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*Full Length Research Article*

# Causal Analysis of Resource Management Capacity, Economic Welfare, and the Effectiveness of the Integrated Area Development Program: A Study in the Pesawaran Forest Management Unit, Lampung Province

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## ABSTRACT

Sustainable rural development faces significant challenges due to climate change, land degradation, and economic pressures, particularly in regions heavily reliant on agriculture. Integrated area development (IAD) is one approach considered capable of integrating economic, social, and environmental aspects through agroforestry and strengthening local institutions. The IAD program is one part of the mainstreaming of the Social Forestry program of the Ministry of Forestry. However, empirical evidence regarding the specific role of community capacity in natural resource management as a mediator of IAD success remains limited. The purpose of this study is a quantitative causal analysis of the influence of economic welfare (X1) and natural resource management capacity (X2) on the success of IAD (Y1), as well as further research related to the mediating role of X2. Forty-two respondents were purposively selected for analysis using the SEM-PLS method, with natural resource management capacity and IAD success (Y1) as the main variables. The R-square value (0.618) and the goodness-of-fit (0.611) indicate that the research model is strong and relevant. Of the two existing hypotheses, all of them are proven significant; namely, increasing natural resource management capacity (X2) influences the success of IAD (Y1), and increasing community welfare (X1) influences increasing natural resource management capacity (X2) and also the success of IAD (Y1), where X2 is a mediating variable. This study argues that the policy for the success of IAD (Y1) in improving welfare must be explicitly implemented and directed toward strengthening community capacity for natural resource management.

## 1. Introduction

Sustainable rural development is a major challenge worldwide, exacerbated by climate change, land degradation, and the economic pressures local communities face. According to the World Bank (2018), as many as 75% of the world's poor live in rural areas and rely on farming for their main source of income. By 2022, the Indonesian Statistics Agency noted that over 12.36 million people were considered poor living in rural areas, the majority of whom depended on

lowland agriculture and forestry. Given the uneven distribution of poverty relief in this situation, we still need integrated, people-centered poverty alleviation strategies that also protect the rural ecosystem. Unlocking integrated area development (IAD) to address these problems is intended to be a comprehensive approach to regional development (Iswanto et al. 2024). It brings together diverse agroforestry activities, local industries, and land restoration to create tourism-oriented landscapes in a given region, pursuing collaboratively comprehensive SDGs (Iswanto et al. 2024). Within the framework of the social forestry policy derived from the Job Creation Law (Law Number 11 of 2020), IAD is the main program to be integrated into social forestry in Indonesia. IAD fosters control erosion, intersystem collaboration, and sustained guidance as key to its success (Pretty et al. 2018; Reed et al. 2021).

As of March 2023, the poverty rate in rural Lampung Province was recorded at 12.65%. Likewise, in the same year, Pesawaran Regency's human development index was 65.8, lower than the provincial average of 67.75. This situation in Pesawaran Regency, Lampung Province, requires implementing the IAD regional development strategy, which aims to enhance community welfare while preserving the region's natural resources (BPS 2023; Koeswara et al. 2023). This is why the IAD program must tackle global, national, and local issues. Within this context, the first pillar of successful program implementation is community training and capacity-building in the fundamental principles of sustainability, agroforestry, and local-to-global policies. Communities need the right knowledge, skills, and institutional capacity in natural resource management to respond to diverse policies, technologies, and changing market conditions. This will help them get the most out of welfare programs. An example of the implementation of classical agroforestry-based IAD in Indonesia is the Pesawaran Forest Management Unit in Lampung Province. This area consists of 32,851 hectares of social forestry, covering 16 villages and over 2,500 households. The IAD program operates under the three social forestry permit schemes: Community Forestry (HKm), Community Plantation Forest (HTR), and Village Forest (HD). Under these conditions, agroforestry has been demonstrated to enhance land productivity, vegetation cover, soil fertility, and water conservation (Cerda et al. 2017; Wulandari et al. 2019). However, achieving long-term productivity and sustainability depends on direct community involvement and on strengthening institutional capacity to manage increased output and meet global market demands (Bester 2021), including compliance with the EUDR policy.

Most previous agroforestry research in IAD has focused only on the impact of agroforestry on income or its relationship to other economic factors (Duffy et al. 2021; Miller et al. 2019; Prabawani et al. 2024). Research on ecological aspects has generally examined the specific and causal role of community capacity (X2) as a mediator between community welfare (X1) and the success of IAD (Y1) (Ali et al. 2024; Miller et al. 2019). There is still limited research using a quantitative, correlation-based approach to assess the multivariate relationships between socio-economic factors, institutional capacity, and environmental resilience (Hamaker 2024; Yusriadi 2025). What is known is that IAD is a crucial framework for integrated development, and X1 and X2 are generally acknowledged as important determinants of IAD success. The quantitative causal relationship between the two main variables remains unknown, particularly the mediating role of community capacity (X2) in translating welfare improvements (X1) into comprehensive IAD success (Y1) in the context of social forestry. This study fills this gap by using the SEM-PLS method to examine the quantitative relationships among X1, X2, and Y1. This provides important real-world evidence for developing targeted policies in Pesawaran Forest Management Unit (KPH Pesawaran).

## 2. Materials and Methods

### *2.1. Research Location*

The Pesawaran Forest Management Unit (KPH Pesawaran) in Lampung Province served as the study site for six months, from May to October 2025. The field study examined forest areas managed by three Farmer Groups (*Gapoktan*): Pujo Makmur, Catur Manunggal Jaya, and Sumber Razeki. These three Gapoktan were chosen because they are the most important and active groups overseeing the Integrated Agricultural Development (IAD) program. They are also the main places where people live, and the majority of the registered homes taking part in agroforestry programs in the KPH Pesawaran area.

### *2.2. Research Type*

The researchers analyzed the relationship between the socio-economic attributes of the respondents and the outcomes of the IAD program using a quantitative, descriptive correlational approach (Santoso et al. 2023). The sample was intentionally selected to emphasize key informants who were actively engaged in the IAD program within the study area. Based on these criteria, 42 people were chosen: 30 farmers from the community (10 from each of the three farmer groups), 6 village representatives, and 6 key stakeholder representatives. This group of respondents was selected for sample analysis due to its compliance with the criteria for sample measurement characterized by low model complexity (Hair et al. 2019; Vasileiou et al. 2018).

The six village representatives were the heads and secretaries of three important villages, which were like the three farmer groups chosen. We picked these representatives so that important people in the area could speak up. There are 16 villages in the KPH Pesawaran area, but only 6 were selected so that as many people as possible could take part and the villages would be relevant to the IAD area. We selected six key stakeholder representatives from the KPH Pesawaran, the main executor of the IAD program. This was done to ensure the input was more accurate, as they were involved in agroforestry activities and had a very powerful social structure (Samrin et al. 2024; Wutich et al. 2024).

We used a structured questionnaire with 22 questions about latent indicators and a 5-point Likert scale to get the main information we needed about variables X1, X2, and Y1. The indicators in the questions were derived from validation studies concerning community capacity and the efficacy of integrated development (Silici et al. 2021; Wulandari et al. 2024). The Institutional Review Board (IRB) at the University of Lampung granted permission for this to proceed. Everyone who answered the questions gave honest, complete answers. This research examines multiple constructs, encompassing independent variables (X) that signify candidate attributes such as gender, age, occupation, income, and length of residence, alongside dependent variables (Y) that indicate the results of the IAD program, evaluated through income enhancement, community involvement, and the durability of land management practices. This study makes two hypotheses based on the conceptual framework to look at the direct and indirect links between variables: (1) The ability to manage natural resources affects the success of IAD, and (2) The well-being of the community affects the success of IAD through the ability to manage natural resources as an intermediary variable.

### *2.3. Quantitative Model SEM* Software to *Smart PLS*

The data analysis in this study is quantitative and uses SEM-PLS to examine how variables are related, with a focus on a theoretical framework grounded in predictions. This call is also meant to make a theory and a structural model with formative indicators (Hanafiah et al. 2020). This study looks at how the independent variables X1 (Community Welfare Improvement) and X2 (Natural Resource Management Capacity Improvement) affect the dependent variable Y1 (IAD Success). **Table 1** presents the indicators for the SEM variables.

**Table 1.** SEM variable indicators

| No | Variable | Symbol | Indicator |
|---|---|---|---|
| 1 | Improvement of community welfare [X1] | [X1.1] | Increase in community income |
| | | [X1.2] | Reduction of community poverty |
| | | [X1.3] | Improved access to public services |
| | | [X1.4] | Improvement of community health quality |
| | | [X1.5] | Improvement of community education |
| | | [X1.6] | Improvement of housing quality |
| | | [X1.7] | Improvement of communication facilities |
| 2 | Improvement of natural resource management capacity [X2] | [X2.1] | Improvement of human resource capacity |
| | | [X2.2] | Improvement of institutional capacity |
| | | [X2.3] | Improvement of access to information |
| | | [X2.4] | Improvement of community skills, knowledge, and attitudes in planning and implementing natural resource management |
| | | [X2.5] | Improvement of cross-sector collaboration |
| 3 | Success of integrated area development (IAD) [Y1] | [Y1.1] | Community welfare index |
| | | [Y2.2] | Stakeholder participation and collaboration index |
| | | [Y2.3] | Institutional capacity index of natural resource management |

## 3. Results and Discussion

**Fig. 1** shows how the exogenous variables X1 (improvement of community welfare) and X2 (improvement of natural resource management capacity) are related to the endogenous variable Y1 (success of IAD).

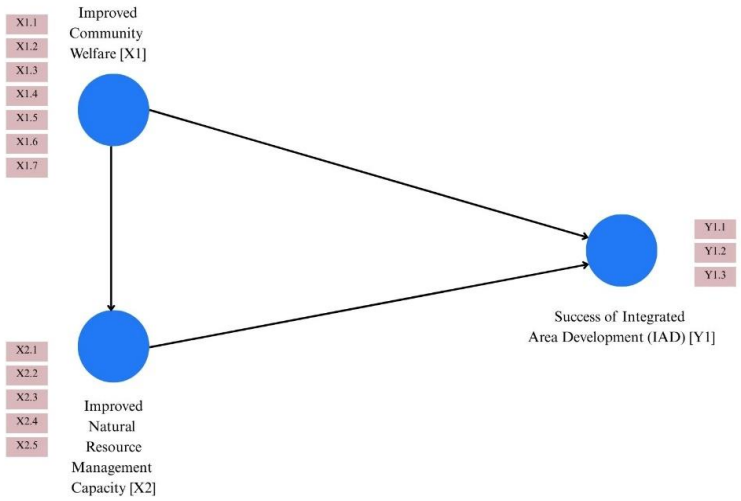


**Fig. 1.** SEM modeling.

This model illustrates a theoretical framework positing that various factors, such as social capacity, environmental conditions, and resource management, affect the efficacy of IAD

programs (Hair et al. 2019; Nordjo et al. 2024). This model is akin to studies on sustainable development, which assert that socio-economic and environmental factors must be equilibrated and integrated into regional planning (Tandio et al. 2023; Widjaja et al. 2024). Wulandari and Inoue (2018) specifically observed in Lampung Province that the efficacy of community-based forest resource management is significantly affected by the social learning process in the governance of socio-economic and ecological factors.

The integrated development projects in the KPH Pesawaran go beyond Indonesia's social forestry policy. In 2017 and 2018, the government permitted local farmer groups to start Community Forestry (HKm), Community Plantation Forest (HTR), and Village Forest (HD). The first steps were to make it legal to get to forest land and to learn some basic skills for growing crops and trees together. Nevertheless, these early programs did not always work well because they lacked sufficient management capacity. This meant that the economic effects were not always the same, even though land was available. The Job Creation Law (Law Number 11 of 2020) officially started an integrated regional development approach around 2021. The goal was to maximize the economic potential and ecological sustainability of protected forest areas. KPH Pesawaran was chosen as the main site for IAD because it has significant potential for agroforestry, coffee, and other timber species, and because these needs must be addressed quickly due to poverty and land degradation. IAD needs to stop using traditional farming methods and switch to a more standardized, market-driven, multi-strata agrophoresis system. This process also needs planned actions that go beyond just giving out seeds or money. So, the focus shifted to strengthening local institutions, improving technical skills, and linking production to value chains. This led to economic growth that was good for the environment, a main goal of the IAD program. The IAD implementation strategy shows that agroforestry can work, both technically, socially, and institutionally.

The Lampung Provincial Forestry Service said that coffee prices were good (IDR 35,000–45,000/kg) and production was average (1.2–1.8 tons/ha/year). However, only about 32% of people in the area were involved in the market (Akrong et al. 2021). This context underscores the significance of the present research model, which highlights the mediating role of natural resource management capacity (X2) in overcoming historical constraints and achieving genuine IAD success (Y1). The loading factor values for each indicator in the first model are shown in **Fig. 2**. Several indicators, particularly X1.2 (0.420) and Y1.2 (0.344), have values below the standard threshold of 0.70.

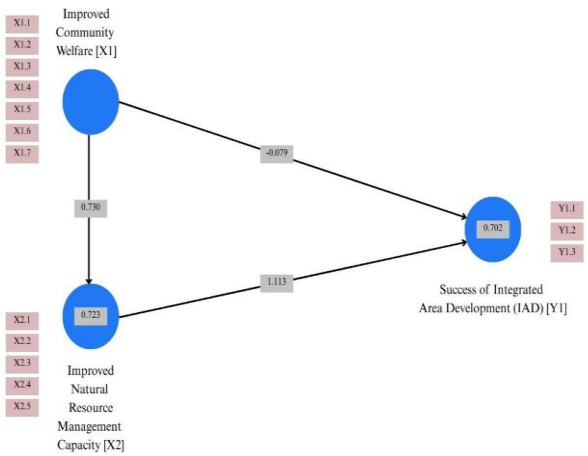


**Fig. 2.** Loading factor value (Outer loading).

According to Hair et al. (2019) and Sarstedt et al. (2019), indicators with values below 0.50 should be eliminated because they do not adequately represent the construct. This indicates weaknesses in several indicators within the community welfare and IAD success variables, which need to be addressed to make the model more representative (Benitez et al. 2020; Ringle et al. 2020). Therefore, these weak indicators were eliminated or not processed further. Similar studies on measuring community participation in village development programs also found that indicators with low reliability often relate to aspects that are not understood or relevant to local conditions (Hilmawan et al. 2023; Wani et al. 2024). This finding aligns with community preferences for the form of facilitation of social forestry programs, which often do not rely solely on economic indicators (Wulandari and Kurniasih 2019).

### *3.1. Measurement Model Fit*

A SEM evaluation of the measurement model was conducted to ensure that the indicators used to measure the construct variables were valid and reliable. Therefore, prior validity and reliability tests were not necessary for the research questionnaire.

#### *3.1.1. Loading factor (outer loading)*

The result of the measurement model evaluation is the elimination of latent-variable indicators that do not meet the requirements (i.e., factor loadings below 0.5). According to Hair et al. (2019), the minimum acceptable factor loading is 0.50. In this study, the standard is set at 0.50, and all indicator items are declared valid, with loading factor values above 0.50, as shown in **Table 2**.

**Table 2.** *Loading factor* values

| No | Variables | Indicator | Loading Factor | Information |
|---|---|---|---|---|
| 1. | Improving Community Welfare [X1] | [X1.1] | 0.611 | Valid |
| | | [X1.2] | 0.420 | Not Valid |
| | | [X1.3] | 0.696 | Valid |
| | | [X1.4] | 0.675 | Valid |
| | | [X1.5] | 0.790 | Valid |
| | | [X1.6] | 0.696 | Valid |
| | | [X1.7] | 0.793 | Valid |
| 2. | Natural Resource Management Capacity Building [X2] | [X2.1] | 0.592 | Valid |
| | | [X2.2] | 0.742 | Valid |
| | | [X2.3] | 0.661 | Valid |
| | | [X2.4] | 0.847 | Valid |
| | | [X2.5] | 0.918 | Valid |
| 3. | Success of Integrated Area Development (IAD) [Y1] | [Y1.1] | 0.559 | Valid |
| | | [Y1.2] | 0.344 | Not Valid |
| | | [Y1.3] | 0.845 | Valid |

**Table 2** shows that two indicators, X1.2 (Community Income) and Y1.2 (Specific Success Indicator), were not valid because their factor loadings were less than 0.50. The elimination of these indicators adheres to conventional SEM protocols to enhance model validity (Dijkstra and Henseler 2015; Henseler et al. 2015). This choice was important to ensure that the measured constructs accurately reflect their conceptual dimensions (Fabbricatore et al. 2023; Henseler et al.

2016). In practice, these findings underscore that certain dimensions of community well-being or perceived success are inconsequential for evaluating the success of IAD in Pesawaran. McKenna et al. (2024) and Syahza et al. (2019) argue that this difference stems from differences in the needs of different communities. It is considered very important that indicators align with site-level facilitators' preferences. Overall, communities evaluate a program according to the nature of the support they directly receive (Wulandari and Kurniasih 2019). Consequently, enhancing social learning by integrating knowledge, norms, and practices is crucial for accurately representing social indicators in community behavior (Wulandari and Inoue 2018).

**Fig. 3** shows the SEM after removing the invalid indicators (X1.2 and Y1.2). The model is easier to understand and focuses on useful indicators that show what the construct is. The model is now stronger because weak indicators have been taken out. The factor loading values for X1.1 went up from 0.611 to 0.619, and for Y1.1, they went up from 0.559 to 0.652 (Hair et al. 2019; Sarstedt et al. 2019). This fits with the general advice that removing weak indicators from a model can make it easier to understand and make latent variables more consistent (Benitez et al. 2020; Ringle et al. 2020). Zhang et al. (2019) examined rural development and found that a shorter SEM model is often more stable and clearer in its relationships between variables.

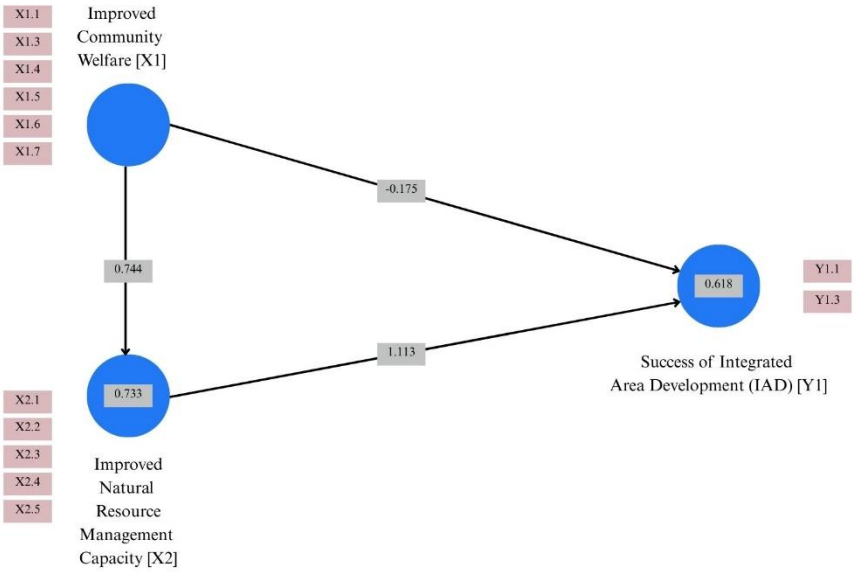


**Fig. 3.** Final Evaluation of loading factor elimination (Outer loading).

According to **Table 3**, all of the indicators in the final model meet the requirements, with factor loadings of at least 0.65 (Henseler et al. 2016; Shmueli et al. 2019). It was confirmed that the variable “Improving Community Welfare” (X1) has six valid indicators (X1.1, X1.2, X1.4, X1.5, X1.6, X1.7), indicating consistency. There are also strong signs for the other two variables, IAD Success (Y1) and Improving Natural Resource Management Capacity (X2). The factor loading at X2.5 is 0.917, which is the highest.

The high level of data indicates that public awareness considers it important to have strong natural resource management skills, which is a key factor in the success of development projects (Putraditama et al. 2021). Additionally, effective natural resource management practices are predicated on significant community capacity-building, undoubtedly supported by various social learning processes over an extended period (Wulandari and Inoue 2018). Research shows that this process has been going on at the research site since farmer groups were set up a few years ago, in

2021, to be exact. We cannot fully determine whether a program is successful simply by gathering a few opinions, as with the IAD program. It is important to consider how well the entire community is utilizing its resources (Tomicevic et al. 2020).

**Table 3.** Final results of the evaluation of factor loading elimination

| No | Variables | Indicator | Loading Factor | Information |
|---|---|---|---|---|
| 1. | Improving community welfare [X1] | [X1.1] | 0.619 | Valid |
| | | [X1.2] | 0.703 | Valid |
| | | [X1.4] | 0.681 | Valid |
| | | [X1.5] | 0.784 | Valid |
| | | [X1.6] | 0.689 | Valid |
| | | [X1.7] | 0.799 | Valid |
| 2. | Natural resource management capacity building [X2] | [X2.1] | 0.595 | Valid |
| | | [X2.2] | 0.746 | Valid |
| | | [X2.3] | 0.659 | Valid |
| | | [X2.4] | 0.844 | Valid |
| | | [X2.5] | 0.917 | Valid |
| 3. | Success of Integrated Area Development (IAD) [Y1] | [Y1.1] | 0.652 | Valid |
| | | [Y1.3] | 0.853 | Valid |

### *3.1.2. R-square value*

The $R^2$ for the endogenous variable IAD Success (Y1) is 0.618, and the $R^2$ for the variable Natural Resource Management Capacity Enhancement (X2) is 0.733. The $R^2$ of the model is strong because it is more than 0.67. This means that the changes in IAD success can be explained by the outside factors (X1 and X2) (Ringle et al. 2020; Shmueli et al. 2019). This agrees with earlier studies that found that a higher $R^2$ value means that social phenomena are better explained (Fabbricatore et al. 2023; Dijkstra and Henseler 2015). **Table 4** shows the results of the R-squared test for X2 and Y1.

**Table 4.** R-square value ($R^2$)

| | R-Square | R-Square Adjusted |
|---|---|---|
| Success of Integrated Area Development (IAD) [Y1] | 0.618 | Strong |
| Natural Resource Management Capacity Building [X2] | 0.733 | Strong |
| Mean R-Square | 0.675 | Strong |

The IAD Success variable's $R^2$ value of 0.618 means that outside variables (X1 and X2) can explain about 62% of the program's success. This high level of dependence teaches us an important lesson about policy: for integrated development (Y1) to work, communities need to be able to manage their own resources and take advantage of better health on their own, not just with help or money from outside sources. The $R^2$ value of 0.733 for the variable Increasing Natural Resource Management Capacity (X2) indicates that external factors, especially community well-being (X1), are very important in strengthening natural resource management capacity (X2). This evidence aligns with the principle of community empowerment, where economic gains (welfare) are effectively channeled through capacity building (X2 as the mediator), making X2 the primary engine that transforms general well-being into sustainable, measurable IAD success (Y1) (Wulandari et al. 2024). This means that the success of integrative development programs such as

the IAD program in Pesawaran cannot be separated from the strategy of increasing local community capacity.

### *3.2. Structural Model Analysis*

#### *3.2.1. Test results–direct effect (path coefficient)*

The results of the exogenous path test can also be used to evaluate a structural model that explains the relationship between exogenous and endogenous variables discussed in the study. **Table 5** presents the results of the direct path hypothesis test, which showed a significant result.

**Table 5.** Test results – immediate effect

| Hypothesis | Sample Mean (M) | Standard Deviation (STDEV) | T Statistics (\|O/STDEV\|) | P -Values | Information |
|---|---|---|---|---|---|
| Increasing Natural Resource Management Capacity [X2] → Success of Integrated Area Development (IAD) [Y1] | 1,120 | 0.127 | 8,765 | 0.000 | Significant |

Natural resource management capacity (X2) has a significant and positive effect on the success of IAD (Y1) ($p < 0.000$). This means that the better the community's capacity to manage natural resources (X2), the greater the effect on the success of the IAD program (Y1). The influential X2 variables consist of increasing the capacity of relevant human resources/institutions (X2.1), institutional strengthening (X2.2), access to information (X2.3), community skills/knowledge/attitudes (X2.4), and inter-sectoral collaboration (X2.5). The Y1 variable in H1 consists of the community welfare index (Y1.1), participation and collaboration of stakeholders (Y1.2), and institutional capacity for natural resource management (Y1.3). This finding is consistent with research stating that strengthening local capacity is the foundation for sustainable development programs (Li et al. 2020; Nordjo et al. 2024). Other research on community forest management also finds that the capacity of the community, both as individuals and as members of community organizations in an area, is essential for the success of conservation initiatives (Situmorang 2023; Wulandari et al. 2018).

#### *3.2.2. Test results – indirect effects*

**Table 6** shows the results of the Indirect Effect test, which indicates that the effect is significant with a p-value smaller than α (0.05). The variables used in this test are grouped as endogenous and exogenous variables.

**Table 6.** Test results – indirect effects

| | Sample Mean (M) | Standard Deviation (STDEV) | T Statistics (\|O/STDEV\|) | P-values | Information |
|---|---|---|---|---|---|
| Improving Community Welfare [X1] → Improving Natural Resource Management Capacity [X2] → Success of Integrated Area Development (IAD) [Y1] | 0.830 | 0.128 | 6,442 | 0.000 | Significant |

**Table 6** displays the results of the mediation test through variable X2 (natural resource management capacity). Community welfare (X1) significantly influences the success of IAD (Y1) by affecting natural resource management capacity (p = 0.000). This means that increased welfare, as reflected in all indicators (X1.1 to X1.7), can encourage the strengthening of natural resource management capacity, including X2.1 to X2.5. Furthermore, this increased capacity contributes to IAD's success, as measured by Y1.1, Y1.2, and Y1.3. The research by Kusumadewi et al. (2024) and Putraditama et al. (2021) also shows similar results to those of this study: community welfare will have a real impact when mediated by adequate technical capacity for natural resource management. In the context of agroforestry, other research indicates that increasing farmers' income contributes to conservation success when supported by natural resource management training, thereby enabling the community to develop the appropriate capacity (Widjaja et al. 2024; Wulandari et al. 2018). Based on the results of this study, to address national and global market challenges, such as the implementation of the EUDR in the next few years, community groups surrounding forests must increase their capacity. Previously, in this discovery, there were two different hypotheses: first, the capacity to manage community-owned resources directly influences the success of IAD; second, this ability plays a very important mediating role in the success of IAD when linked to welfare.

### *3.3. Implications Based on Contextual and SEM Test Results*

The success of IAD depends on how well the program manages natural resources (X2). KPH Pesawaran area is rich in diverse ecosystems, from forests and agricultural lands to small towns within it. Because of this, it is important to develop a program that helps the community learn to manage natural resources sustainably (Putraditama et al. 2021). The results obtained are consistent with several previous findings stating that resources are a key community factor in long-term village growth (Li et al. 2020; Nordjo et al. 2024). Well-managed forest resources can be seen from the relationship between local groups and the community's ability to manage the forest resources produced (Kusumadewi et al. 2024; Situmorang 2023). Wulandari and Kurniasih (2019) stated that capacity-building efforts should be directed according to the needs of the community and how the institution improves community welfare through sustainable natural resource management. For example, "Sustainable Agroforestry Training (SAT)" teaches technical skills such as pruning and soil conservation. "Group-Based Marketing Cooperatives (KBK)" help institutions improve collective marketing and value-added processing. SEM results indicate that capacity-building efforts (X2) are not only effective but also the only way for community welfare (X1) to produce successful IAD outcomes (Y1). The results of the study indicate that community welfare (X1) has a significant impact on IAD success, and the community's ability to manage natural resources plays a role in this effect. These data indicate that there is no natural resource welfare when it is not generated from the community's own capabilities (Wulandari et al. 2018). When communities have needs and depend on the resources they produce, the solution is capacity development in land management, especially in maintaining soil and water quality (Duffy et al. 2021; Widjaja et al. 2024). This study also contributes to the SEM methodology for assessing integrative development programs by more thoroughly examining the relationships among variables (Hair et al. 2019; Sarstedt et al. 2019). Such a model can be implemented in different geographical settings or development initiatives across Indonesia, as long as the indicators are adjusted to the local context (Benitez et al. 2020; Ringle et al. 2020).

## 4. Conclusions

Based on the SEM-PLS analysis in the KPH Pesawaran, a causal relationship is seen between Community Welfare (X1), Natural Resource Management Capacity (X2), and the Success of the IAD Program (Y1). The results of the study convincingly confirm that X2 has a significant, positive, and direct influence on Y1. Meanwhile, X1 was found to have no direct influence on Y1; its beneficial effect is perceived only indirectly, exclusively via the intermediary function of X2. This means that for the economy to grow and for comprehensive IAD to work, people need to know how to manage community resources, like their own technical skills and the strength of their institutions. The scientific understanding achieved in this study has significantly improved, as evidenced by multivariate empirical evidence validating the capacity-based paradigm, which aligns with the integrated forest development program. Overall, this study also emphasizes improving the theoretical understanding of the metrics for successful development, with capacity (X2) quantitatively as a crucial link. It advocates for a transition from solely assessing economic inputs or immediate advantages to evaluating the stability of human and institutional capacity. Based on what we found, we think local stakeholders and decision-makers should make clear policy changes. First, IAD planning and budget allocation must be structurally redesigned to prioritize Capacity Development Modules (e.g., technical agroforestry training, market access education, institutional strengthening) as a core, mandatory investment. Second, monitoring and evaluation efforts by the KPH and local government should focus predominantly on capacity indicators (X2), such as institutional activity rates and adoption of sustainable practices, as these are the most reliable predictors of long-term program effectiveness. Future research should extend this model by exploring the influence of external factors, such as different Social Forestry governance structures (HKm vs. HD), on the strength of the X2 mediation effect, or by incorporating latent constructs, such as social capital, as second-order variables impacting X2.

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**Author Contributions**

C.W.: Conceptualization, Methodology, Supervision, Project Administration, Writing – Review and Editing, Funding Acquisition, Paper Finalization; P.B.: Formal Analysis, Writing – Review and Editing, Validation; K.: Investigation, Data Curation, Visualization, Validation, Writing – Original Draft Preparation; A.H.: Formal Analysis, Data Curation, Visualization; N.A.I.: Resources, Investigation, Writing – Original Draft Preparation; A.R.V.: Data Collection, Formal Analysis; H.S.: Data Collection, Writing – Draft Preparation; A.A.: Data Collection, Resources; A.P.A.: Investigation, Data Analysis; F.Y.S.: Data Collection, Resources; I.: Technical Support, Resources, Validation.

**Conflict of Interest**

The authors declare no conflict of interest.

**Declaration of Generative AI And AI-Assisted Technologies in the Manuscript Preparation**

During the preparation of this work, the authors used ChatGPT (OpenAI) to assist with language editing and formatting improvements. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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