

Analysis of Digital-Based Development Strategies for Fisheries MSMEs: An Islamic Economic Perspective (Case Study of Sibolga City)

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Abstract

This study aims to analyze strategies for developing fisheries-based MSMEs through digitalization from an Islamic Economics perspective in Pasar Belakang District, Sibolga City. A qualitative descriptive approach was employed. Primary data were collected through interviews with key informants representing the three elements of the Triple Helix: academia, represented by Titieu Keumala Sukandar, M.Si.; MSME business actors, represented by Bestian; and government, represented by Gomgom Parulian Hutagalung, S.Pi. Secondary data were obtained from the Ministry of Marine Affairs and Fisheries and the Central Statistics Agency of Sibolga City. Data were analyzed using the SOAR (Strengths, Opportunities, Aspirations, Results) framework integrated with the Resource-Based View (RBV), supported by IFEM and EFEM matrices. The IFEM analysis produced a total score of 3.8310, consisting of Strengths (1.8029) and Opportunities (2.0281), while the EFEM analysis generated a total score of 3.9067, comprising Aspirations (1.9879) and Results (1.9188). The dominance of Opportunities and Aspirations led to the prioritization of the OA strategy. The main strategy emphasizes optimizing riba-free digital payment (e-payment) transactions through strengthening digital literacy and developing human resources with integrity and Islamic ethical values. From an Islamic Economics perspective, this Triple Helix-based strategy reflects the principle of ta'awun and supports ethical muamalah to achieve maslahah and falah for coastal communities.

Keywords: Fisheries MSMEs, Digital Economy, SOAR, Triple Helix, Islamic Economics

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1. Introduction

Micro, Small, and Medium Enterprises (MSMEs) are one of the key pillars of the Indonesian economy because they play a role in creating job opportunities, generating income, and promoting the equitable distribution of economic activity. MSMEs are not merely a complementary sector but also one of the main pillars of the national economy (Syahbudi 2021). Data show that MSMEs number approximately 64 million units—or 98.67% of all business units in Indonesia—employ about 97% of the workforce, and contribute 61.7% to the Gross Domestic Product (GDP) (Yulizar Kasih et al., 2025). The magnitude of this contribution demonstrates that the development of MSMEs plays a strategic role in driving inclusive economic growth and improving public welfare.

Along with advances in information and communication technology, the digital economic transformation presents new opportunities for MSMEs to enhance their competitiveness and expand their business operations. The use of the internet and e-commerce platforms has proven to be an efficient and

cost-effective means for MSME operators to broaden their promotional reach and improve the effectiveness of transactions without physical limitations (Ramadan et al., 2022). Digitalization is not only related to the use of social media and marketplaces as marketing tools but also encompasses the use of digital payments, technology-based financial management, communication with consumers, and logistics technology. The use of these technologies enables MSMEs to expand their market reach, improve transaction efficiency, build closer relationships with consumers, and develop product innovations.

However, the digital transformation has not yet taken place uniformly. Limitations in digital literacy, human resource capabilities, access to technology, product quality, and distribution remain barriers for some MSMEs in optimizing digital economic opportunities. Previous research has also shown that the use of digital marketing can improve marketing efficiency, but its success remains influenced by the readiness of human resources and the ability of business owners to use technology (Rahmawati et al., 2024; Wardani & Zuhri al Nawawi, 2022).

These challenges become even more complex for SMEs in the fisheries sector. Fisheries SMEs have business characteristics that differ from those in other sectors because they are heavily influenced by the availability of raw materials, fluctuations in production output, processing methods, product quality, distribution, and market conditions. Digitalization offers opportunities for fisheries MSMEs to accelerate marketing processes, expand their consumer reach, improve transaction efficiency, and overcome geographical limitations. Marketplaces, social media, digital payment systems, and logistics technology can serve as key tools for connecting fisheries products with consumers at the local, national, and even international levels. However, fisheries MSMEs still face constraints such as limited capital, low digital literacy, inadequate technological infrastructure, poor packaging quality, and disparities in the fisheries product distribution chain (Febriansyah et al., 2025). These conditions indicate that digitalization should not be viewed merely as a marketing activity but must be integrated into a comprehensive business development strategy encompassing product, price, place, promotion, and human resources

The development of the digital economy has opened up opportunities for major transformation for small and medium-sized enterprises (SMEs) throughout Indonesia. Business digitization encompasses not only the use of social media and e-commerce platforms as marketing tools, but also the use of digital payment technologies (Syaza et al., 2023), app-based financial management, and even artificial intelligence for business decision-making. A report published by Google, Temasek, and Bain & Company in 2023 states that Indonesia's digital economy will become one of the largest technology markets in Southeast Asia by 2025, with an estimated economic value of USD 109 billion (E-Conomy SEA Report 2023, n.d.). Small and medium-sized enterprises (SMEs) should be able to fully leverage this potential. However, only a few have succeeded in becoming fully digital. According to a Bank Indonesia survey (2022), only about 16.4% of small and medium-sized enterprises (SMEs) have adopted digital platforms

The fisheries sector is one of the SME industries with great potential for digital transformation, but it also faces the most complex challenges. Fisheries SMEs are the backbone of fishing communities' economies and play a vital role in employment in coastal areas. Through digitalization, fisheries SMEs can streamline operations, expand their market reach, and gain access to consumers at the local, national, and even international levels. However, the main barriers faced by fisheries MSMEs are limited capital, low digital literacy, a lack of access to technological infrastructure, and inequities in the seafood distribution chain, which often disadvantage fishermen and small business owners (Febriansyah et al., 2025).

The significant potential of the fisheries sector in North Sumatra Province is evident in the economic activity across various coastal areas and seafood processing centers (Purba et al., 2023). Based on official statistical data from the Ministry of Marine Affairs and Fisheries (KKP), marine capture fisheries production in several major cities in North Sumatra shows significant variations in volume. For a comparative overview of marine capture fisheries production among cities in North Sumatra, see Figure 1 below:

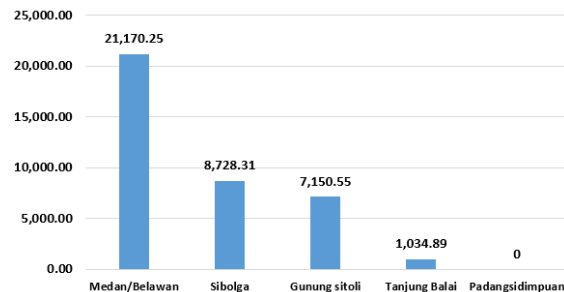


Figure 1. Comparison of Marine Capture Fisheries Production Volumes in Major Cities in North Sumatra (Metric Tons) 2025
Source : Ministry of Marine Affairs and Fisheries (2025)

Based on Figure 1 above, the city of Medan (Belawan area) recorded the highest production at 21,170.25 metric tons, followed by the city of Sibolga at 8,728.31 metric tons, the city of Gunungsitoli at 7,150.55 metric tons, and the city of Tanjung Balai at 1,034.89 metric tons. Meanwhile, the city of Padangsidimpuan recorded zero tons of production due to its geographical location, which is entirely landlocked and lacks a coastline.

Based on this regional mapping, the primary reason for selecting Sibolga City as the focus of this study is its strategic position as the main hub of the fisheries-based economy in the West Coast region of North Sumatra (WPP RI 572). Unlike the city of Medan, whose economy is dominated by the manufacturing and service sectors, the fisheries sector in Sibolga serves as the backbone (core economy) of the local economy, supporting the livelihoods of 4,781 full-time fishermen and 1,405 part-time fishermen, and forming a cluster of MSMEs specializing in seafood processing. The potential fish resources in the WPP RI 572 area are estimated at 1,229,950 metric tons per year, with Tapan Nauli Bay serving as the primary base for Sibolga's fishing activities. In detail, the total marine fishery production of Sibolga City reached 35,207.7 metric tons (an increase from 34,105.13 metric tons in 2023), consisting of 35,175.89 metric tons from the capture fisheries sector and 31.81 metric tons from the aquaculture sector. The scale of these activities also made a significant contribution of 17.8% to Sibolga City's GRDP.

In addition to its geographical advantages and significant contribution to the regional gross domestic product (GRDP), the selection of Sibolga City as the focus of this study is supported by government policy

directives and regulations regarding digital transformation. At the national level, the Ministry of Marine Affairs and Fisheries has issued Ministerial Regulation No. 2 of 2026 on the Empowerment of Micro, Small, and Medium Enterprises in the Marine and Fisheries Sector, which mandates the strengthening of competitiveness, legal compliance, and the digitalization of fisheries MSMEs. This mandate aligns with the Sibolga City Medium-Term Regional Development Plan (RPJMD), which prioritizes the fisheries sector for regional economic development, as well as the Sibolga City Government's commitment to accelerating the adoption of digital technology and e-commerce infrastructure for MSME operators. Furthermore, given the government's strong push for halal certification of SME products, the digitalization of the fisheries sector in Sibolga requires alignment between advancements in digital technology and the application of Islamic economic principles (*muamalah* ethics). Therefore, the City of Sibolga serves as an ideal, strategic, and relevant setting to examine how the synergy between government regulations, business readiness, and academic guidance (the Triple Helix) can be realized through the SOAR approach.

Despite its strategic location and significant contribution to the regional gross domestic product (GRDP), this abundance of fishery production has not automatically resulted in optimal competitiveness and well-being for local processing MSMEs. Most fishery MSMEs in Sibolga City still face obstacles in the conventional distribution chain, packaging quality, limited production technology, and low levels of adoption of digital technology and Sharia-compliant marketing tools. These conditions limit the ability of local fisheries SMEs to compete with large-scale businesses that have modern production and marketing systems (Indra Angkasa, 2025). This phenomenon aligns with Siregar's (2023) findings regarding salted fish processing SMEs in Sibolga, which have experienced a decline in efficiency due to suboptimal supporting infrastructure amid increasingly intense market competition. It is this research gap—between the significant role of the fisheries sector in the regional economy and the still-low level of adoption of digital technologies based on Islamic economic ethics—that makes the city of Sibolga an extremely urgent, crucial, and relevant subject for research compared to other regions.

Strategies for MSME development and the use of technology in business activities highlight the importance of mapping internal and external conditions in determining the direction of business development strategies (Imsar, 2021). Therefore, the development of fisheries-based MSMEs in the digital economy requires a strategy that is not only oriented toward the use of technology but also takes into account internal strengths, external opportunities, the aspirations of

business actors, and the desired outcomes. In this study, the Strengths, Opportunities, Aspirations, and Results (SOAR) approach was used as a strategic analysis framework. Unlike the SWOT approach, which emphasizes the identification of weaknesses and threats, SOAR is more oriented toward strengths and opportunities and encourages organizations to formulate aspirations and measurable outcomes (Kurnia Sari et al., 2023; Zamista & Hanafi, 2020). This approach is relevant to the development of fisheries MSMEs because it can direct attention toward the potential of local products, digital market opportunities, improvements in human resource competencies, innovation, and sustainable business development goals.

The development of fisheries-based MSMEs in the digital economy also requires the involvement of various stakeholders through the Triple Helix approach, which brings together academics (Academicians), business actors or MSMEs (Business), and the government (Government). Academics can play a role in providing research, innovation, knowledge enhancement, and digital literacy; SME operators are the key actors in implementing economic activities and market innovations; while the government plays a role in providing regulations, infrastructure, facilities, and policy support. Synergy among these three actors is crucial because digital transformation cannot proceed optimally if the burden is placed solely on SMEs. The Triple Helix collaboration enables the integration of knowledge, technology, policy, market access, and mentoring, thereby creating a more sustainable ecosystem for the development of fisheries SMEs (Daulay, 2018).

From an Islamic economic perspective, the development of digital-based MSMEs is evaluated not only based on increased sales, efficiency, and profits, but also on their alignment with Sharia principles. Business activities must uphold the values of justice, honesty, trustworthiness, transparency, halal compliance, and the public interest. In this context, the concept of *maqashid al-Sharia* serves as a crucial framework to ensure that digital transformation provides broader benefits for business owners and society. The five primary objectives of *maqashid al-Sharia*—namely, *hifz al-din* (protection of religion), *hifz al-nafs* (protection of life), *hifz al-'aql* (protection of intellect), *hifz al-nasl* (protection of lineage), and *hifz al-mal* (protection of wealth), can be used to evaluate whether SME development strategies not only generate economic profits but also support well-being, improve the quality of human resources, ensure business sustainability, and safeguard assets and transactions in accordance with Sharia principles (Pertiwi & Herianingrum, 2024). Thus, the use of digital technology must be guided so that improvements in

efficiency and competitiveness do not neglect Islamic business ethics.

A number of previous studies have addressed the digitization of MSMEs, business development strategies, SOAR analysis, the Triple Helix model, and MSME development from an Islamic economic perspective. Research on digital marketing indicates that digital technology can expand marketing reach while improving business efficiency, all while maintaining integrity and transparency in transactions (Wardani & Zuhri Nawawi, 2022). Other research indicates that SOAR analysis can be used to formulate business development strategies based on strengths, opportunities, aspirations, and desired outcomes (Yulizar Kasih et al., 2025). Meanwhile, the Islamic economic approach and the *maqashid al-sharia* provide a normative foundation to ensure that innovation and digitalization remain directed toward the public good. Nevertheless, studies that simultaneously integrate SOAR strategy, the digital economy, the Triple Helix model, and the *maqashid syariah* perspective in the development of fisheries SMEs in Sibolga City remain limited. This research gap is important to address because fisheries SMEs have characteristics and challenges distinct from SMEs in other sectors, particularly regarding products, processing, distribution, quality, and market access.

Based on these conditions, this study contributes to two main aspects. First, strategically, the study identifies strengths, opportunities, aspirations, and expected outcomes in the development of fisheries MSMEs through the SOAR approach combined with an evaluation of internal and external factors. Second, conceptually, this study links digitalization strategies with the Triple Helix collaboration and the principles of *maqashid syariah* so that SME development strategies are not only directed toward economic growth and increased competitiveness but also toward strengthening human resources, business sustainability, business ethics, and the public good. This approach is expected to yield strategies that are more contextually relevant to the characteristics of fisheries MSMEs in Sibolga City and capable of addressing the needs of digital economic transformation while remaining grounded in Islamic values.

Based on this background, this study aims to analyze strategies for developing fisheries-based MSMEs in the digital economy from an Islamic economic perspective in Sibolga City, using the SOAR approach and the Triple Helix framework. This study is expected to provide strategic recommendations for MSME actors, the government, and academics on how to optimize the potential of the digital economy, expand market access, improve product quality and human resources, strengthen distribution, and realize the development of competitive and sustainable fisheries MSMEs that are in line with the principles of Islamic economics.

2. Literature Review

2.1 Business Development Strategy

MSMEs play a vital role in economic activity because they contribute to job creation, income generation, and economic equality. In the fisheries sector, MSMEs play a role not only in the trade of catch but also in the processing and creation of added value for fishery products. The MSME development strategy in this study focuses on five key aspects: product, price, place, promotion, and human resources. These five aspects represent a business's ability to create valuable products, set appropriate prices, expand distribution, conduct promotions, and enhance human resource capacity (Hutagalung & Arif, 2023).

The development of MSMEs in the digital age is inextricably linked to entrepreneurs' ability to adopt technology and innovation. The use of e-commerce and product innovation can expand marketing reach and increase sales opportunities for MSMEs (Utami & Syahbudi, 2019). Therefore, strategies for developing fisheries MSMEs should focus not only on enhancing internal capacity but also on the ability to capitalize on changes in the external environment.

2.2 Digital Economy

The digital economy refers to economic activities that utilize digital technology in the processes of production, marketing, transactions, distribution, and communication with consumers. Digitalization provides opportunities for MSMEs to overcome geographical limitations, expand their markets, improve transaction efficiency, and build more intensive relationships with consumers. From an MSME perspective, digital marketing can also be used as a tool to expand marketing reach while adhering to Islamic business ethics (Wardani & Zuhri Nawawi, 2022). The adoption of digital technology in the microbusiness sector requires alignment between the business model framework and the enforcement of *Sharia muamalah* ethics, particularly in offering halal products, ensuring transparency in promotions, and strengthening a mutual aid-based economy (Sari et al., 2026).

2.3 Resource-Based View (RBV)

The Resource-Based View (RBV) is one of the main theoretical frameworks in strategic management that explains that sustained competitive advantage and an organization's optimal performance are largely determined by the ownership, control, and utilization of unique internal resources (Barney, 1991). From the RBV perspective, companies or SMEs are viewed as a collection of heterogeneous resources and capabilities that do not easily transfer between businesses (resource immobility). According to Barney (1991), for a resource to serve as a source of sustained competitive advantage,

it must meet four key criteria known as the VRIN framework:

1. Valuable: Resources are capable of capitalizing on external opportunities or mitigating environmental threats, thereby improving the efficiency and effectiveness of the business.
2. Rare: These resources are controlled by very few competitors in the market.
3. Inimitable (Unique / Difficult to Imitate): Resources are difficult for competitors to imitate due to unique historical conditions, causal ambiguity, or social complexity.
4. Non-substitutable: There is no equivalent resource that can strategically replace it to produce the same performance.

In the context of digital economy-based fisheries MSMEs in Sibolga City, internal resources and capabilities are categorized into three main types:

1. Physical and Geographical Assets: These include an abundant supply of local seafood raw materials unique to Tapanuli Bay/WPP 572 and the freshness of Sibolga's signature processed products.
2. Intangible Assets: These include a product's halal reputation, brand awareness, and consumer trust in the quality of processed seafood products.
3. Organizational and Human Resource Capabilities: These include business owners' level of digital literacy, digital marketing skills, technological adaptability, and business management efficiency.

The application of RBV in this study serves to strengthen the SOAR analysis, particularly the analysis of internal factors (Strengths). The use of digital technology (e-commerce, social media, digital payments, and logistics systems) is viewed as dynamic capabilities that transform the traditional physical resources of fisheries MSMEs into modern competitive advantages that are valuable and adaptable to market changes.

From the perspective of Islamic Economics, the RBV theory is enriched by the principles of stewardship (amanah) and public interest (maslahah). The internal resources possessed by fisheries MSMEs are, in essence, a relative ownership and a trust from Allah SWT that must be managed optimally, fairly, and efficiently. RBV-based resource optimization is not solely aimed at competitive profitability, but rather at fulfilling the Maqashid al-Sharia principles, namely safeguarding wealth (hifz al-mal) through business efficiency, enhancing the intellectual capacity and literacy of human resources (hifz al-'aql), and ensuring business sustainability (hifz al-nasl) to provide the broadest possible economic benefits for the coastal communities of Sibolga City.

2.4 The Triple Helix and the Development of MSMEs

The Triple Helix is a collaboration model that positions academia, business, and government as the three key actors in innovation and economic development. The interaction among these three actors can foster institutional relationships and knowledge exchange that support the innovation process. In the context of MSMEs, this collaboration is crucial because digital transformation requires a combination of knowledge, innovation, business capabilities, policy support, and business development facilities (Mufti et al., 2025).

Academics play a role in generating knowledge, innovation, research, and mentoring; business actors serve as implementers and users of innovation; while the government plays a role in providing regulations, facilitation, empowerment programs, and the creation of a business ecosystem. Thus, the Triple Helix in this study is used to explain the collaborative mechanisms in the implementation of the digitalization strategy for fisheries MSMEs. This approach is also relevant to the development of creative economy-based SMEs, which require interaction among the government, academics, and business actors (Daulay, 2018).

2.5 The Development of MSMEs from an Islamic Economic Perspective

Islamic economics places economic activities and the development of Micro, Small, and Medium Enterprises (MSMEs) within a framework of normative values that is not only oriented toward the pursuit of material profit but also takes into account the principles of justice, honesty, trustworthiness, transparency, halal compliance, and the common good. In digital economic activities, the principles of Islamic economics are reflected through open product information, fair pricing ('adl), transparency in transaction contracts, assurance of the halal status and quality of goods (thayyib), and the avoidance of elements prohibited by Sharia, such as riba, gharar (uncertainty), and tadlis (fraud). Therefore, the adoption of digital technology by MSME actors must strike a balance between operational efficiency and compliance with Sharia business ethics (Mursalmina, 2026).

In the context of business development, the Islamic economics perspective encourages MSMEs to grow sustainably by strengthening human resource capacity, enhancing competitiveness through ethical means, and expanding market access based on mutual cooperation (ta'awun). Digital transformation is not only measured by the extent of sales revenue growth but also by the extent to which it positively impacts the improvement of community welfare, the trustworthy protection of business assets, and the halal compliance of the entire supply chain (Sari et al., 2026). Thus, the application of Islamic economics serves as an ethical and operational

foundation to ensure that digital-based SME development strategies are not only economically effective and competitive but also bring blessings and the broadest possible public benefit (masalah) to society (Tanjung et al., 2025).

3. Methods

This study employs a qualitative approach with descriptive analysis to examine strategies for developing fisheries-based MSMEs in the digital economy from the perspective of Islamic economics in Sibolga City. The qualitative approach was chosen because it focuses on gaining a comprehensive understanding of internal conditions, external opportunities, stakeholder aspirations, and the formulation of business development strategies. The research was conducted in 2026, with the study location focused on Pasar Belakang District, Sibolga City. The research subjects were MSMEs engaged in the processing and marketing of marine fishery products characteristic of Pasar Belakang District, Sibolga City. The research data consisted of primary and secondary data. Primary data was obtained by distributing interview questionnaires to key informants, while secondary data was sourced from scientific literature, government documents, and official statistical data from the Ministry of Marine Affairs and Fisheries (KKP) and the Central Statistics Agency (BPS) of Sibolga City.

Based on the Triple Helix model, the research subjects were selected based on the criteria that informants possess in-depth knowledge, expertise, technical experience, and direct involvement in the fisheries ecosystem as well as the adoption of the digital economy in Sibolga City. The key informants for this study fully represent the three main actors of the Triple Helix (Academia, Business, Government). The government sector is represented by Gomgom Parulian Hutagalung, S.Pi., Head of the Fisheries Infrastructure and Technology Section at the Sibolga City Department of Fisheries, Food Security, and Agriculture, who has 15 years of service and professional experience in the fisheries sector. The business sector is represented by Bestian, a practitioner and marketing manager for small and medium-sized enterprises (SMEs) processing fishery products in Pasar Belakang Subdistrict, Sibolga City, who has approximately 20 years of experience in the marketing chain for processed seafood products.

Meanwhile, the academic sector is represented by Titieu Keumala Sukandar, M.Si., a lecturer at the Sibolga College of Fisheries (STPS) who specializes in fishery product technology and is actively engaged in publishing and conducting research related to the development of fishery product processing technology and marine product SMEs in the city of Sibolga. The involvement of these three expert informants ensures that the analysis of internal and external factors, as well

as the formulation of the SOAR matrix, are derived from credible, objective, and representative sources that reflect on-the-ground realities.

Data analysis was conducted qualitatively using the Strengths, Opportunities, Aspirations, and Results (SOAR) framework. Unlike the conventional SWOT analysis, which focuses on weaknesses and threats, the SOAR approach is a positive, strengths-based strategic analysis that combines internal strengths and external opportunities to fulfill stakeholder aspirations and achieve measurable results. The stages of the SOAR analysis in this study include:

1. Identification of Strategic Factors: Identifying indicators of Strengths, Opportunities, Aspirations, and Results based on the 5P marketing mix (product, price, place, promotion, and human resources), integrated with internal capabilities from the Resource-Based View (RBV), adoption of the digital economy, and Sharia business ethics.
2. IFEM & EFEM Matrix Evaluation: Develop an Internal Factor Evaluation Matrix (IFEM) to measure Strengths and Opportunities, and an External Factor Evaluation Matrix (EFEM) to measure Aspirations and Results. The assessment uses weighting based on level of importance (total weight = 1.00) and a 1–4 rating scale determined by empirical field conditions. Weighted scores are obtained by multiplying the weight by the rating.
3. SOAR Matrix Formulation: The cumulative scores for each quadrant are then incorporated into the SOAR Matrix to identify the top-priority strategy quadrant. The formulation of strategies in the SOAR Matrix consists of four possible combinations:
 - a. SA Strategy (Strengths–Aspirations): Using internal strengths to realize future aspirations.
 - b. SR (Strengths–Results) Strategy: Leveraging internal strengths to achieve measurable results.
 - c. OA (Opportunities–Aspirations) Strategy: Optimally leveraging external opportunities to fulfill strategic aspirations.
 - d. OR (Opportunities–Results) Strategy: Overcoming obstacles by capitalizing on external opportunities to achieve tangible results.
4. Sharia Interpretation & Evaluation: In the final stage, the resulting priority strategy options (particularly the OA combinations) are comprehensively interpreted based on the Triple Helix framework and evaluated from an Islamic Economics perspective (principles of ethical muamalah, transparency, justice, and economic welfare) to produce strategic recommendations that are competitive, sustainable, and bring blessings.

4. Results and Discussion

4.1 Overview of the Fisheries Micro, Small, and Medium Enterprises in the City of Sibolga

This study was conducted among fisheries MSMEs in Sibolga City that are engaged in the processing and marketing of fishery products. Data collection was carried out by distributing questionnaires to three groups of respondents based on the Triple Helix approach, namely academics (Academician), business actors (Business), and the government (Government). Each group was represented by one respondent, bringing the total number of respondents in this study to three, who were selected through purposive sampling based on their direct involvement in and understanding of the development of digital-based fisheries MSMEs in Sibolga City.

As a coastal city with a fisheries-based economy, Sibolga has significant marine fisheries production potential, projected to reach 35,207.7 metric tons in 2024, with a primary fishing workforce of 4,781 people. However, this vast potential has not yet been fully translated into increased competitiveness and well-being for fisheries MSME operators, particularly as they face the challenges of the digital economic transformation. Therefore, this study employs the SOAR (Strengths, Opportunities, Aspirations, Results) analysis approach, integrated with the IFEM (Internal Factor Evaluation Matrix) and EFEM (External Factor Evaluation Matrix), to generate measurable and comprehensive strategic recommendations.

4.2 Internal Factor Evaluation Matrix (IFEM)

Table 1. Internal Factor Evaluation Matrix (IFEM)

No.	Dimensions	Internal Factors	Bobot	Rating	Skor
Strengths					
1	Products	Fishery products are of superior quality, competitive, and halal-certified in accordance with the principles of Islamic economics.	0,0335	3,70	0,1240
2		Sibolga's signature processed seafood products are marketed digitally while maintaining halal standards and local traditions.	0,0365	4,00	0,1460
3		The variety of processed fishery products is tailored to digital market demand and the principle of <i>thayyib</i> (good quality).	0,0340	3,90	0,1326
4	Price	Product pricing on digital platforms is affordable and adheres to the Islamic principle of justice ('adl).	0,0295	3,40	0,1003
5		The prices of products in the digital storefront are commensurate with their halal quality and the transparency of business information.	0,0325	3,70	0,1203
6		MSME operators are able to compete fairly in pricing on digital markets without any element of <i>gharar</i> (fraud).	0,0275	3,30	0,0908
7	Place	The business location is easily accessible and integrated with shipping registration points within the digital logistics ecosystem.	0,0355	4,00	0,1420
8		The distribution of fishery products is proceeding smoothly through e-commerce channels based on Sharia-compliant transaction agreements.	0,0360	3,95	0,1422
9		Product marketing is conducted through an omnichannel approach (online and offline) while upholding the principles of transparency in Islamic transactions.	0,0305	3,60	0,1098

No.	Dimensions	Internal Factors	Bobot	Rating	Skor
10	Promotions	MSME operators actively use social media to promote Islamic principles in business and educate the public about halal products.	0,0295	3,40	0,1003
11		Digital marketing expands market reach by prioritizing ethical communication and Islamic business integrity.	0,0345	4,00	0,1380
12		Digital promotional content is created to be engaging, informative, and free from false narratives prohibited by Sharia law.	0,0265	3,10	0,0822
13	Human Resources	MSME entrepreneurs have business experience and an understanding of Sharia business ethics based on the use of digital technology.	0,0350	4,00	0,1400
14		MSME human resources possess strong digital literacy and adaptability and are committed to upholding the value of integrity in business.	0,0325	3,70	0,1203
15		The Triple Helix collaboration supports the enhancement of human resources' digital capabilities based on the principle of ta'awun (mutual assistance).	0,0300	3,80	0,1140
		Sub Total Strengths	0,4835		1,8029
Opportunities					
1	Products	Market demand for halal-certified fishery products is growing rapidly.	0,0310	3,50	0,1085
2		Product innovations are developed using digital technology while adhering to quality standards and halal certification requirements.	0,0335	3,70	0,1240
3		Access to online marketplaces has expanded the market penetration of Sibolga's halal products to a national scale.	0,0365	4,00	0,1460
4	Price	Price promotions via digital media are fast, transparent, and in line with the principles of fair business practices.	0,0355	4,00	0,1420
5		Digital payment systems (e-payments) make it easier for consumers to conduct accurate, interest-free transactions.	0,0370	4,00	0,1480
6		The discount feature on the marketplace is used to offer fair prices that do not cause harm (la dharar).	0,0345	3,90	0,1346
7	Place	Digital marketplaces are expanding the distribution reach of halal seafood products beyond the region.	0,0360	4,00	0,1440
8		Social media makes it easier for consumers to access transparent information about halal products.	0,0325	3,70	0,1203

No.	Dimensions	Internal Factors	Bobot	Rating	Skor
9		The integration of digital logistics technology speeds up product delivery while maintaining the quality and safety of the goods.	0,0335	3,70	0,1240
10	Promotions	Social media provides a cost-effective digital promotional channel that is consistent with Islamic economic principles.	0,0355	4,00	0,1420
11		Partnerships with content creators are strengthening the digital promotion of Sibolga's signature halal products.	0,0340	3,90	0,1326
12		Digital communication enhances customer service by making it fast, courteous, and reliable.	0,0365	4,00	0,1460
13	Human Resources	Digitalization training strengthens the competencies of MSME human resources in managing Sharia-based businesses.	0,0355	4,00	0,1420
14		Academic guidance accelerates the adoption of digital technology and the implementation of halal management.	0,0360	3,95	0,1422
15		Government support facilitates the development of digital infrastructure and the legal framework for halal certification for MSMEs.	0,0340	3,90	0,1326
		Sub Total Opportunities	0,5165		2,0281
		Total Skor IFEM (Strengths + Opportunities)	1,0000		3,8310

Based on the IFEM calculation results in Table 1, the total score for the Strengths dimension is 1.8029, while the total score for the Opportunities dimension is the highest at 2.0281, resulting in a total IFEM score of 3.8310. This figure is above the standard matrix average (2.50), indicating that the internal position and external opportunities of MSMEs are classified as very strong. The determination of the highest-scoring indicator (excellent category) is based on the product of the importance weight and the actual condition rating, which yields the highest weighted score in the external dimension. Specifically, the "Opportunities" indicator

that received the highest score is the "Utilization of digital payment systems (e-payment)," which facilitates interest-free and accurate transactions for consumers (O5, score 0.1480). This top-ranked "Opportunities" indicator generally confirms that the primary strategic direction for fisheries MSMEs in Sibolga City is focused on the digitization of transaction systems based on Sharia ethics that are transparent, efficient, and trustworthy.

4.3 External Factor Evaluation Matrix (EFEM)

Table 2. External Factor Evaluation Matrix (EFEM)

No.	Dimensions	External Factors	Bobot	Rating	Skor
Aspirations					
1	Products	Developing innovative and modern halal products based on the use of digital technology.	0,0360	4,00	0,1440
2		Expanding digital marketing of halal fishery products to penetrate national and international markets.	0,0345	3,95	0,1363

No.	Dimensions	External Factors	Bobot	Rating	Skor
3		Ensuring that the entire supply chain and digital marketing are free from haram and gharar elements.	0,0340	4,00	0,1360
4	Price	Achieving stability in raw material prices through digital supply chain efficiency based on fair transactions.	0,0285	3,30	0,0941
5		Establishing a digital pricing strategy that is fair (“adl”), transparent, and promotes the common good.	0,0355	4,00	0,1420
6		Increasing business profit margins in a reasonable manner without harming consumers (masalah).	0,0335	3,90	0,1307
7	Place	Expanding an integrated digital distribution network based on the principle of reliable delivery.	0,0315	3,70	0,1166
8		Marketing products outside the region using e-commerce and Sharia-compliant payment systems.	0,0365	4,00	0,1460
9		Improving the effectiveness of digital distribution to maintain product freshness and halal certification.	0,0340	3,95	0,1343
10	Promotions	Receive comprehensive digital marketing training grounded in ethics and the principles of Islamic economics.	0,0355	4,00	0,1420
11		Developing digital promotions that are creative, informative, and uphold honesty.	0,0335	3,90	0,1307
12		Strengthening the reputation of halal and high-quality brands through branding on digital media.	0,0295	3,30	0,0974
13	Human Resources	Enhancing the digital literacy skills of human resources who possess integrity and adhere to Sharia ethics.	0,0370	4,00	0,1480
14		Encouraging MSME personnel to be innovative in using digital platforms in a productive and beneficial way.	0,0340	4,00	0,1360
15		Strengthening Triple Helix synergy based on the value of ta'awun to accelerate the digitalization of MSMEs.	0,0335	4,00	0,1340
		Sub Total Skor Aspirations	0,5070		1,9879
Results					
1	Products	Sustained improvement in the competitiveness of MSME halal products in the digital market.	0,0335	4,00	0,1340
2		Increasing the income of MSME operators in a halal and thayyib manner through the optimization of e-commerce.	0,0345	4,00	0,1380
3		Expanding the reach of digital markets to improve the well-being (hifz al-nafs) of coastal communities.	0,031	3,60	0,1134

No.	Dimensions	External Factors	Bobot	Rating	Skor
4	Harga	Increased consumer interest in purchasing due to price transparency and halal certification on digital platforms.	0,0325	3,70	0,1203
5		Improving the efficiency of secure, riba-free sales transactions through digital payments.	0,0335	4,00	0,1340
6		Business sustainability (hifz al-nasl) is maintained through fair pricing on digital marketplaces.	0,0315	3,70	0,1166
7	Place	Expanding market access and improving distribution chain efficiency through digital logistics technology.	0,0275	3,30	0,0908
8		Increased consumer satisfaction with the clarity of digital information and assurance of halal quality.	0,0315	3,60	0,1134
9		Increasing sales volume of processed fishery products through the optimization of digital marketing channels.	0,0350	4,00	0,1400
10	Promotions	The effectiveness of digital marketing in boosting sales based on Islamic business ethics.	0,0335	3,95	0,1323
11		Growth of the loyal customer base on social media is based on trust and integrity.	0,0335	3,95	0,1323
12		Strengthening the bargaining power and competitive advantage of MSMEs through halal digital branding.	0,0340	4,00	0,1320
13	Human Resources	Improving the productivity and intellectual capacity (hifz al-'aql) of human resources in the digital economy era.	0,0345	3,95	0,1363
14		The wise and effective use of digital technology by MSME personnel, which brings benefits.	0,0340	3,90	0,1326
15		The sustainability of the digital fisheries MSME ecosystem resulting from harmonious Triple Helix collaboration.	0,0335	4,00	0,1340
		Sub Total Results	0,4930		1,9188
		Total Skor EFEM (Aspirations + Results)	1,0000		3,9067

Based on the EFEM calculation results in Table 2, the total score for the Aspirations dimension was 1.9879, which is higher than the total score for the Results dimension (1.9188), resulting in an overall EFEM score of 3.9067. This figure is well above the standard matrix average (2.50), indicating that the external position of MSMEs is very strong. The determination of the leading aspirations indicator is based on the result of multiplying the importance weight by the actual condition rating, which yields the highest weighted score in the external dimension. Specifically, the aspirations indicator (Aspirations) that received the

highest score is “Enhancing the digital literacy skills of human resources who possess integrity and adhere to Sharia ethics” (A13, score 0.1480).

The high score on this top-priority indicator provides a strategic benchmark for guiding the future direction of business development. The commitments and expectations of stakeholders generally focus on strengthening human resource capacity as the primary asset in supporting the successful and sustainable adoption of digital technologies grounded in ethical business practices.

4.4 SOAR Matrix for Fisheries MSMEs in Sibolga City
The SOAR matrix includes four strategies: SA, SR, OA, and OR. After obtaining the IFEM and EFEM results, which indicated that opportunities and aspirations were more dominant, the researcher employed the OA strategy, as shown in the following table.

Table 3. SOAR Matrix

Opportunities (O)	Aspirations (A)	Strategi OA
Digital payment systems (e-payments) facilitate accurate, interest-free transactions for consumers (O5).	Enhancing the digital literacy skills of human resources who possess integrity and adhere to Sharia ethics (A13).	Optimizing the implementation of interest-free digital transactions (e-payments) by strengthening and improving the digital literacy skills of human resources who possess integrity and adhere to Sharia principles (O5, A13).

Based on the results of the SOAR matrix analysis, the Opportunities–Aspirations (OA) combination was identified as the top strategic priority for the development of fisheries MSMEs in Sibolga City. To sharpen the focus of strategy implementation, the formulation of the strategy was centered on identifying indicators with the highest weighted scores (peak scores) from each external dimension. In the Opportunities dimension, the factor with the highest score was the use of digital payment systems (e-payment), which facilitate accurate, interest-free transactions (O5, score 0.1480). Meanwhile, in the Aspirations dimension, the factor with the highest score is the expectation of improved digital literacy among human resources who possess integrity and adhere to Sharia ethics (A13, score 0.1480).

The combination of these two key indicators results in one (1) Primary Focus OA Strategy, namely: Optimizing the Implementation of Riba-Free Digital Transactions (E-Payment) Through Strengthening and Improving the Digital Literacy Skills of Human Resources Who Possess Integrity and Adhere to Sharia Ethics (O5, A13). This strategy synergizes the opportunities for adopting digital payment technology (O5) with the aspiration to improve the capacity and digital literacy of human resources (A13). The use of e-payments offers financial transactions that are practical, fast, accurate, and free from usury, gharar (uncertainty), and fraud. However, the success and sustainability of e-payment technology implementation depend heavily on the readiness of the human resources managing it. Therefore, strengthening the digital literacy of human resources—grounded in the ethical values of muamalah

(shiddiq, amanah, ‘adl)—is key to ensuring that digital technology is operated wisely, transparently, and in a way that brings public benefit (masalahah) and blessings to fisheries MSMEs in Sibolga City.

4.5. Implementation of the Triple Helix Model in the Development of Digital Fisheries MSMEs

The success of implementing SOAR strategies depends heavily on strong synergy among the three main actors in the Triple Helix model: Academics (A), Business (B), and Government (G). Based on the results of the SOAR matrix analysis and survey data, this study identifies the specific roles of each actor. Based on the results of interviews and questionnaires administered to three key informants representing the elements of the Triple Helix—Academics, Business Practitioners/SMEs, and Government—mutually reinforcing perceptions regarding the execution of the OA Strategy were obtained:

1. Academic Perspective: Academics emphasize the importance of strengthening human resource capacity through training in digital marketing and Islamic financial literacy. Academics serve as knowledge incubators and technical advisors to help fisheries MSMEs adopt online marketplaces and understand the principles of muamalah in digital transactions.
2. Perspective of Business Owners/SMEs (Business): SME owners view the OA strategy as a real opportunity to break free from the limitations of the local Sibolga market. Business owners need easy access to e-payment technology and integration with digital logistics systems so that halal-certified processed fishery products can reach consumers outside the region efficiently and while still fresh.
3. Government Perspective: The relevant agency/Sibolga City Government emphasizes its role as a regulator and facilitator by providing digital infrastructure, streamlining business licensing procedures, and facilitating free halal certification. The government is committed to building a supportive ecosystem so that collaboration between academics and MSMEs can proceed sustainably.

The interactive synergy among these three Triple Helix actors in accelerating the digitalization of Sibolga’s fisheries MSMEs is, in essence, a manifestation of the command to practice ta’awun (mutual assistance in righteousness), as decreed by Allah SWT in Surah Al-Ma’idah, verse 2, which reads:

"And help one another in righteousness and piety, but do not help one another in sin and aggression. Fear Allah; indeed, Allah’s punishment is severe."

According to Ibn Kathir’s Tafsir, this verse commands the servants of Allah to support one another in doing good (al-birr) and in piety (at-taqwa). In this context, the

principle of al-birr is realized through the Triple Helix collaboration: academics contribute knowledge, the government provides legal frameworks and facilities, and MSME operators conduct their businesses honestly and with integrity. This collaboration forms a muamalah ecosystem free from fraudulent practices (gharar) and usury (riba), so that the adoption of digital technology brings public benefit (maslahah) and shared blessings to the coastal communities of Sibolga.

4.6. *An Analysis from the Perspective of Islamic Economics on the Development of Digital Fisheries MSMEs*

An analysis of development strategies for fisheries-based MSMEs in the digital economy in Sibolga City cannot be separated from the normative foundations of Islamic economics, given that the majority of fisheries business operators in Pasar Belakang Subdistrict uphold Sharia values in their economic activities. Building on the theoretical framework presented, Islamic economics positions MSME activities as not only oriented toward the pursuit of material profit but also as having an obligation to uphold the principles of justice, honesty (shiddiq), trustworthiness, transparency, halal compliance, and the common good (maslahah). In this study, Islamic muamalah ethics and business ethics are integrated as a normative evaluation framework for the Key Focus OA Strategy, which is derived from the combination of the top-level indicators (O5 and A13). First, regarding the adoption of digital payment technologies and transaction systems (relevant to O5: Riba-free e-payments), Islamic economics emphasizes the importance of openness, transparency in contracts, fair pricing ('adl), and the avoidance of elements prohibited by Sharia, such as riba, gharar (uncertainty), and tadlis (fraud). The use of Sharia-compliant e-payment systems ensures that every financial transaction between fisheries MSME operators and consumers is accurate, secure, transparent, and free from usury. This aligns with Mursalmina's (2026) view that the adoption of digital technology by MSME operators must strike a balance between operational efficiency and compliance with Sharia business ethics.

Second, regarding the aspect of strengthening human resource capacity (relevant to A13: Digital literacy of human resources with integrity and Sharia ethics), Islamic economics promotes business development through the enhancement of human resource skills and the improvement of competitiveness in an honest (shiddiq) manner. The success of digital transformation should not be judged solely by the magnitude of increased sales revenue, but rather by the extent to which it positively impacts the strengthening of intellectual competence (hifz al-'aql), business sustainability (hifz al-nasl), and the trustworthy protection of assets. As emphasized by Sari et al. (2026), enhancing human resource capacity based on Sharia ethics ensures that MSME actors are able to

utilize digital platforms wisely and responsibly, while avoiding business practices that harm others.

Third, regarding collaboration and welfare impacts, the implementation of a strategy based on Triple Helix synergy (academia, business, and government) embodies the command of ta'awun (mutual assistance in righteousness and piety; Quran 5:2). This collaboration fosters a fair and cooperative digital economic ecosystem aimed at expanding market access and ensuring the halal status of the entire supply chain for Sibolga's signature fishery products.

Overall, the integration of the Key OA Strategies (O5 and A13) with Sharia values demonstrates that the implementation of Islamic economics serves as both an ethical and operational foundation. These strategies ensure that the digital transformation of Sibolga City's fisheries MSMEs is not only effective and economically competitive but also brings blessings, public interest (maslahah), and the broadest possible true well-being (falah) to coastal communities, as emphasized by Tanjung et al. (2025) and Chapra (2001) state that the primary goal of the Islamic economic system is to realize maslahah and well-being for all of humanity.

5. Conclusions

This study concludes that Pasar Belakang Subdistrict, Sibolga City, holds a strategic position as the primary economic hub for marine fisheries processing in the West Coast region of North Sumatra (WPP RI 572). Based on the results of the SOAR analysis integrated with the IFEM matrix (total score 3.8310) and the EFEM matrix (total score 3.9067), the development of fisheries MSMEs in this region is dominated by external opportunities (Opportunities) and stakeholder aspirations (Aspirations), thereby establishing the OA Strategy combination as the top priority. By identifying the key factors with the highest weighted scores in the Opportunities dimension (O5: interest-free e-payment, score 0.1480) and the Aspirations dimension (A13: digital literacy for human resources adhering to Sharia ethics, score 0.1480), the Primary Focus OA Strategy was formulated, namely: optimizing the implementation of interest-free digital transactions (e-payment) by strengthening and enhancing the digital literacy skills of human resources who possess integrity and adhere to Sharia ethics. The successful execution of this strategy relies on the synergy of the three Triple Helix actors (academics, business actors, and the government), which, from an Islamic economics perspective, embodies the principle of ta'awun (Quran 5:2) by upholding the ethics of muamalah ('adl, shiddiq, tabligh, amanah), eliminating the practices of riba and gharar, and promoting transactional efficiency to achieve the public interest (maslahah) and well-being (falah) of coastal communities.

As a recommendation, the Sibolga City Government is encouraged to expand the provision of digital network infrastructure in coastal areas, facilitate business licensing (NIB/KUSUKA), and provide training and incentives for the adoption of Sharia-compliant e-payments among fisheries MSMEs. Fisheries MSMEs are urged to consistently improve their digital literacy, adopt digital payments based on Sharia contracts, and uphold business ethics such as fair and transparent pricing ('adl) and the halal status of products (thayyib). Meanwhile, academics are advised to continue strengthening research support, training in Sharia financial literacy, and digital business incubation. These efforts need to be refined by future researchers through quantitative testing of the effectiveness of e-payment adoption, as well as by expanding the geographic scope and pool of research informants.

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Nur Aisyah Tanjung contributed to conceptualization, methodology, software, validation, formal analysis, investigation, resources, data curation, and writing-review. Muhammad Syahbudi contributed to conceptualization, methodology, validation, formal analysis, resources, and writing-review. Aqwa Naser Daulay contributed to software, validation, formal analysis, and writing-review. All authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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C : Conceptualization I : Investigation
M : Methodology R : Resources
So : Software D : Data Curation
Va : Validation W : Writing - Review
Fo : Formal analysis

Conflict of Interest Statement

The authors declare that they have no known competing financial, personal, or professional interests that could have influenced the research or its publication.

Informed Consent

Informed consent was obtained from all individuals who participated in this study.

Ethical Approval

The study was conducted in accordance with applicable ethical standards and institutional policies. No separate ethical approval was required.

Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

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