

Evaluation of sustainability development based on community perspective as a participatory approach in Pasaran Island, Bandar Lampung, Indonesia

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Abstract. Pasaran Island, a small island in Bandar Lampung City with a population of 1,500, requires a participatory approach for effective development evaluation. This research aims to evaluate the sustainability of Pasaran Island in Bandar Lampung City through a participatory approach, by involving the community in providing direct input into effective development programs. This method allows the community to provide direct input on the sustainability of their area. The local community has extensive knowledge of the island's social, economic, and ecological dynamics. In this study, 100 respondents were surveyed, consisting of 53% native residents and 47% migrants. The analysis utilized the IPA matrix to assess community perspectives, focusing on individuals who had lived on the island for at least five years. Positive gaps indicate where community expectations align with reality, while negative gaps highlight areas needing improvement. The community identified key areas for improvement, including disaster mapping (-0.27), disaster knowledge (-0.23), and tsunami awareness (-0.30). Additional challenges in landscape management were related to waste disposal (-0.17) and organizational structure (-0.07). Furthermore, improvements were needed in natural resource-based livelihoods (0.04), the fishing economy (0.05), and area management (0.05). Significant gaps were also identified in fish farming (-0.04), dock/boat arrangement (-0.09), fish trader zoning (-0.06), and local government fund transparency (-0.09).

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1 Introduction

Pulau Pasaran, situated in the Teluk Betung Timur, Bandar Lampung City, is a small inhabited island experiencing significant pressures from residential activities, fisheries, and land-use changes. With a population of approximately 1,500 residents and a total area of only 12.02 hectares, the average land area per individual is merely 0.008 hectares or 80.13 m². The majority of the island's inhabitants depend on fisheries as their primary livelihood, making the sustainability of development on Pulau Pasaran heavily reliant on achieving a balance between resource exploitation and environmental conservation data from Badan Pusat Statistik Bandar Lampung City. The island is renowned as a hub for anchovy production, which serves as a critical component of the local economy and the primary source of income for its residents the data from Ministry of Marine Affairs and Fisheries. However, anthropogenic activities and increasing pressures on natural resources have given rise to numerous sustainability challenges, including environmental degradation, a decline in quality of life, and threats to the ecological carrying capacity of the island. The escalating demand for economic development in coastal regions exacerbates ecological pressures. Consequently, in-depth research on sustainable ecological development in coastal landscapes is crucial [1]. Sustainable development is a global agenda embedded within the Sustainable Development Goals (SDGs) initiated by the United Nations in 2015. This framework emphasizes the integration of social, economic, and environmental dimensions to ensure sustainability for present and future generations. Small islands play a pivotal role in achieving these goals through the management of natural resources, climate change adaptation, and community empowerment.

Moreover, SDG 1, No Poverty, and SDG 2, Zero Hunger, are aligned with efforts to enhance the well-being of small island communities through fisheries-based economic development, sustainable tourism, and livelihood diversification. SDG 13, Climate Action, underscores the necessity for both mitigation and adaptation strategies to address the impacts of climate change. These interlinkages drive economic expansion, population growth management, and social welfare improvements, all of which are essential components of the 2030 Agenda for Sustainable Development.

Community engagement is a critical determinant in achieving sustainable development, particularly in capturing and integrating local perspectives. A participatory approach empowers communities to actively contribute to resource planning and management. This strategy ensures a balanced integration of social, economic, and environmental dimensions [2]. Research on community perspectives in Pulau Pasaran aims to assess the island's resilience and explore how the integration of these three dimensions can drive successful sustainable development outcomes for small islands. This study aims to understand local community perceptions of the adequacy of facilities, infrastructure, and amenities in supporting their livelihoods on Pasaran Island, Bandar Lampung City; explore community views on the priority of zoning strategies in an effort to mitigate potential natural disasters; and analyze community livelihood needs in ensuring the socio-economic sustainability of Pasaran Island. Author could write this in paragraphs.

2 Method

2.1 Data collection technique

This research was conducted on Pulau Pasaran, Bandar Lampung City. Administratively, the research location is situated on Pulau Pasaran, Kotakarang Village, East Teluk Betung Sub-

district, Bandar Lampung City, Lampung Province. Data collection techniques employed a combination of both quantitative and qualitative approaches. This integration of data was utilized to provide a comprehensive dataset.

Quantitative data were collected through questionnaires and presented in tables and diagrams. The quantitative data were derived from 100 respondents from Pulau Pasaran, selected based on the criterion of having resided on the island for at least five years. Meanwhile, qualitative data were gathered through literature review and open-ended questions posed to key informants. This study used descriptive analysis to provide explanations based on the collected data and information. The goal of descriptive analysis is to obtain current information on the ongoing conditions and to identify relationships between variables. The quantitative data were analyzed using the Importance-Performance Matrix Analysis (IPMA). Based on the questionnaire responses, the data were analyzed further using IPMA. The IPMA is a matrix that consists of four quadrants, each of which visually illustrates overall community satisfaction. The input for IPMA consists of questionnaire responses that include two factors: performance factors and importance factors. The results of the IPMA are presented in a diagram that positions each variable in the questionnaire on a Cartesian diagram, where the X-axis represents five performance factors and the Y-axis represents importance factors (Fig. 1) [3]. The strategies that can be implemented based on the position of each variable in the four quadrants are as follows (Fig. 1):

In the Importance-Performance Analysis (IPA), Quadrant 1 represents factors crucial to the community but with unsatisfactory performance, requiring significant improvement. Quadrant 2 includes factors that meet community expectations and should be maintained. Quadrant 3 consists of factors deemed less important with low performance, making further improvements less critical. Lastly, Quadrant 4 highlights factors of low importance, suggesting that reducing resources allocated to these variables could enhance cost efficiency (Fig 1).

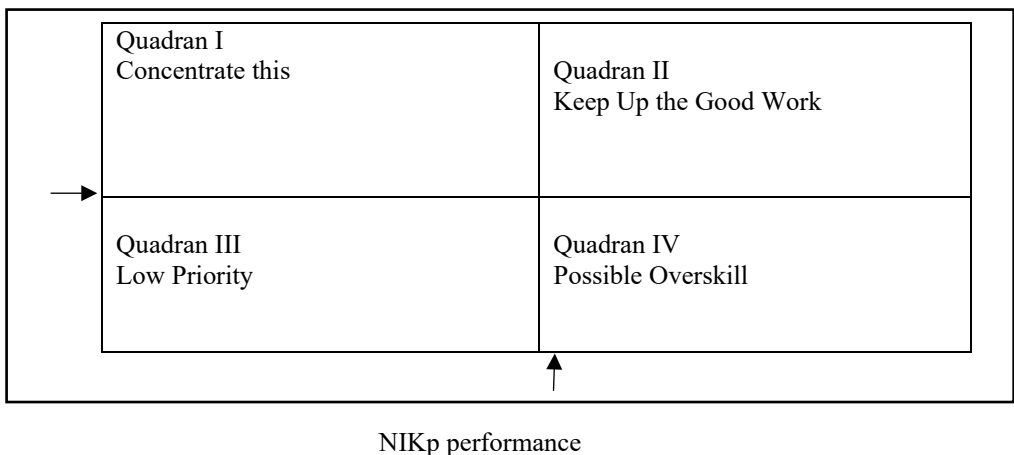


Fig. 1. Importance Performance Matrix Analysis (IPMA)

Source: Martilla and James (1977)

Data collection for this study was conducted over three field visits, with data being gathered in the late afternoon between 3:00 PM and 6:00 PM local time. In research studies, it is crucial to collect accurate data. In this context, it is important to avoid generalizations or stereotypes based on gender when assessing an individual's honesty. Each person is unique, and other factors such as personal values, education, culture, and life experiences also play significant roles in shaping behavior and honesty when completing the research questionnaire [4].

The quality of the data also depends on how the questions are framed and how respondents understand and interpret those questions. In research contexts, it is essential to employ objective scientific methods for data collection and analysis. For example, using random sampling techniques, formulating questions clearly and neutrally, and considering various factors that may influence respondent honesty [5].

3 Results

3.1 Respondent background

The total number of respondents in this study was 100 individuals, each meeting the criteria of having resided on Pulau Pasaran for at least five years and being of productive age, defined as 17 years or older. This criterion was selected to ensure emotional and psychological maturity, so that the responses gathered would align with the objectives of the research. The respondents comprised 33% males and 67% females (Fig. 2). The 67% female representation indicates that the majority of the respondents were women, while men constituted a minority group within the sample. This information provides insight into the gender composition of the respondents involved in this study.

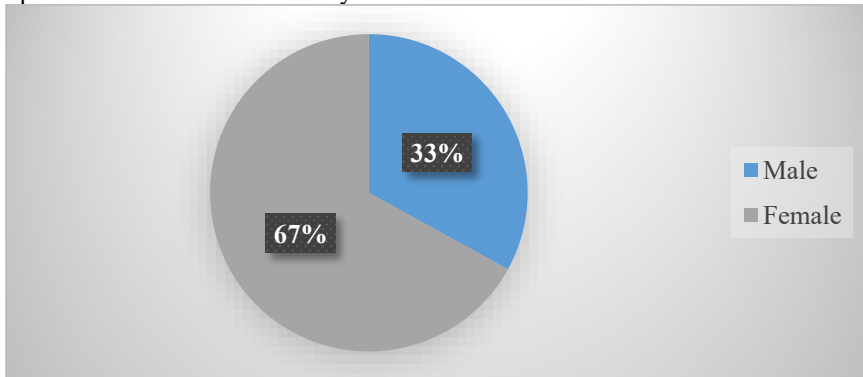


Fig. 2. Gender Percentage of Respondent

The ages of the respondents whose data were collected by the researcher ranged from 17-25 years (11%), 26-36 years (26%), 37-47 years (27%), 30-40 years (26%), 40-50 years (27%), and over 70 years (3%) (Fig. 3 and Table 2).

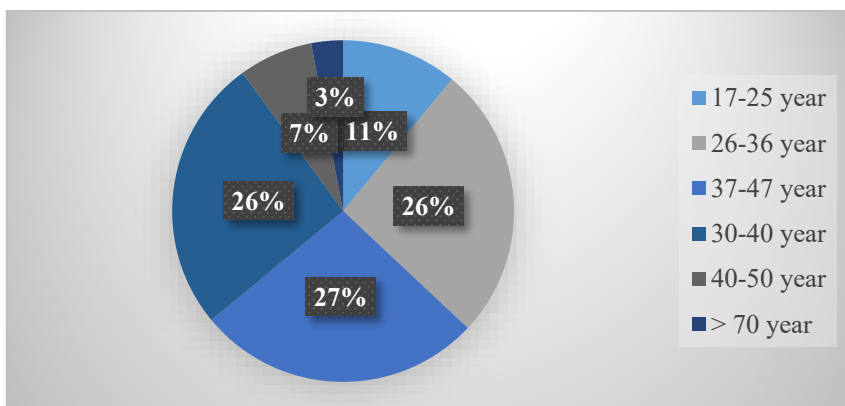


Fig. 3. Age Range of Respondents

Data collection for this study was conducted over three field visits, with data being gathered in the late afternoon between 3:00 PM and 6:00 PM local time. In research studies, it is crucial to collect accurate data. In this context, it is important to avoid generalizations or stereotypes based on gender when assessing an individual's honesty. Each person is unique, and other factors such as personal values, education, culture, and life experiences also play significant roles in shaping behavior and honesty when completing the research questionnaire.

The ages of the respondents whose data were collected by the researcher ranged from 17-25 years (11%), 26-36 years (26%), 37-47 years (27%), 30-40 years (26%), 40-50 years (27%), and over 70 years (3%) (Fig. 3 and Table 2). In Indonesia, the image of women working in tourism has undergone a positive shift, with women increasingly entering the tourism sector in line with rising investments in tourism and an increase in tourist arrivals (Cukier & Wall, 1993). The ages of the respondents whose data were collected by the researcher ranged from 17-25 years (11%), 26-36 years (26%), 37-47 years (27%), 30-40 years (26%), 40-50 years (27%), and over 70 years (3%) (Fig. 3 and Table 2).

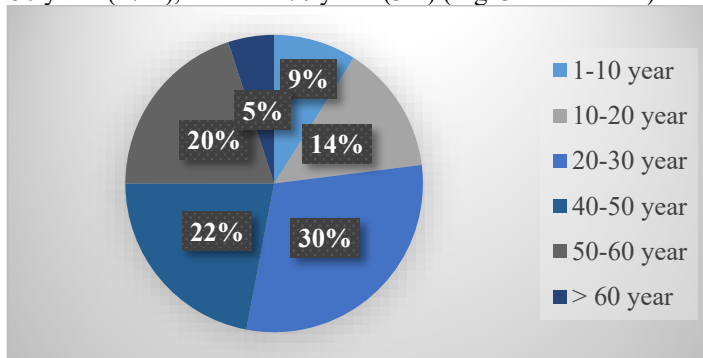


Fig. 4. Years of Residence

The demographic status of the 100 respondents on Pulau Pasaran indicates that 53% are indigenous residents, while 47% are migrants (Fig. 4). Indigenous residents are ethnic groups with historical, cultural, and identity ties to the area. They have inhabited the region for a long period and possess traditional knowledge, along with a strong connection to the natural resources on Pulau Pasaran. Participation in community-based management can also provide opportunities for local populations to think critically and develop solutions for themselves, while facilitating the integration of local knowledge, skills, and resources in governance [6].

The importance of synergy between the government, local communities, and traditional wisdom is critical in the management of coastal areas. Empowering coastal communities is essential for promoting their self-sufficiency. This model proves effective as the active involvement of coastal communities can enhance income, preserve environmental sustainability, and enable them to manage marine resources in accordance with local potential and culture [7]. Migrants are individuals who have moved to the area due to economic factors or environmental changes. Migrants contribute to the cultural and demographic diversity on Pulau Pasaran. It is expected that migrant communities will collaborate with local residents in environmental management [8].

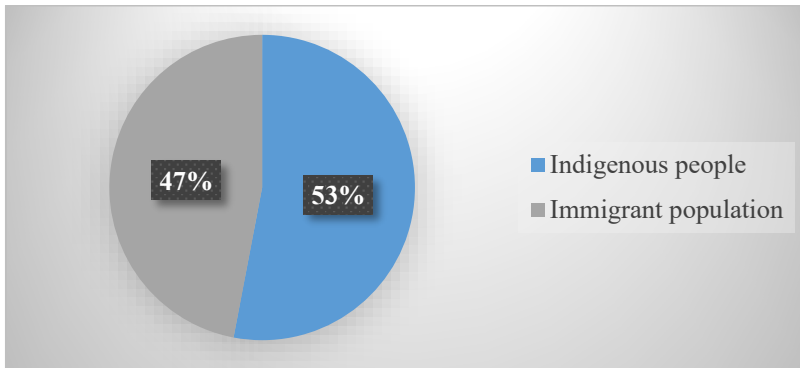


Fig. 5. Respondents Residence Status

The respondents' regional origins show that 52% are indigenous residents of Pulau Pasaran, 3% are from Lampung, 39% are migrants from West Java, Indramayu, 3% are from Central Java, and 3% are from other regions (Fig. 5). Migrants can have a positive and significant impact on the socio-economic life of the local area.

The socio-economic conditions of the community, as reflected in the respondents' occupations, show that 40% are housewives, 21% are fishermen, 16% are fish processors, 15% are entrepreneurs and traders, 3% are private employees, 2% are unemployed, and 3% are students or have student status. This data indicates that majority of respondents are engaged in domestic work or the fisheries sector. Family background influences education and future employment opportunities for the next generation. Children from better-off families tend to have easier access to high-paying jobs (direct effect). While human capital is important, family background also plays a role in job matching processes in the labor market. Children from wealthy families benefit from living in better environments, receiving quality education from highly educated parents, and are more likely to attend high-quality higher education institutions [9].

The socio-economic status of the respondents in this study is also crucial to understand. The data from the respondents reveals that 37% have a monthly income between 300,000 and 1,000,000 IDR, 19% earn between 1,000,000 and 2,000,000 IDR, 13% have an income between 3,000,000 and 4,000,000 IDR, 3% earn between 4,000,000 and 5,000,000 IDR, and 2% earn more than 7,000,000 IDR per month. Additionally, 21% of respondents did not provide information regarding their monthly income (Fig. 5). Fishermen's income is influenced by the type and scale of their business, fish species, season, weather conditions, technology, geographical location, operational costs, government policies, market prices, resource sustainability, market access, infrastructure, education, training, and government support. All of these factors impact the output and profitability of fishermen in a given month.

Monthly income activities are also affected by the fishing season. The most influential factor is the spatio-temporal patterns of fishing activities. Fuel costs and team expenses are also considered in calculating the net monthly salary of fishermen. Coastal fishermen often choose locations closer to the shore to balance costs. The importance of the marine environment and geographic location for fishing varies throughout the seasons [10].

3.2 Community perceptions of facilities and infrastructure in Pulau Pasaran, Bandar Lampung City.

The results of the IPA (Importance-Performance Analysis) Matrix, which assesses the importance, performance, and gap of various service indicators in Pulau Pasaran, offer valuable insights into community perceptions regarding existing facilities and infrastructure.

The Road Access indicator has the highest importance value (4.61) with a slightly higher performance score (4.62), yielding a positive gap (+0.01), suggesting that road access meets or even exceeds the community’s expectations. In contrast, the Waste Disposal indicator exhibits the largest negative gap (-0.17), with an importance score of 4.35 and a performance score of 4.18, indicating a significant need for improvement in waste management (Fig. 6).

The Road Provision indicator shows an importance value of 4.5 and a performance value of 4.43, resulting in a gap of -0.07, signifying good performance but with room for further enhancement. The Formal Education Facilities demonstrate alignment between importance (4.38) and performance (4.38), indicating that the community's needs in this area are adequately met. The Water Supply indicator (4.33 importance, 4.32 performance, gap -0.01) and Complete Public Facilities (4.26 importance, 4.25 performance, gap -0.01) also reflect nearly satisfactory results in meeting expectations.

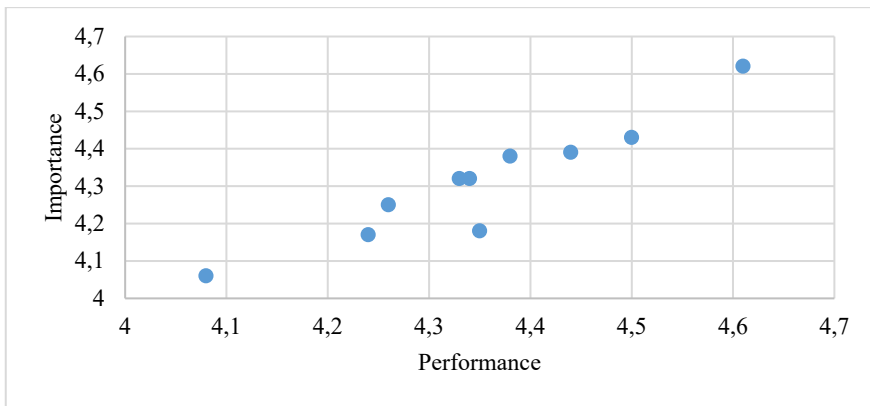


Fig. 6. IPA Diagram of Natural Facilities and Infrastructure on Pasaran Island

Table 1. Indicator on Natural Facilities and Infrastructure in Pasaran Island

Indicator	Importance	Performance	Gap
Road Access	4,61	4,62	0,01
Road provision	4,5	4,43	-0,07
Formal education facilities	4,38	4,38	0
Non-formal education facilities	4,08	4,06	-0,02
Importance of education	4,44	4,39	-0,05
Importance of environmental conditions	4,34	4,32	-0,02
Waste Disposal	4,35	4,18	-0,17
Institutional structure	4,24	4,17	-0,07
Water Provision	4,33	4,32	-0,01
Complete public facilities	4,26	4,25	-0,01

3.3 Community perceptions on zoning priorities to prevent natural disasters in Pasaran Island, Bandar Lampung City

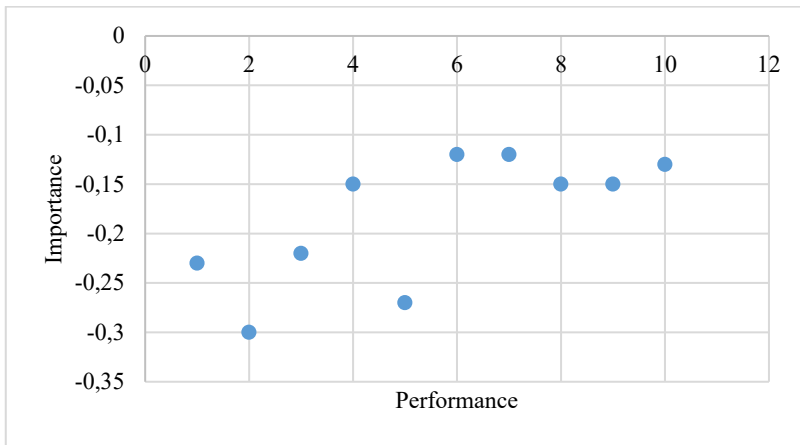


Fig. 7. IPA Zoning Diagram for Pasaran Island

Table 2. Indicator and evaluation

Indicator	Importance	Performance	Gap
Disaster Knowledge	4,14	3,91	-0,23
Tsunami Knowledge	4,21	3,91	-0,3
Material Losses	4,27	4,05	-0,22
Tidal Flood Control Facilities	4,56	4,41	-0,15
Disaster-Prone Map	4,17	3,9	-0,27
Disaster Evacuation Area	4,66	4,54	-0,12
Disaster Anticipation	4,44	4,32	-0,12
Life Consequences	4,35	4,2	-0,15
Community: Disaster Mitigation	4,16	4,01	-0,15
Government: Disaster Mitigation	4,51	4,38	-0,13

This data evaluates the relationship between the importance, performance, and gap levels for disaster mitigation indicators in Pulau Pasaran. The analysis reveals that the indicator of Tsunami Knowledge exhibits the largest gap (-0.3), with an importance score of 4.21 and a performance score of 3.91. This indicates that the community's awareness of tsunami risks is insufficient relative to its importance, signaling the need for specialized training or education on tsunami preparedness. The Hazardous Disaster Map indicator also shows a significant gap (-0.27), with importance rated at 4.17 and performance at 3.9. This highlights a lack of access to or inadequate use of disaster risk maps by the community. Material Losses exhibit a gap of -0.22, with importance at 4.27 and performance at 4.05, emphasizing the necessity of improved mitigation strategies to minimize economic impacts caused by disasters.

Meanwhile, the indicators for Flood Control Facilities and Consequences on Livelihoods both present a gap of -0.15, with importance values of 4.56 and 4.35, and performance scores of 4.41 and 4.2, respectively. This indicates the critical need for improvements in infrastructure and enhanced protection for the community against natural disasters. The Disaster Mitigation by Government indicator reflects a gap of -0.13, with importance rated at 4.51 and performance at 4.38, suggesting that while the government has performed well, there is still room for improvement in policy and implementation of disaster mitigation programs. The Disaster Evacuation Area indicator shows the smallest gap (-0.12), with the highest importance (4.66) and performance (4.54), signifying a strong focus on ensuring the provision of adequate evacuation areas. Overall, this data demonstrates that while certain aspects of disaster mitigation are adequate, significant gaps remain in areas such as community knowledge, access to information, and infrastructure protection. Integrated efforts between the community and the government are essential for enhancing comprehensive disaster mitigation.

3.4 Community perceptions of the prioritization of life needs to support sustainability on Pasaran Island, Bandar Lampung City

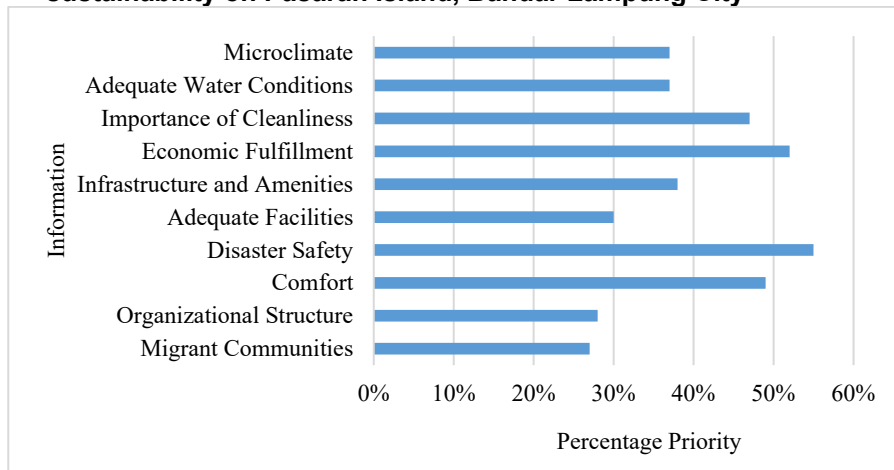


Fig. 8. Community Perspective

Table 3. Perspective Community

Information Respondents	Percentage
Migrant Communities	27%
Organizational Structure	28%
Comfort	49%
Disaster Safety	55%
Adequate Facilities	30%
Infrastructure and Amenities	38%
Economic Fulfillment	52%
Importance of Cleanliness	47%
Adequate Water Conditions	37%
Microclimate	37%

This data evaluates the initial knowledge of the community regarding the primary needs for living in Pulau Pasaran through descriptive analysis. The analysis is based on percentage groupings from the questionnaire results, with a range spanning from "Not Important at All," "Not Important," "Somewhat Important," "Important," to "Very Important." The data was summarized by highlighting those factors considered "Very Important" from the community's perspective. Based on the data collected, various "Very Important" values that could influence the quality of life in Pulau Pasaran have been identified. The community perceives that the presence of immigrants holds a "Very Important" value of 27% as part of the social structure. The importance of having an organizational structure is rated at 28% in the community's view. The community places significant importance on comfort, with a "Very Important" score of 49%, and disaster security, with a score of 55% under the "Very Important" category (Fig. 8 and Table 3).

The importance of adequate facilities is rated at 30%. The community considers economic sufficiency as "Very Important," with a score of 52%. Environmental cleanliness is also viewed as "Very Important" with 47%, underscoring its role in fulfilling the community's quality of life (Fig. 8 and Table 3). Overall, the data offers a comprehensive view of the perspectives on social, economic, and environmental needs in the region, with some aspects showing positive results, while others require further attention to enhance the overall quality of life.

Small-scale fisheries are critical for supporting food systems, the environment, culture, livelihoods, and sustainable development. Typically, these operations are collective and traditional, deriving from natural resources. Many small-scale fishing communities are organized into associations or cooperatives, which exhibit high levels of solidarity. This sector is increasingly gaining attention in the global agenda, particularly within the context of fisheries with a sustainable outlook [12]. Small-scale fisheries have opportunities to enhance management and sustainability at the regional level.

This data highlights various indicators related to disaster mitigation, zoning, natural resource management, and participatory management, evaluated through a GAP analysis. In the context of disaster mitigation, the very small gap in road access (0.01) suggests relatively good sufficiency, while road provision (-0.07) indicates the need for improvements. Formal educational facilities show no gap (0), reflecting alignment with community expectations, while non-formal educational facilities (-0.02) require minor improvements. Regarding zoning, the importance of education (-0.05) and environmental conditions (-0.02) indicates slight misalignment, whereas waste management (-0.17) reveals a significant need for improvement. Institutional structure also shows a moderate gap (-0.07), emphasizing the importance of enhancing governance.

In natural resource management, water provision (-0.01) and public facilities (-0.01) are close to adequate levels. However, fisheries cultivation (-0.04) shows a small gap, signaling the need to optimize aquaculture efforts. Zoning for fishing activities, such as boat equipment and fishing gear (-0.09), as well as zoning for fish traders (-0.06), shows a moderate gap, underscoring the need for better infrastructure and zoning policies.

Finally, in participatory management, the transparency of fund management (-0.09) and community-based management (-0.06) show gaps, highlighting the need for improved financial accountability and local participation. The transparency of fund management from the subdistrict also shows a small gap (-0.05), indicating the need for better governance mechanisms. Overall, this analysis identifies key areas that require development to achieve more sustainable and inclusive management.

3.5 Community perspective

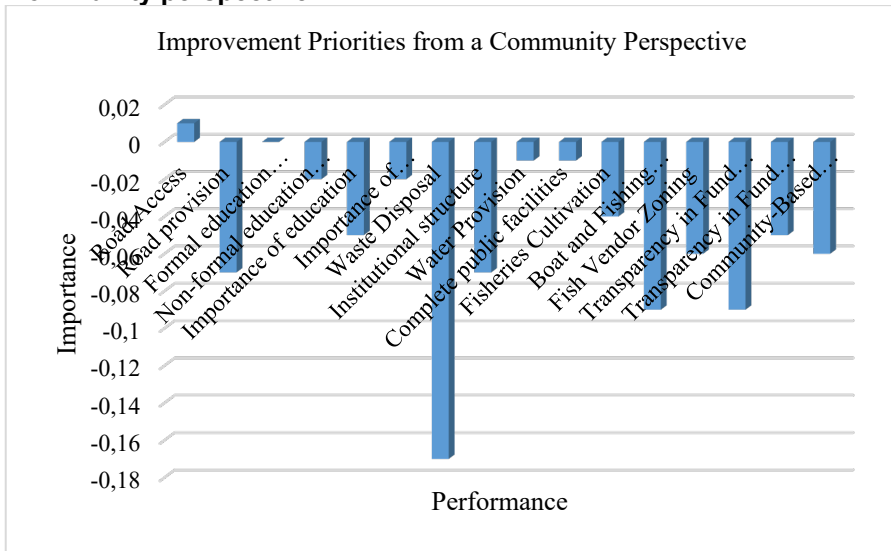


Fig. 9. Priority for evaluation

Table 4. Indicators and gaps in improvement priorities from a community perspective

Indicator	Gap
Road Access	0,01
Road provision	-0,07
Formal education facilities	0
Non-formal education facilities	-0,02
Importance of education	-0,05
Importance of environmental conditions	-0,02
Waste Disposal	-0,17
Institutional structure	-0,07
Water Provision	-0,01
Complete public facilities	-0,01
Fisheries Cultivation	-0,04
Boat and Fishing Equipment	-0,09
Fish Vendor Zoning	-0,06
Transparency in Fund Management	-0,09
Transparency in Fund Management from the Subdistrict	-0,05
Community-Based Management	-0,06

4 Discussions

4.1 Social and economy aspect for facilities

The waste management indicator demonstrates the largest gap (-0.17), reflecting significant challenges in the sustainability of the local ecosystem. Poor waste management systems can exacerbate water and soil pollution, thereby degrading natural habitats and reducing environmental quality. Mitigation efforts through community-based waste management systems should be prioritized.

A smaller gap is observed in indicators related to education, both formal (0.00) and non-formal (-0.02). However, the importance of education (gap -0.05) indicates that the community perceives education as a strategic element for long-term social development. This aligns with theories suggesting that education plays a critical role in enhancing community participation in local resource management [11]. Road access (gap 0.01) and water provision (-0.01) exhibit minimal gaps, yet they remain essential for supporting the community's economic activities, particularly in the fisheries sector. Improved accessibility can facilitate the distribution of fishery products and increase local incomes [12]. Furthermore, the presence of nearly complete public facilities (gap -0.01) highlights significant economic potential, provided it is supported by optimal infrastructure policies.

4.2 Ecological aspect from zonation

(-0.15) highlight the suboptimal state of environmental management systems. Ecological unpreparedness increases the risk of coastal habitat degradation, which may exacerbate disaster impacts. Solutions such as mangrove restoration and the development of green infrastructure can serve as environmentally friendly mitigation measures. The gaps in disaster knowledge (-0.23) and tsunami awareness (-0.30) reflect a lack of community education regarding disaster risks. Limited knowledge undermines the community's ability to act proactively during emergencies. Community-based education programs can enhance awareness and encourage public participation in disaster mitigation efforts.

Material losses (-0.22) represent one of the direct consequences of disasters frequently faced by the residents of Pulau Pasaran. Moreover, the availability of facilities such as evacuation areas (-0.12) and disaster mitigation structures (-0.13) heavily depends on government budget allocations. Investments in disaster-resilient infrastructure not only safeguard community assets but also reduce post-disaster recovery costs [13].

4.3 Social and economy aspects to support sustainability

Indicators related to environmental cleanliness (47%), adequate water conditions (37%), and microclimate (37%) highlight the importance of sustainable natural resource management. Inadequate water conditions can impact public health and lead to coastal ecosystem degradation. Efforts such as improving waste management and conserving coastal vegetation can enhance microclimate conditions and water quality (Rahman et al., 2021). Disaster safety (55%) is a top priority for the community, reflecting the need for improved knowledge and mitigation facilities. Additionally, comfort (49%) and organizational structure (28%) underscore the importance of community solidarity in managing coastal areas. Community-based programs, such as disaster mitigation training and environmental management, can strengthen social engagement (Anderson & Wood, 2020). Economic fulfillment (52%) is a dominant indicator, reflecting the community's dependence on local resources. Adequate facilities (30%) and infrastructure (38%) are prerequisites for supporting economic activities.

Collaborative efforts involving stakeholders, including governments, communities, and universities, are essential for achieving integrated and sustainable coastal management [14].

5. Conclusions and recommendation

5.1 Conclusions

This study reveals that Pulau Pasaran faces multidimensional challenges impacting the ecological, social, and economic sustainability of its community. From an ecological perspective, indicators such as environmental cleanliness (47%) and adequate water conditions (37%) underscore the need to improve natural resource and waste management. Poorly maintained environments exacerbate microclimatic conditions and adversely affect public health. From a social standpoint, disaster safety emerges as a primary concern (55%), reflecting the community's vulnerability to hazards such as tidal floods and tsunamis. Limited knowledge of disaster-prone area maps (-0.27) and community-based disaster mitigation strategies (-0.15) highlights the urgent need to enhance community capacity through education and training. Other social dimensions, such as comfort (49%) and community organizational structure (28%), emphasize the importance of solidarity and coordination in strengthening societal resilience. Economically, fulfilling economic needs (52%) is a dominant issue, with infrastructure (38%) and facilities (30%) serving as critical enablers of sustainable economic activities. However, inadequate facilities (-0.15) and insufficient measures to address tidal flood control (-0.15) hinder the productivity of coastal communities.

5.2 Recommendation

Ecological Management to enhance environmental conservation programs with a focus on waste management, water quality improvement, and reforestation to improve the microclimate. **Social Capacity Building:** Implement community-based disaster mitigation education programs, develop disaster-prone area maps, and provide evacuation facilities. **Economic Strengthening:** Invest in infrastructure that supports economic activities, such as road access, tidal flood control, and improved public facilities. **Stakeholder Collaboration:** Engage communities, governments, and non-governmental organizations in the planning and implementation of community-based programs. Meeting community needs is essential for the effective management of landscape services. Active participation and collaboration from local stakeholders can further enhance the sustainability and success of these management efforts [15].

Acknowledgement

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