

The mediating role of community trust in institutional readiness for sustainable mangrove forest rehabilitation

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Manuscript received: 10 December 2025. Revision accepted: 24 March 2026.

Abstract. Mohta G, Sadjati E, Suhada N, Roflimas. 2026. *The mediating role of community trust in institutional readiness for sustainable mangrove forest rehabilitation. Asian J For 10 (1): r100123. <https://doi.org/10.13057/asianjfor/r100123>.* Mangrove rehabilitation plays a crucial role in sustaining mangrove forests, coastal ecological functions, and socio-ecological resilience. However, its long-term success depends not only on technical aspects but also on the institutional readiness of local community organizations. This study examines the relationships among government support, initial community participation, and the institutional readiness of Forest Farmer Groups (KTH), with community trust as a mediating variable, in community-based mangrove rehabilitation in Pasir Limau Kapas Village, Indonesia. A census survey of 68 KTH members was conducted and analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The results showed that government support had a positive effect on both trust and institutional readiness, and exerted an indirect effect through trust as a partial mediator. Community trust significantly strengthened institutional readiness, while initial participation did not significantly affect trust, although it directly influenced institutional readiness. These findings indicate that mangrove rehabilitation success is more strongly determined by governance quality, institutional support, and trust-building than by initial participation alone, with direct implications for sustainable mangrove management and ecological functions. This study contributes by explicitly positioning trust as a mediating mechanism linking government support and institutional readiness, extending the social-ecological systems framework. Practically, it highlights the importance of strengthening local institutions through clear roles, secure land access, and continuous facilitation. However, the cross-sectional design and single study site limit the generalizability of the findings.

Keywords: Community-based mangrove management, forest governance, institutional readiness, mangrove forest rehabilitation, social forestry

INTRODUCTION

Mangrove ecosystems are among the most productive coastal ecosystems, providing essential ecological functions such as major blue carbon storage, coastal protection from erosion and extreme waves, and habitats for diverse aquatic and semi-aquatic species (Alongi 2008; Donato et al. 2011). In Indonesia, mangroves store substantial carbon and play a key role in maintaining coastal biodiversity and socio-ecological resilience (Alongi et al. 2016; Hilmi et al. 2019). However, over the past two decades, more than 40% of Indonesia's mangroves, approximately 3.5 million hectares, have been degraded due to land conversion and unsustainable use (Murdiyarto et al. 2015; Richards and Friess 2016). This degradation has caused habitat loss, declining ecosystem services, and increased vulnerability to climate change (Alongi et al. 2016; Hilmi et al. 2019; Sunkur et al. 2023). Similar conditions are found in Riau Province, particularly in Rokan Hilir District, a national priority area for mangrove rehabilitation (Ulfa et al. 2025). Therefore, mangrove rehabilitation is essential to restore ecological functions and strengthen coastal resilience.

The Government of Indonesia, through the Mangrove for Coastal Resilience (M4CR) program, promotes a landscape-based approach integrating biophysical, social, economic, and institutional dimensions. At the site level, rehabilitation success depends not only on technical factors but also on the institutional readiness of local actors responsible for post-rehabilitation management (Damastuti et al. 2022; Gunawan et al. 2025). Strong institutions support sustainable management and ecological recovery (Dale et al. 2014; Sudrajat et al. 2023). Institutional readiness reflects organizational capacity to manage change, including clear structures, defined roles, resource availability, social legitimacy, and long-term commitment.

In community-based rehabilitation, *Kelompok Tani Hutan* or Forest Farmer Groups (KTH) play a central role in bridging conservation objectives with local practices. Their institutional readiness directly affects ecological sustainability, including regeneration success, habitat stability, and protection consistency (Ebeler et al. 2025). Stronger KTH institutions are associated with higher seedling survival, reduced anthropogenic pressures, and improved biodiversity recovery (Pamungkas et al. 2024; Suryawan et al. 2025). Thus, institutional readiness is a key

determinant of both organizational effectiveness and rehabilitation success in sustaining ecological functions and biodiversity (Pamungkas et al. 2024; Suryawan et al. 2025).

Community trust is a crucial social mechanism that reduces uncertainty, enhances acceptance of external interventions, and strengthens collective action (Gorris and Koch 2024). Trust in government, program implementers, and perceived benefits influences both community participation and institutional readiness, ultimately affecting long-term sustainability (Buncag et al. 2023; Br Ginting et al. 2025).

Previous studies using Structural Equation Modeling (SEM) in mangrove rehabilitation have largely focused on direct relationships and have not adequately examined mediation mechanisms (Listiana and Ariyanto 2024). Many emphasize participation without integrating institutional readiness and trust within a comprehensive framework, while others remain descriptive or partial (Suharti et al. 2022; Lestari and Susiana 2023). Consequently, empirical studies modeling simultaneous socio-institutional relationships using SEM, particularly incorporating trust as a mediating variable, remain limited.

In contrast to prior studies that treat participation or external support as direct determinants (Ramadona et al. 2024; Rodríguez-Rodríguez et al. 2024), this study explicitly models community trust as a mediator linking government support and institutional readiness. This approach addresses a methodological gap through PLS-SEM and contributes theoretically by confirming the role of trust as a key mechanism in coastal socio-ecological systems.

Based on this gap, this study examines the effects of government support, initial community participation, and community trust on the institutional readiness of Forest Farmer Groups (KTH) in Pasir Limau Kapas Village, Rokan Hilir District, using PLS-SEM. Theoretically, it contributes to social and institutional governance literature by positioning trust as a mediating mechanism. Practically,

it provides evidence-based insights to strengthen mangrove rehabilitation strategies for long-term ecological sustainability and biodiversity conservation. The hypotheses are as follows:

H1: Initial community participation → community trust (+)

H2: Initial community participation → institutional readiness (+)

H3: Community trust → institutional readiness (+)

H4: Government support → community trust (+)

H5: Government support → institutional readiness (+)

H6: Community trust mediates the relationship between initial community participation and institutional readiness

H7: Community trust mediates the relationship between government support and institutional readiness

MATERIALS AND METHODS

Study area

This study was conducted from June to October 2025 in Pasir Limau Kapas Village, Rokan Hilir District, Riau Province, Indonesia, one of the target areas of the National Mangrove Rehabilitation Acceleration Program (Figure 1). Administratively, the area has a local governance structure that developed during the era of the Siak Sultanate and is currently led by a *Penghulu* (village head), who plays an important role in coordinating village development programmes.

The local community has long depended on mangrove ecosystems, including their use as wooden poles for house foundations and as a source of fisheries resources such as shellfish, mud crabs, and shrimp, which form an important component of coastal household livelihoods. However, since the 1980s, parts of the mangrove area, particularly in Sungai Tengar Hamlet, have experienced degradation, as indicated by a decline in mangrove vegetation cover of *Rhizophora* spp. and *Avicennia* spp. due to unsustainable resource use.

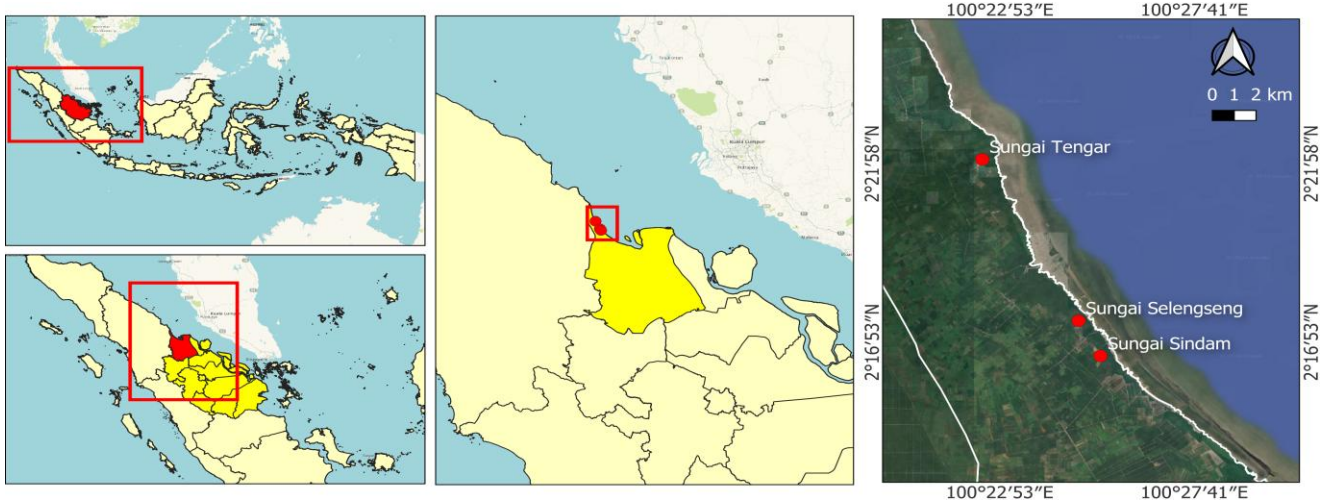


Figure 1. The study location in Pasir Limau Kapas Village, Rokan Hilir District, Riau Province, Indonesia, showing the spatial distribution of the working areas of the Forest Farmer Groups (KTH)

Table 1. Biophysical characteristics of the study sites

Hamlet	E (° ' ")	N (° ' ")	pH	Salinity (ppt)	Substrate
Sungai	100°22'10"-	2°21'50"-	7.67	24.2	Sandy
Tengar	100°22'45"	2°22'20"			mud
Sungai	100°24'25"-	2°17'05"-	7.89	26.2	Sandy
Selengseng	100°25'15"	2°17'55"			mud
Sungai	100°25'15"-	2°16'10"-	7.10	24.2	Sandy
Siandam	100°25'50"	2°16'50"			mud

This is consistent with the map shown in Figure 1, which indicates that most of the Pasir Limau Kapas area is classified as sparse mangrove, defined as mangrove forests with low stand density or discontinuous vegetation cover. This classification reflects ecosystem degradation and highlights the need for more intensive rehabilitation and management efforts.

Climatologically, the study area has a humid tropical climate with high rainfall throughout the year and is influenced by tidal regimes. Topographically, the coastal area is relatively flat and low lying, making it highly influenced by tidal dynamics and seawater intrusion. Biophysically, the study area comprises three coastal hamlets with estuarine water characteristics that are generally suitable for mangrove growth (Table 1).

Historically, the Pasir Limau Kapas area has been the site of various mangrove rehabilitation initiatives. In 2021, the National Economic Recovery (PEN) program was implemented with a large-scale mangrove planting target; however, in several locations, it demonstrated low survival rates and faced governance challenges. In addition, rehabilitation activities carried out by non-governmental organizations, including the Indonesian Coastal Conservation Foundation (YAKOPI), showed relatively better success rates. These initiatives reflect local-level rehabilitation experiences, although they were not specifically implemented in the three hamlets that constitute the focus of this study.

Institutionally, the mangrove areas in the study site fall under two management regimes. Sungai Tengar Hamlet is located within an Area for Other Uses (APL) managed by the village government, while Sungai Selengseng and Sungai Siandam Hamlets are situated within Convertible Production Forest (HPK) areas as part of the state forest, with management under the jurisdiction of the Forest Management Unit (KPH) of Bagansiapiapi. Therefore, rehabilitation activities in these two hamlets are carried out in accordance with the authority and coordination framework of the KPH.

The establishment of Forest Farmer Groups (KTH) as community-based organizations indicates the presence of a local institutional base with strong potential to support mangrove rehabilitation. The combination of economic dependence on mangrove resources, historical experience in resource management, and village-level institutional dynamics makes Pasir Limau Kapas a suitable site for examining institutional readiness in mangrove rehabilitation programs.

Procedures

Data were collected through a structured questionnaire administered via interviews, based on the constructs of initial community participation, government support, community trust in the mangrove rehabilitation program, and the institutional readiness of Forest Farmer Groups (KTH). Quantitative analysis using PLS-SEM was based on responses from all members of the three Forest Farmer Groups involved in the mangrove rehabilitation program ($n = 68$), as presented in Table 2. Therefore, a total population sampling (census) approach was applied.

The census approach was used to maximize the stability of parameter estimates and model reliability in the context of a small and finite population, for which PLS-SEM is appropriate (Ringle et al. 2014; Hair et al. 2022). The analysis still employed inferential statistical procedures, including bootstrapping and significance testing of path coefficients, for model evaluation, as is standard in variance-based SEM approaches. Therefore, the findings are not intended for statistical generalization beyond the study context but rather to provide conceptual and analytical insights into relationships among constructs in institution-based mangrove rehabilitation.

In addition to KTH respondents, two key informants from the village government were purposively selected due to their strategic knowledge of village policies and institutional readiness in mangrove rehabilitation (Table 3). Data from these informants were not included in the PLS-SEM estimation but were used to enrich contextual interpretation and discussion without affecting sample size or parameter estimates (Palinkas et al. 2015; Andrade 2021; Memon et al. 2025).

This study is a social research project based on questionnaires and interviews involving respondents aged ≥ 18 years, without medical intervention or high-risk experimentation, and therefore did not require approval from a formal medical ethics committee. Data collection followed established principles of social research ethics. All respondents were informed about the research objectives, the types of data collected, and their right to refuse or withdraw participation at any time without consequences. Oral informed consent was obtained prior to data collection, and confidentiality and anonymity were maintained by not recording personal identifiers. All data were used solely for scientific analysis.

Data analysis

The measurement items were adapted from previous studies and adjusted to the context of site-level mangrove rehabilitation. The instrument was developed based on key constructs, including Initial Community Participation, Government Support, Community Trust in the Mangrove Rehabilitation Program, and Institutional Readiness of KTH. Each construct was represented by indicators reflecting its conceptual dimensions, as derived from the relevant literature and tailored to the local conditions of the study area.

All variables were measured using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The constructs were each operationalized into five

indicators, resulting in a total of 20 indicators in the research model. All constructs were modeled as reflective, with indicators representing manifestations of the latent variables.

The instrument was pilot-tested on respondents with comparable characteristics to ensure clarity of language, contextual relevance, and consistency of understanding. The results of the pilot test were used to refine the wording of the items to better align with field conditions without altering the substance of the indicators.

The operationalization of variables was conducted by mapping each latent construct into measurable indicators representing its dimensions. In the research model, Initial Community Participation and Government Support function as exogenous variables, Community Trust in the Mangrove Rehabilitation Program serves as a mediating variable, and Institutional Readiness of KTH acts as the endogenous variable.

Institutional readiness represents the capacity of community-based organizations to manage activities in a structured manner, including aspects of governance, role allocation, and internal coordination (Weiner 2009; Nilsen 2020). Meanwhile, community trust reflects members' confidence in the consistency, transparency, and benefits of the implemented rehabilitation program (Mayer et al. 1995; Blake-Hepburn et al. 2025). Both constructs were measured using indicators presented in Table 4.

Table 2. Village government respondents (Purposive Sampling)

Position	Affiliation	Number
Village head	Pasir Limau Kapas	1
Mangrove village facilitator	M4CR-Pasir Limau Kapas	1

Table 3. Forest Farmer Group respondents in Pasir Limau Kapas Village (Census), Rokan Hilir District, Riau Province, Indonesia

Forest Farmer Group	Hamlet	Area (ha)	Mangrove planting pattern	Number of members
Sambu Bersatu	Sei Tengar	13	Intensive 10,000 trees/ha	19
Peduli Pesisir	Sei Siandam	29	Enrichment 3,000 trees/ha	27
Alam Pesisir	Sei Selengseng	46	Enrichment 3,000 trees/ha	22
Total				68

Table 4. Definition of variables, indicators, and symbols in the study

Type of variable	Variable	Indicator	Symbol
Exogenous	Initial community participation (P)	Discussion participation in KTH establishment (Purnomo et al. 2022)	P1
		Participation in mangrove rehabilitation socialization (Yewendwesen et al. 2025)	P2
		Engagement in training/technical guidance (Maryana 2022)	P3
		Commitment to post-program plant maintenance (Nugroho et al. 2023)	P4
		Initiative to involve others (Fathima Mafaziya Nijamdeen et al. 2023)	P5
Exogenous	Government support (D)	Facilitation of KTH formation (Galudra 2019)	D1
		Provision of technical assistance (Imran et al. 2025)	D2
		Logistical support (Budi et al. 2021)	D3
		Funding/support commitment (Rahayu et al. 2024)	D4
		Response to community feedback (Damastuti et al. 2022)	D5
Mediation	Community trust in the mangrove rehabilitation program (K)	Confidence in program benefits (Firdaus et al. 2021)	K1
		Clarity of objectives and procedures (Gracela et al. 2024)	K2
		Transparency in site/group selection (Lawasi 2024)	K3
		Sense of involvement (Roslinda et al. 2022)	K4
		Positive prior program experience (Pohnan et al. 2015)	K5
Endogenous	Institutional readiness of Forest Farmer Groups (KTH) (Y)	Active management structure (Mohta et al. 2023)	S1
		Clear operational work plan (Ramadhan et al. 2025)	S2
		Understanding of task division (Roslinda et al. 2022)	S3
		Effective internal communication (Rochimah 2024)	S4
		Internal conflict resolution mechanism (Dinda et al. 2019; Suharti et al. 2022)	S5

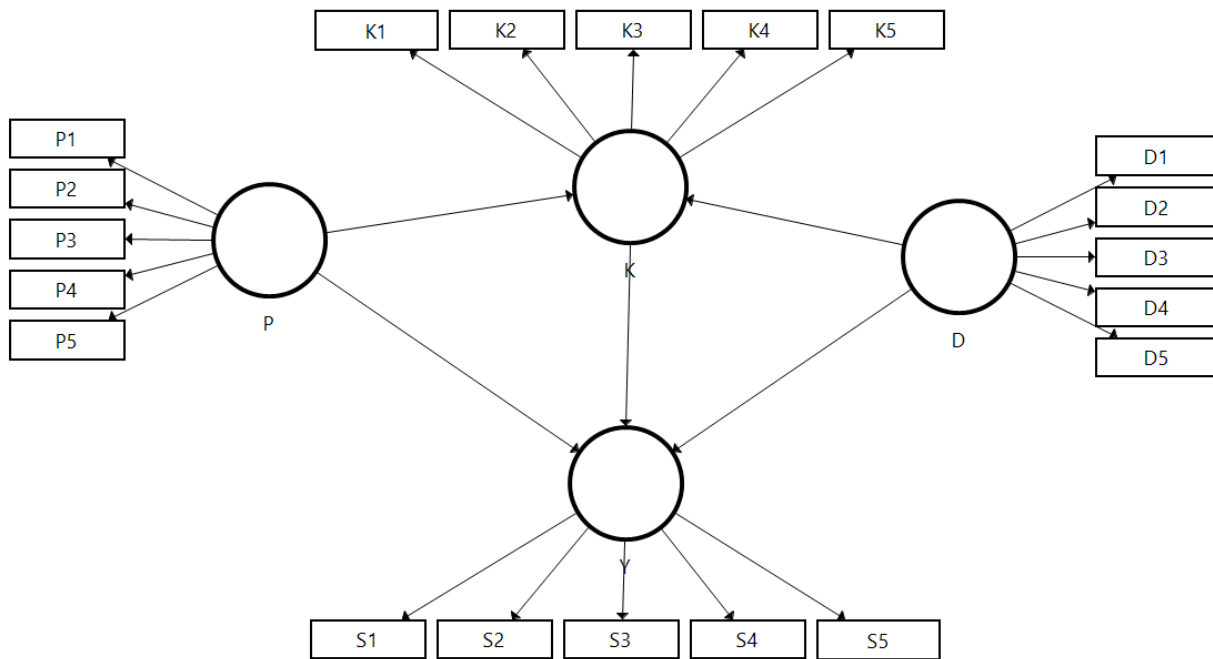


Figure 2. Conceptual SEM model

The conceptual model is presented in Figure 2, with indicators shown in Table 4. The analysis was conducted using the PLS-SEM approach with SmartPLS 3.2.9. Construct validity was assessed by removing indicators with loadings < 0.70 . Since all constructs were modeled as reflective, indicators that did not meet the outer loading threshold (≥ 0.70) were eliminated to improve construct validity, in accordance with the evaluation procedures in PLS-SEM (Hair et al. 2022). Convergent validity was evaluated using an Average Variance Extracted (AVE) ≥ 0.50 . Internal reliability was assessed using Cronbach's alpha and Composite Reliability (CR), with a threshold of ≥ 0.70 . Discriminant validity was tested using the Fornell-Larcker criterion and HTMT (≤ 0.85). The significance of relationships among constructs was assessed using bootstrapping at a significance level of $\alpha = 0.05$ ($t \geq 1.96$) (Hair et al. 2022).

RESULTS AND DISCUSSION

Model evaluation

The evaluation of the measurement model indicates that indicators K1, P3, P5, D1, D2, and S5 were removed because their Variance Inflation Factor (VIF) values exceeded the recommended threshold, indicating the presence of multicollinearity among indicators (Hair et al. 2017). Conceptually, this condition reflects overlapping meanings among indicators as well as a high degree of information redundancy. In addition, limited response variance, and the normative nature of the indicators in the context of national programs such as M4CR also contribute to the high correlations among indicators. The elimination process was carried out iteratively to obtain a more parsimonious, multicollinearity-free, and stable measurement

model, while still considering the implications for the breadth of conceptual coverage in interpreting the results.

All constructs met the criteria for reliability and convergent validity (Table 5), as indicated by Composite Reliability (CR) values exceeding 0.90 and average variance extracted (AVE) values above 0.50 (Chin 2010; Hair et al. 2017). Outer loadings for all indicators were above the recommended threshold of 0.70. Discriminant validity was confirmed using the Fornell-Larcker criterion, where the square root of each construct's AVE exceeded its correlations with other constructs.

Further evaluation of collinearity in the final model indicates that all Variance Inflation Factor (VIF) values are below the threshold of 5, with the exceptions of indicators D4 (VIF = 5.194) and P1 (VIF = 5.230). Although these values slightly exceed the conservative threshold (Hair et al. 2017), they remain within an acceptable range and do not indicate substantial multicollinearity issues (Henseler et al. 2015; Hair et al. 2017). Accordingly, the measurement model can be considered to satisfy the assumption of no multicollinearity at an acceptable level.

Model fit was acceptable, as indicated by a Standardized Root Mean Square Residual (SRMR) of 0.043, well below the threshold of 0.08. The Normed Fit Index (NFI) was 0.889, indicating a marginal fit (Bentler and Bonett 1980; Kline 2016; Kamaruddin et al. 2024). The final structural model after indicator refinement is presented in Figure 3. In PLS-SEM, SRMR is considered the primary fit index, while NFI serves as a supplementary measure and should be interpreted alongside other indicators such as R^2 and Q^2 (Henseler et al. 2016; Hair et al. 2017). Therefore, the model's predictive capability should be interpreted as predictive relevance within the study context rather than general predictive ability across populations.

Discriminant validity was further supported by the Heterotrait Monotrait Ratio (HTMT). All HTMT values (Table 6) were below the recommended threshold of 0.90, indicating that the constructs are empirically distinct despite their conceptual proximity (Henseler et al. 2015; Hair et al. 2017). Overall, these results indicate that the constructs were measured reliably and validly, although the high reliability values suggest that the indicators capture relatively specific dimensions of the constructs.

As a complementary assessment, all constructs were measured using perception-based survey instruments from the same respondents and time period, which may introduce Common Method Variance (CMV) (Podsakoff et al. 2024). Although no formal diagnostic test was conducted, the measurement model results suggest that CMV did not dominate the findings, as indicated by adequate discriminant validity and the absence of substantial multicollinearity. Nevertheless, CMV should be considered a methodological limitation when interpreting the relationships among constructs.

The evaluation of the structural model (Table 7) indicated that the coefficient of determination (R^2) values reflects strong explanatory power (Hair et al. 2017), particularly for institutional readiness of KTH. The evaluation of predictive relevance using the Stone-Geisser's Q^2 approach (Table 8) indicates that the model demonstrates good predictive capability (Stone 1974; Hair et al. 2017). The Q^2 values for Program Trust (0.488) and institutional readiness (0.573) indicate strong predictive relevance, as both exceed the threshold of 0.35 (Hair et al.

2017). These results suggest that the model has substantial predictive power for the endogenous constructs and not only explains the relationships among constructs (as reflected by R^2) but also demonstrates strong predictive relevance.

Table 5. Construct reliability and validity calculation results

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Government support (D)	0.948	0.948	0.966	0.905
Community trust in the mangrove rehabilitation program (K)	0.908	0.912	0.936	0.785
Institutional readiness of Forest Farmer Groups (KTH) (Y)	0.908	0.91	0.936	0.784
Initial community participation (P)	0.947	0.948	0.966	0.905

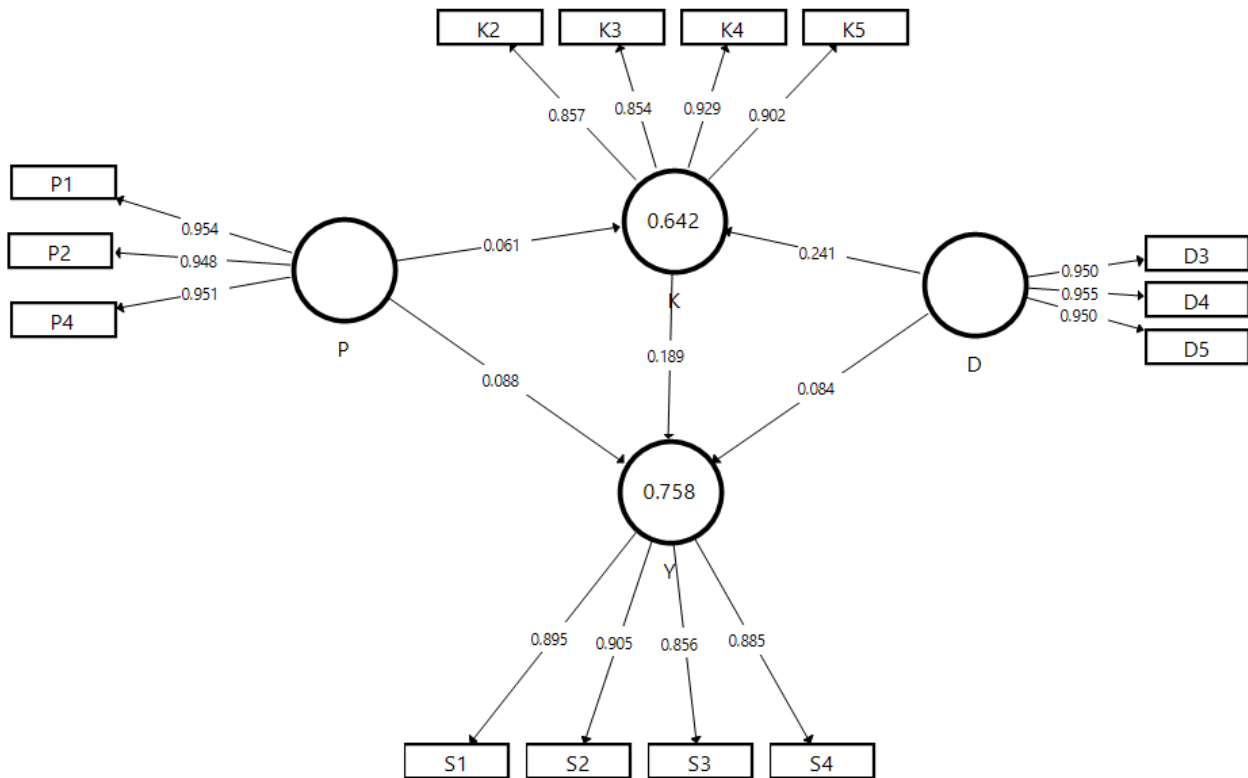


Figure 3. Final SEM model after indicator refinement

Table 6. HTMT values

	Government Support (D)	Community Trust in the Mangrove Rehabilitation Program (K)	Institutional Readiness of Forest Farmer Groups (KTH) (Y)
Government support (D)			
Community trust in the mangrove rehabilitation program (K)	0.847		
Institutional readiness of Forest Farmer Groups (KTH) (Y)	0.882	0.883	
Initial community participation (P)	0.894	0.801	0.861

Table 7. R² values

	R Square	R Square Adjusted
Community trust in the mangrove rehabilitation program	0.642	0.631
Institutional readiness of Forest Farmer Groups (KTH)	0.758	0.747

Effect size (f²) analysis indicates that the effect of government support on community trust, as well as the effect of community trust on the institutional readiness of KTH, falls within the medium category. In contrast, the effects of government support and initial community participation on other endogenous constructs are classified as small (Table 9) (Cohen 1988; Hair et al. 2017). Overall, both measurement and structural model evaluations demonstrate that the PLS-SEM model meets methodological adequacy criteria and is suitable for explaining relationships among constructs in community-based mangrove rehabilitation.

However, high statistical performance does not necessarily eliminate conceptual limitations. In this study, indicators with outer loading values below the recommended threshold were removed to improve construct validity and model parsimony. As a result, the constructs were operationalized using dimensions most relevant to the context of national mangrove rehabilitation programs. Consequently, the reduced indicators produced more parsimonious yet more specific constructs. Thus, the findings reflect the operational definitions applied in this study and do not represent the full theoretical scope of each construct. Therefore, the interpretation of the results and their policy implications should be considered within these conceptual boundaries.

Structural equation model

The structural equation model based on standardized path coefficients is expressed as:

Table 8. Predictive relevance (Q²)

	Q ²	Interpretation
Community Trust in the Mangrove Rehabilitation Program	0.488	Strong
Institutional Readiness of Forest Farmer Groups (KTH)	0.573	Strong

Note: Q² > 0.35 indicates strong predictive relevance (Hair et al. 2017)

Table 9. Effect size (f²) of structural model

Relationship	f ²	Effect Size
Government support → community trust	0.241	Medium
Government support → institutional readiness of KTH	0.084	Small
Community trust → institutional readiness of KTH	0.189	Medium
Initial community participation → community trust	0.061	Small
Initial community participation → institutional readiness of KTH	0.088	Small

Note: f² = 0.02 (small), 0.15 (medium), 0.35 (large) (Cohen 1988; Hair et al. 2017)

$$Y = 0.298 D + 0.357 K + 0.283 P$$

Where, Y represents institutional readiness of KTH, D represents government support, K represents community trust in the mangrove rehabilitation program, and P represents initial community participation.

Four of the five structural paths were statistically significant at the 5% level (Table 10). Significant relationships were observed between government support and community trust, government support and institutional readiness, community trust and institutional readiness, and initial community participation and institutional readiness. The relationship between initial community participation and community trust was not significant.

The analysis results indicate partial mediation in the relationship between government support and institutional readiness through community trust. Indirect effects were tested using a bootstrapping procedure with 5,000 subsamples. Based on Table 11, only one mediation path shows a significant indirect effect, namely government support → community trust → institutional readiness (β = 0.197; p = 0.013). Since the direct effect of government support on institutional readiness is also significant (β = 0.298; p = 0.034), this relationship is classified as partial mediation. In contrast, the path initial community participation → community trust → institutional readiness is not significant (p = 0.317), indicating the absence of a mediation effect.

Table 10. Path coefficients

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Government support -> community trust in the mangrove rehabilitation program	0.552	0.540	0.196	2.816	0.005
Government support -> institutional readiness of Forest Farmer Groups (KTH)	0.298	0.295	0.141	2.117	0.034
Community trust in the mangrove rehabilitation program -> institutional readiness of Forest Farmer Groups (KTH)	0.357	0.370	0.109	3.268	0.001
Initial community participation -> community trust in the mangrove rehabilitation program	0.277	0.292	0.214	1.299	0.194
Initial community participation -> institutional readiness of Forest Farmer Groups (KTH)	0.283	0.272	0.128	2.204	0.028

Table 11. Specific indirect effects

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Government support -> community trust in the mangrove rehabilitation program -> institutional readiness of Forest Farmer Groups (KTH)	0.197	0.194	0.080	2.474	0.013
Initial community participation -> community trust in the mangrove rehabilitation program -> institutional readiness of Forest Farmer Groups (KTH)	0.099	0.117	0.099	1.001	0.317

Discussion

Reflective indicators of KTH institutional readiness

The findings indicate that the institutional readiness of KTH is primarily supported by operational planning, the functionality of organizational structures, and internal communication. A clear and applicable work plan serves as the main foundation, as it provides direction for activity implementation, reduces operational uncertainty, and strengthens coordination and members' trust (Handayani et al. 2025). In the context of mangrove rehabilitation, structured planning enables the consistent integration of post-planting management stages, thereby directly improving rehabilitation success, particularly in the post-planting phase and in increasing plant survival rates.

The functionality of the organizational structure and a clear division of roles ensure effective decision-making and support the implementation of institutional responsibilities. This is directly related to the group's capacity to carry out post-planting management through routine maintenance, monitoring, and disturbance control, which are key factors in sustaining the outcomes of mangrove rehabilitation.

Internal communication and members' understanding of their roles strengthen group cohesion and the effectiveness of collective work, ensuring that rehabilitation activities do not stop at the planting stage but continue into the post-planting management phase and the long-term sustainability of the rehabilitation area. Overall, institutional readiness is not only determined by the presence of formal structures, but by the ability to perform functions consistently (Lestari and Susiana 2023).

In the forestry context, these findings confirm that institutional readiness is a determining element of the

effectiveness of mangrove rehabilitation, as it directly influences the success of maintenance, monitoring, and the long-term sustainability of the ecological and economic functions of mangroves. Thus, institutional readiness functions as a mechanism that bridges technical interventions and the sustainability of mangrove rehabilitation outcomes.

The effect of government support on community trust in the mangrove rehabilitation program

The SEM results show that government support has a positive and significant effect on community trust in mangrove rehabilitation programs. This finding is consistent with the significant path coefficient in the SEM model, indicating that an increase in government support is directly followed by an increase in community trust in the program.

Government support is reflected in the provision of information, technical assistance, institutional facilitation, and the clarity of program procedures. At the site level, the involvement of government actors in social preconditioning and institutional facilitation contributes to enhancing program credibility and the perception of certainty, which are key components in building community trust.

In the forestry context, this support acts as an initial driver in the formation of trust. However, the long-term sustainability of trust is primarily determined by the consistency of program implementation and the capacity of local institutions to manage post-planting activities.

In contrast to several previous studies showing that community involvement and participation contribute to building trust through collaboration and interaction in

mangrove conservation programs (Setyaningrum et al. 2022; Izzudin et al. 2024), the findings of this study indicate that, in coastal contexts, government support plays a more dominant role in shaping initial community trust. This difference suggests that the determinants of trust are contextual, where in areas with a high intensity of program intervention, government support tends to become a more dominant factor compared to initial community participation.

The effect of government support on KTH institutional readiness

The SEM results show that government support has a positive and significant effect on the institutional readiness of KTH. This support strengthens internal governance through the facilitation of institutional establishment, the completeness of documentation, and the clarity of work area delineation. In addition, the government's role as a conflict mediator and consensus facilitator enhances land access certainty and social stability.

In the context of mangrove rehabilitation, these conditions enhance the operational readiness of KTH, particularly in maintenance and ecosystem control in response to coastal biophysical dynamics. Thus, institutional readiness becomes a critical prerequisite for successful rehabilitation, especially in supporting post-planting sustainability. However, it is important to maintain a balance between external support and internal empowerment to avoid dependency and ensure institutional sustainability (Agarwal 2010; James et al. 2021).

The role of community trust in the mangrove rehabilitation program as a mediator

Community trust in the program acts as a mediator in the relationship between government support and the institutional readiness of KTH. In this study, trust is formed through transparency of information, technical clarity, and community involvement in planning. These conditions enhance a sense of ownership and certainty in program implementation, which in turn strengthens institutional readiness.

These findings support the literature that positions trust as a component of social capital in strengthening cooperation and institutional legitimacy (Putnam et al. 1994; Uphoff and Wijayaratra 2000). However, this mediating role is contextual and cannot be generalized without considering variations in socio-ecological conditions across different locations.

Limited initial community participation and weak mediating role of community trust in the mangrove rehabilitation program

The findings indicate that initial community participation did not play a significant role in building trust in the mangrove rehabilitation program and therefore did not function as an effective mediating pathway toward the institutional readiness of Forest Farmer Groups (KTH). Empirically, participation during the early stages of the program in Pasir Limau Kapas Village tended to be procedural and informative, being limited to attendance at

socialization events and compliance with pre-assessment stages designed by program organizers. This form of involvement was not accompanied by sufficient understanding of the program scheme, financing mechanisms, role allocation, or long-term institutional implications.

Field data indicate the presence of initial skepticism among community members, partly triggered by delays in activity implementation, uncertainty regarding planting schedules, and prior experience with the 2021 National Economic Recovery (PEN) program, which was perceived as largely unsuccessful. This condition was reflected in the low level of community confidence during the early stages, suggesting that participation did not foster a sense of ownership or commitment to the program. Consequently, the non-significant role of initial participation in building trust is directly supported by empirical evidence.

These findings suggest that initial participation, as operationalized in this study, lacked sufficient quality and depth to function as a mechanism for trust-building. This may reflect a continuing top-down approach, in which opportunities for dialogue, interest negotiation, and substantive authority sharing were not fully realized (Cornwall 2008; Alonzo et al. 2024). As a result, community trust began to develop only at later stages, when interactions became more intensive, transparent, and practice-oriented, such as through drone mapping, biophysical land verification, and consistent technical guidance.

Nevertheless, field observations also reveal the presence of initial social capital, including the initiative of some community members to independently carry out mangrove seedling activities and their involvement in assisting planning teams at rehabilitation sites. These findings suggest that initial participation retains strategic value as an entry point to the program, although its effectiveness depends largely on how such participation is facilitated and subsequently strengthened.

Overall, the results indicate that strengthening the institutional readiness of KTH is not determined solely by the level of initial participation, but by the quality of social interactions that foster trust. From a policy perspective, mangrove rehabilitation strategies should shift from symbolic participation toward meaningful engagement by ensuring clear information, consistent implementation, and genuine decision-making opportunities for the community from the outset. Empirically, such an approach is more relevant for building trust and enhancing local institutional readiness.

Synthesis of findings and research contributions

This study shows that government support is strongly associated with the institutional readiness of KTH, both directly and through community trust as a key mediating mechanism. Meanwhile, initial community participation primarily serves as an entry point that directly influences institutional readiness, but has not been able to significantly build trust without adequate understanding, clear facilitation, and substantive engagement.

Thus, trust functions as a bridging mechanism between government support and the group's internal capacity,

while also strengthening institutional readiness. Theoretically, this study contributes by positioning institutional readiness as a linking variable between external interventions and the sustainability of resource management, thereby extending the application of the social-ecological systems framework to the context of community-based mangrove rehabilitation.

These findings underscore the importance of legitimacy and governance within the framework of social institutions (Ostrom 1990; Putnam et al. 1994), particularly in the context of community attributes and local government roles in community-based resource management (van Klingeren and de Graaf 2021; Handayani et al. 2025).

From a policy perspective, the findings highlight the importance of building trust through transparency, inclusiveness, locally tailored facilitation, and institutional empowerment that integrates local knowledge and meaningful engagement from the planning stage. In the context of mangrove rehabilitation, program success is not determined solely by technical interventions, but by the interaction between government support, community trust, institutional readiness, and coastal socio-ecological dynamics (Fauzi and Anna 2013; Liu et al. 2023).

More broadly, these findings demonstrate a pattern of relationships consistent with the hypothesized causal structure in the context of Pasir Limau Kapas Village. Based on these results, a tentative theoretical expectation can be proposed that, in coastal areas of Indonesia and parts of the Global South, an active and facilitative role of the state is closely associated with the formation of trust and institutional readiness. However, this expectation still requires further validation through comparative multi-site studies.

In this study, consistent and transparent government support shows a stronger association with the institutional readiness of KTH than initial community participation. These findings provide an empirical contribution to the development of institutional social literature in coastal areas, while also serving as a basis for hypothesis development in future research.

Theoretical implications

This study enriches the Social-Ecological Systems (SES) approach by demonstrating that institutional readiness is the result of interactions between external support, trust, and internal capacity. These findings underscore the role of governance and legitimacy as key factors in the management of common resources, including mangrove forests, as emphasized in the SES framework (Ostrom 1990; Putnam et al. 1994; Rippey et al. 2024).

Thus, the main theoretical contribution of this study lies in positioning institutional readiness as a linking mechanism between external interventions and the sustainability of resource management, while also highlighting the role of trust as a mediator in strengthening this relationship within coastal social-ecological contexts.

Practical implications

The findings indicate that the performance of mangrove rehabilitation is highly dependent on institutional readiness, which ensures the success of post-planting management,

monitoring, and the long-term sustainability of rehabilitation efforts. Clarity of the program, certainty of land access, and a well-defined division of roles have been shown to improve targeted participation and reduce planting failures. Support from the village government in strengthening local legitimacy also contributes directly to governance stability and the protection of mangrove areas. For KTH, strengthening organizational structure, internal communication, and technical capacity is directly associated with improved plant survival rates and the sustainability of mangrove ecological functions. Overall, the effectiveness of rehabilitation is not determined solely by technical interventions, but by the quality of community-based forestry governance.

Conclusion, this study shows that government support and community trust are key factors in shaping the institutional readiness of KTH, with trust serving as an important mechanism that bridges the influence of government support on such readiness. Meanwhile, initial participation has a limited role in the absence of structural support, adequate facilitation, and continuous communication. In the forestry context, institutional readiness constitutes a fundamental basis for the effectiveness of mangrove rehabilitation, as it determines the sustainability of management and the long-term ecological functions of mangrove ecosystems. Theoretically, this study contributes by providing empirical evidence that institutional readiness functions as a link between external interventions and the sustainability of resource management, while also strengthening the application of the social-ecological systems framework in the context of community-based mangrove rehabilitation. Practically, the findings of this study emphasize that forest management, particularly mangrove rehabilitation, should prioritize strengthening local institutions through clear roles of actors, secure land access and tenure status, and continuous facilitation to build trust and ensure the success of post-planting management. However, this study is limited by its cross-sectional design and single-site scope, which constrains generalizability and causal inference. Therefore, future research is recommended to employ longitudinal designs and multi-site comparative studies to deepen the understanding of institutional dynamics in community-based mangrove rehabilitation.

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