DETERMINATION OF SHARIA FINANCING SCHEMES IN THE MARINE AND FISHERIES SECTOR IN MALUKU

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Abstract

This study aims to identify and determine an appropriate Sharia-compliant financing scheme that meets the needs of the marine and fisheries sector in Maluku. Given this sector's significant potential to support the regional economy, it still faces challenges in accessing financing. The study uses the Analytic Hierarchy Process (AHP) and the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS). The analysis results indicate that the five main criteria in selecting Sharia financing schemes are profitability, risk, Sharia compliance, accessibility, and social impact. Through TOPSIS, mudharabah and musyarakah financing schemes were identified as the best alternatives meeting these criteria. The study also found that business actors in Maluku's marine and fisheries sector still require improved financial literacy in Sharia finance to fully leverage existing financing opportunities. Sharia financing schemes such as qardh hasan and ijarah are also deemed essential, especially to support small and medium enterprises (SMEs) needing low-risk capital access. This study is expected to contribute to the development of the marine and fisheries sector in Maluku by promoting more effective and sustainable use of Sharia-compliant financing schemes.

Keywords: Sharia Financing, Marine Sector, AHP, TOPSIS

A. INTRODUCTION

The marine and fisheries sector plays a strategic role in supporting Indonesia's economy, not only as a source of food and employment but also as a major contributor to seafood exports. As an archipelagic country with more than 17,000 islands, Indonesia possesses vast marine resources, encompassing capture fisheries, aquaculture, and seafood processing industries. The marine sector contributes up to 6% of the national Gross Domestic Product (GDP) and employs over 12 million workers[1]. The Maluku region, renowned for its rich marine biodiversity, serves as one of the key centers for seafood production in Indonesia, significantly contributing to food security and the national economy.[2]

However, despite its potential, this sector faces numerous challenges, particularly in financing access. Most fishers and marine entrepreneurs struggle to obtain capital from formal financial institutions due to collateral limitations, natural risk factors, and low financial literacy.[3] From the banking perspective, this sector is considered high-risk with significant uncertainties. Prudential principles in banking management, which emphasize the importance of collateral, further restrict the sector's access to financing.[4]

Many assets owned by fishers do not meet collateral requirements, such as small boats under 10 GT or unregistered land without legal certificates. Unstable and irregular incomes also make it difficult for fishers to demonstrate their creditworthiness to conventional financial institutions.[5] These obstacles hinder the optimal utilization of the marine sector's immense potential to drive economic growth and improve the welfare of coastal communities.

As an alternative, Islamic financing has emerged as a more inclusive and equitable solution. Unlike conventional systems, Islamic financing emphasizes fairness, transparency, and profit-sharing principles, making it

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[1] F. Fauzi, "Kontribusi Sektor Kelautan terhadap PDB Nasional," Indonesia Economic Review 12, no. 1 (2019): 56-70.

[2] Badan Pusat Statistik Maluku, Laporan Tahunan Sektor Kelautan dan Perikanan di Provinsi Maluku (Ambon: Badan Pusat Statistik Maluku, 2023), 45.

[3] A. Amiruddin, "Akses Pembiayaan Sektor Kelautan dan Perikanan di Indonesia," Journal of Marine Economics 5, no. 2 (2017): 115–127

[4] S. Sitorus, "Prudential Banking dalam Pembiayaan Sektor Perikanan," Bank Indonesia Journal 5, no. 2 (2017): 189–203.

[5] Lembaga Ilmu Pengetahuan Indonesia, Peran Lembaga Keuangan Pedesaan dalam Pembiayaan Usaha Perikanan Tangkap (Jakarta: LIPI Press, 2016).

better suited to high-risk and uncertain businesses like the marine and fisheries sector. Karim (2018) highlighted that schemes such as Musyarakah and Mudharabah are ideal for small enterprises with irregular incomes, while Murabahah and Ijarah schemes can be used for acquiring fishing gear and boats.[6]

In this context, research on the appropriate Islamic financing schemes for the marine sector is highly significant. Previous studies have shown that Islamic financing not only provides sustainable capital but also builds trust among coastal communities towards financial institutions.[7] In Maluku, despite the presence of Islamic financial institutions, awareness and access to Islamic financing schemes remain low, particularly for small and medium enterprises (SMEs) in the marine and fisheries sector.[8]

Using an analytical approach that combines the Analytical Hierarchy Process (AHP) and Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), this study aims to identify the most suitable Islamic financing scheme to support the marine and fisheries sector in Maluku. This research is expected to provide strategic contributions to enhancing Islamic financial inclusion, maximizing the economic potential of marine resources, and supporting the sustainability of coastal community livelihoods.

B. THEORETICAL BASIS
1. Potential and Challenges of the Marine and Fisheries Sector

As an archipelagic country, Indonesia has enormous potential in the marine and fisheries sector. Capture fisheries, aquaculture, and seafood processing are the three main sub-sectors supporting the sector's economic contribution. Fauzii (2019) reported that this sector contributes 6% to the national GDP and provides employment for over 12 million people. Maluku, with its rich marine biodiversity, plays a significant role in supporting national fish production. However, various structural challenges, such as limited financing access, asset legality issues, and unstable fisher incomes, hinder the sector's optimization.

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[6] A. Karim, *Prinsip-Prinsip Pembiayaan Syariah: Musyarakah dan Mudharabah* (Jakarta: Pustaka Islam, 2018).

[7] A. Hafidh and R. Rahman, "Pembiayaan Syariah dalam Sektor Kelautan: Solusi untuk Keberlanjutan," *Jurnal Ekonomi Islam* 15, no. 2 (2022): 89–102.

[8] A. Alamsyah, "Literasi dan Aksesibilitas Pembiayaan Syariah di Sektor Kelautan dan Perikanan Maluku," *Jurnal Keuangan Islam* 7, no. 3 (2023): 234–247.

2. Advantages of Islamic Financing for the Marine Sector

Islamic financing offers a more inclusive alternative compared to conventional financing. Profit-sharing principles in schemes like Musyarakah and Mudharabah enable entrepreneurs to share risks with financiers, making them suitable for high-risk sectors like marine fisheries.[9] Additionally, schemes like Murabahah and Ijarah support the procurement of fishing equipment without requiring large upfront payments, offering greater flexibility for fishers.

3. AHP and TOPSIS Analytical Methods

AHP and TOPSIS are decision-making techniques widely used to prioritize options in multi-criteria scenarios. Kannan and Tan (2020) applied these methods to identify the best alternatives in the fisheries sector, including determining financing schemes.[10] Sari et al. (2021) also found these approaches effective in assessing the feasibility of various Islamic financing schemes for Indonesia's marine sector.[11]

4. Relevance of Islamic Financing in the Maluku Region

In Maluku, the implementation of Islamic financing still faces challenges, particularly regarding low Islamic literacy and limited access to Islamic financial services in coastal areas. Alamsyah (2023) noted that while Islamic financial institutions are present, public awareness of Islamic financing must be enhanced to encourage optimal utilization of these services.[12]

This study seeks to address these needs by identifying the most suitable Islamic financing schemes for the marine sector in Maluku, integrating Islamic principles with multi-criteria analysis using AHP and TOPSIS methods. The results of this study are expected to provide practical solutions to support sustainable, marine-based economic development in the region.

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[9] A. Karim, *Prinsip-Prinsip Pembiayaan Syariah: Musyarakah dan Mudharabah* (Jakarta: Pustaka Islam, 2018).

[10] V. Kannan and K. Tan, "AHP and TOPSIS in Decision-Making for Fisheries Projects," *Asian Journal of Operations Research* 14, no. 2 (2020): 122–135

[11] R. Sari, "Pemilihan Skema Pembiayaan pada Proyek Kelautan di Indonesia dengan AHP dan TOPSIS," *Jurnal Manajemen dan Bisnis* 12, no. 3 (2021): 312–326.

[12] A. Alamsyah, *Pembiayaan Syariah di Maluku: Analisis Akses dan Implementasi* (2023).

C. RESEARCH METHOD

This study adopts a quantitative approach with the *Analytical Hierarchy Process* (AHP) and *Technique for Order of Preference by Similarity to Ideal Solution* (TOPSIS) methods to determine the appropriate Islamic financing scheme for the maritime and fisheries sector in Maluku.

1. Research Design

The study is exploratory-descriptive and aimed at identifying and analyzing Islamic financing schemes suitable for the characteristics of the maritime sector in Maluku. AHP is used to measure the weight of criteria, while TOPSIS is used to determine the best alternatives in multi-criteria decision-making.[13]

2. Data and Data Sources

Primary data is collected through interviews and questionnaires with fishermen, small and medium enterprise (SME) actors, and practitioners of Islamic financial institutions in Maluku. Secondary data is gathered from reports of Islamic financial institutions, the Central Bureau of Statistics (BPS), and relevant literature.[14]

3. Data Collection Techniques

Data collection is conducted through in-depth interviews, structured questionnaires using a Likert scale to evaluate criteria affecting financing, and documentary studies involving relevant sources.[15]

4. Data Analysis

AHP is used to determine the weight of criteria based on pairwise comparisons, while TOPSIS is applied to determine the ranking of alternatives based on their distance from the positive and negative ideal

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[13] T. L. Saaty, *The Analytic Hierarchy Process: Planning, Priority Setting, Resource Allocation* (New York: McGraw-Hill, 1980).

[14] R. Fauzii, *Peran Sektor Kelautan dalam Perekonomian Indonesia* (2019), Badan Pusat Statistik Maluku, *Statistik Kelautan dan Perikanan Provinsi Maluku* (Ambon: Badan Pusat Statistik Maluku, 2023).

[15] S. Suharto et al., "Skema Pembiayaan Syariah untuk Usaha Kecil di Indonesia," *Journal of Islamic Finance* 10, no. 4 (2020): 412–425.

solutions. The AHP process follows the steps outlined by Saaty,[16] and the TOPSIS calculations refer to the method by Hwang & Yoon.[17]

5. Location and Respondents

The research is conducted in Maluku, with respondents including fishermen, SMEs in the fisheries sector, and Islamic financial institutions operating in the region.[18]

6. Validation of Results

The analysis results are validated through a focus group discussion (FGD) with stakeholders to ensure the relevance and applicability of the research findings.[19]

D. DISCUSSION

To explore the most suitable Sharia financing scheme in the marine and fisheries sector, this study implements two analytical methods, the Analytic Hierarchy Process (AHP) and the Technique for Order of Preference by Similarity to the Ideal Solution (TOPSIS). This research focuses on identifying and evaluating various available Sharia financing schemes, intending to understand the key criteria influencing financing decisions among business actors in this sector.

1. Criteria Identification

From the analysis using the AHP method, six experts who are knowledgeable in developing Sharia-compliant financing schemes for the marine and fisheries sector completed questionnaire A1. The criteria used include Sharia compliance, accessibility, social impact, profitability, risk, operational efficiency, and inclusiveness. After data processing and ranking, five criteria with the highest values were obtained from the eight criteria used. Here are the details:

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[16] T. L. Saaty, *The Analytic Hierarchy Process: Planning, Priority Setting, Resource Allocation* (New York: McGraw-Hill, 1980).

[17] C. L. Hwang and K. Yoon, *Multiple Attribute Decision Making: Methods and Applications* (New York: Springer, 1981).

[18] A. Alamsyah, *Pembiayaan Syariah di Maluku: Analisis Akses dan Implementasi* (2023).

[19] R. Kannan and L. M. Tan, "AHP and TOPSIS Method in Decision Making for Marine Projects," *Asian Journal of Operations Research* 14, no. 2 (2020): 122–135.

Table 1. Selected Criteria and AHP Scores

No.	Criteria	Score
1.	Profitability	5,0
2.	Risk	4,8
3.	Sharia Compliance	4,6
4.	Accessibility	4,1
5.	Social Impact	3,8

These criteria will serve as the main criteria for determining the Sharia financing scheme, while the criteria of operational efficiency and inclusiveness were not selected and therefore will not be included in the subsequent process.

In the AHP testing phase, the criteria obtained from data processing are assigned weights, with five experts assigning these weights using questionnaire A2.

A pairwise matrix is then created based on the number of experts who agreed to weigh the criteria. In the second weighting phase, six expert practitioners participated in assigning the weights.

Table 2. Pairwise Comparison Matrix

	Profitability	Risk	Sharia Compliance	Accessibility	Social Impact
Profitability	1,00	4,00	4,00	4,00	5,00
Risk	0,25	1,00	3,00	4,00	6,00
Sharia Compliance	0,25	0,33	1,00	4,00	4,00
Accessibility	0,25	0,25	0,25	1,00	1,00
Social Impact	0,20	0,17	0,25	1,00	1,00

These matrices are created based on the experts' weight assignments. Next, the five tables are processed to form a geometric mean matrix, with the values summed horizontally.

Table 3. Horizontal Sum of Geometric Mean

	Profitability	Risk	Sharia Compliance	Accessibility	Social impact
Profitability	1,00	3,02	3,77	4,37	4,75
Risk	0,33	1,00	3,24	2,52	4,04
Sharia Compliance	0,27	0,31	1,00	2,18	3,77
Accessibility	0,23	0,40	0,46	1,00	1,51
Social Impact	0,21	0,25	0,27	0,66	1,00
Jumlah	2,04	4,97	8,73	10,73	15,0

Next, weighting is performed to determine the rating value for each criterion, detailed below:

Table 4. Weighting

						Total	Weight
Profitability	0,491	0,607	0,432	0,407	0,315	2,253	0,451
Risk	0,163	0,201	0,371	0,235	0,268	1,238	0,248
Sharia Compliance	0,130	0,062	0,114	0,203	0,250	0,760	0,152
Accessibility	0,112	0,080	0,053	0,093	0,100	0,438	0,088
Social Impact	0,103	0,050	0,085	0,030	0,062	0,312	0,062
						5,00	1,00

In this table, the weighting for each criterion is calculated by summing horizontally across each row to obtain the total, and the final weighting for each criterion is shown in the rightmost column.

The weighting results show that profitability is the most important aspect, with a weight of 0.451, followed by risk at 0.248, Sharia compliance at 0.152, accessibility at 0.088, and social impact at 0.062 in determining the Sharia financing scheme for the fisheries and marine sector in Maluku. This weighting result will be used in the TOPSIS analysis. Before it is used, a consistency test must be conducted to measure whether the experts' responses are consistent and can proceed to the TOPSIS testing stage, or whether the responses are too inconsistent to continue.

The consistency test is evaluated using the consistency index (CI) and the random index (RI). The CI measures the logical consistency level among pairwise comparisons, while the RI is the average CI value of a randomly generated comparison matrix based on Saaty's preference scale, arranged according to the number of items being considered. The consistency ratio (CR) indicates the allowable level of inconsistency (0.10 or 10%). A higher CR means the comparisons are less consistent, while smaller values indicate greater consistency. A CR above 0.1 suggests that pairwise comparisons should be reviewed or revised.

Before performing the consistency test, calculations are made based on the values in the priority column, obtained by multiplying each row total by the total number of criteria (five). The values in the "result" column are calculated by dividing each criterion's vertical result in the priority column by the total criteria (five). The column results are then summed to determine overall consistency. The detailed process is as follows:

Table 5. Calculation of Results

	Profitability	Risk	Sharia Compliance	Accessibility	Social Impact	Sum per row	Priorities	Result
Profitability	1,00	3,02	3,77	4,37	4,75	2,253	11,263	0,991
Risk	0,33	1,00	3,24	2,52	4,04	1,238	6,188	1,058
Sharia Compliance	0,27	0,31	1,00	2,18	3,77	0,760	3,801	1,133
Accessibility	0,23	0,40	0,46	1,00	1,51	0,438	2,191	1,019
Social Impact	0,21	0,25	0,27	0,66	1,00	0,312	2,77	1,142
Number of Criteria	5						Total	5,343

Table 6. Consistency Test

CI =	0,086	
RI =	1,12	
CR =	0,08	Consistency

From the table, it can be seen that CI = 0.086, the CI value is obtained from (the number in table 5 results – the number of criteria) ÷ (the number of criteria – 1). The value of R1=1.12 is the fixed value. And CR is obtained from the CI value divided by RI.

Based on the consistency test of the CR value is 0.08 so that the value is less than 0.1, it can be concluded that the answers from the experts are consistent and can be continued to the next stage.

2. Determination of the Financing Scheme

This stage will use TOPSIS analysis was carried out to find superior financing schemes for Sharia financing products in Maluku consisting of Musyarakah, Mudharabah, Murabahah, Ijarah, and Qardhul Hasan. This analysis is carried out after the AHP analysis is completed, this is because the results of the AHP analysis will be an instrument in the TOPSIS analysis. The first stage of TOPSIS analysis is to collect data through an A3 questionnaire, in this study the number of respondents is 50, and respondents consist of experts, practitioners of Financial Institutions, consumers/customers, and the public.

Table 7. Average Criteria

		Profitability	Risk	Sharia Compliance	Accessibility	Social Impact
Financing Sceme	Musyarakah	3,92	3,82	5,00	3,84	3,66
	Murabahah	3,94	3,88	3,68	3,70	3,70
	Ijarah	3,77	3,64	3,79	3,86	3,58
	Mudharabah	4,10	4,08	4,02	4,10	4,04
	Qardhul Hasan	3,38	3,76	3,42	3,46	3,12

The next stage is to create a normalized decision data matrix, the results of which can be seen in the following table:

Table 8. Normalized Decision Data Matrix

Financing Scheme	Profitability	Risk	Sharia Compliance	Accessibility	Social Impact
Musyarakah	0.46	0.45	0.56	0.45	0.45
Murabahah	0.46	0.45	0.41	0.44	0.46
Ijarah	0.44	0.42	0.42	0.45	0.44
Mudharabah	0.48	0.48	0.45	0.48	0.50
Qardhul Hasan	0.39	0.44	0.38	0.41	0.38

The numbers in each location and criterion column are obtained from the value of the criterion column divided by the sum of squares to be squared by 0.5 and then processed to obtain a weighted decision matrix in the following table:

Table 9. Weighted Decision Matrix

Weight	0,45	0,240	0,15	0,08	0,06
	Profitability	Risk	Sharia Compliance	Accessibility	Social Impact
Musyarakah	0.21	0.11	0.08	0.04	0.03
Murabahah	0.21	0.11	0.06	0.03	0.03
Ijarah	0.20	0.10	0.06	0.04	0.03
Mudharabah	0.22	0.11	0.07	0.04	0.03
Qardhul Hasan	0.18	0.11	0.06	0.03	0.02

Next, determine the positive and negative ideal values with the ideal value matrix, the results of which can be seen in the following table:

Table 10. Ideal Value Matrix

	Profitability	Risk	Sharia Compliance	Accessibility	Social Impact
Musyarakah	0.21	0.11	0.08	0.04	0.03
Murabahah	0.21	0.11	0.06	0.03	0.03
Ijarah	0.20	0.10	0.06	0.04	0.03
Mudharabah	0.22	0.11	0.07	0.04	0.03
Qardhul Hasan	0.18	0.11	0.05	0.03	0.02
Vj+	0.22	0.11	0.08	0.04	0.03
Vj-	0.18	0.10	0.05	0.03	0.02

The numbers Vj+ and Vj- are taken from the maximum and minimum values in the schematic numbers and criteria. The researcher chose a positive ideal value (Vj+) on the criteria of profitability, sharia compliance, accessibility, and social impact because in financing these criteria/aspects must be maximized to obtain profits and attract customer interest while the risk criteria use a negative ideal value (Vj-) because to obtain maximum profits must be able to reduce risk.

Next, calculate the distance using the calculation of the Euclidean distance. Here are the details:

Table 11. Euclidean Value Distance

Financing Scheme	S+	S-
Musyarakah	0.01000	0.04583
Murabahah	0.02449	0.03464
Ijarah	0.03000	0.02646
Mudharabah	0.01000	0.04796
Qardhul Hasan	0.05196	0.01000

The last stage is to determine the superior scheme by looking at which one has the highest score to be prioritized as the best scheme in the sect. The solid scoring results are seen in the following table:

Table 12. Advantages of Regional Scores

Financing Scheme	S+	S-	PI	Ranking
Musyarakah	0.01000	0.04583	0.82087	2
Murabahah	0.02449	0.03464	0.58579	3
Ijarah	0.03000	0.02646	0.46863	4
Mudharabah	0.01000	0.04796	0.82746	1
Qardhul Hasan	0.05196	0.01000	0.16139	5

This study found that the mudharabah scheme achieved the highest score of 0.82746 closest to the ideal solution, followed by the musharakah scheme with a score of 0.82087, the murabah scheme with a score of 0.58579, the ijarah scheme with a score of 0.46863 and the qardhul hasan scheme with a score of 0.16139.

E. CONCLUSION

The mudharabah scheme can be a leading sharia financing scheme in the marine and fisheries sector in Maluku based on certain criteria profitability, risk, sharia compliance, accessibility, and social impact. The mudharabah scheme follows the most important criteria such as profitability and lower risk, while the musharakah scheme can also be the next choice, especially because it is suitable for capital partnerships in the marine and fisheries sectors that require synergy between business actors.

Meanwhile, the ijarah and murabahah schemes are considered less than ideal because they have limitations in terms of flexibility or higher risks in the marine and fisheries sector.

REFERENCES

Alamsyah, A. "Literasi dan Aksesibilitas Pembiayaan Syariah di Sektor Kelautan dan Perikanan Maluku". *Jurnal Keuangan Islam, Vol. 7 No. 3 (2023).*

_____. Islamic Financing in Maluku: Access and Implementation Analysis. Maluku: Maluku Research Institute, 2023.

Amiruddin, A. "Akses Pembiayaan Sektor Kelautan dan Perikanan di Indonesia". *Journal of Marine Economics, Vol. 5 No.2 (2017).*

Badan Pusat Statistik Maluku. *Laporan Tahunan Sektor Kelautan dan Perikanan di Provinsi Maluku.* 2023.

Kannan, V., & Tan, K. "AHP and TOPSIS in Decision-Making for Fisheries Projects". *Asian Journal of Operations Research, Vol. 14 No. 2 (2020).*

Karim, A. *Prinsip-Prinsip Pembiayaan Syariah: Musyarakah dan Mudharabah.* Pustaka Islam, 2018.

Lembaga Ilmu Pengetahuan Indonesia. *Peran Lembaga Keuangan Pedesaan dalam pembiayaan Usaha Perikanan Tangkap.* Jakarta: LIPI Press, 2016.

Hafidh, A., & Rahman, R. "Pembiayaan Syariah dalam Sektor Kelautan: Solusi untuk Keberlanjutan". *Jurnal Ekonomi Islam*, Vol. 15 No. 2 (2022).

Hwang, C.L., & Yoon, K. *Multiple Attribute Decision Making: Methods and Applications.* Springer, 1981.

Rachmawati, R., & Thalib, T. "Implementasi Pembiayaan Syariah dalam Sektor Perikanan di Malaysia". *Jurnal Keuangan Syariah*, Vol. 9 No. 3 (2021).

Saaty, T. L. *The Analytic Hierarchy Process: Planning, Priority Setting, Resource Allocation.* McGraw-Hill, 1980.

Sari, R. "Pemilihan Skema Pembiayaan pada Proyek Kelautan di Indonesia dengan AHP dan TOPSIS". *Jurnal Manajemen Dan Bisnis,* Vol. 12 No. 3 (2021).

Sitorus, S. "Prudential Banking dalam Pembiayaan Sektor Perikanan". *Bank Indonesia Journal*, Vol. 5 No. 2 (2017).

Suharto, S. Preferensi Skema Pembiayaan Bagi Hasil dalam Industri Kelautan dan Perikanan". *Journal of Islamic Finance,* Vol. 10 No.4 (2020).