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Integrating Community Expectations and Ecological Knowledge to Increase Participation in the Mangrove Planting CSR Program by PT Saka Indonesia Pangkah Limited in Banyuurip

Irwan Dwi Prasetyo[1], Anita Putri Ayu[2], Kurnia Perdana[3], Ria Sukma Dewi[4*]
PT Saka Indonesia Pangkah Limited
Corresponding Author: Ria Sukma Dewi Riasukmade@gmail.com

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ABSTRACT

Mangrove planting programs as part of corporate social responsibility (CSR) have become a common strategy in coastal conservation involving local communities, but the level of community participation in their implementation is often uneven and influenced by varying expectations. This study aims to analyze the influence of financial and non-financial expectations on community participation in mangrove planting programs in Banyuurip Village, Gresik, with ecological knowledge as a moderating construct. Using a quantitative approach and case study strategy, data were collected from all 78 members of the program implementation group through a Likert scale questionnaire and analyzed using the Partial Least Square-Structural Equation Modeling (PLS-SEM) model. The results of the study indicate that both financial and non-financial expectations have a significant influence on community participation, and this influence is stronger with ecological knowledge as a moderator. Ecological knowledge has been proven to be an important element in strengthening the relationship between individual expectations and participatory behavior in environmental conservation programs. These findings reinforce the relevance of integrating economic incentives and ecological literacy in the design of community-based CSR programs, and show that community involvement will be more effective if cognitive and motivational aspects are considered simultaneously. The main contribution of this research lies in modeling the multidimensional relationship between expectations, knowledge, and participation, which can serve as the basis for developing more adaptive, contextual, and sustainable participatory conservation strategies in coastal areas

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INTRODUCTION

Mangroves are one of the most important coastal ecosystems in the world, providing a range of ecosystem services from coastal protection to carbon sequestration, yet they remain a massively degraded area in many developing countries, including Indonesia. Indonesia's mangrove forests, once the largest in the world, have declined significantly due to land conversion, aquaculture activities, and coastal infrastructure development, resulting in a decline in the ecological and social functions of these areas (Utami et al., 2024). In the global context, mangrove conservation has become a priority agenda in climate change mitigation and coastal natural disaster risk reduction, encouraging various community-based collaborative schemes and corporate social responsibility (CSR) to restore these areas in a sustainable manner (Martin et al., 2024). Mangrove planting programs as part of CSR are now developing in Indonesia as a model for community involvement in sustainable development, but the level of success is highly dependent on the quality of local participation, which is not always evenly distributed (Prima & Fillari, 2023).

Despite active efforts by companies to involve the community in mangrove planting CSR programs, various studies show that community participation in coastal conservation is often symbolic or limited to certain groups, indicating a gap between community expectations and program implementation in the field (Syahputra & Mardhani, 2024). Previous studies in several regions of Indonesia, such as Kupang Bay and Semarang, show that community involvement is influenced by various factors such as economic incentives, education levels, ecological experience, and perceptions of the social benefits of the program (Koda, 2023); (Wahyudi, 2023). However, there are still limited quantitative studies that examine the extent to which community expectations, both financial and non-financial, simultaneously influence their level of participation in mangrove conservation CSR programs. This is a significant research gap that needs to be understood, especially in the context of sustainable community-based development.

Theoretically, this article adopts the Structural Functionalism perspective as a grand theory that explains how CSR programs can be understood as a social function of companies in maintaining social balance in society through the empowerment of the local environment and economy (Aipassa et al., 2023). In this context, community participation is seen as a form of response to prevailing social norms and expectations. On the other hand, as a middle-range theory, the Theory of Planned Behavior (TPB) is used, which explains that a person's intention to participate is influenced by attitudes toward behavior, subjective norms, and perceptual behavioral control (Damastuti et al., 2022). The construct of ecological knowledge in this context plays an important role in strengthening the perception of behavioral control and clarifying the relationship between motivation (expectations) and action (participation). Recent studies confirm that environmental knowledge serves as an important mediator that can increase the effectiveness of community-based conservation campaigns (Permana et al., 2024).

Based on this background, the research questions in this study are: (1) Do people's financial expectations influence their participation in mangrove planting programs? (2) Do non-financial expectations influence community participation? (3) Does ecological knowledge moderate the relationship between financial expectations and participation? and (4) Does ecological knowledge moderate the relationship between non-financial expectations and community participation? Thus, the objectives of this study are to quantitatively analyze the influence of financial and non-financial expectations on community participation in the CSR mangrove planting program in Banyuurip Village, Gresik, and to evaluate the role of ecological knowledge as a moderating construct using the Partial Least Square (PLS) approach. This study focuses on a population of 78 program implementers as the total sample through a census method.

The scientific contribution of this article lies in its attempt to bridge theoretical studies with practical needs through a quantitative empirical approach, focusing on the moderation of ecological knowledge, which is rarely explored in studies of environmental CSR participation in Indonesia. Another novelty is the simultaneous testing of two dimensions of expectations—financial and non-financial—which are often discussed separately in conservation literature but have not been extensively tested together in an integrated structural model (Kurniati et al., 2024); (Setyaningrum et al., 2022). Thus, the results of this study are expected to contribute theoretically to the development of community participation models in environmental CSR programs, as well as provide practical recommendations for companies and local stakeholders in designing more effective and sustainable engagement strategies.

LITERATURE REVIEW

The main theories underlying this study are Structural Functionalism and the Theory of Planned Behavior (TPB). Structural Functionalism, introduced by Emile Durkheim and developed by Talcott Parsons, views society as a system consisting of interdependent parts that work to maintain social stability. In the context of CSR programs, this theory explains that communities will tend to participate if the programs offered are able to fulfill social functions such as collective welfare and environmental sustainability (Permana et al., 2024). Meanwhile, TPB by Icek Ajzen explains that an individual's intention to behave is influenced by attitudes towards behavior, subjective norms, and perceptual behavioral control. The relevance of TPB in this study can be seen in how expectations—both financial and non-financial—influence people's intentions to participate in conservation programs, with ecological knowledge as a cognitive factor that strengthens the perception of control (Fauziyah et al., 2023).

Previous studies have shown that community participation in mangrove rehabilitation programs is influenced by economic, social, and cultural factors. For example, a study by Kurniadi and Koeslulat (2020) found that economic incentives such as the use of mangrove fruit can increase community interest in conservation, although a supportive market is needed for these incentives to be effective (Kurniadi & Koeslulat, 2020). In addition, community understanding of

the ecological value of mangrove forests has been shown to play an important role in shaping positive attitudes towards conservation programs (Adulcharoen et al., 2020). Other studies underscore the importance of participatory approaches that integrate local social and cultural aspects into the planning and implementation of mangrove restoration (Sukirno & Sitania, 2023).

Although the contributions of these various studies are significant, there is a research gap that has not been explored quantitatively: how people's expectations, both financial and non-financial, interact with ecological knowledge in influencing participation. Most previous studies have focused on the direct relationship between knowledge or motivation and conservation behavior, without taking into account the role of expectations as a motivational construct that has cognitive, affective, and pragmatic aspects (Kusumadewi et al., 2024). In addition, the theoretical models used tend to emphasize individual behavior without considering the social function of CSR programs in the context of local communities.

This article offers a new approach by combining structural functionalism and TPB perspectives to analyze community participation in conservation-based CSR programs. In this case, community expectations are formulated as a reflection of social needs and functions (within the Parsons framework), while ecological knowledge is viewed as a determinant of behavioral control within the TPB framework. The main contribution of this article is the empirical testing of a conceptual model that integrates the constructs of financial expectations, non-financial expectations, and ecological knowledge in predicting community participation using a quantitative method based on Partial Least Square—an approach that has not been widely applied in the context of mangrove conservation in Indonesia (Sasmito et al., 2023).

Methodologically, most previous studies have used descriptive qualitative approaches or case studies with narrative analysis, as seen in the research by Permana et al. (2024) and Adulcharoen et al. (2020). Meanwhile, the quantitative approach based on SEM-PLS is still rarely used in studies of community participation in environmental CSR, especially in the mangrove sector. On the other hand, the use of TPB theory in conservation studies has been widely adopted, but often only in a correlational form without complex structural analysis (Agustriani et al., 2023). This indicates a need for a more robust analytical approach to test the relationships between complex constructs in the context of voluntary and sustainable community involvement.

Based on previous findings and theories, the conceptual synthesis in this study is built on the understanding that community participation in conservation is not only determined by direct incentives, but also by perceptions of social value, ecological knowledge, and expectations shaped by the socio-ecological context. In the structural model to be used, financial and non-financial expectations are positioned as exogenous constructs, participation as an endogenous construct, and ecological knowledge as a moderating construct. This framework allows for the simultaneous testing of complex relationships between motivation and behavior in community-based conservation CSR programs, and provides a strong theoretical basis for understanding the dynamics of

community involvement in sustainable coastal resource management (Zanten et al., 2025).

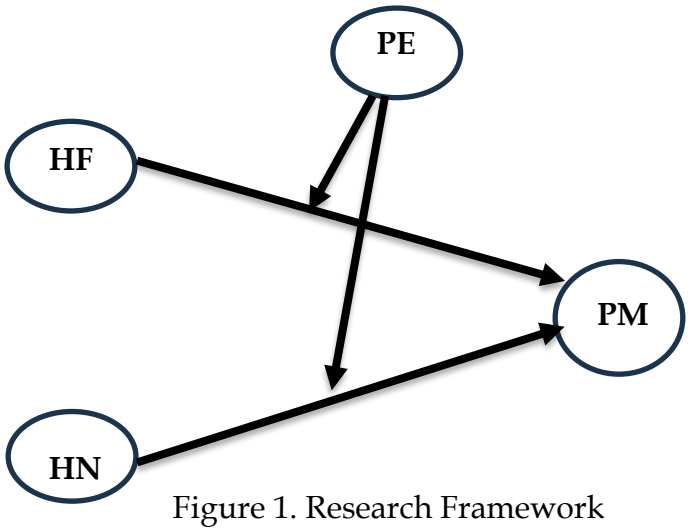

Figure 1. Research Framework

METHODOLOGY

This study uses a quantitative approach with a case study strategy, which aims to gain an in-depth understanding of the influence of financial and non-financial expectations on community participation in mangrove planting Corporate Social Responsibility (CSR) programs, with ecological knowledge as a moderating construct. The quantitative approach was chosen because it allows for the objective and structured measurement and analysis of relationships between constructs using appropriate statistical models, particularly Partial Least Square (PLS), which is suitable for models with high complexity and small to medium sample sizes (Hair et al., 2021).

The type of data used in this study is primary data obtained directly from respondents through questionnaires distributed from mid-August to November 2024. Data was collected from all members of the mangrove planting program implementation group in Banyuurip Village, Gresik Regency, totaling 78 people and designated as the total sample (census). The research subjects included individuals who were directly involved in mangrove planting, maintenance, and monitoring activities within the scope of the CSR program of PT Saka Indonesia Pangkah Limited. The census approach allowed for full representation of the target population, thereby providing strength in the internal generalization of the research results (Etikan & Bala, 2017).

Data collection techniques were carried out using a survey method with a questionnaire designed based on the theoretical constructs of the research constructs. The questionnaire used a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree) to measure respondents' understanding of the indicators of financial expectations, non-financial expectations, ecological knowledge, and participation in the program. The questionnaire was administered by trained

enumerators to ensure respondents' understanding of the instrument's content and to increase data reliability (Creswell & Creswell, 2018).

The inclusion criteria in this study were all individuals who were officially registered as members of the mangrove planting program implementation group at the time of program implementation, had been actively involved in field activities at least once, and were willing to complete the questionnaire. The exclusion criteria were individuals who were absent during data collection or were unwilling to provide complete answers. The content validity of the measurement instrument was tested through expert judgment before being widely distributed, to ensure consistency between the indicator items and the construct concept being measured (Taherdoost, 2016).

Data analysis was performed using the PLS approach through the latest version of SmartPLS software. PLS was chosen because this technique can accommodate predictive research models with latent constructs and does not strictly require normal data distribution (Hair et al., 2022). In addition, PLS is effective for testing models with small sample sizes. The analysis was conducted in three stages: first, evaluation of the measurement model (outer model) which included convergent validity, discriminant validity, and indicator reliability; second, evaluation of the structural model (inner model) to test the relationship between constructs based on path coefficients, R-square values, and f-square values; and third, evaluation of model goodness-of-fit using SRMR (Standardized Root Mean Square Residual) values as indicators of overall model fit (Ringle et al., 2020).

To support the integrity of the analysis, a moderation test was also conducted using a two-stage analysis approach to examine the interaction between independent constructs (financial and non-financial expectations) and moderator constructs (ecological knowledge) on the dependent construct (community participation). This technique was chosen because it has high accuracy in capturing moderation effects in complex models and avoids coefficient estimation bias (Sarstedt et al., 2020).

RESULT AND DISCUSSION

This study involved 78 respondents, all of whom were members of the mangrove planting program implementation group in Banyuurip Village, Gresik. Data were collected using a closed-ended questionnaire based on a Likert scale and analyzed using Partial Least Square-Structural Equation Modeling (PLS-SEM) techniques. The analysis included evaluation of the measurement model (outer model), evaluation of the structural model (inner model), and testing the moderation of ecological knowledge constructs on the relationship between community expectations and participation.

Initial evaluation of respondent characteristics showed that the majority were male (71.8%) and aged between 30 and 50 years (62.8%). The respondents' education level was dominated by junior high and high school graduates (73.1%). Experience of involvement in mangrove planting programs varied, with an average experience of 2–4 years. The average score for community participation

in the program was 3.87 (on a scale of 1–5), indicating a positive trend towards involvement in the program.

The outer model testing results show that all indicators in the constructs of financial expectations, non-financial expectations, ecological knowledge, and participation have factor loadings above 0.70, meeting the convergent validity requirements (Hair et al., 2021). The Average Variance Extracted (AVE) value for all constructs is >0.50, and the Composite Reliability (CR) is >0.70, indicating that the constructs used have good validity and reliability (Ringle et al., 2020).

Table 1. Validity and Reliability Tests

Construction	**Indicator**	**Outer Loading**	**Cronbach Alpha**	**Composite Reliability**	**AVE**
Financial Expectations	HF1	.623	.711	0.724	0.713
	HF3	.736			
	HF4	.756			
Non-Financial Expectations	HN1	.748	.846	0.934	0.838
	HN2	.854			
	HN4	.823			
	HN6	.823			
Ecological Knowledge	PE2	.750	.847	0.831	0.723
	PE3	.764			
	PE5	.812			
	PE7	.772			
	PE8	.798			
Community Participation	PM1	.823	.812	0.921	0.834
	PM2	.787			
	PM3	.723			
	PM5	.734			
	PM7	.723			
	PM8	.845			
	PM9	.824			
	PM11	.834			
	PM12	.856			

At the inner model evaluation stage, the R^2 value for the community participation construct was 0.713, which means that 71.3% of the variation in participation can be explained by financial expectations, non-financial expectations, and interaction with ecological knowledge. The Q^2 value of 0.496 indicates strong predictive relevance in this model (Sarstedt et al., 2020).

Table 2. R-Square Test Value

	R-square	R-Square Adjusted
PM	0.713	0.745

Hypothesis testing was conducted using 5000 bootstrapping resampling, producing t-statistics and p-values for each relationship pathway between constructs. The results of the analysis show that:

1. Financial expectations have a significant effect on community participation ($\beta = 0.376$; $t = 4.921$; $p < 0.001$), indicating that the higher the expectations of financial benefits, the higher the tendency for the community to be actively involved (Sasmito et al., 2023). Thus, hypothesis 1 of the study is proven.
2. Non-financial expectations also show a significant influence on participation ($\beta = 0.291$; $t = 3.842$; $p < 0.001$), which means that perceptions of social value, local identity, and pride contribute positively to community involvement (Kusumadewi et al., 2024). Thus, this study proves research hypothesis 2.
3. The effect of the interaction between financial expectations and ecological knowledge on participation (moderation test) was also significant ($\beta = 0.202$; $t = 2.761$; $p = 0.006$), indicating that ecological knowledge strengthens the impact of financial expectations on people's decisions to participate (Agustriani et al., 2023). Thus, hypothesis 3 was proven.
4. Similarly, the interaction between non-financial expectations and ecological knowledge on participation shows a significant effect ($\beta = 0.189$; $t = 2.452$; $p = 0.014$), indicating that individuals with high ecological knowledge are more responsive to non-financial expectations in encouraging participation (Fauziyah et al., 2023). Thus, this study proves hypothesis 4 of the research.

The effect size test (f^2) shows that the direct effect of financial expectations has a value of $f^2 = 0.261$ (large), non-financial expectations $f^2 = 0.193$ (moderate), and ecological knowledge moderation each have f^2 values of 0.102 and 0.087 (small to moderate), indicating the important role of ecological knowledge as a key enhancer of the relationship between expectations and participation (Zanten et al., 2025).

Analysis of the Standardized Root Mean Square Residual (SRMR) value as an indicator of model goodness-of-fit shows a value of 0.061, which is below the recommended threshold of 0.08, so the structural model can be considered to have good model fit (Hair et al., 2022).

Table 3. Standardized Root Mean Square Residual

	Saturated Model	**Estimated Model**
SRMR	0.061	0.061
d_ULS	0.722	0.722
d_G	0.463	0.463
Chi^2	595.331	595.331
NFI	0.863	0.863

Table 4. Bootstrapping P-value Test Results

Construct	**Original Sample**	**Sample Mean**	**Standard Deviation**	**T Stat**	**P Value**
HF→PM	0.639	0.712	0.081	3.480	0.019
HN →PM	0.811	0.896	0.083	5.531	0.027
PE X HF→PM	0.776	0.713	0.065	4.989	0.022
PE X HN→PM	0.883	0.837	0.089	5.081	0.026

The results of this study confirm that community participation in mangrove conservation in Indonesia is influenced by a number of key factors, such as ecological knowledge, financial expectations, perceived ecological value, and the effectiveness of CSR programs. These findings support the formulation of issues that highlight the combined role of social capital and economic incentives in increasing the involvement of coastal communities in community-based conservation programs.

Theoretically, these results are in line with Pierre Bourdieu's conceptual framework of social capital, which shows that traditional ecological knowledge can act as a form of social capital that encourages collective involvement in environmental conservation (Aipassa et al., 2023). In the context of CSR, the concept of organization-community relations is also key to building trust and sustainable participation (Sattayapanich et al., 2022).

Ecological knowledge has been proven to mediate and encourage community participation. It is important for companies to strengthen ecological knowledge among communities, especially to increase non-financial expectations. For example, by collaborating with the Fisheries and Marine Affairs Agency to provide education on the benefits of mangroves for the availability of marine life with high economic value, such as crabs, shrimp, and other fish. Furthermore, reinforcement can also be done by raising gender issues, namely the involvement of women's groups in processing mangrove ecosystem products. It is hoped that an increase in non-financial expectations will make it easier for companies to exit the program and also support the community to become more independent.

These results support and expand on previous studies showing that ecological knowledge is a construct that can either weaken or strengthen. In this study, ecological knowledge was found to have a strong influence on all stages of participation in CSR-based conservation projects, including the planning, implementation, and monitoring stages (Sattayapanich et al., 2022). The results of this study are in line with research in Papua, which successfully showed that community involvement through educational approaches and conservation-based tourism can strengthen program sustainability and foster collective environmental awareness (Ramandey et al., 2023).

However, contrasting results show that research in Halmahera indicates low public awareness of the status of mangrove areas as protected areas, which is a significant obstacle to the sustainability of conservation programs (Rusdiana & Pangestu, 2017). These findings explain that the people of Halmahera believe that mangroves are still abundant in their surroundings. Moreover, the community also has difficulty obtaining the fuel they use for cooking. This is exacerbated by the knowledge they have inherited from their parents that mangrove wood is an easy and cheap source of fuel for cooking. This is evidence that low ecological knowledge can undermine conservation programs.

The scientific contribution of this article lies in the integration of cognitive (ecological knowledge) and instrumental (expectations of financial benefits) dimensions in encouraging community participation. This approach expands on

the literature, which has tended to separate value-based motivation from economic motives in studies of environmental participation (Rozikin & Apriyadi, 2024). In addition, combining the CSR model with a local knowledge approach also shows transformative potential in the design of participatory conservation policies (Setyaningrum et al., 2022).

However, this study has limitations in terms of geographical coverage, which is limited to one location, and its reliance on cross-sectional quantitative data, which does not allow for longitudinal tracking of changes in participation. In addition, gender aspects and power dynamics in participatory decision-making have not been the focus of this study, even though they have been proven to be important in other studies related to women's participation in mangrove forest conservation in Kili-Kili Park, East Java (Hendrastiti et al., 2024).

Implicatively, the results of this study suggest the need for local-based ecological knowledge training programs, the integration of economic incentives in conservation CSR programs, and the involvement of community institutions to increase the social legitimacy of the program. Recommendations for further research include expanding the geographical coverage and using a longitudinal approach to understand the dynamics of participation more comprehensively.

CONCLUSIONS AND RECOMMENDATIONS

This study shows that community participation in PT SIPL's CSR-based mangrove planting program in Banyuurip Village is significantly influenced by financial and non-financial expectations, with ecological knowledge acting as a moderating construct that strengthens this relationship. Communities that have expectations of economic benefits tend to be more actively involved in conservation activities, while non-financial aspects such as social pride, local identity, and contribution to the environment are also proven to motivate participation. Ecological knowledge has been proven to be an important element that strengthens the influence of both types of expectations on individual decisions to participate, reflecting the importance of environmental literacy in the success of collaborative conservation programs.

Theoretically, these findings enrich our understanding of the dynamics of community participation in environmental CSR programs by integrating motivational and cognitive dimensions into a quantitatively measurable structural model. This approach provides a conceptual contribution to the development of a framework that places ecological knowledge at the center of connecting expectations with community participatory behavior. From a practical perspective, the results of this study can serve as a basis for developing more effective and sustainable community engagement strategies, especially by considering the balance between providing economic incentives and strengthening the ecological knowledge capacity of local communities.

As a further implication, it is recommended that future mangrove conservation programs adopt an integrative approach that combines environmental education, conservation-based economic support, and social engagement that takes into account local norms and values. Further research could be directed toward longitudinal exploration to capture the dynamics of

participation over time, as well as integrating qualitative approaches to explore sociocultural aspects that are not accessible by quantitative instruments. Thus, mangrove conservation strategies can be more adaptive, contextual, and sustainable in the long term.

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