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Resisting Financial Predation: A Community-Based Financial Literacy Strategy to Mitigate Illegal Investment Risk in Coastal Indonesia

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Abstract. *This study develops a financial literacy–based strategy to mitigate illegal investment risks in vulnerable coastal communities using a Financial Vulnerability Index (IKF) and a Multi-Criteria Decision-Making (MCDM) approach integrating AHP and TOPSIS. Conducted in three Central Maluku villages, the IKF combines economic vulnerability, financial literacy, and access to finance. Findings show Wailulu and Asilulu as highly vulnerable (IKF > 0.90), while Tulehu is more resilient. AHP-TOPSIS results rank community-based training as the most effective strategy, followed by local media literacy and fishermen cooperative engagement. These findings validate the Community-Embedded Literacy Delivery Model (CELDM), highlighting the effectiveness of localized, participatory approaches. The study informs inclusive and adaptive financial literacy policies targeting high-risk populations.*

Keywords: *illegal investment; financial literacy; community-based strategy; AHP-TOPSIS; coastal vulnerability; financial inclusion*

Abstrak. *Penelitian ini mengembangkan strategi mitigasi investasi ilegal berbasis literasi keuangan bagi komunitas pesisir rentan dengan menggabungkan Indeks Kerentanan Finansial (IKF) dan pendekatan MCDM (AHP-TOPSIS). Studi dilakukan di tiga desa di Maluku Tengah, dengan IKF mencakup dimensi kerentanan ekonomi, literasi keuangan, dan akses keuangan. Wailulu dan Asilulu tergolong sangat rentan (IKF > 0,90), sementara Tulehu lebih tangguh. Hasil AHP-TOPSIS menunjukkan pelatihan komunitas sebagai strategi paling efektif, diikuti kampanye media lokal dan kemitraan koperasi nelayan. Temuan ini menguatkan Model Penyampaian Literasi Berbasis Komunitas (CELDM), dan memberikan dasar bagi kebijakan literasi keuangan yang inklusif dan kontekstual.*

Kata kunci: *investasi ilegal; literasi keuangan; strategi berbasis komunitas; AHP-TOPSIS; kerentanan pesisir; inklusi keuangan*

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Introduction

Illegal investment practices have become an increasingly worrying phenomenon in various regions of Indonesia, especially in coastal communities that are structurally vulnerable. In Maluku Province, the Investment Alert Task Force noted that the number of illegal entities offering unlicensed investments has increased significantly from year to year, in line with low financial literacy among the population in the islands (OJK, 2023). Characteristics such as dependence on the informal sector, low understanding of financial instruments, and limited access to formal financial institutions are dominant factors that increase the vulnerability of communities to investment fraud schemes (Bire et al., 2019; Cavallo et al., 2023; Goenadi et al., 2022).

Data from the BPS (2023) shows that more than 65% of the coastal population in Central Maluku Regency work in the informal sector, such as fishing and small-scale farming, with only around 38% owning savings accounts, far below the national average of 61% (BPS, 2023; OJK, 2022). The vulnerability of coastal communities is not only rooted in economic and regulatory aspects but is also influenced by sociocultural dimensions. Illegal investors often exploit trust-based interaction patterns within local communities through relational and persuasive approaches (Aswani et al., 2019). A study by Adetunji & David-West (2019) also revealed that the dominance of informal practices and limited access to valid information exacerbate community vulnerability to illegal investment.

Financial literacy plays a crucial role in reducing the risk of community involvement in illegal investment. Individuals with adequate financial understanding tend to be better able to evaluate risks and more cautious in making financial decisions (Mudzingiri & Koumba, 2021; Njegomir & Ćirić, 2012; Xu et al., 2023). However, geographical challenges and low levels of financial education penetration make conventional literacy strategies less effective in coastal areas (Hasna et al., 2024). This is reinforced by data from BAZNAS (2023) showing that the Islamic financial literacy index in Eastern Indonesia, including Maluku, remains in the low category (<40%).

Financial literacy efforts undertaken by the government and financial institutions have generally been top-down and not fully contextualised to the social realities of coastal communities. However, the success of literacy programmes heavily depends on community participation levels and the relevance of the messages conveyed (Hsu & Chen, 2023; Voznyak et al., 2020). Approaches such as the Community-Embedded Literacy Delivery Model (CELDM), which is based on

participation and social integration, are considered more effective in communities with limited literacy and access to information (Setiadi et al., 2024). This model emphasises the importance of delivering literacy through existing social networks within the community, such as fishermen's groups, mosque administrators, and local cooperatives.

As part of efforts to mitigate the risk of illegal investment, structured measurements are needed to map risks and develop systematic mitigation measures. In this study, a Financial Vulnerability Index (IKF) was developed as a tool for mapping risk levels based on three main dimensions: economic vulnerability, financial literacy, and financial access (Ameliawati & Setiyani, 2018). The IKF enables a more holistic mapping of areas most vulnerable to investment fraud.

To formulate contextual and evidence-based mitigation strategies, a Multi-Criteria Decision Making (MCDM) approach was used, combining the Analytic Hierarchy Process (AHP) to determine criterion weights and the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) to evaluate alternative mitigation strategies. This combination of methods has proven effective in making complex decisions based on multiple criteria and contextual factors (Alshebami & Al Marri, 2022; Dogan et al., 2022; Ishizaka & Labib, 2011).

Although various studies have highlighted the importance of financial literacy (Goenadi et al., 2022; Njegomir & Ćirić, 2012; Xu et al., 2023) and the role of local actors and social capital in preventing illegal investment (Dewanty & Isbanah, 2018; Khairani et al., 2019), studies that specifically integrate financial vulnerability measurements with community-based financial literacy strategies in coastal areas are still scarce (Adetunji & David-West, 2019; Aswani et al., 2019). Furthermore, the application of the AHP-TOPSIS method to formulate local character-based mitigation strategies has not been widely developed in academic literature (Sari & Tüysüz, 2022).

Therefore, this study offers two main contributions. First, it develops a Financial Vulnerability Index (FVI) to measure community risk to illegal investment more contextually, considering literacy, economic, and access dimensions. Second, it proposes the Community-Embedded Literacy Delivery Model (CELDM) as a participatory and sociocultural approach to delivering financial literacy. By integrating quantitative analysis and a local social value-based approach, this study is expected to generate more inclusive, sustainable, and relevant mitigation strategies for the needs of coastal communities in Indonesia.

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Methods

This research uses a descriptive quantitative approach to analyse the level of financial vulnerability of coastal communities and formulate systematic and evidence-based mitigation strategies against illegal investment risks. The methods employed combine the Multi-Criteria Decision Making (MCDM) approach, specifically the Financial Vulnerability Index (FVI), Analytic Hierarchy Process (AHP), and Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS). The FVI approach is designed to measure the level of vulnerability of communities to exposure to illegal investment through three main dimensions: financial literacy, social relations, and access to information (((((Caylor & Hammell, 2022; Rane & Choudhary, 2023). AHP is used to determine the priority weights of mitigation strategy criteria based on expert preferences through a pairwise comparison matrix (((Saaty, 2008; Wang, 2018), The weights from AHP are then input into the TOPSIS method, which is used to rank the five alternative strategies based on their proximity to positive and negative ideal solutions (((Ng et al., 2023; Zytoon, 2020).

Primary data were obtained through questionnaires and interviews with two groups of respondents. The first group consisted of six experts (economists and financial academics, marine experts, community leaders, financial institution practitioners, and local government officials) for the AHP analysis. The second group consisted of 51 adult community members from three coastal villages in Central Maluku Regency—Wailulu, Tulehu, and Asilulu—who served as respondents for the IKF and TOPSIS analyses. The selection of locations was done purposively based on variations in access to financial institutions, community literacy, and village social structure. The unit of analysis was individuals who had received or heard about illegal investment offers, were not financial professionals, and were willing to participate.

The questionnaire instrument was designed to measure IKF dimensions and evaluate five alternative mitigation strategies: community-based literacy training, local media campaigns, partnerships with fishermen's cooperatives, field education by financial institutions, and distribution of simple brochures or infographics. These five strategies were evaluated based on five criteria: accessibility, local relevance, community collaboration, long-term effectiveness, and simplicity of message (((Gupta et al., 2022; ((((Szabo et al., 2021). In addition to questionnaires, in-depth interviews were conducted with village officials and community leaders, as well as Focus Group Discussions (FGDs) to validate the IKF indicators and explore strategy preferences in a participatory manner ((((Shi & Zhong, 2021).

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Secondary data was obtained through literature reviews, policy reports, and publications from the Central Statistics Agency (BPS), the Financial Services Authority (OJK), the National Zakat Agency (BAZNAS), and Islamic financial institutions. Data validity was strengthened through triangulation of techniques and sources (((Creswell, 2012).

IKF analysis was conducted by normalising indicator scores (scale 0–1) and calculating a weighted composite index, which was then categorised into three vulnerability levels: low (< 0.50), moderate (0.50–0.75), and high (> 0.75). Furthermore, AHP was used to calculate criterion weights through the eigenvector of the comparison matrix and consistency test (CR < 0.1) ((((Dogan et al., 2022; ((Kim et al., 2018). These weights were used in the TOPSIS analysis to form a weighted decision matrix, calculate the Euclidean distance to the positive and negative ideal solutions, and determine the closeness coefficient (Ci) value. The strategy with the highest Ci value was considered the most optimal strategy to implement ((((Do Nascimento et al., 2022); ((Howari et al., 2023). The combined AHP-TOPSIS approach enables the integration of expert assessment and community perception, resulting in contextual, participatory, and data-driven mitigation strategies.

Results and Discussion

This research aims to formulate the most appropriate illegal investment risk mitigation strategy for coastal communities. As a basis for designing the strategy, the first step is to measure the Financial Vulnerability Index (FVI) to map the level of vulnerability of each village to illegal investment risk. The IKF is used as an initial diagnostic tool to identify the most vulnerable villages that require prioritised interventions.

Financial Vulnerability Index (FVI) Measurement

To illustrate the level of vulnerability of coastal communities to illegal investment risks, this study uses the Financial Vulnerability Index (FVI), which consists of three main dimensions: economic vulnerability, financial literacy vulnerability, and financial access vulnerability. Each dimension is translated into three key indicators that reflect the community's ability to deal with financial risks.

Based on the conceptual structure, the Index of Financial Vulnerability (IKF) is constructed from three main dimensions, namely *economic vulnerability*, *financial*

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literacy vulnerability, and *financial access vulnerability*. Each dimension is measured through several indicators that are relevant to the context of coastal communities, as shown in Table 1.

Table 1. IKF Dimensions and Indicators

Dimensions	Indicators
Economic Vulnerability	Single main source of income
	Reliance on the informal sector
	Not having an emergency fund.
Financial Literacy Vulnerability	Not understanding investment risks.
	Not familiar with financial institutions
	Not understanding consumer rights.
Access to Finance Vulnerability	Distance to formal financial institutions > 5 km
	No savings
	Never attended financial training.

Furthermore, to describe the level of vulnerability in each of the study villages, indicator data was normalised based on a 0-1 scale where higher values indicate a greater level of vulnerability to a particular aspect. The results of IKF indicator normalisation for the three villages of Wailulu, Tulehu, and Asilulu are presented in Table 2.

Table 2. IKF Indicator Normalisation Score per Village

Indicators	Village		
	Wailulu	Tulehu	Asilulu
Single main source of income	0.90	0.60	0.85
Reliance on the informal sector	0.88	0.65	0.91
Not having an emergency fund	0.92	0.70	0.89
Not understanding investment risks	0.85	0.55	0.87
Not familiar with financial institutions	0.89	0.50	0.91
Not understanding consumer rights	0.93	0.52	0.95
Distance to formal financial institutions > 5 km	0.94	0.40	0.96
No savings	0.91	0.48	0.94
Never attended financial training	0.88	0.45	0.92

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Based on the scores in Table 2, indicators were grouped into the three main dimensions of the IKF, namely economic vulnerability, financial literacy, and access to finance. The average score of each dimension for each village is presented in Table 3.

Table 3. Average IKF Dimension Score per Village

Dimensions	Village		
	Wailulu	**Tulehu**	**Asilulu**
Economic Vulnerability	0.90	0.65	0.88
Financial Literacy	0.89	0.52	0.91
Access to Finance	0.91	0.44	0.94

These results show that Tulehu has relatively lower levels of vulnerability across all dimensions. In contrast, Wailulu and Asilulu have consistently high scores, particularly on the access to finance and literacy dimensions.

Table 4. IKF Total Score per Village

Village	IKF Total (average of 3 dimensions)	Category
Wailulu	0.90	Highly Vulnerable
Tulehu	0.54	Tough Enough
Asilulu	0.91	Highly Vulnerable

Next, Table 4 presents the calculation of the total IKF score for each village, which is obtained by averaging the three dimensions. Based on the total score, the vulnerability category was determined. Asilulu and Wailulu fall into the *highly vulnerable* category with IKF scores of 0.91 and 0.90, respectively, while Tulehu is categorised as *moderately resilient* with a score of 0.54. These findings form the basis for developing mitigation strategies that are contextualised and responsive to the needs of each community.

Determining Evaluation Criteria

Following the measurement of the Index of Financial Vulnerability (IKF), it was found that two of the three research villages - Wailulu and Asilulu - were categorised as "highly vulnerable" to illegal investment risk, with IKF scores of 0.90 and 0.91, respectively. Meanwhile, Tulehu Village has a lower level of

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vulnerability (IKF = 0.54), and is classified as a village with relatively resilient financial vulnerability.

Based on these results, this study focuses on analysing mitigation strategies in two villages classified as highly vulnerable, namely Wailulu and Asilulu, in order to formulate more targeted intervention strategies. The strategy analysis was conducted through a Multi-Criteria Decision Making (MCDM) approach with Analytic Hierarchy Process (AHP) and Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) methods.

The initial stage involved identifying and formulating evaluation criteria to assess the effectiveness of various risk mitigation strategies. The criteria were established based on a review of academic literature (Rane & Choudhary, 2023; Shi & Zhong, 2021), field observations, and in-depth discussions with experts. Five main criteria were established: accessibility, simplicity of message, suitability to local conditions, community collaboration, and long-term effectiveness, which are relevant in the context of communities with low financial literacy and limited access to information (Howari et al., 2023; Tanim et al., 2022). The results of the criteria prioritisation weights are presented in Table 5 below:

Table 5. Criteria Priority Weights

No.	Criteria	Weight
1.	Accessibility	0,44
2.	Simplicity	0,25
3.	Appropriateness of local conditions	0,15
4.	Local collaboration	0,09
5.	Long-term effectiveness	0,07

The results show that the accessibility criterion received the highest weight in the determination of illegal investment risk mitigation strategies, followed by simplicity of message and suitability to local conditions. This finding reflects the urgency of developing strategies that are accessible, communicative, and adaptive to the socio-economic realities of the community, especially in areas with high levels of financial vulnerability.

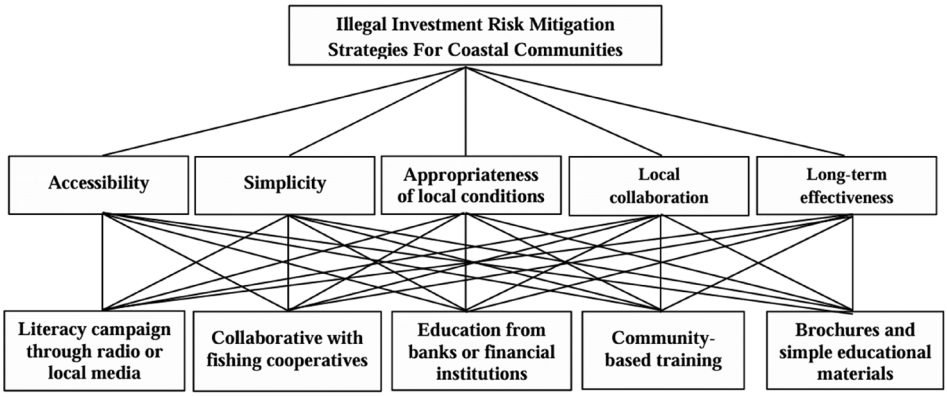
As shown in the results of the Financial Vulnerability Index (IKF) measurement, both villages are classified as highly vulnerable (IKF > 0.90), which indicates low financial literacy, limited access to formal financial institutions,

and economic dependence on the informal sector. In this context, the criteria of accessibility and simplicity are crucial so that the strategies designed can truly reach the community and be functionally understood.

This is reinforced by the findings of Howari et al. (2023) and Tanim et al. (2022), which confirmed that the success of financial literacy interventions in high-risk areas is largely determined by the clarity of the message, ease of access to information, and relevance to local conditions. Therefore, an illicit investment risk mitigation approach that emphasises these dimensions would be more effective in responding to the actual vulnerabilities of coastal communities.

To clarify the decision-making structure in this study, Figure 1 presents an AHP hierarchy model that illustrates the linkages between research objectives, evaluation criteria, and alternative mitigation strategies assessed based on their relevance to the community's financial vulnerability conditions.

Figure 1. AHP Hierarchical Structure



After the hierarchical structure is formed, the next step is to calculate the priority weight of each criterion. This process begins by compiling a pairwise comparison matrix between criteria, based on the relative importance of each criterion in determining the effectiveness of illegal investment risk mitigation strategies. The values in this matrix are obtained from the assessment results of experts and stakeholders through the AHP questionnaire.

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Table 6. Pairwise Comparison Matrix

	Accessibility	Keseder hanaan	Appropriateness of local conditions	Local collaboration	Long-term effectiveness
Accessibility	1,00	2.88	3.63	4.14	4.61
Simplicity	0.35	1,00	3.09	2.52	3.80
Appropriateness of local conditions	0,28	0,32	1,00	2.08	3.63
Local collaboration	0,24	0,40	0,48	1,00	1.35
Long-term effectiveness	0,24	0,26	0,28	0,74	1,00

Next, the *geometric mean is* calculated for each criterion as the basis for normalisation and weight determination.

Table 7. Average Geometry for each Criterion

	Accessibility	Simplicity	Appropriateness of local conditions	Local collaboration	Long-term effectiveness	Geometric Mean
Accessibility	1,00	2.88	3.63	4.14	4.61	2,83
Simplicity	0.35	1,00	3.09	2.52	3.80	1,70
Appropriateness of local conditions	0,28	0,32	1,00	2.08	3.63	1,16
Local collaboration	0,24	0,40	0,48	1,00	1.35	0,79
Long-term effectiveness	0,24	0,26	0,28	0,74	1,00	0,59

Based on these results, a normalisation process is carried out to obtain the priority weight of each criterion, which is then used as the basis for evaluating alternative mitigation strategies.

The weighting results show that accessibility is the most dominant criterion (0.44) in determining mitigation strategies, followed by simplicity (0.25) and suitability of local conditions (0.15). Local collaboration and long-term effectiveness occupied lower weights of 0.09 and 0.07, respectively. The next step was consistency

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testing. This test was conducted by calculating three main parameters, namely: Consistency Index (CI), Random Index (RI), and Consistency Ratio (CR).

Table 8. Results of Normalisation and Criteria Weighting

						Total	Weighting
Accessibility	0,480	0,592	0,428	0,395	0,320	2.22	0,44
Simplicity	0,167	0,206	0,365	0,240	0,264	1,24	0,25
Appropriateness of local conditions	0,132	0,067	0,118	0,198	0,252	0,77	0,15
Local collaboration	0,116	0,082	0,057	0,095	0,094	0,44	0,09
Long-term effectiveness	0,104	0,054	0,033	0,071	0,069	0,33	0,07
						5,00	1,00

Table 9. Consistency calculation results

	Accessibility	Simplicity	Appro-priateness of local conditions	Local collabo-ration	Long-term effectiveness	Number of lines	Priorotas	Results
Accessibility	1,00	2.88	3,63	4.14	4.61	16.26	0,44	0,993
Simplicity	0.35	1,00	3.09	2,52	3.80	10.76	0,25	1.051
Appropriateness of local conditions	0,28	0,32	1,00	2.08	3.63	7.31	0,15	1.119
Local collaboration	0,24	0,40	0,48	1,00	1.35	3.47	0,09	1.017
Long-term effectiveness	0,22	0,26	0,28	0,74	1,00	2.50	0,07	1.122
Number of criteria	5						Total	5.301

Next, the *Consistency Index* (CI) was calculated.

$$CI = \frac{\lambda_{max} - n}{n-1} = \frac{5{,}301 - 5}{4} = 0{,}075$$

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By using a *Random Index* (RI) of 1.12 for the number of criteria (n = 5), the *Consistency Ratio* (CR) is obtained.

$$CR = \frac{CI}{RI} = \frac{0{,}075}{1{,}12} = 0{,}067$$

Then the following results were obtained:

Table 10. Consistency test

CI =	0,075	
RI =	1,12	
CR =	0,067	Consistent

Since the CR value is <0.10 (i.e., 0.067), the pairwise comparison matrix is declared consistent and can be used in the next stage.

Determination of Illegal Investment Risk Mitigation Strategy

The next step in this research is to determine the most optimal illegal investment risk mitigation strategy for coastal communities through the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) method. The strategy assessment focused on two villages with very high levels of financial vulnerability, namely Wailulu and Asilulu, as identified through the results of the *Index of Financial Vulnerability (IKF)* measurement. The five alternative strategies analysed include: 1) Literacy Campaign through Radio or Local Media; 2) Collaboration with Fishermen's Cooperative; 3) Education from Banks or Financial Institutions; 4) Community Based Training; and 5) Distribution of Brochu res and Simple Educational Materials.

The weight of the criteria resulting from the AHP analysis is used in the process of assessing alternative strategies. The assessment matrix is compiled based on the average score of respondents' perceptions that illustrate how much each strategy fulfils the five specified criteria, as presented in Table 11 below:

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Table 11. Average Criteria for Evaluating Alternatives against Criteria

	Accessibility	Simplicity	Appropriateness of local conditions	Local collaboration	Long-term effectiveness
Literacy campaign through radio or local media	3.82	3.92	4.00	3.94	3.86
Collaborative with fishing cooperatives	3.84	3.78	3.78	3.8	3.7
Education from banks or financial institutions	3.66	3.74	3.76	3.76	3.58
Community-based training	4.1	4.08	4.02	4.1	4.04
Brochures and simple educational materials	3.38	3.26	3.42	3.36	3.12
Sum of squares	70.97	70.92	72.28	72.20	67.46

Next is to compile a normalised decision matrix, as shown in the following table.

Table 12. Normalised Decision Data Matrix

	Accessibility	Simplicity	Appropriateness of local conditions	Local collaboration	Long-term effectiveness
Literacy campaign through radio or local media	0.4534	0.4648	0.4707	0.4643	0.4713
Collaborative with fishing cooperatives	0.4558	0.4478	0.4449	0.4469	0.4515
Education from banks or financial institutions	0.4330	0.4430	0.4427	0.4430	0.4363
Community-based training	0.4876	0.4837	0.4724	0.4833	0.4916
Brochures and simple educational materials	0.4006	0.3866	0.4025	0.3960	0.3808

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This involves the formation of a weighted normalised decision matrix, which is obtained by multiplying each element in the normalised matrix by the criteria weights from the AHP analysis.

Table 13. Weighted Decision Matrix

BOBOT	**0,44**	**0,25**	**0,15**	**0,09**	**0,07**
	Accessibility	**Simplicity**	**Appropriateness of local conditions**	**Local collaboration**	**Long-term effectiveness**
Literacy campaign through radio or local media	0.1995	0.1162	0.0706	0.0418	0.0330
Collaborative with fishing cooperatives	0.2005	0.1120	0.0667	0.0402	0.0316
Education from banks or financial institutions	0.1905	0.1108	0.0664	0.0399	0.0305
Community-based training	0.2145	0.1209	0.0709	0.0435	0.0344
Brochures and simple educational materials	0.1763	0.0966	0.0604	0.0356	0.0267

The next step is to identify the positive ideal solution (Vj^+) and negative ideal solution (Vj^-), which represent the highest and lowest values of each criterion on the analysed alternatives.

The determination of positive ideal values (Vj^+) and negative ideal values (Vj^-) is a crucial stage to evaluate the relative effectiveness of each alternative mitigation strategy against predetermined criteria. In this study, all criteria are classified as benefit criteria, as the higher the score on each criterion indicates the better or more desirable quality of the proposed mitigation strategy. For example, high accessibility reflects the ease with which the community can reach the strategy; high simplicity indicates ease of understanding; while the suitability of local conditions confirms the contextuality of the strategy to the characteristics of coastal communities. Similarly, local collaboration reflects participation and synergy with community actors, and long-term effectiveness signifies the potential sustainable impact of the strategy.

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Table 14. Ideal Value Matrix

	Accessibility	Simplicity	Appropriateness of local conditions	Local collaboration	Long-term effectiveness
Literacy campaign through radio or local media	0.1995	0.1162	0.0706	0.0418	0.0330
Collaborative with fishing cooperatives	0.2005	0.1120	0.0667	0.0402	0.0316
Education from banks or financial institutions	0.1905	0.1108	0.0664	0.0399	0.0305
Community-based training	0.2145	0.1209	0.0709	0.0435	0.0344
Brochures and simple educational materials	0.1763	0.0966	0.0604	0.0356	0.0267
Vj+	**0.2145**	**0.1209**	**0.0709**	**0.0435**	**0.0344**
Vj-	**0.1763**	**0.0966**	**0.0604**	**0.0356**	**0.0267**

The weighted values of each alternative are used to determine the positive (Vj^+) and negative (Vj^-) ideal solutions, which represent the best and lowest performance on each criterion, respectively. These values become a reference for calculating the distance of each strategy to the ideal solution, so that the most optimal mitigation strategy can be identified and worthy of prioritisation.

Table 15. Eucledean distance

Strategy	S^+	S-
Literacy campaign through radio or local media	0.0217	0.0651
Collaborative with fishing cooperatives	0.0228	0.0615
Education from banks or financial institutions	0.0368	0.0382
Community-based training	0.0080	0.0800
Brochures and simple educational materials	0.0727	0.0203

The next step is to calculate the Closeness Index (Ci) value for each strategy. Ci is the ratio between the distance to the negative solution (S^-) and the total distance ($S^+ + S^-$), in order to determine the most optimal illegal investment risk mitigation strategy worth prioritising. The value of Ci ranges from 0 to 1, where a higher value indicates a greater closeness to the positive ideal solution, while signalling a stronger preference as the optimal alternative.

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Table 16. Risk Mitigation Strategy Excellence Score

Strategy	S^+	S-	Ci	Ranking
Literacy campaign through radio or local media	0.0217	0.0651	0.7496	2
Collaborative with fishing cooperatives	0.0228	0.0615	0.7293	3
Education from banks or financial institutions	0.0368	0.0382	0.5098	4
Community-based training	0.0080	0.0800	0.9091	1
Brochures and simple educational materials	0.0727	0.0203	0.2187	5

The calculation results show that:

Community-based training has the highest score (Ci = 0.9091), making it the most recommended primary mitigation strategy to reduce the risk of illegal investments in coastal areas. This strategy is considered the most effective as it directly addresses the financial literacy vulnerabilities and limited access to information that characterise highly vulnerable communities such as those in Wailulu and Asilulu.

Literacy campaign through local media (Ci = 0.7496) and collaboration with fisher cooperatives (Ci = 0.7293) ranked second and t hird. These two strategies are feasible to implement in a complementary manner as they combine mass and institutionalised educative approaches with community-based empowerment models. This is in line with the needs of vulnerable areas that suffer from geographic isolation and informal sector dominance.

Meanwhile, education from financial institutions (Ci = 0.5098) and simple educational brochures (Ci = 0.2187) showed relatively lower effectiveness. This reflects the limited reach and relevance of top-down and passive approaches to communities that do not have adequate literacy readiness or information access infrastructure.

The results of this study show that an interactive and participatory community-based approach is the most effective strategy in mitigating the risk of illegal investments in coastal areas. The community-based training strategy is most relevant as it directly responds to the three main challenges of coastal communities identified through the Index of Financial Vulnerability (IKF) mapping, namely low financial literacy, limited access to valid information, and lack of trust in formal

financial institutions. Wailulu and Asilulu villages, which recorded very high IKF scores (>0.90), show similar patterns of vulnerability: economic dependence on the informal sector, no emergency fund, and no financial training. These conditions emphasise the urgency of interventions that are localised, contextualised, and build collective community capacity.

This finding is in line with the Community-Embedded Literacy Delivery Model (CELDM) approach, which emphasises the importance of delivering literacy messages through entrenched social structures in the community (Fauziyah & Kriswibowo, 2023; Setiadi et al., 2024). The effectiveness of mitigation programmes is not only determined by the content of the message or the authority of the messenger. However, it is strongly influenced by the emotional and social connection between the messenger and the target community. When financial literacy is delivered by local actors-such as community leaders, fishermen groups, or mosque administrators-the message is more easily accepted because it is rooted in proven and trusted social relations.

Two other strategies that also show significant potential are literacy campaigns through local media and collaboration with fishermen cooperatives. In relation to IKF, these two approaches have the advantage of reaching groups with limited access to formal institutions and low understanding of financial consumer rights. Local media and cooperatives function as communication and economic nodes that have gained social legitimacy, making it easier to deliver literacy messages effectively and sustainably.

In contrast, more formal and one-way strategies, such as education from financial institutions and distribution of educational brochures, tend to be ineffective because they are unable to build participation and emotional closeness. This finding reinforces the argument that top-down approaches that do not consider the sociocultural context of coastal communities actually widen the literacy gap and trust in the formal financial system (Altinay et al., 2023).

The integration of the AHP-TOPSIS method and Index of Financial Vulnerability (IKF) mapping in this research enables the development of mitigation strategies that are not only evidence-based, but also contextual to the social realities of coastal communities. This combination of quantitative and sociocultural approaches is an important step in building community economic resilience more systemically and equitably. In other words, the success of mitigation strategies depends not only on economic rationality, but also on recognising the social dynamics, local cultural practices and beliefs that have lived in the community.

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Conclusions

This research integrates the Financial Vulnerability Index (IKF) measurement with the AHP-TOPSIS approach to formulate risk mitigation strategies for illegal investments in coastal communities. The results show that Wailulu and Asilulu villages are classified as highly financially vulnerable (IKF > 0.90), characterised by the dominance of the informal sector, low financial literacy, and lack of access to formal financial institutions. These conditions increase the community's exposure to illegal investment practices that capitalise on information gaps and social relations.

Through AHP analysis, it was found that accessibility, suitability of strategies to local conditions, and simplicity of messages were the main criteria in determining the effectiveness of mitigation strategies. TOPSIS results identified community-based training as the most recommended strategy, followed by literacy campaigns through local media and collaboration with fishermen cooperatives. All three strategies prioritise participatory approaches, are based on established social relations, and are appropriate to the cultural context of coastal communities.

However, this study has several limitations. Firstly, the limited geographical coverage of three villages in Central Maluku District limits the generalisability of the findings. Secondly, the AHP-TOPSIS approach based on expert and respondent perceptions remains vulnerable to subjective bias. Thirdly, the IKF indicators used are static and do not represent the dynamics of long-term financial behaviour.

This limitation leaves room for future research to expand the coverage area, apply a more comprehensive mixed-method approach, and develop IKF models that are more adaptive to social and economic changes. Nonetheless, this study provides significant conceptual and practical contributions in designing evidence-based mitigation strategies, particularly to improve the financial literacy and resilience of coastal communities to the risks of illegal investments.

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