

The Contribution of Islamic Financial Instruments to Maritime Development: Evaluation and Policy Recommendation for Maluku Regions

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ABSTRACT

Maritime development in the Indonesian archipelago faces structural challenges, particularly in obtaining inclusive, sustainable, and locally suitable funding in Maluku. To address these issues, Islamic financing system is considered as a potential alternative to conventional system, using instruments based on *Maqasid al-sharia* principles. This study aims to evaluate five Islamic financial instruments focusing on productive *Waqf*, *Mudharabah*, *Ijarah*, *Musyarakah*, and *Sukuk*, in supporting the development of maritime regions in Maluku. We used MCDA with AHP and TOPSIS methods to evaluate these instruments. The evaluation criteria were economic feasibility, Sharia compliance, risk management, social support, and environmental impact. The results rank instruments, with productive *Waqf* being the most effective, followed by *Mudharabah*, *Ijarah*, and then *Musyarakah* and *Sukuk* being less suitable. The study reveals that productive *Waqf* is at the top due to its non-commercial nature, community participation, and reaching marginalised groups. *Mudharabah* is considered good for micro and small businesses with profit-sharing. *Ijarah* is for financing assets without ownership transfer. *Musyarakah* and *Sukuk* are less flexible for coastal communities. The findings of this study highlight that Islamic financing systems have an essential role in guiding decision-making in the maritime development.

Keywords: Financial Instruments, Global Maritime Fulcrum, Islamic Finance, SDGs

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INTRODUCTION

Indonesia, as the world's largest archipelago with a highly strategic geographical location along international shipping lanes, plays an important role in strengthening global logistics and trade systems. Situated between two oceans and two continents, Indonesia's waters form a major axis in global trade flows, where more than 80% of global trade volume is transported by sea, making maritime transport a cornerstone of the global economy ([Antaranews Maluku, 2023](#)). Furthermore, recognising this opportunity, the government of Indonesia has launched the Global Maritime Fulcrum (GMF) vision as a transformational strategy, positioning port cities not only as logistics distribution hubs but also as regional economic growth centres and land-sea connectors. One of the key regions in realising this vision is Maluku, which is located along domestic and international shipping lanes and shares borders with Australia and Timor Leste, making it a key gateway in the regional maritime network. This strategic potential is further strengthened by Maluku's rich marine resources and biodiversity, making it an integral part of Eastern Indonesia's development strategy in the GMF vision. Policy priorities include port development, improving inter-island connectivity and strengthening logistics infrastructure ([Brookings.edu, 2023](#)). Its geography, consisting of thousands of small islands and the predominance of coastal communities dependent on a marine-based economy make Maluku regions a strategic place to study maritime funding systems ([Pattinama, 2015](#)). In the issue, maritime development in Maluku faces complex structural challenges, especially in inclusive and sustainable financing. Coastal communities as main actors facing limited access to formal financial services. The reasons given are low financial literacy, lack of locally suitable financial products, and weak institutional capacity ([Evans et al., 2023](#); [Sulu et al., 2015](#)).

Reliance on a single sector, especially one vulnerable to environmental factors, increases vulnerability so that it implies that the dependence on the fisheries sector affected by seasons and ecosystem changes adds economic risks. Conventional financial systems relying on fixed collateral and inflexible risk management often fail to address regions due to possess unique challenges like geographical spread and economic instability ([Bisaro & Hinkel, 2018](#); [Guzel, 2021](#); [Ma & Hu, 2024](#); [Tadesse, 2012](#)). These lead a widening financing gap and a lack of the supportive environment for maritime development ([Sumaila et al., 2021](#)). Even a specific initiative (floating logistics) faces funding issues due to non-adaptive financing ([Gurning et al., 2022](#)). On the other hand, the dependency of sustainable maritime development is determined by governance, collaboration, and local approaches ([Cisneros-Montemayor et al., 2021](#); [Cavallo et al., 2023](#)). Islamic financing system as an alternative solution aligned with social justice, environmental sustainability, and social responsibility because principles of Islamic finance apply prohibition of *riba* (interest), risk-sharing, and asset-backed financing. It's important to connect these principles with the values of coastal communities, the communal living and reliance on natural resources. *Maqashid Sharia*, the objectives of Islamic law, which integrate spiritual, social, economic, and environmental aspects. These objectives align with the SDGs such as in the context of protecting the environment and promoting social justice.

In contrast to conventional financial systems based on fixed interest and formal collateral, Islamic finance offers a value-based approach, solidarity and sustainability, which is more in line with the socio-economic character of coastal communities ([Evans et al., 2023](#); [Tadesse, 2012](#)). Previous studies have shown that social-based instruments such as zakat, waqf and Islamic microfinance can strengthen the economic resilience of at-risk communities ([Apriantoro et al., 2024](#); [Busari et al., 2025](#); [Guzel, 2021](#); [Hamidi et al., 2024](#); [Ma, 2024](#); [Rusydiana et al., 2022](#); [Tok et al., 2022](#)). Likewise, profit-sharing-based instruments such as *Mudharabah* and *Musyarakah* are considered more ethical and sustainable because they encourage fair partnership businesses that do not harm others ([Saleem et al., 2023](#); [Campisi et al., 2018](#)). However, most of these studies are still limited to the macro level or urban areas and have not specifically evaluated the effectiveness of financial instruments especially in the islands ([Tok et al., 2022](#)).

This study seeks to address the gap of previous studies by integrating the Multi-Criteria Decision Analysis (MCDA) approach, specifically through the combination of the Analytic Hierarchy Process (AHP) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) methods. Empirically, MCDA has been proven effective in supporting strategic decision-making in various sectors, such as energy, marine and environment, due to its ability to balance multidimensional criteria ([Tsakalerou et al., 2022](#)). However, its application to evaluate Islamic financial instruments in the context of maritime development is still very limited, whereas the complexity of challenges in coastal areas requires a holistic evaluative method. These methods should be able to simultaneously accommodate aspects of economic efficiency, environmental sustainability, social inclusiveness and Sharia compliance, which often intersect in community-based development practices. Based on this urgency, this study aims to evaluate the effectiveness of five Islamic financial instruments consisting of productive *Waqf*, *Ijarah*, *Mudharabah*, *Musyarakah* and *sukuk* in supporting maritime regional development.

This study bridges theory and practice, offering a culturally sensitive, Islamic finance-driven roadmap to address the unique needs of island communities while advancing Indonesia's maritime development goals. In Maluku, this model could fund a waqf-based cold storage facility managed by local fishermen, improving income stability (economic empowerment) while adhering to Islamic ethics (no interest) and environmental stewardship (reducing waste). Through Sharia-based financing strategies that integrate local socio-ecological conditions with the MCDA quantitative analysis framework, this study also enriches the literature of Islamic finance oriented towards sustainable development through the integration of Islamic ethics and SDGs, and support the GMF agenda and the achievement of SDGs with adaptive, equitable, and sustainable financing solutions, especially for marginalised maritime communities. Theoretically, the result of this study contributes to the development of an evaluation model based on the integration of *Maqashid Sharia* and SDGs. Practically, the resulting policy recommendations are designed to address the specific challenges of the archipelago, emphasising the principles of equity, local context relevance, and socio-ecological adaptation.

METHOD

Design and Data

This study uses MCDA approach, which is a descriptive quantitative method that integrates AHP and TOPSIS. The AHP-TOPSIS combination is chosen because it is capable of systematically and objectively ranking alternatives, while addressing the complexity of multidimensional decision-making involving multiple criteria and options (Dogan et al., 2022; Tsakalerou et al., 2022). Through this approach, Islamic financial instruments are evaluated and prioritised to determine which ones most effectively support the strategic development of the GMF in the Maluku Islands region.

Data collections started with primary data, explaining each respondent group, then secondary data. Primary data were divided into two groups: AHP and TOPSIS respondents. The AHP part involved six experts from various fields (academics and researchers of Islamic economics and finance, marine technology specialists, practitioners of Islamic financial institutions). Subsequently, the TOPSIS part had 50 respondents evaluating alternatives, including the same AHP experts but in a different role. Then there were secondary data from journals, documents, and policies. This study emphasises the method robustness by combining expert input with broader respondent evaluations and supporting documents.

Alternative Islamic Financial Instruments and Evaluation Criteria

The five Islamic financial instruments investigated in this study are *Mudharabah*, *Musyarakah*, *Sukuk*, *Ijarah*, and productive *Waqf*. The selection of these instruments is based on two main considerations.

- 1) Conformity with Sharia principles and the needs of coastal communities that often have limited access to conventional financing (Yahya et al., 2023; Thiele & Gerber, 2017). Five roles for each instrument:
 - a. *Mudharabah* is a profit-sharing partnership scheme that supports seafood processing enterprises.
 - b. *Musyarakah* is co-financing collaboration for maritime ecosystem-based projects.
 - c. *Sukuk* refers to Asset-based instruments for maritime infrastructure development (harbours, fish markets).
 - d. *Ijarah* related to leasing of productive assets (vessels, fishing gear) without the obligation of ownership.
 - e. Productive *Waqf* is management of waqf assets to fund sustainable economic activities.
- 2) The participatory, inclusive and value-based characteristics of these five instruments make them ideal solutions to accelerate the economic development of coastal communities.

Regarding evaluation criteria, five main points were established based on literature review and contextual considerations of Maluku.

- 1) Economic Feasibility – impact on local efficiency and growth (Saleem et al., 2023; Hasan & Lu, 2023).
- 2) Shariah Compliance – adherence to Islamic principles like prohibition of *riba* and *gharar*, and justice in contracts (Yahya et al., 2023).
- 3) Risk Management – instrument's ability to handle natural disasters, economic crises, climate change (Scholtens & Van'T Klooster, 2019; Tsakalerou et al., 2022).
- 4) Social Support – community acceptance of financing mechanisms (Evans et al., 2023; Pennino et al., 2021).

- 5) Environmental Impact – effects on the ecosystem and contribution to sustainable development (Cisneros-Montemayor et al., 2021).

Analysis Procedures

There are several stages consisting of AHP and TOPSIS, validation of the integration of AHP and TOPSIS methods, research location and subjects, and analytical tools.

1. AHP Stage

The AHP stage is used to determine the priority weights of each evaluation criterion based on expert perceptions. Each respondent is asked to compare two criteria at a time based on their relative importance. The steps involved in the AHP process are as follows:

- Hierarchy Structuring**
Setting up a hierarchy structure with the main goal at the top and criteria below. Downgrading the evaluation criteria to the next level to build a systematic analytical framework.
- Developing the Pairwise Comparison Matrix**
Respondents provided ratings using Saaty's (2008) Pairwise Comparison Scale with 1 = equally important, 3 = moderately more important, 5 = strongly important, 7 = very strongly more important, 9 = extremely more important, and even values (2, 4, 6, 8): a value between two adjacent levels of judgement.
- Normalising the Pairwise Matrix**
Each element in the comparison matrix is divided by the total sum of its column using the formula,

$$\text{Normalized Value}_{ij} = \frac{a_{ij}}{\sum_{j=1}^n a_{ij}}$$

- Calculating Priority Weights**
The average of each row in the normalized matrix is taken to determine the weight of each criterion:

$$\text{Weight}_i = \frac{\sum_{j=1}^n \text{Normalized Value}_{ij}}{n}$$

- Consistency Check**
To ensure logical consistency of judgments, the following indicators are computed:
Maximum Eigenvalue (λ_{maks})

$$\lambda_{maks} = \frac{\sum (\text{Weighted Sum} \frac{\text{Row}}{\text{Weight}})}{n}$$

Consistency Index (CI)

$$CI = \frac{\lambda_{maks} - n}{n - 1}$$

Consistency Ratio (CR)

$$CR = \frac{CI}{RI}$$

Where RI is the Random Consistency Index depending on matrix size. A CR less than 0.1 indicates that the comparison matrix is logically consistent and the weights can be used for subsequent analysis.

2. TOPSIS Stage

The TOPSIS stage is used to rank the effectiveness of Islamic financial instrument alternatives based on the criteria weighted through the AHP process. In this stage, respondents assess each alternative according to the five established criteria using a Likert scale with 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. The TOPSIS analysis involves the following steps:

- Constructing the Decision Matrix (X)**
The first step is to develop the decision matrix based on the scores assigned by respondents for each financial instrument against each evaluation criterion.
- Normalising the Decision Matrix**

Normalization is conducted to eliminate scale differences and allow comparability among criteria. The normalization formula:

$$rij = \frac{X^{ij}}{\sqrt{\sum_{j=1}^n x_{ij}^2}}$$

3) Constructing the Weighted Normalized Matrix (V)

The normalized values $rij_{\{ij\}}$ are then multiplied by the weights of each criterion derived from the AHP process to form the weighted normalized matrix.

$$v_{ij} = w_j \cdot r_{ij}$$

4) Determining the Positive Ideal Solution (A^+) and Negative Ideal Solution (A^-)

The positive ideal solution (A^+) is the maximum value for benefit criteria and the minimum value for cost criteria.

$$A^+ = \{(\max v_{ij} | j \in J)(\min v_{ij} | j \in J), i = 1, 2, 3, \dots, m\} = \{v_1^+, v_2^+, \dots, v_m^+\}$$

$$A^- = \{(\max v_{ij} | j \in J)(\min v_{ij} | j \in J), i = 1, 2, 3, \dots, m\} = \{v_1^-, v_2^-, \dots, v_m^-\}$$

5) Calculating the Euclidean Distance to the Ideal Solution

Distance to the Positive Ideal Solution:

$$S_i^+ = \sqrt{\sum_{j=1}^n (v_{ij} - v_j^+)^2}$$

Distance to the Negative Ideal Solution

$$S_i^- = \sqrt{\sum_{j=1}^n (v_{ij} - v_j^-)^2}$$

Where v_j^- is the minimum value for criterion j .

These distances are then used to calculate the closeness coefficient (C_i), which determines the final ranking of the alternatives.

6) Calculating the Closeness Coefficient (C_i)

The closeness coefficient, C_i , measures how close each alternative is to the ideal solution. C_i ranges from 0 to 1, with higher values being better.

$$C_i = \frac{S_i^-}{S_i^+ + S_i^-}, 0 < 1 \text{ dan } i = 1, 2, 3, \dots, m$$

The C_i values determine the ranking of Islamic financial instruments. The higher the C_i , the better the alternative because it's closer to the ideal solution. C_i ranges between 0 and 1, reinforcing that 1 is best. Also, emphasize that the ranking helps in decision-making by showing which instruments (five Islamic financial instrument) are most effective based on the criteria used.

3. Validation of the Integration of AHP and TOPSIS Methods

AHP and TOPSIS are combined because they complement each other: AHP objectively assigns weights using ordinal preferences and logical consistency, while TOPSIS ranks alternatives by their closeness to an ideal solution (Hwang & Yoon, 1981). Cross-sector studies confirm their combined effectiveness (Dogan et al., 2022; Tsakalerou et al., 2022).

4. Research Location and Subjects

The study was conducted in Maluku, an archipelagic and coastal region. The reasons for choosing this location are its maritime potential and relevance to the Global Maritime Fulcrum. The research subjects are four groups: academics in Islamic Economics and Marine Tech, regional policymakers, Islamic financial institutions, and coastal MSMEs.

5. Analytical Tools

All calculation processes in this study were carried out using Microsoft Excel, including the implementation of both AHP and TOPSIS.

RESULTS AND DISCUSSION

Identification and Formulation of Criteria

The AHP method is used to determine the relative importance of each criterion, involving six experts from various fields. This study used Saaty's (2008) pairwise comparison scale (1-9) via questionnaires, resulting in priority weights.

Table 1 AHP weights

No.	Criteria	Weight
1.	Economic feasibility	0.476
2.	Sharia compliance	0.210
3.	Risk management	0.141
4.	Social support	0.089
5.	Environmental impact	0.082

Source: Authors' own calculation

As shown in Table 1, economic feasibility has the highest weight (0.476), meaning it's the most important factor. Then, the other criteria in descending order are Sharia compliance (0.210), risk management (0.141), social support (0.089), and environmental impact (0.082).

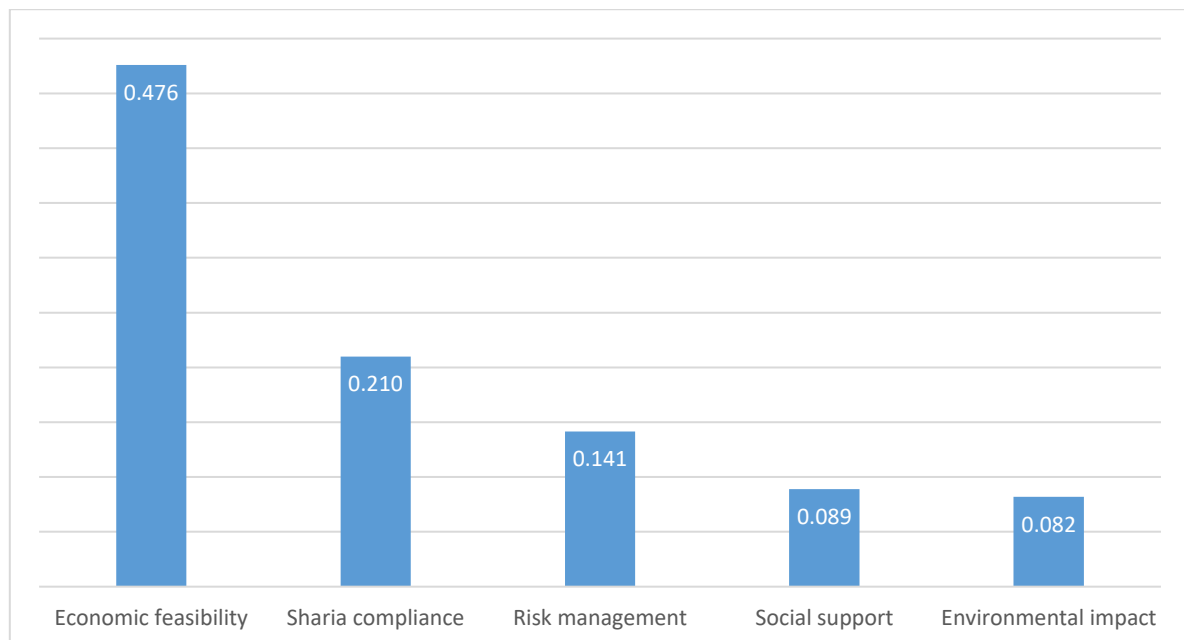


Figure 1 The result of evaluation for Islamic financial instruments

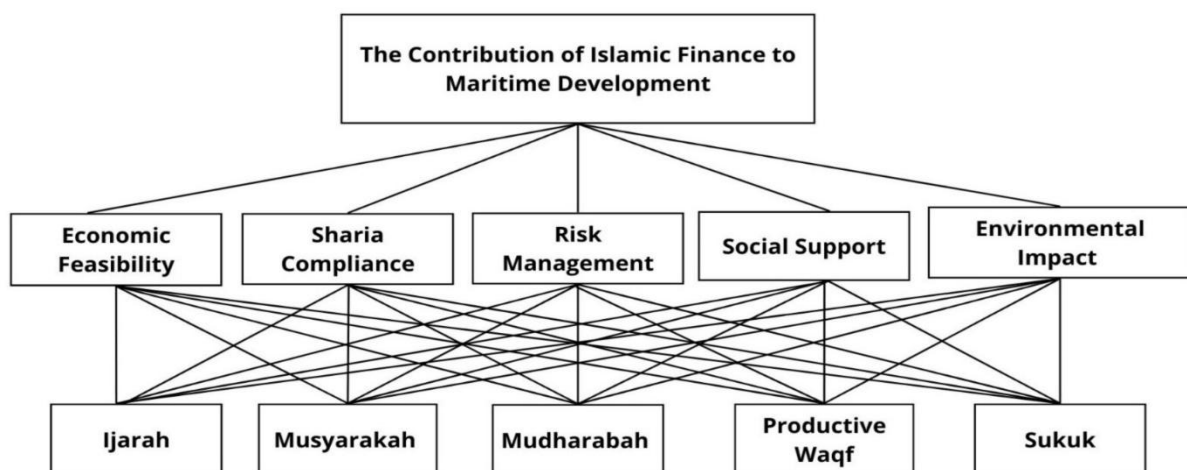


Figure 2 AHP Hierarchical Structure

Figure 1 implies Sharia-based maritime development prioritising economic effectiveness and Islamic justice principles in choosing financing instruments. This result is supported by [Chu et al. \(2023\)](#), [Ogara et al. \(2023\)](#), and [Yahya et al. \(2023\)](#), disclosing sustainability, social inclusion, community orientation, ecological aspects, and regional risks. In Figure 2, AHP hierarchical structure shows links the goal criteria, and Islamic financial instruments.

After setting up the hierarchy, priority weights were calculated involving pairwise comparison matrix, geometric mean, normalisation, and consistency checks. These results are shown in Table 2.

Table 2 Pairwise comparison matrix

Criteria	Economic Feasibility	Sharia Compliance	Risk Management	Social Support	Environmental impact
Economic feasibility	1.00	4.00	3.00	5.00	5.00
Sharia compliance	0.25	1.00	2.00	3.00	3.00
Risk management	0.33	0.50	1.00	3.00	1.00
Social support	0.20	0.33	0.33	1.00	2.00
Environmental impact	0.20	0.33	1.00	0.50	1.00

Source: Authors' own calculation

Subsequently, the geometric mean and row-wise summation were calculated to obtain the base values for the normalisation process.

Table 3 Horizontal summation of geometric means

Criteria	Economic Feasibility	Sharia Compliance	Risk Management	Social Support	Environmental impact	Row Total
Economic feasibility	1.00	4.00	3.00	5.00	5.00	18.00
Sharia compliance	0.25	1.00	2.00	3.00	3.00	9.25
Risk management	0.33	0.50	1.00	3.00	1.00	5.83
Social support	0.20	0.33	0.33	1.00	2.00	3.86
Environmental impact	0.20	0.33	1.00	0.50	1.00	3.03
Total	1.98	6.16	7.33	12.50	12.00	

Source: Authors' own calculation

The next step is normalisation, which involves dividing each value in a row by the total of its respective column. The resulting normalised values are then summed horizontally to obtain the final priority weights as shown in Table 4.

Table 4. Result of criteria weighting

						Row Total	Final Weight
Economic feasibility	0.505	0.649	0.400	0.416	0.409	2.380	0.476
Sharia compliance	0.126	0.162	0.240	0.250	0.272	1.051	0.210
Risk management	0.166	0.081	0.240	0.083	0.136	0.708	0.141
Social support	0.101	0.053	0.080	0.166	0.045	0.446	0.089
Environmental impact	0.101	0.053	0.040	0.083	0.136	0.414	0.082
Total						5.00	1.00

Source: Authors' own calculation

The weighting results from the AHP process indicates that the highest priority is economic feasibility at 0.476, followed by Sharia compliance, risk management, social support, and environmental impact. These weights were used in the TOPSIS analysis to evaluate Islamic financial instruments. The weights through a consistency test were validated involving CI, RI, and CR. CI measures deviation from logical consistency, RI is the average inconsistency from a random matrix, and CR is the ratio of CI to RI. The CR determines if the matrix is consistent.

Tabel 5 Eigenvalue and consistency calculation

	EF	SC	RM	SS	EI	Row Total	Priority	λ (Lambda)
Economic feasibility	1.00	4.00	3.00	5.00	5.00	18.00	0.476	5.4527
Sharia compliance	0.25	1.00	2.00	3.00	3.00	9.25	0.210	5.3571
Risk Management	0.33	0.50	1.00	3.00	1.00	5.83	0.089	5.3186
Social Support	0.20	0.33	0.33	1.00	2.00	3.86	0.082	5.2157
Environmental Impact	0.20	0.33	1.00	0.50	1.00	3.03	0.141	5.2744
Number of Criteria	5							5.3237

Note: EF= Economic Feasibility, SC=Sharia Compliance, RM= Risk Management, SS= Social Support, EI= Environmental Impact.

Source: Authors' own calculation

$$\lambda_{max} = \frac{(5,4527) + (5,3571) + (5,3186) + (5,2157) + (5,2744)}{5}$$

The average eigenvalue obtained is $\lambda_{max} = 5.3237$. This value is used to calculate the Consistency Index (CI) as follows.

$$CI = \frac{\lambda_{max} - n}{n - 1} = \frac{5,3237 - 5}{4} = 0,0795$$

Using the Random Index (RI) value of 1.12 for five criteria, the Consistency Ratio (CR) is calculated as follows.

$$CR = \frac{CI}{RI} = \frac{0,0795}{1,12} = 0,071$$

Table 6 Consistency test result

Index	Value
CI (Consistency Index)	0.0809
RI (Random Index)	1.12
CR (Consistency Ratio)	0.0722
Conclusion	Consistent

Source: Authors' own calculation

In addition, Eigenvalue and Consistency Calculation were conducted. The result shows that the CR is less than 0.071, which is the acceptable threshold according to AHP (Saaty, 2008). Therefore, the pairwise comparison matrix is considered consistent. The resulting weights are deemed valid and suitable for the next analytical stage using the TOPSIS method.

Evaluation of Islamic Financial Instruments

TOPSIS is employed to evaluate Islamic financial instruments for the Global Maritime Fulcrum in Maluku. There are five instruments: *Mudharabah*, *Musyarakah*, *Sukuk*, productive *Waqf*, and *Ijarah*. The criteria weights from AHP (economic feasibility, Sharia compliance, etc.) are used in TOPSIS to calculate the closeness coefficient (Ci). Data was collected from 50 respondents using a Likert scale (1 to 5).

Table 7 Average ratings of alternatives against each criterion

	EF	SC	RM	SS	EI
Ijarah	5.0	4.0	4.0	4.0	4.0
Musyarakah	3.0	3.0	3.0	3.0	3.0
Mudharabah	5.0	4.0	5.0	3.0	5.0
Productive Waqf	5.0	5.0	4.0	3.0	4.0
Sukuk	3.0	2.0	3.0	3.0	3.0
Squared Sum	93	70	75	52	75

Note: EF= Economic Feasibility, SC=Sharia Compliance, RM= Risk Management, SS= Social Support, EI= Environmental Impact.

Source: Authors' own calculation

Each value was then normalised by dividing it by the square root of the total squared sum per criterion and each normalised value was multiplied by its respective AHP-derived criterion weight and the result is presented in Table 8.

Table 8 Normalised decision matrix

	EF	SC	RM	SS	EI
Ijarah	0.5184	0.4780	0.4618	0.5547	0.4618
Musyarakah	0.3110	0.3585	0.3464	0.4160	0.3464
Mudharabah	0.5184	0.4780	0.5773	0.4160	0.5773
Productive Waqf	0.5184	0.5976	0.4558	0.4160	0.4558
Sukuk	0.3110	0.2390	0.3464	0.4160	0.3464

Note: EF= Economic Feasibility, SC=Sharia Compliance, RM= Risk Management, SS= Social Support, EI= Environmental Impact.

Source: Authors' own calculation

Table 9 Weighted Decision Matrix

Weight	0.476	0.210	0.141	0.089	0.082
Alternative	Economic Feasibility	Sharia Compliance	Risk Management	Social Support	Environmental impact
Ijarah	0.254	0.100	0.065	0.049	0.038
Musyarakah	0.152	0.075	0.049	0.037	0.028
Muharabah	0.254	0.100	0.081	0.037	0.047
Productive Waqf	0.254	0.125	0.064	0.037	0.037
Sukuk	0.152	0.050	0.049	0.027	0.028

Source: Authors' own calculation

From the weighted decision matrix (Table 9), the values for the positive ideal solution (V_j^+) and negative ideal solution (V_j^-) were calculated as shown in Table 10.

Table 10 Ideal solution matrix

	Economic Feasibility	Sharia Compliance	Risk Management	Social Support	Environmental impact
Ijarah	0.254	0.100	0.065	0.049	0.038
Musyarakah	0.152	0.075	0.049	0.037	0.028
Muharabah	0.254	0.100	0.081	0.037	0.047
Productive Waqf	0.254	0.125	0.064	0.037	0.037
Sukuk	0.152	0.050	0.049	0.027	0.028
V_j^+	0.254	0.125	0.081	0.049	
V_j^-					0.038

Source: Authors' own calculation

The positive ideal solution (V_j^+) represents the highest expected value for each criterion, while the negative ideal solution (V_j^-) reflects the lowest value, which should ideally be avoided. There are four benefit criteria (economic feasibility, Sharia compliance, social support, risk management) where higher values are better. For instance, economic feasibility is considered better if it provides a strong positive impact on the local economy. A higher Sharia compliance score indicates stronger religious legitimacy and a greater social support suggests broader community acceptance, while an effective risk management reflects the instrument's capacity to handle economic and environmental uncertainty. In contrast, the environmental impact criterion is treated as a cost criterion, meaning that a lower value is preferable. A high environmental impact score implies greater ecological harm, which contradicts the principles of sustainable development.

The study used the highest and lowest values from each criterion column in a weighted normalised decision matrix to generate V_j^+ and V_j^- , which are then used to calculate Euclidean distances.

Table 11 Euclidean Distances

Islamic Financial Instrument	S ⁺	S ⁻
Ijarah	0,0312	0,1156
Musyarakah	0,1200	0,025
Muharabah	0,0273	0,1195
Productive Waqf	0,0218	0,1279
Sukuk	0,1324	0,0000

Source: Authors' own calculation

After obtaining two distances (probably the positive and negative ideal solutions), the final step in the analysis is calculating C_i for each instrument alternative. C_i is a value between 0 and 1 that shows how close an alternative is to the ideal solution and reflects its overall feasibility in supporting Sharia-based maritime development. Based on the calculation results, the five Islamic financial instruments were ranked as follows.

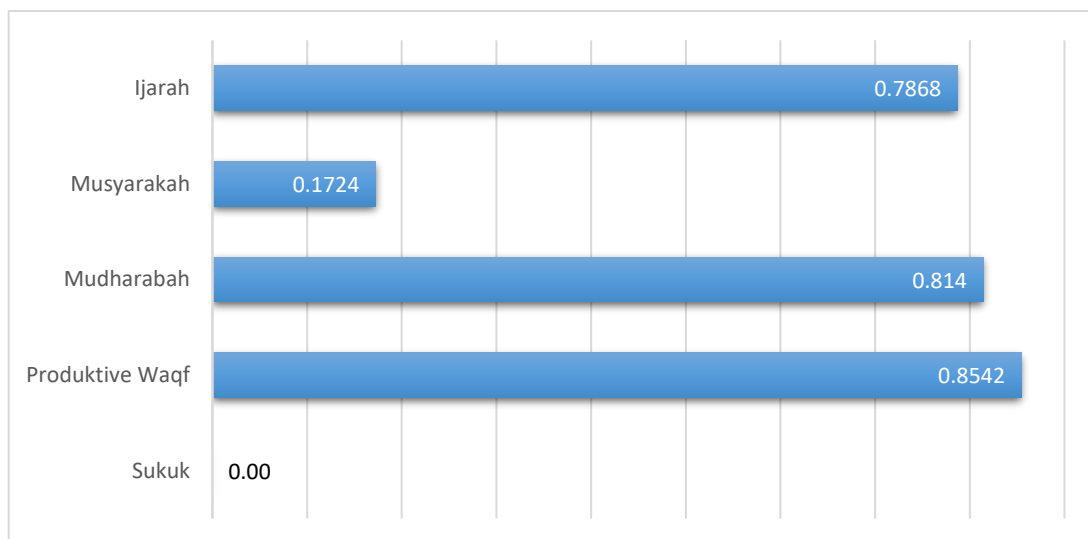
Table 12 Preference Scores of Islamic Financial Instruments

Islamic Financial Instrument	S ⁺	S ⁻	C_i	Rank
Ijarah	0,0312	0,1156	0,7868	3
Musyarakah	0,1200	0,025	0,1724	4
Mudharabah	0,0273	0,1195	0,8140	2
Produktive Waqf	0,0218	0,1279	0,8542	1
Sukuk	0,1324	0,000	0,0000	5

Source: Authors' own calculation

As shown in Table 12, productive *Waqf* ranks first (C_i : 0.8542), aligning best with evaluation criteria, followed by Mudharabah (0.8140) and Ijarah (0.7868). Musyarakah (0.1724) and Sukuk (0.0000) lag significantly. This highlights differences in Islamic financial instruments' effectiveness for maritime development in Maluku, with productive Waqf as the most viable option.

A visual comparison of the preference scores (C_i) for each Islamic financial instrument is presented in Figure 3.

**Figure 3** Preference Scores of Islamic Financial Instruments

Higher C_i values mean better alignment with criteria. As shown in Figure 3, productive waqf have the highest score, then Muharabah and Ijarah. Musyarakah is much lower, and Sukuk is the lowest.

Islamic Financial Instruments to Maritime Sector Development for Maluku Regions

The findings disclose that productive waqf is the most superior due to social benefit, asset sustainability, and flexibility, *Mudharabah* and *Ijarah* are strategically valuable for microenterprise and asset-based economies, and *Musyarakah* and *Sukuk* are less flexible and adaptive for local community needs. The productive *Waqf* include being non-commercial, community-based, no repayment obligations, and supporting social welfare and local economy sustainability so that it has a significant advantage. The finding is supported by [Kausar et al. \(2023\)](#) focusing on the socio-economic role of productive *Waqf*, which is a type of Islamic endowment used for community benefit and a source of community economic empowerment when managed professionally ([Yasniwati, 2023](#)). Then, *Mudharabah* and *Ijarah* are also effective. The other instruments have their own benefits: *Mudharabah* uses profit-sharing, and *ijarah* helps finance assets without transferring ownership. [Suryanto et al., \(2023\)](#), [Liang et al., \(2022\)](#), and [Schreiber et al. \(2020\)](#) support these findings because community-based innovations boost growth and resilience in local economies. While *Musyarakah* (a profit-and-loss sharing partnership) and *Sukuk* (Islamic bonds) are good in theory for collaborative projects and building infrastructure, they don't work as well in practice in coastal areas. *Musyarakah*'s complex structures and *Sukuk*'s focus on big projects don't fit well with the simpler, community-focused needs of coastal areas. [Budianto \(2023\)](#) claims that other Islamic financial tools like microfinance and waqf (endowments) are better suited for these communities.

Productive waqf is the most superior due to social benefit, asset sustainability, and flexibility. *Mudharabah* and *Ijarah* are also strategically valuable for microenterprise and asset-based economies. *Musyarakah* and *Sukuk* are less flexible and adaptive for local community needs. Thus, Islamic financial instruments supporting maritime development, focusing on productive waqf, *Mudharabah*, and *Ijarah* can elaborate two key pillars of Indonesia's vision in Maluku. The first pillar is about marine resource management that's equitable and sustainable. Under *Maqashid al-sharia* principles and green finance and in relation to the objectives of Islamic law, can be ensuring justice, public welfare, and sustainability, while green finance serves as the funding projects. The second pillar is maritime infrastructure and connectivity. Productive waqf is suggested for financing community ports, Sharia-compliant fish markets, and ecotourism. Waqf is an Islamic endowment, so productive waqf would mean using such endowments to generate income for community projects.

CONCLUSION

Productive waqf is the most effective instrument due to its non-refundable nature, flexibility, and ability to reach marginalised groups. *Mudharabah* and *Ijarah* are particularly relevant for community empowerment through profit sharing and leasing. *Musyarakah* and *Sukuk* are less suitable for small-scale needs. This strategic financing model supports two key pillars of the Global Maritime Fulcrum, community-based infrastructure and sustainable resource management.

Productive *Waqf* aligned with a community-based approach is the optimal solution for Maluku's marine development. This study has implications for a practical roadmap for stakeholders to improve the welfare of coastal communities in a sustainable manner. Recommendations include promoting productive waqf, integrating other instruments, reforming public financing, building local financial ecosystems, and prioritising community investment. This implies that policymakers should prioritise these instruments in their strategies for maritime development, creating specific programs or regulations that facilitate their implementation. Another angle is the theoretical implication. The study applies Islamic finance principles to maritime development, which might not be a common approach. This could open up new research avenues in combining ethical finance with sustainable development. It also validates the use of MCDA methods in evaluating financial instruments, which could be useful in other sectors or regions. Social implications should also be considered. The effectiveness of *Waqf* and *Mudharabah* in reaching marginalised groups suggests that inclusive finance models can drive equitable development. This could reduce poverty and enhance community participation in maritime projects, leading to more sustainable outcomes.

Limitations of this study include geographical coverage and the need for temporal analysis. The study is specific to Maluku, so the findings might not apply to other regions with different characteristics. This is important because it cautions against generalizing the results. Future studies in other areas would need to validate the findings in their own contexts. Also, the study with MCDA relies on expert judgments. There might be subjectivity in the criteria weights, which could affect the results' reliability so that future studies could use different methodologies to cross-validate. There is also a need to study how *sukuk* can be scaled down for smaller communities or integrated with other instruments. This is recognised as the potential for future research of this study. *Sukuk* and *Musyarakah* are required to explore in simpler models because these instruments already score low in adaptability. In addition, comparative studies across regions could highlight the contextual factors that influence the effectiveness of these financial instruments.

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