate, such as only getting involved with social activities related to fertilizer subsidies to fulfill economic needs. About innovation, the community has a high average category because of its efforts to find new ideas about types of plants, how to grow crops, market potential, processing plant products, and looking for new farming ideas from various sources of information. One example of farmers' innovation at BKPH Mojorayang is cultivating bees and producing honey. They also cultivated forestry crops intercropped with *porang* (*Amorphophallus muelleri*) and corn (*Zea mays*). Innovative farmers are the first to receive innovations, and their presence of innovative farmers will provide benefits in agricultural development activities [21].

Table 1. Characteristics of communities around the forest.

Dimension	Indicator	Average	Category	
X1.1	The area of cultivated land			
	a. The cultivated land in the state forest area	1.07 ha	Large	
	b. The of cultivated land out of the state forest area	0.72 ha	Large	
X1.2	Farming experience			
	a. The length of time farmers cultivate land in the forest	30.64 years old	Long time	
	b. Time length for farmers to farming	32.38 years old	Long time	
X1.3	Age	Age	66.61 years old	Old
X1.4	Revenue	Revenue (IDR/month)	IDR 2,773,926	High
X1.5	Number of family dependents	Number of family dependents	4 persons	Plenty
X1.6	Formal Education	Formal education	Senior high school	Senior high school
X1.7	Non-formal Education	Non-formal education	3 times training	Moderate
X1.8	Group motivation	Total average score	3.46	High
X1.9	Innovation	Total average score	4.04	High

Empowerment Process Accuracy

Table 2 shows that the accuracy of the empowerment process on average has a "high" category. This happened because the initiative and objectives program were determined by an agreement with the community with *Perum Perhutani*, a two-way awareness process with material which highlights the forest management techniques, community institutions in the form of LMPSDH were formed by village officials, *Perum Perhutani* and forest farmer communities, the rights and obligations of the parties had been established, determined in the Decision Letter *Kulin KK*, the utilization of the management space has been determined together, and the rules of the Decision Letter *Kulin KK* have also determined the proportion of profit sharing. These findings confirm the research of that the establishment of the LMPSDH was facilitated by the *Perum Perhutani* and with the deliberation of forest farmers. This means that the LMPSDH is independent and does not belong to the *Perum Perhutani*, only to the plot of its lap in the *Perum Perhutani* area. Farmers can determine the cultivation of food crops with certain types of plants permitted by the *Perum Perhutani* [22].

The Role of Empowerment Workers

The analysis of Table 2 shows that the role of empowerment workers is in the 'high' category. Empowerment workers are the *Perum Perhutani* foreman officers who assist and interact directly with the farmers and manage forest resources daily. According to farmers' perceptions, the foreman is the *Perhutani* officer closest to them in assisting various forest resource management activities [16].

Support of Farmer Group Leader

Table 2 shows that the farmer group leader's support was in the 'high' category. Farmer group leader support includes the role of group leaders, leadership behavior, and leadership style. The group leader has an important role in managing the farmer group. The group leader helps farmers in several ways, such as explaining the purpose of forming the group, providing facilities and infrastructure, encouraging members, listening to their aspirations, and solving all problems in farming activities. The results, similar to those of on the *Bina Sejahtera* farmer Group, stated that group leader support positively correlated with empowering farmer group members. The higher the support of the group leader, the higher the process of empowering farmer groups to run a farming business [23].

Table 2. Results of analysis of empowerment process, role of empowerment worker and leader support.

Item	Variables	Average score	Category
X2	The accuracy of the empowerment process	4.04	High
X3	The role of empowerment workers	3.94	High
X4	Famer group leader support	3.81	High

Forest Sustainability

Table 3 shows that forest sustainability falls in the "high" category. The Social Forestry Program, which involves the community in the LMPSDH, has an impact on increasing forest sustainability from ecological, economic, and social perspectives. The existence of social forestry positively affects the community [24]. The positive impact is reducing unemployment by absorbing labor in the forest management process. The lower the unemployment rate, the better the level of the community's economy, which reduces illegal forestry cases, such as illegal logging, forest encroachment, and forest fires.

Table 3. Results of analysis of participation variables and forest sustainability.

Item	Variables	Average score	Category
Y1	Participation	3.91	High
Y2	Forest Sustainability	3.83	High

Confirmatory Factor Analysis

Following the application of the modification model, the results of the concurrent validity assessment for the Empowerment Process Accuracy Construct (X2) and the characteristics of the communities surrounding the forest (X1) showed that all measurement items satisfied the requirements for determining the outer loading value. Additionally, after eliminating insufficient indicator items, the Average Variance Extracted (AVE) surpassed 0.50, signifying the validity and appropriateness of these measures for assessing each latent variable. In the role of the Empowering HR Construct (X3), the Group Leader Support Construct (X4), the Participation Construct (Y1), and the Forest Sustainability Construct (Y2), there was no model modification. All measurement items satisfied the criteria of the outer loading test, as each question item exceeded the threshold of 0.5. Additionally, the average variance extracted (AVE) surpassed 0.50, indicating validity and suitability for measuring each latent variable. The results of the Collinearity VIF test for all constructs indicate that all predictor constructs are <7; therefore, collinearity is not a problem between construct dimensions [15,25,26].

The next step was to do a discriminant validity test, which started with the HTMT inference test. Confidence interval (CI) values less than or equal to 1.00 were found by a bootstrapping technique with 5,000 resamples, showing no problems with discriminant validity. Significantly, this study's 2.5% and 97.5% CI for each dimension to the variable value were less than or equal to 1.00, indicating that discriminant validity issues were not raised by supporting indicators for any of the constructs [14]. Meanwhile, a composite reliability test was used to examine all values of the latent variable, yielding a composite reliability value of 0.7. Every

concept exhibited strong reliability, and the study's questionnaire was dependable and consistent. The final step of the confirmatory factor analysis test was determining the significance of the association between dimensions and variables. It revealed that t-statistics values over 1.96 and p-values below 0.05 were present in the total lower-order construct that formed the higher-order national culture construct. We can conclude that all dimension constructs that are LOC (lower-order construct) are actually HOC (variables).

Measurement Model

To determine convergent validity, the outer loading value must be more than 0.70. Reflective indicator loading is a useful measure for latent variables with values greater than 0.50. The test findings demonstrate that all variables have indicators with loading factor values of 0.50 or higher, indicating their validity. Examining the average variance extracted (AVE) value is another method for confirming convergent validity. If the suggested value is more than 0.5, then the hidden variable accounts for over 50% of the variation observed in the reflective indicators. But only reflecting measurement methods are applicable to AVE. The CI values for the discriminant validity test, which was determined using the heteroitt-monotrait ratio of correlations (HTMT), were 2.5% and 97.5%. All of the supporting indicators are compatible with discriminant validity if the variable value is 1.00 or less. The construct also exhibits dependability, as seen by composite reliability results worth 0.70 and a Cronbach's alpha value of 0.60.

Inner Model

In order to ascertain the association between latent variables, the inner model is tested subsequent to the fulfillment of the outer requirements and model estimation [17]. The inner model is found using the inner VIF value, model fit, R-square (R²), and predictive relevance (Q²). There is no multicollinearity across independent variables when all variable constructs produced by the variance inflation factor (VIF) value are less than 10 in the multicollinearity test [15,25]. When using PLS to test the model, R-square (R²), or the coefficient of determination for each endogenous latent variable, is utilized. The test findings show that the exogenous variables contribute 76.7% of the 0.767 R-squared for the forest sustainability construct. Simultaneously, the participation construct's coefficient of determination is 0.856, which translates to an external variable of 85.6%.

Furthermore, the structural model's predictive relevance (Q²) determines the observation score. Predictive relevance of the PLS model is obtained from endogenous latent variables with a Q² value larger than zero [26]. The Predictive Relevance (Q²) test results in this study are good because the number is 0.568. In this work, the normal fit index (NFI) and the standardised root means square residual (SRMR) test models were used to assess model fit. According to [25], the model is considered fit if the SRMR is smaller than 0.10. The model in this study fits the data well, as indicated by the SRMR score of less than 0.10 [17].

Hypothesis Testing

To ascertain whether a hypothesis is accepted or rejected, bootstrapping procedures are used to test hypotheses using path coefficients and T-statistic values, taking into account the resulting p-value. Table 4 presents the outcomes of the hypothesis testing.

Table 4. Hypothesis testing results.

Variables	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values	Conclusion
X1 -> Y1	0.004	0.005	0.026	0.171	0.865	Rejected
X2 -> Y1	0.244	0.246	0.056	4.371	0	Accepted
X3 -> Y1	0.172	0.173	0.042	4.134	0	Accepted
X4 -> Y1	0.585	0.582	0.056	10.517	0	Accepted
Y1 -> Y2	0.876	0.875	0.021	42.67	0	Accepted

The first hypothesis (H1) is rejected, with a path coefficient of 0.004 which is close to +1, a T-statistic value of 0.171 (<1.96), and a p-value of 0.865 (>0.05). The second hypothesis (H2) is accepted with a path coefficient value of 0.244 which is close to +1, a T-statistic value of 4.371 (>1.96), and a p-value of 0.000 (<0.05). The third hypothesis (H3) is accepted with a path coefficient value of 0.172 which is close to +1; a T-statistic value of 4.134 (>1.96), and a p-value of 0.000 (<0.05). In the fourth hypothesis (H4), the path coefficient value is 0.585, which is close to +1; the T-statistic value is 10.517 (>1.96); and the p-value is 0.000 (<0.05) so that the hypothesis is accepted. Finally, the fifth hypothesis (H5) is accepted with a path coefficient value of 0.876, which is close to +1, a T-statistic value of 42.67 (>1.96), and a p-value of 0.000 (<0.05) [15,17,26].

Conclusion

Participation in forest management by the community has a substantial beneficial impact on the long-term viability of the forest, therefore it will increase the sustainability of the forest. A few important and useful elements that can boost community involvement in forest management are the validity of the empowerment process, the importance of empowering human resources, and group leaders' support. It is advisable to utilize a bigger sample size to conduct further research. This ensured that the research results were more representative. Additionally, we consider expanding the number of variables not studied in this research, especially the connecting variables that might influence the research results. This approach will lead to diverse research analyses and outcomes.

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