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Voluntary participation in community collaborative forest management: A case study of Central Java, Indonesia*

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Abstract

This paper examines voluntary participation in community forest management, and characterizes how more participation may be induced. We implemented a survey of 571 respondents and conducted a case study in Central Java, Indonesia. The study's novelty lies in categorizing the degrees of participation into three levels and in identifying how socio-economic factors affect people's participation at each level. The analysis finds heterogeneous responses across the three levels and also finds that publicly organized programs, such as information provision and benefit sharing, are highly effective. Overall, the results suggest a positive perspective and further corrective measures for the success of community forest management.

Keywords: Voluntary participation, community collaborative forest management, participation level

*Remaining errors are ours.

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1 Introduction

“How can we make people understand that Community Collaborative Forest Management (*Pengelolaan Hutan Bersama Masyarakat* or PHBM) is beneficial and how can we encourage more people to ‘practically’ participate in this program?” These questions have been raised by the managers of the state-owned forest enterprise, Perum Perhutani, which is responsible for implementing the PHBM program in the Kendal Forest Management Unit (KPH Kendal), Central Java, Indonesia. In particular, “more participation” in terms of the degree and the number of members in the PHBM program is acknowledged as necessary and important in successful forestry management to protect the environment of KPH Kendal and to improve forest production of timber and non-timber products. However, up until now, Perum Perhutani has not been successful in encouraging enough community members to participate more in the program nor in inducing practical participation, as the choice to participate is entirely voluntary.¹

KPH Kendal covers 81 villages that are involved in the PHBM program. However, not all community members are eager to participate in the program. Indeed, the degree of participation, which captures how actively they become involved in the program, varies from member to member. Some participate in the program only to cultivate forest lands; some participate to utilize additional PHBM activities, such as training, routine meetings, and fieldwork team projects; and others fully participate in active or managerial roles, from planning to harvesting timbers or non-timber products in KPH Kendal. Given the state of affairs, this study classifies community members into three groups depending on the degree of participation and identifies the determinants that enhance motivation to participate more actively in the program for each stage of the three groups. Doing so enables us to derive some important implications for sustainable forest management in Indonesia and other areas

¹The report provided by Perum Perhutani (2010) states that communities who live near forests remain conservative and have difficulty in accepting some drastic changes under the PHBM program. This resistance may be due to their dependency on the environment and their interaction with forest resources. Currently, there is some debate that community participation makes the program more effective in improving the living standards of all forest users through the benefit sharing mechanism of community forest management.

in foreign countries.

The main objective of sustainable forest management is to meet the needs and aspirations of the current generation without damaging future generations. Preventing local people from over-utilizing forests has proven unsuccessful in top-down type governmental forest policies due to the difficulties of monitoring and enforcement (see, e.g., Arnold (1991) and Mather (1992)). Thus, forest management policies have shifted toward people-oriented management as a continuous flow of multiple benefits, a trend that has been supported by scientists (see, e.g., Franklin (1995) and Malla (1997)). In this regard, forest management authorities have placed the highest priority on participatory forest programs, which encourage local communities to voluntarily get involved in the management of forest resources to protect, manage, and develop forests in a sustainable way.

Many previous works have discussed how community participation is associated with the effectiveness of sustainable forest resource management in relation to people's incentives to participate in the program through various mechanisms, such as benefit sharing.² For example, Salam et al. (2005) collected primary cross-sectional data in Bangladesh through interviews and field observations under multistage stratified random sampling, with their logit analyses identifying the factors affecting the sustained participation of farmers in participatory forestry applying a logit regression analysis. Their argument is that a partnership between local participants and management authorities is needed to conduct successful strategies for sustainable development.

Maskey et al. (2006) examine the determinants of collective management of participatory forestry in Nepal by using ordered probit and two-stage least-squares models. They show that community participation is based on the socio-economic profile of an individual and that level of participation is determined by the benefits obtained from common forest resources. Furthermore, Emtage and Suh (2004) identify the socio-economic factors that

²For an explanation of various case studies, see, e.g., Khan and Begum (1997), Schroeder (1999), Gibson and Becker (2000), Mohan and Stokke (2000), Emtage and Suh (2004), Parfitt (2004), Ito et al. (2005), Martin (2005), Khadka and Schmidt-Vogt (2008), and Layzer (2006).

influence households' tree management intentions by collecting survey data from rural communities in Leyte Province, the Philippines. Their results reveal that levels of land ownership and previous experience in the forestry industry are related to the involvement of community members.

Studies have also been conducted to evaluate participatory forestry in Indonesia. Sutopo (2005) analyzes how the PHBM program affects forest sustainability and community welfare in the Ngawi district by using correlation analysis indicating that the program has a significant impact on forest sustainability and a small impact on community welfare. Applying participatory conservation planning, participatory mapping, and participatory rural appraisal as descriptive research methods, Djajanti (2005) also reveals that the PHBM program provides the community with more equitable access to forest resources particularly in harvesting non-timber forest products.

A recent work by Djamhuri (2008) discusses incentive structures in social forestry programs through field observation and interviews with members of such programs and finds that the transfer of rights from the state to community members is a useful approach to establish an effective incentive structure. However, the degree of community participation depends on the incentive structure and the existing social capital. In summary, past works have focused primarily on analyzing socio-economic factors affecting people's motivation for community participation; the results appear to reach a consensus that relations between members and management authorities, the incentive structure of sharing benefits, and social capital are important determinants.

However, most of these works do not evaluate and compare the effectiveness of different forestry policies implemented by the government and do not consider the different degrees of participation in community forest management. As mentioned above, more 'practical' participation is necessary for the success of community forest management, and more detailed analysis of these factors must be valuable from a policy perspective. Because no systematic work has focused on analyzing the impact of several different forest policies and different

degrees of participation within a single framework, this paper seeks to tackle this absence. More specifically, we characterize (1) what types of governmental policies and (2) what socio-economic factors induce more participation in community forest management from entry to managerial levels by utilizing the example of the PHBM program in Indonesia.

For this purpose, we use primary cross-sectional data from households located near forests in KPH Kendal, Central Java, Indonesia. A field survey was conducted with a stratified random sampling in KPH Kendal from December 2010 to January 2011. For our research areas, we selected three forest districts (Semarang, Batang, and Kendal) that cover the entire KPH Kendal region or, more precisely, three villages from Semarang, three villages from Batang, and four villages from Kendal that consider the PHBM program's criteria. The sample consists of 571 respondents. These study sites were chosen because community forests are administered by the PHBM program in a coherent manner, but there are sufficient variations with respect to socio-economic conditions, current performance of community forestry and types of publicly organized programs.

The novelty of this study is (1) to categorize the degree of participation into three levels—nominal participation, active participation, and managerial participation, and (2) to analyze the details of socio-economic factors as well as several government policies that induce more active participation from non-member to members, from nominal to active, and from active to managerial levels. They represent different levels of community participation. The degrees sequentially increase and become stronger in order of nominal, active and managerial. As noted above, more practical participation is reported to be necessary and important for the success of Indonesia's community forestry, as many forest users are still nominal members who neither fully utilize nor contribute to the potential benefit of the program. Therefore, with an eye on different degrees of participation, our analysis provides important implications for the current forest policy debate.

For each category of the three participation levels, we conduct a logit regression analysis to clarify the determinants of community participation and then discuss the differences and

similarities across the categories with respect to the individual behaviors of participation. We choose this step-wise methodology of logit regressions rather than multinomial logit approach because the decision to participate at the three levels is sequentially made as a custom or an implicit rule in the study areas of community forest management.³ To the best of our knowledge, our work can be considered the first to characterizes such details about how voluntary participation evolve at each stage of the forest program.

The logit analysis indicates some heterogeneous responses across different levels of participation. Most importantly, education level is negatively associated with the eagerness of households to participate in the PHBM program as nominal participants, meaning that less educated people are more likely to participate in the program at the entry level. However, once people participate in the program as nominal participants, education level is positively associated with a household's incentive to participate in the program, indicating that highly educated people are more likely to play a role as an active participant or even as a managerial participant. In addition to the non-monotonicity property of education levels, the result also finds that people are encouraged to participate in the program through certain Perum Perhutani policies, such as giving advice and informational provision of benefit sharing mechanisms, and through public credibility of Perum Perhutani by fulfilling the agreement related to benefit sharing.

Our survey data confirms the problem raised by the managers of Perum Perhutani that many people become members as only nominal participants by signing without understanding what the program does. This finding suggests that a current scheme for inviting people to be members may not provide enough information about the program at the entry stage. As a result, highly educated people are likely to be more reluctant to participate due to lack of information. Thus, Perum Perhutani should offer special programs for further informational provision at the entry stage. If the government appropriately considers some heterogeneous responses across each stage of participation, particularly with respect to education levels,

³In other words, an individual cannot be a managerial participant without being a nominal and active participant.

we believe that a positive perspective of the program can be expected to induce further voluntary participation. Because this research also shows that some programs organized by Perum Perhutani are effective, such improvements to induce the entry of highly educated people should enhance the community's overall performance in forest management.

The remainder of the paper is organized as follows. Section 2 overviews the PHBM program in KPH Kendal and describes the study site. Section 3 presents data and empirical methodology; it then shows the estimated results of the logit models for each of the three categories classified by the levels of community participation. Some important policy implications are also discussed. Section 4 presents the discussion and conclusion.

2 Community collaborative forest management

2.1 PHBM program

In collaboration with 5386 forest villages in Java and Madura, Perum Perhutani is mandated to manage the state forests with greater attention to the society's socioeconomic problems, particularly those of rural communities living around the forests. The close interaction between communities and forests forces forest management authorities to take into account the sustainability of forest ecosystems and the life of the poor around the forest. In 2001, Perum Perhutani developed the Community Collaborative Forest Management (*Pengelolaan Hutan Bersama Masyarakat* or PHBM) program, which had evolved from the Forest Village Community Development (*Pembangunan Masyarakat Desa Hutan* or PMDH) program that was initiated in 1992.

The PHBM program is intended to provide directions and knowledge-sharing and guide forest resource management to improve the communities' welfare, quality of life, and economic and social capacities by coordinating the roles and responsibilities of Perum Perhutani, local communities, stakeholders, and interested parties related to forest resource management. The second objective is to enhance the quality of forest resources, forest productivity,

and forest security with the sustainability of the functions and benefits of forest resources. In this program, a principle of “sharing” is applied, and the community around the forest is given the opportunity to voluntarily participate in forest management from planning to timber harvesting (see Djajanti (2005), Perum Perhutani (2007), and Prambudiarto (2008)).

To support the PHBM program, each village is obliged to establish a community organization called the Forest Village Community Institution (*Lembaga Masyarakat Desa Hutan* or LMDH). The implementation of the PHBM program requires institutions that are legally able to act on behalf of the rural community; thus, the LMDH plays a role in endorsing the community to exercise rights and obligations as a legal entity that is approved by the notary. That is, once the community forms the LMDH, it will obtain rights and duties to manage a certain forest area. This institution publicizes the representative opinion of the community in cooperation with Perum Perhutani and other related parties. In this sense, the LMDH can be considered a practical authority on forest management for their respective villages.

Perum Perhutani and the LMDH of each village cooperatively formulate regulations that are to be written in the Memorandum of Understanding (MoU). These include how the community participates in the PHBM program and utilizes forest resources. In essence, the LMDH receives benefits from harvesting timber in the managed forest area, which vary across every village. In consultation with the LMDH, the community under the program has the authority to decide how benefit sharing enhances community welfare. Community members are allowed to cultivate food crops between forest plants in an intercropping system, such as rice, corn, cassava, peanuts, and vegetables. Furthermore, the community also has the right to access non-timber forest products, such as firewood, fodder, and teak leaf, for the fulfillment of daily needs, which implies that the PHBM program can provide extra revenues for farmers through the LMDH. At the same time, the PHBM program obliges the LMDH with the community members to maintain the trees in the forest area and to keep the forest security from threats, such as illegal logging and forest fires.

2.2 KPH Kendal

The study site in this paper is the Kendal Forest Management Unit (KPH Kendal), located in Central Java, Indonesia. The total area of KPH Kendal managed by Perum Perhutani is 20413.9 hectares which lie in three districts (5339.88 hectares in Batang, 13198.3 hectares in Kendal, and 1875.7 hectares in Semarang) consisting of 81 villages (34 villages in Batang, 35 villages Kendal, and 12 villages in Semarang). The forest area of KPH Kendal is grouped into three categories: production forest (16967.98 hectares or 83%), protection forest (2771.6 hectares or 14%), and forest for special purposes, such as tourism forest (674.3 hectares or 3%) (see Perum Perhutani (2010)). Figure 1 provides a map of Central Java, Figure 2 explains the location of KPH Kendal in Central Java, and Figure 3 illustrates land use in KPH Kendal. Furthermore, the number of residents in KPH Kendal is 300961 people (79656 households). Because most people in KPH Kendal are farmers in agricultural sectors (40.5% of the residents), they depend on forests for earnings and have close interaction with them in daily life.

KPH Kendal has been chosen as a study site of community forest management practices under the PHBM program. Most households live near forest areas in which community members are allowed to voluntarily participate in the PHBM Program. Because participation is entirely voluntary, the levels of community participation are different depending on household characteristics. Most participants in the PHBM program are farmers with limited land holdings, and, thus, tend to be motivated to hold more land and increase their earnings from cultivation. Some non-farmers are also interested in participation because they pay significant attention to forest sustainability. They believe that forest degradation will cause significantly negative externalities on the environment and on their daily life through flooding and the decline of ground water levels.

3 Empirical analysis

3.1 Data

This study uses primary data obtained from a field survey conducted in KPH Kendal, Central Java, Indonesia. The data were collected through interviews and field observation methods using a stratified random sampling from December 2010 to January 2011. The sample unit was the household, who was considered to be the respondent. To gather in-depth attitudes and beliefs from individuals as the sample, we included close inspection in addition to the procedure of asking a series of questions in the survey. KPH Kendal covers three districts: Semarang, Batang, and Kendal. Each district consists of a number of villages. According to the criteria on the performance of the PHBM program, these villages are classified into four performance groups: *pemula* (beginner), *muda* (junior), *madya* (middle), and *menuju mandiri* (toward independent). Only one village is classified as *menuju mandiri* in the Kendal district, whereas no villages are classified as *menuju mandiri* in the Semarang and Batang districts.

For each of the three districts, we chose four villages from the Kendal district and three villages from the Semarang and Batang districts (one from each of the performance groups). The selected villages include Kedungsuren, Protomulyo, Magelung, Kertosari, Subah, Pecalungan, Bandung, Gondoriyo, Podorejo, and Wates. For each selected village, we randomly chose 58 households, yielding 580 households in total. At the time of survey analysis, nine households did not complete questionnaires and were discarded from the study. A total of 571 respondents remained as the final sample.

To avoid incompatibility, the questionnaire was tested with some respondents. After a series of revisions, a final version of the questionnaires was utilized during the survey period. Because the sampled households included many less educated farmers, the way to ask questions was carefully evaluated based on their knowledge, and some additional explanations were needed to allow them to understand the questions. The respondents were

Javanese, so we used the Javanese language to communicate with them. In addition to the questionnaire, we collected other supporting documents, such as profiles and activity reports of villages, LMDHs, and KPH Kendal, and regulation documents from Perum Perhutani of KPH Kendal. We also conducted interviews with some stakeholders, such as the heads of villages, the LMDH chairman, Perum Perhutani officials, and NGOs officials who have been involved in the PHBM program. These supporting documents helped to provide comprehensive information and a more complete understanding of the research area.

3.2 Community participation

Each household participating in the PHBM program was characterized by the degree of community participation. Specifically, we considered three categories based on the degree of community participation: (i) nominal participation, (ii) active participation, and (iii) managerial participation. First, all sampled households were divided into either participating households, which are called ‘nominal participants,’ or non-participating households, depending on if the household had signed the document. If they signed it, they are considered ‘nominal’ participants. All participants have the right to officially obtain a specific forest plot to be cultivated with some obligations, such as taking care of the plot and the associated trees planted by Perum Perhutani. In reality, however, it is difficult to enforce all nominal participants to meet the obligations. Thus, some nominal participants are, indeed, ‘nominal’ and only registered in the program without doing the required tasks. Thus, these people do not practically participate in the program.

Second, we divided nominal participants into two groups: those who actively participate in the program, called ‘active participants,’ and those who are not practically involved in the program. Active participants are considered individuals who become involved in special and extra activities organized by Perum Perhutani, such as regular meetings, training, and teamwork jobs. They actively manage the assigned plot and engage in activities assigned as obligations to achieve the goal of the program. Third, we further divided active partici-

pants into two groups: those who participate in the program at the managerial level, called ‘managerial participants,’ and those who are actively involved in the program but not at the managerial level. Managerial participation can be considered an ideal form of participation based on the definition of the PHBM program in which the community is involved in all levels of activities in the forest management system, from planning to harvesting. They fully participate in the program through not only voluntarily donated labor but also ideas and materials. Finally, note that some nominal participants are active participants, and some active participants are managerial participants in our categorization. Put differently, those categorized as active participants in our sample are always nominal participants, and in the same way, managerial participants are always nominal and active participants.

3.3 Methodology

This study applied a logit regression analysis to identify factors affecting each of the three levels of community participation under the PHBM program. Each level of community participation can be captured as binary-choice models, which presume that households face a choice problem of participation and that the choice depends on identifiable characteristics. Let y_i denote a choice variable such that $y_i = 1$ if respondent i chooses to participate in the program, and $y_i = 0$ otherwise. The probability of participation of respondent i , $\Pr(y_i = 1)$, is represented by the distribution function F evaluated at $X_i\beta$, where X_i is a vector of explanatory variables and β is a vector of unknown parameters. The logit regression analysis assumes a logit form of a distribution function:

$$\Pr(y_i = 1) = \frac{\exp(X_i\beta)}{1 + \exp(X_i\beta)},$$

which allows us to estimate the probability of the occurrence that respondent i participates in the PHBM program.

The empirical analysis is divided into three steps, depending on different participation

levels. Each step attempts to identify factors encouraging people to participate in the PHBM program at a different level. In the first step, which aims at identifying the determinants of ‘nominal’ participation, the logit analysis is based on the whole samples and uses the choice variable y_i^n , satisfying that $y_i^n = 1$ if respondent i participates at least ‘nominally’ in the PHBM program, and $y_i^n = 0$ otherwise where the superscript of n in y_i^n represents “nominal.” In the second step, we restrict ourselves to the sample of nominal participants (or participating households irrespective of the levels of community participation). To identify the determinants of ‘active’ participation, our logit analysis uses the choice variable y_i^a , satisfying that $y_i^a = 1$ if respondent i participates ‘actively’ in the PHBM program, and $y_i^a = 0$ otherwise where the superscript a represents ‘active.’ In the third step, we further restrict ourselves to the sample of active participants. To identify the determinants of ‘managerial’ participation, our logit analysis takes the choice variable y_i^m , satisfying that $y_i^m = 1$ if respondent i participates in the program at the managerial level, and $y_i^m = 0$ otherwise where the superscript m represents “managerial.”

Concerning the explanatory variables in the logit models for each of the above three steps, we take six variables related to the characteristics of the household, which include the household’s income level (inc), the age of household’s head (age), the occupation of household’s head as a farmer (occ), the number of family members (fam), extensive land holding by the household (land), and the education level of household’s head (edu). The occupation of household’s head as a farmer (occ) is a dummy variable which equals unity if the head is a farmer, and zero otherwise. Extensive land holding by the household (land) is measured in terms of the area, and the education level of household’s head (edu) is represented by the school year of household’s head. The reasoning behind the inclusion of the six variables is as follows.

Because young generations tend to leave the village and seek other types of employment in nearby cities, old people may be more dependent on the forest and may then be more interested in community participation than young people. Thus, the expected sign of the

age of household's head (age) is positive. In addition, the income level and occupation of the respondents may also influence the motivation of community participation of households. Typically, low income is a common characteristic of forest farmers, meaning that they tend to access the forest more intensively in order to fulfill their daily needs such as food, firewood, and fodder. These forms of access enable them to earn direct benefits and keep their income. That is, people with high incomes and non-farm jobs outside the rice field or forest may be less dependent on the forest. Thus, the signs of household's income level (inc) and the occupation of household's head as a farmer (occ) are expected to be negative and positive, respectively.

Moreover, the number of family members may also be an important factor that encourages them to increase their earnings from the forest, as the household generally needs human resources, such as their wife and children, to access the forest. Thus, the sign of the number of family members (fam) would be positive, i.e., larger family size is associated with more incentive to participate in the program. Furthermore, households with large fields may not have enough time to access the forest and may not require earnings or benefits from the forest, while those with fewer land holdings may have an incentive to utilize the forest for the fulfillment of their needs. Thus, the coefficient on extensive land holding by the household (land) is expected to be negative. Finally, we expect that the education level of the household's head (edu) would positively or negatively affect community participation. Highly educated people with broader knowledge about the importance of forest management for community life would have strong motivations to engage in the program. However, high level of education allow people opportunities for jobs with higher earnings than those engaged in farm- or forest-related tasks; consequently, high education may be a factor that reduce their dependency on the forest.

To evaluate the effectiveness of public programs and policies aimed at enhancing community participation, our logit analysis includes the three dummy variables of advice provision (adv), information provision (inf), and fulfillment of the agreement (ful), all of which must

be appropriately implemented by Perum Perhutani. First, the dummy variable of advices (adv) takes unity if the household receives specific advices on forest management from Perum Perhutani, and zero otherwise. Some field official staffs of Perum Perhutani regularly hold meetings with community members to deliver advices on forest and agriculture managements. The meeting would encourage them to participate more in the program, so the coefficient on advices (adv) should be positive.

Second, the dummy variable of information provision (inf) takes unity if the household obtains information about the benefit sharing mechanism from Perum Perhutani or other sources, and zero otherwise. According to information from the staff of Perum Perhutani and LMDH management, Perum Perhutani has always implemented the benefit sharing mechanism. However, not all community members understand this mechanism. In some regions, only those who become actively involved in the LMDH are well familiar with the mechanism. The crucial problem may be that the LMDH and Perum Perhutani do not announce the benefit sharing mechanism to all community members. By providing information about the mechanism, Perum Perhutani believes that community members are induced to participate in the program in a more active manner with high motivations for managing and protecting the forest. Thus, informational provision of the benefit sharing mechanism would positively influence community participation. Because active participants have enough knowledge of the PHBM program including benefit sharing, we include information provision (inf) in the first and second steps, i.e., in the logit analysis at the levels of nominal and active participants.

For the third variable related to public programs and policies, we take the dummy variable of fulfillment of the agreement (ful) which takes unity if the household feels that Perum Perhutani fulfills the agreement on the PHBM program signed between Perum Perhutani and the household, and zero otherwise. It has been reported that Perum Perhutani often fails to fulfill the agreement as initially planned; thus, community members suspect that Perum Perhutani does not fulfill the agreement. This event may be partly because the

LMDH and Perum Perhutani do not provide enough information on the benefit sharing mechanism, as mentioned before. The fulfillment of obligations and agreements by Perum Perhutani, such as implementing the benefit sharing mechanism as a real and binding action, could improve the reputation of Perum Perhutani and encourage people to participate in the PHBM program, so the coefficient on the variable should be positive.⁴ Given the fact that this issue is crucial for those who have already joined the program, we include fulfillment of the agreement (ful) in the second and third steps, i.e., in the logit analysis at the levels of active and managerial participants.

In addition to the above-mentioned variables related to household characteristics and Perum Perhutani's policies, we include two additional explanatory variables: the length of time during which the household has been involved in the program in terms of years (len) and the satisfaction with the program (sat), represented by the dummy variable and takes unity if the household is satisfied with the program, and zero otherwise. The longer people were involved in the program, the more highly motivated they are to participate at responsible levels, which can be explained by the fact that they acquire more knowledge and skills to efficiently benefit from the program. Moreover, personal judgment of satisfaction with the PHBM program affects motivation. High satisfaction may encourage nominal and active participants to shift toward active and managerial participation levels, respectively. Thus, the length of time (len) and satisfaction with the program (sat) should positively be associated with community participation. Because the above arguments are valid only for nominal participants, we include these two variables in the second and third steps, i.e., in the logit analysis at the levels of active and managerial participants.

Throughout this study, our focus is on identifying the process whereby people move to another stage of community participation as argued above. To this end, we conduct logit analysis for each stage of nominal, active, and managerial participants. Finally, all of the

⁴The fairness of payment mechanism could be related to the reputation of Perum Perhutani. Some Perum Perhutani field officers give the entire payment to the community and take a margin. How the payment is arranged depends on the personality of the field officers that have contact with the community.

arguments posed on the expected signs of the coefficients for each independent variable are summarized in Table 1. In the next subsection, we examine whether our arguments can be supported empirically.

3.4 Results

3.4.1 Some preliminary results

This subsection overviews the summary statistics of the household survey on the PHBM program in KPH Kendal. In particular, we summarize the results for each of the three categories based on the levels of community participation: (i) nominal participation, (ii) active participation, and (iii) managerial participation. Recall that active participants are also considered nominal participants, and managerial participants are also considered nominal and active participants. All 571 respondents live near KPH Kendal’s forest area of. Table 2 shows the summary statistics of the variables in our logit models for all samples, nominal participants, and active participants (and managerial participants). The number of total observations is 571, and the total nominal and active participants are 535 and 234, respectively. The total managerial participants is $101 (= 234 \times 0.432)$.

Concerning household characteristics, the average age of the household’s head and the ratio of farmers are the highest for the sample of nominal participants and the lowest for the sample of managerial participants. Moreover, the average household’s income, the average area of household’s land holding, and the average of school years of the household’s head are the lowest for the sample of nominal participants and the highest for the sample of managerial participants. These findings imply that as the level of community participation increases, the averages of household characteristics (except for the average number of family members) change in a non-monotone manner. Highly educated young people with high incomes, non-farm occupations, and large land holdings tend to become involved in the PHBM program at the managerial level, while less-educated old farmers with low incomes and small land holdings tend to become nominal participants in the PHBM program.

The three policy-related variables (advice provision, information provision, and fulfillment of agreements) have the same tendency in that they increase with the level of community participation. This finding seems to support that special programs organized by Perum Perhutani could be associated with high motivation of people participating in the PHBM program. Moreover, as for the other two explanatory variables that capture motivation of community participation, length of time in the PHBM program and satisfaction with the PHBM program are positively linked to the level of community participation, which may also be consistent with our intuitions. The next subsection formally examines how the attitude of community participation is influenced by household characteristics, policy-related measures, and other control variables by applying the logit regression analysis in the framework of the three steps.

3.4.2 Logit regression analysis

This subsection shows the results of the three logit regression based on different levels of community participation. The first step examines the determinants of nominal participation at the entry level for the entire sample (571 observations); the second step examines the determinants of active participation for the sample of nominal participants (535 observations); and the third step examines the determinants of managerial participation for the sample of active participants (234 observations). Table 3 shows the estimated results of the three logit analyses.

First step (Nominal participation): The result of the logit regression at the first step shows that the coefficients on the occupation of household's head as a farmer (occ) and information provision (inf) are significantly positive, while those on the land holding by the household (land) and the education level of household's head (edu) are significantly negative. As for the variables capturing Perum Perhutani's policies, the significantly positive coefficient on information provision (inf) has an important policy implication, as information about the

benefit sharing mechanism provided by Perum Perhutani, rather than the advice provision, is effective in encouraging people to participate in the PHBM program at least at the nominal or entry level.

Concerning the explanatory variables capturing household characteristics, the motivation of nominal participation is higher for farmers who tend to depend more on the forest than for non-farmers. Moreover, people with relatively small land holdings have more incentive for nominal participation. Furthermore, higher education level is associated with a lower incentive for nominal participation. This finding could be considered consistent with the argument that high level of education allows people opportunities for jobs with higher earnings than those engaged in farm- or forest-related tasks, and that, consequently, higher education can be a factor that reduces their dependency on the forest, as mentioned in Gunatilake et al. (1993) and Adhikari (2003).

Second step (Active participation): The result of the logit regression for the sample of nominal participation at the second step shows that the coefficients on the two household characteristics variables (household income (inc) and education level of household's head (edu)), the three policy variables (advice provision (adv), information provision (inf), and agreement fulfillment (ful)), and the two explanatory variables (participation length (len) and program satisfaction (sat)) are all positive at the 5% or 10% significance level.

Concerning household characteristics, higher income is associated with higher motivation for active participation, which is in contrast to the argument that people with low incomes have more incentive to become involved in the program due to their high dependency on the forest. One plausible explanation of the result is that once people participate in the program at the nominal level, high-income people are more concerned about forest sustainability and related environmental problems, so they have more motivation to become more involved in the program.

Moreover, in contrast to the result at the first step of nominal participation, higher

education is associated with higher motivation for active participation. Flint et al. (2008) emphasize that meaningful or effective participation of households in participatory forestry can be achieved by improving knowledge, skills, and experiences that are oriented toward the community. Salam et al. (2005) also mention that increasing local capabilities and updating skills and knowledge on participatory policy are required to maintain sustained participation. These findings appear to suggest that educated people are more motivated to become involved in community participation in an effective way. Thus, our result of the significantly positive coefficient on education level at the active level of community participation could be consistent with their arguments.

Regarding the effectiveness of Perum Perhutani's policies, the significantly positive coefficients on advice provision (adv), information provision (inf), and agreement fulfillment (ful) imply that all three types of Perum Perhutani's participatory policies are effective in encouraging people to participate in the PHBM program in an active or effective way, although advice provision is not effective in doing so at the nominal or entry level of participation. Furthermore, time length of program participation (len) and satisfaction with the program (sat) are positively associated with the motivation of community participation at the active level, as expected.

Third step (Managerial participation): The result of the logit regression over the sample of active participation at the third step shows that the coefficients on education level of household's head (edu) and the two policy variables (advice provision (adv) and agreement fulfillment (ful)) are significantly positive. Concerning household characteristics, higher education is associated with higher motivation of managerial participation, which is in contrast to the result for the first step of nominal participation but is consistent with the result for the second step of active participation. As suggested in Salam et al. (2005) and Flint et al. (2008), educated people are likely to become more involved in the PHBM program in an effective way, i.e., to participate in the program as management staffs. This argument

may be supported by the significantly positive coefficient on education level. Moreover, similar to the previous results at the second step, our logit analysis at the third step also confirms the effectiveness of Perum Perhutani's policies, advice provision and agreement fulfillment.

In sum, our three-step logit analysis illustrates the following two important results. First, we find some heterogeneous responses for the exogenous variables, such as education and income to the participation incentive across different degrees of participations. In particular, it is interesting to see that the education level of household's head is linked to the motivation of community participation in the PHBM program, but how they are related depends on participation levels. Less educated people have more incentive for community participation at the nominal or entry level, while highly educated people have more incentive for community participation at the active and managerial levels where participants become involved in the program in a more practical and responsible way. Our conjecture is that the relationship between education level and motivation for participation is closely related to the argument that highly educated people are generally associated with high intrinsic motivation on environmental issues or social responsibility (see, e.g., Brekke et al. (2003) and Kakinaka and Kotani (2011), for an explanation of intrinsic motivation). Once highly educated people with high intrinsic motivation recognize the importance of the program and how it can contribute to their life as a member of the community or as a nominal participant, they are motivated to improve the forest management practice by becoming more involved in the program as active or managerial participants.

Second, some special programs and policies organized by Perum Perhutani encourage people to participate in the PHBM program at each participation level, which has important policy implications. Perum Perhutani could enhance the effectiveness of the PHBM program on sustainable forest management by adopting effective programs and policies, such as advice provision, information provision, and agreement fulfillment, to induce more community participation, which has been a crucial issue in the field of human decision processes (see,

e.g., Gardner and Berry (1995) and Gino (2008)).

4 Conclusion

This study examined the motivation of community participation in the PHBM program through a survey at KPH Kendal and data collected by interviewing 571 respondents. In particular, we have conducted logit analyses to discuss the effectiveness of the publicly organized program and the determinants of people's motivation for community participation at each of the three participation levels: nominal, active, and managerial. The three-step analysis has shown some heterogeneous responses across different participation levels. The first step regression show that when people are farmers or hold less land, then they have more incentive to be nominal participants. Most importantly, less educated people have more incentive for community participation at the nominal level, which also implies that highly educated people hesitate to become members at the entry stage.

However, the second and third step regressions show that highly educated people have more incentive for community participation at the active and managerial levels, which is in sharp contrast with the first step regression. Our argument is that once highly educated people become members of the community forest and gain more knowledge about the intent or effectiveness of the PHBM program, they are more willing to cooperate or become practically involved in the program. This type of participation incentives may be driven by intrinsic motivation, as such higher levels of participation do not guarantee higher material payoffs or gratification to those in the PHBM program's current framework, and standard utility maximization may not be a good argument for this finding. That is, highly educated people appear to realize the importance of community forestry programs from social and environmental protection points of view after being nominal participants and, thus, tend to have higher intrinsic motivation to voluntarily participate in the program.

The results have also presented that Perum Perhutani's special programs and policies,

such as advice provision, information provision, and agreement fulfillment, can successfully encourage people to participate in the PHBM program at each participation level. This finding could be considered consistent with the argument of Adhikari (2003) that both households and Perum Perhutani's officials should have opportunities to generate higher benefits from the forest through close communications if they are better informed about the potential resources that they can utilize. Moreover, in rural areas, such as some villages in KPH Kendal, a sense of trust has a higher value in the community, meaning that Perum Perhutani should keep their commitment to fulfill all agreements.

Our survey data and research have confirmed the problem raised by managers of Perum Perhutani that many people become members only as nominal participants by signing without understanding the program. However, our research also reveals some possible measures to increase participation. At this point, we can say that a current scheme for inviting people to become members may not provide enough information about the program at the entry stage. As a result, highly educated people are likely to be more reluctant to participate due to a lack of information. Thus, it may be effective for Perum Perhutani to organize some special programs for further informational provision at the entry stage. However, recall that the existing programs organized by Perum Perhutani are identified as effective. Overall, the results obtained in this study suggest a positive perspective for the community forestry program. That is, if heterogeneous responses of participants at different stages, particularly with respect to education levels, are carefully considered and if further improvement of publicly organized programs are made with respect to informational provision and benefit sharing, then more people are expected to voluntarily participate up to higher levels, which will further contribute to the success of community forest management.

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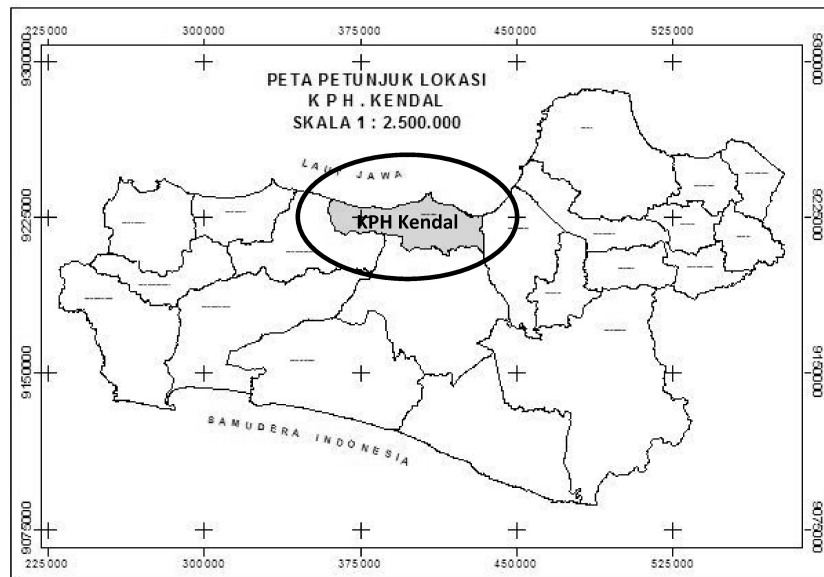
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Figure 1: Map of Central Java

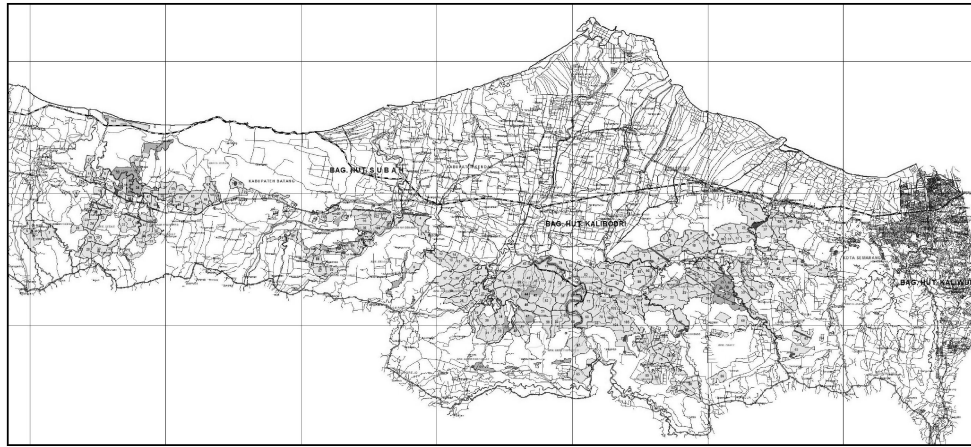


Figure 2: Map of KPH Kendal location



Scale = 1 : 2,500,000

Figure 3: Map of land use in KPH Kendal



Scale = 1 : 100,000

Production forest Protection forest Forest for other purposes

Table 1: Expected signs of independent variables in the logit regression

	First step	Second step	Third step
	Nominal Participation	Active Participation	Managerial Participation
Age of household's head (age)	+	+	+
Household's income (inc)	-	-	-
Household's occupation as a farmer (occ)	+	+	+
Number of family members (fam)	+	+	+
Extensive land holding by the household (land)	-	-	-
Education level of household's head (edu)	+/-	+/-	+/-
Advice provision (adv)	+	+	+
Information provision (inf)	+	+	+
Agreement fulfillment (ful)		+	+
Time length involved in the program (len)		+	+
Satisfaction with the program (sat)		+	+

Table 2: Summary statistics of variables

	Whole sample		Nominal participants		Active participants		Managerial participants	
	Mean	St. dev.	Mean	St. dev.	Mean	St. dev.	Mean	St. dev.
<i>Dependent variable</i>								
Household's attitude to participation	0.939	-	0.437	-	0.432	-	-	-
<i>Independent variable</i>								
Age of household head	48.658	12.213	48.899	12.302	47.855	11.606	46.515	11.936
Income of household	1.053	804	1.027	770	1.243	922	1.312	1,001
Occupation of household head as farmer	0.657	-	0.686	-	0.615	-	0.525	-
Number of family members	2.876	1.277	2.884	1.287	2.906	1.250	2.941	1.139
Land holding by household	2,007	4,910	1,939	4,918	2,721	6,743	3,593	8,340
Education level of household head	4.723	4.108	4.475	3.905	5.671	4.110	7.158	4.393
Advice from Perum Perhutani	0.622	-	0.643	-	0.889	-	0.990	-
Information provision by Perum Perhutani	0.529	-	0.563	-	-	-	-	-
Fulfillment of agreements by Perum Perhutani	-	-	0.520	-	0.799	-	0.980	-
Length of time period in PHBM program	-	-	3.202	1.074	3.299	1.042	3.287	1.080
Satisfaction of PHBM program	-	-	0.553	-	0.739	-	0.822	-
Number of observations	571		535		234		101	

Table 3: Logit regressions for each step of participation

	First step	Second step	Third step
	Nominal Participation	Active Participation	Managerial Participation
age	-0.0217 (0.0204)	0.0027 (0.0100)	0.0003 (0.0153)
inc	-0.003 (0.0003)	0.0003 * (0.0002)	-0.0003 (0.0002)
occ	1.9076 ** (0.4863)	0.0346 (0.2571)	-0.2387 (0.3763)
fam	0.0558 (0.1789)	-0.0713 (0.0887)	0.0903 (0.1327)
land	-0.0001 ** (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
edu	-0.2466 ** (0.0648)	0.0755 ** (0.0328)	0.1446 ** (0.0470)
adv	0.4050 (0.4742)	1.5379 ** (0.2709)	2.7147 ** (1.0628)
inf	5.3211 ** (1.2802)	0.7382 ** (0.3140)	-
ful	-	1.0260 ** (0.3034)	3.0399 ** (0.7698)
len	-	0.1968 * (0.1056)	-0.0198 (0.1528)
sat	-	0.7101 ** (0.2328)	0.5335 (0.3766)
cons	3.5568 ** (1.3436)	-4.1300 ** (0.7702)	-6.6000 ** (1.6906)
No. of obs.	571	535	234

Notes: * significance at the 10% level; ** significance at the 5% level.