



The Impact of Village Governance Environmental Management on Community-Based Mangrove Development in Karang City, Bandar Lampung

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ABSTRACT

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Local governments have a significant and strategic position in development because they are at the site/field level that is directly related to the community. In reality, each local government organization has a program in the same place, so there is no program coordination between local government organizations. Environmentally aware village governance emphasizes the role of local governments in sustainable and environmentally aware development. The analytical framework examines the relationship between four independent variables [X1] Program, [X2] Environmental Governance, [X3] Market Access, [X4] Institutional Collaboration, with dependent variables [Y1] Sustainable Development and [Y2] Collaborative Governance-Pentahelix. This study focuses on the significant role of effective institutional collaboration in achieving sustainable development and good governance. To optimize sustainable development and governance in forest landscapes, a holistic approach that combines strong institutional collaboration and environmental governance is essential. In addition, strong environmental policies at the village level must support mangrove forest conservation, which is essential for maintaining coastal biodiversity. The results of the study indicate that institutional collaboration and environmental governance are significant key factors in achieving sustainable development and good governance, while market access and programs do not have a significant impact on sustainable development. Institutional collaboration directly contributes to sustainable development and good governance. Consequently, this study shows that strong and effective environmental governance is needed for environmental management and sustainable development in the village. Thus, this study shows that to achieve success in environmental management and sustainable development in the village, strong environmental governance and effective institutional collaboration are needed.

1. INTRODUCTION

Indonesia has the widest distribution of mangrove ecosystems in the world, which is around 20% or 3.49 million hectares of the total area of mangroves in the world. Based on One Map Mangrove data, the area of mangrove ecosystems in Indonesia is around 2.2 million hectares inside forest areas and 1.3 million hectares outside forest areas, spread across 257 districts/cities. The vastness of the mangrove ecosystem is accompanied by a wealth of biodiversity (KEHATI). Local governments have a crucial role in environmental management, including mangrove ecosystems. Encroachment on mangrove forests is increasingly visible, and the need for land is an alternative choice in life, especially housing, therefore many mangrove forests are cut down and ready to be used as alternative settlements for residents. Currently, there are symptoms other than the opening of mangrove land for ponds and other needs. In 2023, reports of mangrove land damage have occurred since 2010 with an area reaching 86 thousand hectares. In 2020, Walhi (Walhi Lingkungan Hidup) Lampung

noted that only 2,013 hectares of Mangrove Forest remained. The position of the village government becomes very difficult and a dilemma in exercising its autonomy rights because in terms of policy, its structure is still under the district, and development planning from the center to the regions/villages often only becomes an object.

The role of local government in environmental issues is at the site level so local governments are responsible for maintaining and managing ecosystems. The existence of mangrove damage in the administrative area of the village authority has the consequence that the village government supervises everything that has the potential to damage the mangroves. In implementing this, the village government can formulate policies and basic regulations that support mangrove conservation and restoration efforts up to the stage of determining special conservation zones, management, and supervision. Education and socialization in the community are very significant to raise awareness of the importance of mangroves, so there needs to be a process of assistance and education. This cannot be done alone but must be done in

partnership with other parties, therefore mangrove rehabilitation and restoration are the vision and mission of sustainable development in Karang City, Bandar Lampung. The problems faced by clematis in village government are related to law enforcement and supervision, in reality, the level of compliance and legal awareness of the community is still relatively low. Indonesia is basically a country that adheres to the constitutional principle of environmental protection so that all forms of actions or deeds carried out in the jurisdiction of the Unitary State of the Republic of Indonesia must pay attention to environmental aspects, both land and coastal environments, including mangrove forests. In addition to being burdened with obligations and responsibilities to maintain environmental sustainability, society also has the right to demand that everyone respect the human rights of others. In addition, with the existing laws and regulations, every citizen is obliged to obey and not damage and pollute the environment for the common good [1].

The concept of collaborative governance is a governance system where government institutions directly involve actors outside the government, including the community, NGOs, and the private sector, in a formal decision-making process that is oriented towards the common interest. Effective collaboration can unite visions and missions, optimize resources, and create synergies in the implementation of sustainable development programs [2]. However, to achieve optimal collaboration, a forum or institution is needed to manage the collaboration. This institution must be able to ensure that all parties participate in a deliberative and consensual manner in the formulation or implementation of public policies, or public asset programs. Good environmental governance includes the implementation of policies that prioritize sustainability, the implementation of Strategic Environmental Assessments (KLHS), and effective monitoring and enforcement of the law. In the context of environmental political ecology, this also means fairness in the distribution of environmental benefits and responsibilities. Fair and sustainable market access is significant to encourage economic activities that do not damage the environment and improve the welfare of local communities [3].

Programs designed to support sustainable development must be accompanied by strong collaboration mechanisms so that their impact is more significant. This study aims to evaluate the influence of market access, environmental governance, and programs on sustainable development and governance through forest landscape-based institutional collaboration [4]. This study was conducted in Kota Karang Village, which is a downstream coastal area of Bandar Lampung. The position of this village is significant because it is strategically located as a downstream area that receives impacts from various activities upstream. On the other hand, Kota Karang Village has challenges in the form of environmental degradation due to land conversion and unsustainable human activities. Based on these conditions, it is necessary to enforce good environmental village governance

in this village. Research on this matter needs to be conducted because so far there have been many studies on mangrove management that only analyze ecological aspects without linking them to policy. This means that the role of academics/researchers must also be considered and included as variables to be analyzed. By using Structural Equation Modeling (SEM), this study is expected to provide empirical evidence supporting the importance of institutional collaboration and environmental governance in good community-based mangrove development in achieving sustainable development in Indonesia. It is hoped that the findings of this study will form the basis for more effective and coordinated policy-making in forest management and sustainable development, by incorporating environmental considerations and collaborative governance principles. This study focuses on the village of Kota Karang located in the coastal area of Bandar Lampung, which is an area directly impacted by upstream activities. However, the geographical, social, and economic characteristics of this village show relevance to other coastal areas in Indonesia that experience similar pressures. Nevertheless, the results of this study can provide relevant insights for areas with similar characteristics, although they cannot be directly generalized to all regions of Indonesia.

2. METHODOLOGY

This study was conducted in the downstream area of Way Betung Watershed in Karang City, Lampung Province, Indonesia, from February to July 2024. In-depth interviews, surveys, and direct observations were used to ensure that the data collected were representative. Data collection was conducted from February to May 2024. The processing stage of the research results was carried out from June to July 2024. Although the analysis time was relatively short, in-depth and relevant findings can be obtained with this combination of sufficient time for data collection and analysis.

2.1 Procedure

In this study, the dependent or endogenous variables are represented as follows: [X1] Program, [X2] Environmental Governance, [X3] Market Access, [X4] Institutional Collaboration, [Y1] Sustainable Development, and [Y2] Collaborative Governance-Pentahelix (Table 1).

2.2 Data analysis

By using Structural Equation Modeling (SEM) with SmartPLS 4 software, this study uses quantitative analysis to explore.

The relationship pattern between variables and indicators will be examined using Structural Equation Modeling (SEM) analysis, as illustrated in Figure 1.

Table 1. Overview of variables, indicators, and their symbols in the model

No.	Variables	Symbol	Indicator
1	Program [X1]	[X1.1] [X1.2] [X1.3]	Government Programs NGO Programs Tourism Program
2	Environmental Governance [X2]	[X2.1] [X2.2]	Sustainability in an Environmental Context Strategic Environmental Assessment (SEA)
3	Market Access [X3]	[X3.1]	Economy

		[X3.2]	Environment
		[X3.3]	Social
4	Institutional Collaboration [X4]	[X4.1]	Active Role in Institutional Collaboration
		[X4.2]	Synergy between Vision and Mission and their Implementation
		[X4.3]	Mutualism in Relationships with Each Other
5	Sustainable Development [Y1]	[Y1.1]	Sustainable Development 1
		[Y2.2]	Sustainable Development 2
		[Y2.3]	Sustainable Development 3
6	Collaborative Governance-Pentahelix [Y2]	[Y2.1]	Government
		[Y2.2]	Business World (Business)
		[Y2.3]	Academics (Academics)
		[Y2.4]	Media (Press)
		[Y2.5]	Public

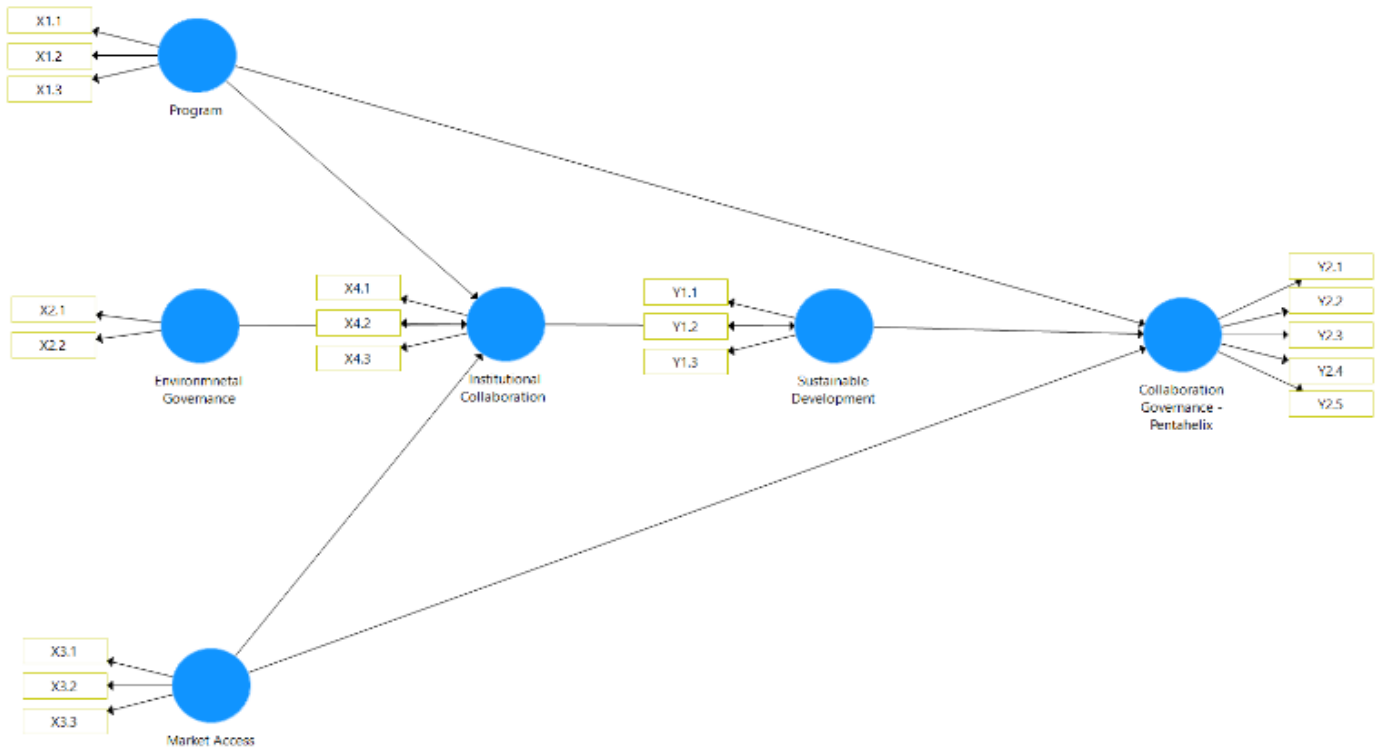


Figure 1. Structural model of variables and indicators

3. RESULTS

3.1 Measurement of model suitability

The measurement model suitability analysis aims to evaluate the validity and reliability of each indicator. This process is often referred to as a two-stage approach. If an indicator is found with a value of less than 0.05, the indicator will be eliminated. If the indicator loading factor is 0.70 or

higher, it indicates that the indicator is quite valid in representing the latent factor. The loading factor between 0.50 and 0.70 indicates validity. However, due to the large sample size in this study, the loading factor value used was >0.50 which was declared valid. The loading factor reflects the importance of the indicator in explaining the latent variable. As shown in Table 2 and Table 3, all indicators meet the required criteria and are considered significant >0.50 [5].

Table 2. Indicator loading factors

No.	Variables	Indicator	Standardized Loading Factor (γ)	Information
1	Program[X1]	[X1.1] Government Programs	0.825	Significant
		[X1.2] NGO Program	0.632	Significant
		[X1.3] Tourism Program	0.846	Significant
2	Environmental Governance [X2]	[X2.1] Sustainability in an environmental context	0.883	Significant
		[X2.2] Strategic Environmental Assessment (SEA)	0.673	Significant
3	Market Access [X3]	[X3.1] Economy	0.764	Significant
		[X3.2] Environment	0.820	Significant
		[X3.3] Social	0.568	Significant
4	Institutional Collaboration [X4]	[X4.1] Active Role in Institutional Collaboration	0.826	Significant

		[X4.2] Synergy between Vision and Mission and their Implementation	0.673	Significant
		[X4.3] Mutualism in Relationships with Each Other	0.881	Significant
5	Sustainable Development [Y1]	[Y1.1] Sustainable Development 1	0.578	Significant
		[Y1.2] Sustainable Development 1	0.805	Significant
		[Y1.3] Sustainable Development 1	0.707	Significant
6	Collaborative Governance-Pentahelix [Y2]	[Y1] Government	0.870	Significant
		[Y2] Business World (Business)	0.896	Significant
		[Y2.3] Academics (Academics)	0.638	Significant
		[Y2.4] Media (Press)	0.388	Not Significant
		[Y2.5] Society	0.635	Significant

Table 3. Building reliability and validity

Latent Variables	Cronbach Alphas	Rho_A	Composite Reliability	Average Variance Extracted (AVE)
Market Access	0.743	0.777 years	0.765 years	0.526
Environmental Governance	0.796	0.747	0.759	0.616
Institutional Collaboration	0.712	0.751	0.839	0.637
Program	0.770	0.718	0.815	0.599
Sustainable Development	0.797 years	0.731	0.742	0.594
Governance	0.760	0.805	0.850	0.592
Average				0.594

Table 4. R-square (R²)

Variables	R-square	Information
Institutional Collaboration	0.700	Strong
Sustainable Development	0.590	Strong
Governance	0.753	Strong
Average	0.681	

Table 4 shows that all research variables meet the criteria for Construct Validity and Reliability. Specifically, the CR value exceeds 0.70, AVE is above 0.50, and Cronbach's Alpha is greater than 0.70. In SEM analysis, the assessment of validity and reliability using AVE, CR, Cronbach's Alpha, and HTMT values is very significant because these metrics reflect the quality of the measurement of the constructs used in the study. Reliability assesses the consistency and dependency of indicators in measuring the construct. The AVE value shows how well the construct explains the variance of its indicators, while CR and Cronbach's Alpha show the internal reliability of the indicators in measuring the construct.

The magnitude of the direct effect of each variable is represented by the R-square measure. The R-square value, or coefficient of determination, indicates the percentage of variation in the endogenous construct that can be explained by the exogenous variable [6]. Specifically, the R² value indicates the extent to which the exogenous latent variable explains the variance in the endogenous latent variable [7]. R² is used to describe the impact on the predictor variables-the more constructs included, the higher the R-square. R² is always interpreted in the context of complex model studies [8].

3.2 Structural model suitability

The structural model was evaluated by examining the coefficients that describe the relationships between the latent variables. This assessment was conducted for each path, with the study examining three interrelated paths among the latent variables. The external loading coefficients for the indicators are depicted in Figure 2. The fit of the structural model can be reviewed in Table 5 and Table 6, which details the fit of the structural model.

Structural models are built by identifying exogenous and endogenous variables to evaluate their effects. These models are then tested to determine their alignment with the observed data. Furthermore, structural models are used to test hypotheses regarding the relationships or impacts among variables, thereby providing empirical support for the theory or concept being investigated. The results of hypothesis testing, from 7 (seven) hypotheses, proved significant with a p-value smaller than α (0.05) as follows:

H1: Environmental Governance→Institutional Collaboration significant (p<0.05)

H2: Institutional Collaboration→Sustainable Development significant (p<0.005)

H3: Market Access→Collaborative Governance-Pentahelix significant (p<0.005)

H4: Market Access→Institutional Collaboration is not significant (p>0.005)

H5: Program→Collaborative Governance-Pentahelix significant (p<0.05)

H6: Program→Institutional Collaboration is not significant (p>0.005)

H7: Sustainable Development→Collaborative Governance-Pentahelix significant (p<0.005)

The results of hypothesis testing of 7 (seven) hypotheses proved significant with a p-value smaller than α (0.05) as follows:

H1: Environmental Governance→Institutional Collaboration→Sustainable Development→Collaborative Governance – Pentahelix significant (p<0.05)

H2: Market Access→Institutional Collaboration→Sustainable Development→Collaborative Governance – Pentahelix not significant (p>0.005)

H3: Institutional Collaboration→Sustainable Development→Collaborative Governance-Pentahelix significant (p<0.005)

H4: Program→Institutional Collaboration→Sustainable Development→Collaborative Governance-Pentahelix not significant (p>0.005)

H5: Environmental Governance→Institutional Collaboration→Sustainable Development significant ($p<0.05$)
H6: Market Access→Institutional Collaboration→Sustainable Development not significant

($p>0.005$)
H7: Program→Institutional Collaboration→Sustainable Development is not significant ($p>0.005$)

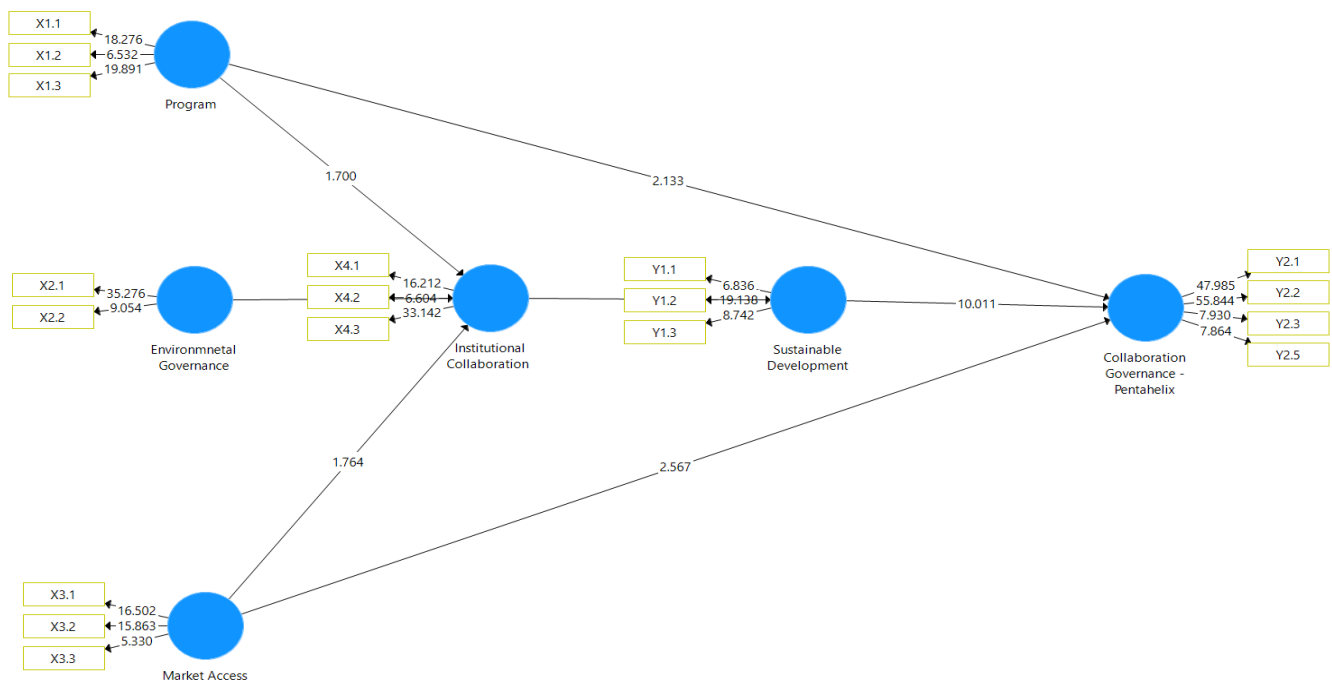


Figure 2. Internal load coefficient values for final model indicator arrows

Table 5. Structural model fit-path coefficients

	Original Sample	Average Example	Standard Deviation	T-value	P-value	Description
Environmental Governance→ Institutional Collaboration	0.601	0.603	0.106	5,657 people	0.000	Significant
Institutional Collaboration→ Sustainable Development	0.768 years	0.771	0.045 at 0.045	16,907 people	0.000	Significant
Market Access→Collaborative Governance - Pentahelix	0.173	0.178	0.067 years	2,567 years	0.010	Significant
Market Access→ Institutional Collaboration	0.123	0.118	0.070	1,764 people	0.078 years	Not Significant
Program→ Collaborative Governance - Pentahelix	-0.155	-0.156	0.073 years	2,133 people	0.033	Significant
Program→Institutional Collaboration	0.184	0.192	0.108	1,700 people	0.089 years	Not Significant
Sustainable Development→ Collaborative Governance - Pentahelix	0.822	0.820	0.082	10,011 years	0.000	Significant

Table 6. Structural model fit-specific indirect

	Original Sample	Average Example	Standard Deviation	T-value	P-value	Description
Environmental Governance→Institutional Collaboration→Sustainable Development→Collaborative Governance-Pentahelix	0.379	0.380	0.078	4,845	0.000	Significant
Market Access→Institutional Collaboration→Sustainable Development→Collaborative Governance-Pentahelix	0.078	0.074	0.045	1,734	0.083	Not Significant
Institutional Collaboration→Sustainable Development→Collaborative Governance-Pentahelix	0.631	0.631	0.072	8,754	0.000	Significant
Program→Institutional Collaboration→Sustainable Development→Collaborative Governance-Pentahelix	0.116	0.122	0.072	1,618	0.106	Not Significant
Environmental Governance→Institutional Collaboration→Sustainable Development	0.462	0.465	0.091	5,075	0.000	Significant
Market Access→Institutional Collaboration→Sustainable Development	0.095	0.091	0.054	1,752	0.080	Not Significant
Program→Institutional Collaboration→Sustainable Development	0.141	0.148	0.083	1,696	0.090	Not Significant

4. DISCUSSION

4.1 Environmental governance→Institutional collaboration→Sustainable development

The Influence of Environmental Governance on Sustainable Development through Institutional Collaboration is significant ($0.000 < 0.05$). This shows that good environmental governance has a very positive influence on sustainable development with effective institutional collaboration. These results indicate that Environmental Governance has a significant influence on Sustainable Development through Institutional Collaboration. Good environmental governance includes effective regulation, public participation, transparency, and accountability in decision-making. In the context of Environmental Village Governance Management, especially in Community-Based Mangrove Development, this governance is very significant for the preservation and sustainable use of mangrove ecosystems. Based on environmental governance theory, collaboration between institutions is very significant in addressing complex and cross-sectoral environmental problems [9]. Environmental governance refers to the processes and structures that ensure the effective management of environmental resources and the prevention of environmental degradation. This governance involves coordination and collaboration between various stakeholders, including government agencies, private companies, and civil society organizations, to effectively address environmental issues.

Mangrove areas have a very significant role in preventing seawater from entering the land and as a barrier to coastal erosion [10]. However, the lack of understanding of the benefits of mangroves causes people to be less protective of mangrove forests which provide various benefits for coastal ecosystems [11]. One strategy for community empowerment is to involve various stakeholders to support the success of programs and activities [10]. The synergy between stakeholders is very significant in achieving program goals [10, 11]. The government, private sector, and community organizations need to collaborate in developing community empowerment programs. Collaborative governance can be described as a process that involves shared norms and mutually beneficial interactions between governance actors [10].

Government involvement in mangrove conservation is very significant because the government is responsible for establishing regulations and policies that support conservation, including protecting mangrove areas legally and providing incentives for conservation [12]. The government is also responsible for monitoring and enforcing laws related to mangrove conservation, including preventing illegal actions such as illegal logging and conversion of fields [12]. In addition, the private sector can contribute through programs that support mangrove conservation projects and through investment in environmentally friendly technology and business practices to reduce negative impacts on mangrove ecosystems [13].

The role of non-governmental organizations (NGOs) is also very significant, as they help local communities obtain financial and technical assistance for conservation projects and raise awareness of the importance of mangroves through educational campaigns [14]. The involvement of local communities is also very significant, as they are involved in mangrove management and conservation through training and

empowerment programs and incorporate their traditional knowledge [14]. Collaboration with academics and researchers is also needed to provide scientific data and research that supports best practices in mangrove conservation, as well as to develop new technologies for mangrove mapping, monitoring, and restoration [15].

Good environmental governance can help organizations work together better, which in turn will promote sustainable development. Good governance ensures the regular and effective implementation of environmental programs and policies. This includes cooperation between different levels of government and sectors, as well as active participation from the public and private sectors. The Management of Environmentally Conscious Village Governance in Community-Based Mangrove Development shows that effective governance plays a vital role in ensuring that mangrove conservation and development initiatives are incorporated into local policies and practices. Environmental policies must be implemented in the daily lives of the community, so a group of people or a community who want to do it and have the ability to do it are needed [16]. With good environmental governance, we can make the environment a good place to achieve sustainable development goals.

4.2 Environmental governance→Institutional collaboration→Sustainable development→Collaborative Governance→Pentahelix

The effect of Environmental Governance on Governance through Sustainable Development and Institutional Collaboration is significant ($0.000 < 0.05$). This shows that good environmental governance not only supports sustainable development but also contributes significantly to better governance. These results indicate that Environmental Governance has a significant effect on Governance through Sustainable Development and Institutional Collaboration. In the context of Environmental Village Governance Management of Community-Based Mangrove Development Impacts, integrating environmental aspects into governance is essential to ensure the sustainability of the mangrove ecosystem in the long term. The theory of governance and sustainable development emphasizes the importance of integrating environmental aspects into governance to achieve sustainable outcomes. Good environmental governance can create an institutional framework that supports effective collaboration between stakeholders [9].

A form of institutional collaboration is needed to support sustainable mangrove management. In general, sustainable development assessment can use three development indicators, namely economic, social, and environmental [17]. Mangrove economic indicators can be assessed based on mangrove use value and mangrove non-use value [18]. The utility value of mangroves is divided into direct utility value in the form of fish resources or firewood, and then there is indirect utility value in the form of ecosystem services [19]. The non-utility value of mangroves is an illustration of the importance of maintaining mangrove sustainability for the future. Social indicators can be assessed based on community participation, community welfare, and gender equity [20]. Community participation is related to the level of local community participation in the management and conservation of mangrove forests, including participation in education and training programs [20]. Social welfare is related to health and education indicators in communities that depend on mangrove

forests, such as literacy rates, access to health services, and poverty rates. Gender equity is related to women's participation in economic activities and mangrove forest management, as well as their role in decision-making [20]. As for environmental indicators, there are several things that need to be considered, namely ecosystem conditions, biodiversity, and mangrove rehabilitation. Ecosystem conditions are related to the area of mangrove forests that are still remaining or increasing, including the quality and health of the mangrove ecosystem which is assessed based on vegetation density, biodiversity, and soil conditions [21]. Biodiversity is related to the number and diversity of flora and fauna species in the mangrove ecosystem, including endemic and endangered species. Furthermore, mangrove forest rehabilitation is related to the level of success of the damaged mangrove forest restoration and rehabilitation program, measured by the level of new vegetation growth and ecosystem function recovery [22]. So mangrove sustainability and prevention of land conversion can be achieved if the use of mangrove land takes into account these three indicators [23].

Collaborative Governance-Pentahelix has a strategic and significant role in supporting sustainable development goals, by increasing joint innovation, especially to advance regional socio-economics. This collaboration is strategic because it refers to the collaboration between five main actors, namely Academician, Business, Community, Government, and Media (ABCGM). In sustainable development governance in Indonesia, this concept is stated in the Regulation of the Minister of Tourism of the Republic of Indonesia Number 14 of 2016 concerning Tourism Destination Guidelines. This policy states that the purpose of implementing the pentahelix model is to create harmony at the lower level and ensure the quality of activities, facilities, services, and create experiences and benefits, in order to provide benefits for all parties involved. In this study, Pentahelix is measured through indicators such as the frequency of meetings between actors, the level of stakeholder participation, and the effectiveness of policy implementation produced through collaboration.

In this study, good environmental governance showed a positive impact on overall governance through sustainable development mechanisms and institutional collaboration. This suggests that effective environmental governance policies and practices can strengthen the institutional framework and promote sustainable development, which ultimately has a positive impact on overall governance. In the context of Environmentally Conscious Village Governance Management in Community-Based Mangrove Development, such governance practices are essential to ensure sustainable management and conservation of mangrove ecosystems. Effective policies must encompass differences in national and international policies and must consider the legal implications associated with such policy differences [24]. Therefore, it is significant to continue to strengthen environmental governance through inclusive and collaborative policies.

4.3 Institutional collaboration→Sustainable development→Collaborative governance-pentahelix

The effect of institutional collaboration on governance through sustainable development is significant ($0.000 < 0.05$). This shows that collaboration between institutions plays a significant role in supporting sustainable development which ultimately has a positive impact on governance such as minimizing development barriers and reducing the impact of

environmental damage [25]. In the context of Community-Based Mangrove Development, institutional collaboration is very significant for the management and preservation of sustainable mangrove ecosystems. These results show that institutional collaboration has a significant effect on governance through sustainable development. Institutional collaboration can also contribute to encouraging the potential of natural resources to build synergy with other natural resources [26]. Collaboration between local communities and stakeholders plays a significant role in ensuring sustainable resource management [27].

This study did not explicitly consider mediator or moderator variables, although these variables may influence the relationship between the independent and dependent variables. Further research could consider potential mediator variables such as public awareness of environmental policies, or moderator factors such as more specific local government policies.

Future governance will have challenges in coordinating existing and future ideas, innovations, and initiatives [28]. Based on network and collaboration theory, collaboration between institutions can increase collective capacity to address the complex and dynamic challenges faced in sustainable development [29]. Effective collaboration between institutions allows for more efficient and equitable resource management, which in turn strengthens governance. This can be done through regional management plans prepared by stakeholders to ensure resource sustainability, maintain biodiversity, and manage resources wisely [30]. Strong institutional collaboration has been shown to have a positive impact on governance through sustainable development mechanisms. Good governance tends to have a more stable risk profile and is able to avoid potential regulatory problems in the future [31]. Policy is a form of governance that is very necessary to reduce conflicts of interest between institutions [32].

This is in line with research [33] Previous research shows that the Penta-Helix model can help develop sustainable community-based tourism (CBT). For example, Penglipuran Tourism Village in Bali has successfully implemented this strategy by including five main components: government, community, academics, business, and media. This cross-sector collaboration allows for the preservation of local wisdom and the improvement of community economic welfare. Penta-Helix serves as a significant tool to maintain a balance between resource utilization for tourism needs and environmental protection. In addition, it ensures that local communities are actively involved in every stage of the process from planning to implementation, and evaluation. This study shows that collaborative approaches such as Penta-Helix are not only relevant but can also be applied elsewhere with similar features and problems, such as in the context of sustainable natural resource governance.

In this study, the relationship between market access and institutional collaboration did not show significant results, which may be due to the lack of adequate market infrastructure or support at the local level. Further research could explore other external factors that may influence this relationship, such as government policies or broader market conditions.

This emphasizes the importance of cross-sector and cross-institutional collaboration in achieving the goals of good and sustainable governance. Efforts to build the quality of sustainable and environmentally aware development can be made with the contribution and role of each actor, both government, private, community, and community, in good

governance [26]. Governance transformation can encourage the optimization of roles between institutions to realize sustainable development [34]. Effective collaboration and communication between all sectors involved are significant in the process of identifying, evaluating, and managing risks related to environmental changes that have occurred and will occur [35].

5. CONCLUSION

This study explains that environmental governance has a significant effect on sustainable development through institutional collaboration, while market access and programs do not show a significant effect without the support of strong institutional collaboration. It is proven that effective institutional collaboration is essential to achieve sustainable development and good governance, indicating that cooperation between institutions that have aligned visions and missions and mutually contributing relationships are the keys to success. Consequently, to achieve optimal sustainable development and forest landscape-based governance, an approach that integrates institutional cooperation and strong environmental governance is needed. The village government is responsible for the management and protection of the mangrove ecosystem in Karang City, Bandar Lampung. The village government sets policies and regulations for mangrove conservation and restoration, monitors activities that can damage mangroves, and establishes special conservation zones. To raise awareness of the importance of mangroves, it is essential to provide education and socialization to the community. To implement effective environmental policies, the government, communities, NGOs, and the private sector must work together in the decision-making process. Good governance and institutional collaboration directly contribute to sustainable development. Therefore, this study shows that strong environmental governance and effective institutional collaboration are necessary for successful environmental management and sustainable development in villages.

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