DOI: 10.28934/jwee25.34.pp231-254
JEL: L21, L26, Q56

ORIGINAL SCIENTIFIC PAPER

Formulating Strategies for Empowering Women Fishery Entrepreneurs toward Sustainable Blue Entrepreneurship

Eviatiwi Kusumaningtyas Sugiyanto[1]
Ratna Wijayanti[2]
Universitas Semarang, Faculty of Economics, Semarang, Indonesia
Yudhitiya Dyah Sukmadewi[3]
Universitas Semarang, Faculty of Laws, Semarang, Indonesia
Kesi Widjajanti[4]
Universitas Semarang, Faculty of Economics, Semarang, Indonesia

A B S T R A C T

This study develops a defensive strategy framework for women in the fisheries sector, focusing on their pursuit of sustainable blue entrepreneurship. The research employs a quantitative SWOT analysis, where data were collected through structured questionnaires, document reviews, and observations. Respondents evaluated internal and external factors using a Likert scale, and the results positioned women entrepreneurs in the defensive quadrant, highlighting the urgency of strategic responses to external threats and internal weaknesses. Findings emphasize three key dimensions: (1) resilience and vulnerability management to strengthen adaptive capacity, (2) social capital and collective action to reduce dependency and enhance cooperative power, and (3) adaptive co-management with quadruple helix collaboration, integrating community, academia, government, and private sector. These dimensions form a structured

[1] Corresponding author, e-mail: eviatiwisugiyanto@usm.ac.id
[2] E-mail: r47nawijayanti@usm.ac.id
[3] E-mail: yudhitiyasukmadewi@usm.ac.id
[4] E-mail: kesi@usm.ac.id

defensive strategy that ensures both survival and long-term sustainability. The novelty of this study lies in applying quantitative SWOT within a gender-sensitive framework for the blue economy. Practically, the results guide policymakers and stakeholders in empowering women entrepreneurs and reinforcing resilient coastal livelihoods.

KEYWORDS: *women entrepreneurs, fisheries, blue economy, sustainability, swot analysis, defensive strategy*

Introduction

The marine and fisheries sector plays a strategic role in the Indonesian economy. It contributes to more than a quarter of the national gross domestic product (GDP), equivalent to more than USD 256 billion per year, and covers about 65% of the country's territory (Ayu et al., 2025). The sea is not only a source of food, but also the main source of livelihood for millions of coastal communities. However, the facts show that about 5.23 million fishers in Indonesia are still categorized as poor, especially in coastal areas (Putra et al., 2021). This imbalance indicates that the enormous potential of the marine sector has not yet been fully realized to improve the well-being of coastal communities (Anand et al., 2021). Women fishers play an important role in supporting the economy of coastal households (Swathi Lekshmi et al., 2022). The low income of fishers requires the contribution of female fishers (wives) to improve their welfare. They are not only involved in pre-production, production, and post-production, but also run small businesses such as selling fresh fish and processing marine products. This role is not only an additional source of income, but also a mainstay of the family economy, especially when the income from fishing is insufficient.

The concept of sustainable blue entrepreneurship is important in this context. Blue entrepreneurship not only promotes economic sustainability but also pays attention to the protection of the marine environment and the social empowerment of coastal communities (Evans et al., 2023; Rahaman et al., 2024). Globally, blue entrepreneurship initiatives, driven by innovation, marine technology, and green investment, continue to grow. However, studies on blue entrepreneurship development strategies, especially those focusing on women fishers, are still very limited (Figueiredo et al., 2023). Demak District in Central Java, Indonesia, is a coastal area with great potential yet complex challenges. Despite a strong patriarchal culture, a fisherwomen's community of over 100 members has

emerged, showing real opportunities for structured and sustainable entrepreneurial development. This highlights the gap between the maritime sector's vast potential and coastal poverty, as well as the limited research on strategies to develop women fishers into sustainable blue entrepreneurs.

Women entrepreneurs play an important role in economic growth, as more than 60% of MSMEs in Indonesia are run by women (BPS-Statistics Indonesia, 2021; Sugiyanto et al., 2021). Due to the significant role and contributions of women fishing entrepreneurs, it is essential to harness the potential of these businesses to support their continued success. Sustainable blue entrepreneurship is expected to address the complex issues facing coastal communities, including economic, social, and environmental issues. Blue entrepreneurship has increased in recent years, as evidenced by the rise of accelerators, innovation awards, and investment companies that support marine technology and start-ups (Dijkstra et al., 2022). This study aims to formulate strategies for developing the entrepreneurial potential of women fishers through a SWOT analysis, identifying internal and external factors that enhance business competitiveness and promote sustainable blue entrepreneurship, thereby strengthening the economic, social, and environmental resilience of coastal communities.

Literature Review

Fisherwomen Entrepreneurs

Women fishers play an important role in the fisheries value chain, from pre-production to production and post-production (Chambon et al., 2024; Roy et al., 2023).In many coastal areas, they are involved in the sale of fresh fish, the processing of marine products, and the distribution of these products to local markets. The economic contribution of fisherwomen is often the mainstay of their families, especially when income from fishing declines due to seasonal factors, weather, or fishing policies (Roy et al., 2023). More than 60% of MSMEs in Indonesia are run by women, indicating their strategic role in local economic development (Sugiyanto et al., 2024; Sugiyanto & Wijayanti, 2023, 2024). However, women fishers' businesses are still generally informal, have low production capacity, and minimal access to capital and technology (Selim et al., 2025)

The Concept of Sustainable Blue Entrepreneurship

Blue entrepreneurship is an entrepreneurial approach that utilises marine resources sustainably, taking into account economic, social, and environmental aspects (Dijkstra et al., 2022; Elston et al., 2024). This concept has evolved in line with the growing global interest in the sustainable blue economy, which promotes marine technology innovation, green investment, and ecosystem-based resource management (Amon et al., 2022). Sustainable blue entrepreneurship has the potential to alleviate poverty in coastal regions while preserving marine ecosystems, but its success depends heavily on strengthening entrepreneurs' capacity, market access, and policy support (Evans et al., 2023; Rahaman et al., 2024).

SWOT Analysis as a Strategy Formulation Tool

SWOT analysis (Strengths, Weaknesses, Opportunities, Threats) is a strategic method for identifying internal and external factors that influence the performance of an organization or company (Mardiyana et al., 2022; Sabado, 2025). In the context of fisherwomen's entrepreneurship, SWOT analysis can identify strengths such as seafood processing skills and community networks, weaknesses such as limited capital and technology, opportunities such as trends in processed fishery products, and threats such as price volatility and climate change (Rahmiyati & Rachmawati, 2023). The use of SWOT analysis with scoring methods enables the prioritization of appropriate strategies, both offensive and defensive (Fan et al., 2023; Mihajlović et al., 2024).

The Quadruple Helix Framework in Coastal Community Empowerment

The quadruple helix model involves four key actors (academics, government, business, and society) in the process of innovation and strategy development (Carayannis et al., 2022; Morawska-Jancelewicz, 2022). When empowering fishers, this collaboration is important to ensure knowledge transfer, regulatory support, improved market access, and community empowerment (Rashid et al., 2024). Integrating the quadruple helix into the development strategy for sustainable blue entrepreneurship enables the creation of inclusive, adaptable, and highly competitive solutions (Loizidou et al., 2024; Sampaolo et al., 2021).

Materials and Methods

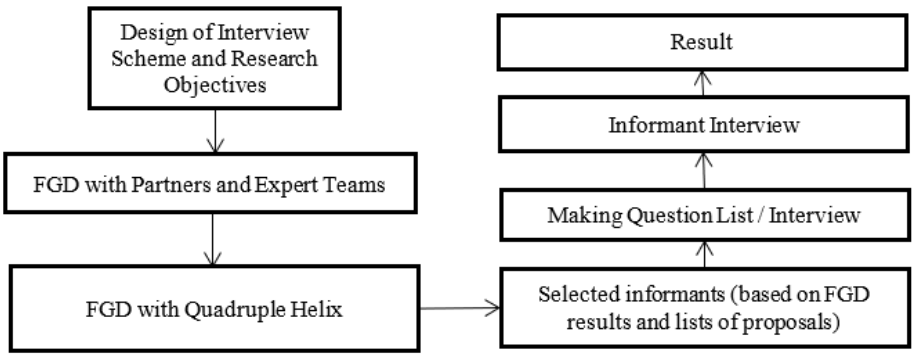
Research Design

This study employs a quantitative design with a SWOT analysis to map internal (strengths and weaknesses) and external (opportunities and threats) factors influencing the entrepreneurial potential of women fishers, with the results guiding the prioritization of strategies for sustainable blue entrepreneurship development.

Informant Selection

Informants were selected through purposive sampling based on the Quadruple Helix Framework, comprising four key groups: academics involved in non-profit coastal development programs, government representatives overseeing coastal and entrepreneurship initiatives, women fishers managing maritime enterprises from production to marketing, and community members from women fishers' groups in coastal areas of Demak District.

Figure 1: Steps for Selecting Informants



Source: Authors' elaboration

This study involved 30 informants: five academics, five government representatives, fifteen businesswomen, and five community members, purposively selected to represent all Quadruple Helix stakeholders. Fisherwomen were included if they had run a maritime business for at least three years, lived in the Demak District, and actively participated in

women's empowerment groups. Most were aged 30–50, had completed secondary education, and earned IDR 2–4 million monthly. Rooted in Javanese coastal traditions, they balance household and fishing roles, shaping their entrepreneurial decisions and business participation.

Data Collection

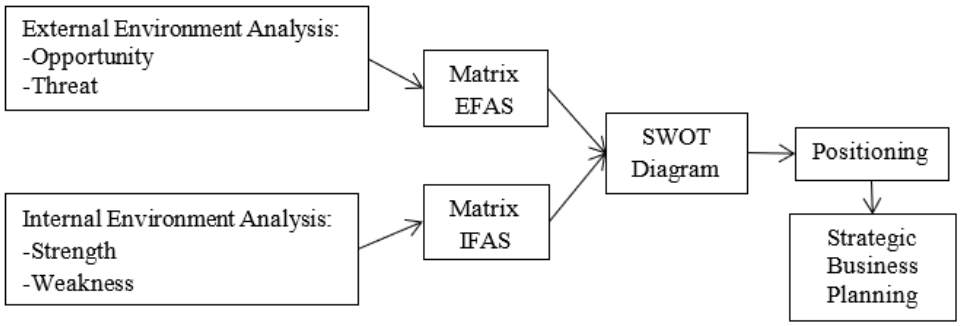
Data were collected through structured questionnaires, observation, and documentation. The 20-item questionnaire measured perceptions of strengths, weaknesses, opportunities, and threats on a 4-point Likert scale (1 = very low impact, 4 = very high impact). Observations over two months in three Demak villages (Wedung, Bonang, and Sayung) monitored business activities, coastal conditions, and community interactions, while documentation reviewed regional plans, cooperative reports, and fisheries statistics. Internal factors were identified from local business capacities, resources, and constraints of women fishers, and validated through expert interviews. External factors were drawn from policy documents, market trends, and environmental data. A focus group with Quadruple Helix representatives ensured validity and relevance, followed by a pilot test with five female fishers to refine the questionnaire.

Data Analysis Procedures

The analysis was carried out in three steps:

1. Identify the SWOT factors: grouping the data into strengths, weaknesses, opportunities, and threats based on the questionnaire results, observations, and documentation studies.
2. Weighting and scoring: Assign a weighting (0–1) and a score (1–4) to each SWOT factor based on its degree of influence and then calculate the weighted score.
3. Strategy formulation – incorporate the results of the analysis into the SWOT matrix (EFAS and IFAS) to determine priority strategic alternatives for the development of women entrepreneurs in the fisheries sector towards sustainable blue entrepreneurship.

Figure 2: Model of Development Planning Strategy of Empowering Fisherwomen



Source: Authors' elaboration

Results and Discussion

Internal Environmental Factors

Fisherwomen have several strong and empirically proven internal advantages. First, traditional seafood processing skills and ancestral knowledge represent tacit knowledge that is difficult to replicate, giving local products an advantage (e.g., flavor, processing techniques, cultural uniqueness), which aligns with the resource-based view (RBV) of competitive advantage through local resources. The uniqueness of this product is also relevant to the concept of sustainable blue entrepreneurship, which consists of sustainably utilizing local marine resources while preserving cultural values (Elston et al., 2024; Kyvelou et al., 2025). The concept of the blue economy, which now places more emphasis on social and sustainable dimensions, opens up opportunities for value-added products such as these to gain market recognition and political support (Veríssimo et al., 2021).

Second, social capital, including family support, community solidarity, regular client networks, and active women's fishing groups, serves as the basis for organization, trust, and informal distribution mechanisms that support household microenterprises. The empowerment literature demonstrates that social capital enhances the collective capacity for information sharing, market access, and cooperation in production (Sugiyanto et al., 2021, 2024). Government/NGO practices that empower communities (e.g., cooperative education, coastal field schools) increasingly

facilitate the transformation of this social capital into more formal economic capacities (Bokayev et al., 2024).

Third, easy access to local raw materials, generational fishing experience, flexible working hours, and entrepreneurship are a combination of human capital and operational practicality that enables rapid adaptation to market opportunities (e.g., product diversification). Innovation in small-scale processing and collaboration with local partners increases adaptive capacity to survive in uncertain conditions (e.g., fluctuations in catch) (Petersen-Rockney et al., 2021). Shared practices between stakeholders (quadruple helix) also open up access to technical and market support if properly promoted (Sampaolo et al., 2021).

Table 1: Internal Factors Analysis Summary (IFAS)

Internal Factors	
Strength	**Weakness**
Traditional seafood processing skills	Limited access to financing
Family and social support	Weak financial management
Easy access to marine raw materials	Low digital literacy
Generations of fishing experience	Minimal formal education
High entrepreneurial spirit	Uncertified products
Active community of fisherwomen	Traditional production equipment
The uniqueness of local products	Dependent on middlemen
Flexible working hours	Inconsistent product quality
Small-scale processed innovations	The dual role of working women
Social capital of local groups	No training or mentoring
The strong commitment of fisherwomen	Low awareness of gender equality
Regular customer network	Lack of data and information on coastal businesses
Solidarity among communities	Sub-optimal business management
Partner/network collaboration	Decline in marine production
	Low gender participation in decision-making

Source: Authors' elaboration

Despite their rich social and cultural capital, women entrepreneurs in the fisheries sector face structural constraints that limit the scale and sustainability of their businesses. Limited access to finance and dependence on middlemen are problems associated with the center-periphery market

(Mittal & Raman, 2021). Formal financing often fails to reach informal microenterprises, resulting in low profit margins and weak bargaining power. This limits the ability to invest in more hygienic equipment or production capacity to meet modern market standards.

Weak financial management, sub-optimal governance, and a lack of data on coastal farms hinder planning and access to evidence-based aid programs or subsidies (Nashrullah et al., 2024). At the practical level, many government and NGO programs offer training, but weak data and governance limit long-term productivity gains. Although initiatives like the Maritime Village Program and Coastal Schools increasingly prioritize women's empowerment, challenges in implementation and affordability remain. Low digital literacy and minimal formal education limit the ability of economic actors to access digital markets, pricing information, or marketing platforms that can increase profit margins (Joseph et al., 2025). In the connected blue economy, limited digital access hinders entry into high-value markets, while the lack of product certification (hygiene, safety, halal) and outdated equipment restricts market reach and consistent quality.

Women's dual roles (as workers and homemakers) and low participation in decision-making limit women's time and space to aggressively develop businesses or take on leadership roles in economic networks (Franzke et al., 2022). This requires not only technical interventions (training, capital), but also normative interventions (gender mainstreaming, local policy change). A literature review shows that while there are empowerment initiatives, gender aspects are often not at the forefront of larger marine programs (Freeman & Svels, 2022).

External Factors Analysis Summary

Rising consumer demand for healthy, eco-friendly fishery products creates a value-added niche for hygienic and certified products (e.g., food/halal certification), offering fisherwomen opportunities for product differentiation (Nicolosi et al., 2021). Market digitalization and e-commerce expand access to urban and national markets, reducing reliance on middlemen and extending value chains. Government initiatives prioritizing the blue economy and women's empowerment, such as the Coastal Field School and Marine Tourism Village Program, support training, product branding, and ecotourism development (Rahaman et al., 2024). Partnership models (cooperatives, village-owned enterprises, CSR, university collaborations) and investor interest in innovation enhance access to capital,

technology, and markets. Certification and mentoring programs further strengthen market penetration when implemented collectively and systematically.

Table 2: External Factors Analysis Summary (EFAS)

External Factors	
Opportunity	**Threat**
Interest in healthy seafood products	Climate change disrupts the marine supply
Digital/online market opportunities	Competition from manufactured products
Support for business-strengthening programs	Fluctuating raw material prices
Access to training from universities/CSR	Significant occupational health risks
Tourism has the potential to promote local products	Inadequate infrastructure
Cooperation with cooperatives/other parties	Minimal legal protection for micro businesses
Demand for environmentally friendly products	Small local market
Product certification opportunities	The role of women is under-recognised
Investor interest in the business	Marine pollution and industrial waste
Synergy with larger MSMEs	Dependence on middlemen
Policy and regulatory support	Deteriorating environmental/ecosystem conditions
Implementation of gender equality and human rights	Fishing areas are becoming increasingly limited
Utilization of innovation and technology	

Source: Authors' elaboration

Ecological and market threats endanger business sustainability: (1) climate change and ocean warming alter fish distribution and productivity, reducing raw material supply, and (2) marine pollution and ecosystem degradation lower catch quality and volume (Martínez-Vázquez et al., 2021). These factors threaten small enterprises, while price fluctuations, poor post-harvest infrastructure, and weak legal protection limit women-owned businesses from accessing high-value markets. Additional barriers

include competition from other regions, health risks, and limited recognition of women's roles in decision-making. Mitigation requires climate adaptation, pollution control, infrastructure investment, market access improvement, and gender empowerment across the value chain.

Strategic Business Planning

Based on the EFAS and IFAS matrices, the analysis produced strength, weakness, opportunity, and threat scores of 2.82, 2.91, 1.84, and 3.71, respectively. These results guided the formulation of priority strategies for developing women fisher entrepreneurs toward sustainable blue entrepreneurship.

Table 3: Evaluation Matrix of Strength Factors

No	Internal factors (Strength)	Weight	Rating	Weight x Rating
S1	Traditional seafood processing skills	0.08	3	0.25
S2	Family and social support	0.12	2	0.24
S3	Easy access to marine raw materials	0.08	2	0.16
S4	Generations of fishing experience	0.06	3	0.19
S5	High entrepreneurial spirit	0.09	3	0.28
S6	Active community of fisherwomen	0.08	4	0.31
S7	The uniqueness of local products	0.04	3	0.13
S8	Flexible working hours	0.14	3	0.41
S9	Small-scale processed innovations	0.05	3	0.15
S10	Social capital of local groups	0.06	2	0.11
S11	The strong commitment of fisherwomen	0.07	3	0.22
S12	Regular customer network	0.06	3	0.18
S13	Solidarity among communities	0.03	3	0.09
S14	Partner/network collaboration	0.03	3	0.09
	Total	1.00		2.82

Source: Authors' elaboration

Table 4: Evaluation Matrix of Weakness Factors

No	Internal factors (Weakness)	Weight	Rating	Weight x Rating
W1	Limited access to financing	0.09	3	0.28
W2	Weak financial management	0.09	3	0.27
W3	Low digital literacy	0.07	3	0.21
W4	Minimal formal education	0.07	2	0.15
W5	Uncertified products	0.07	3	0.20
W6	Traditional production equipment	0.08	2	0.15
W7	Dependent on middlemen	0.07	3	0.22
W8	Inconsistent product quality	0.05	2	0.10
W9	The dual role of working women	0.11	4	0.44
W10	No training or mentoring	0.05	3	0.14
W11	Low awareness of gender equality	0.05	3	0.15
W12	Lack of data and information on coastal businesses	0.06	3	0.17
W13	Sub-optimal business management	0.05	3	0.14
W14	Decline in marine production	0.06	3	0.18
W15	Low gender participation in decision-making	0.04	3	0.12
	Total	1.00		2.91

Source: Authors' elaboration

Table 5: Evaluation Matrix of Opportunity Factors

No	External factors (Opportunity)	Weight	Rating	Weight x Rating
O1	Interest in healthy seafood products	0.09	2	0.18
O2	Digital/online market opportunities	0.09	1	0.09
O3	Support for business-strengthening programs	0.12	3	0.35
O4	Access to training from universities/CSR	0.09	2	0.19
O5	Tourism has the potential to promote local products	0.06	1	0.06
O6	Cooperation with cooperatives/other parties	0.07	2	0.13
O7	Demand for environmentally friendly	0.08	1	0.08

No	External factors (Opportunity)	Weight	Rating	Weight x Rating
	products			
O8	Product certification opportunities	0.09	2	0.18
O9	Investor interest in the business	0.05	1	0.05
O10	Synergy with larger MSMEs	0.07	2	0.14
O11	Policy and regulatory support	0.06	2	0.13
O12	Implementation of gender equality and human rights	0.08	2	0.16
O13	Utilization of innovation and technology	0.05	2	0.10
	Total	1.00		1.84

Source: Authors' elaboration

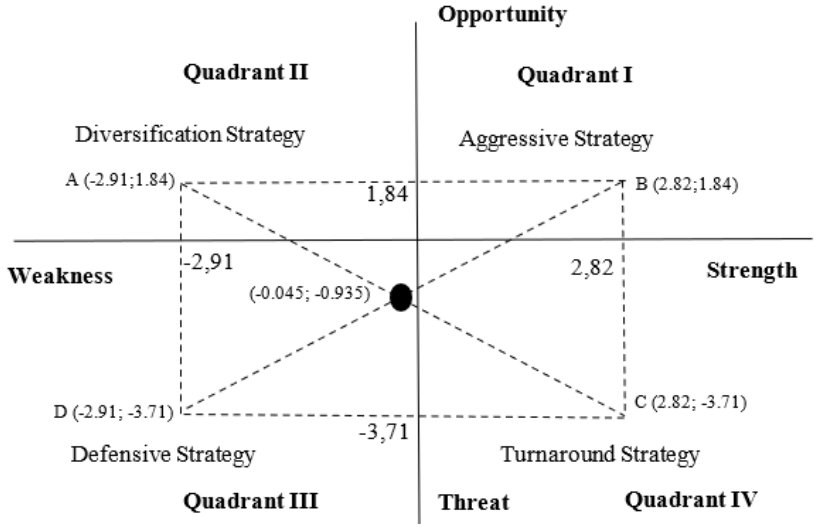
Table 6: Evaluation Matrix of Threat Factors

No	External factors (Threat)	Weight	Rating	Weight x Rating
T1	Climate change disrupts the marine supply	0.13	4	0.513
T2	Competition from manufactured products	0.05	3	0.144
T3	Fluctuating raw material prices	0.08	3	0.255
T4	Significant occupational health risks	0.08	4	0.314
T5	Inadequate infrastructure	0.11	4	0.423
T6	Minimal legal protection for micro businesses	0.06	4	0.224
T7	Small local market	0.07	3	0.221
T8	The role of women is under-recognized	0.08	4	0.333
T9	Marine pollution and industrial waste	0.11	4	0.449
T10	Dependence on middlemen	0.06	3	0.178
T11	Deteriorating environmental/ecosystem conditions	0.07	4	0.288
T12	Fishing areas are becoming increasingly limited	0.10	4	0.391
	Total	1.00		3.734

Source: Authors' elaboration

Based on the SWOT diagram, the strategic position for female entrepreneurs is in quadrant III. Quadrant III (weakness-threat) or defensive strategy. This position reflects internal weaknesses that are slightly more pronounced than its strengths, and external threats that outweigh the opportunities. A relevant strategy is to minimize weaknesses such as limited capital, technology, and market access while anticipating threats such as commodity price volatility, competition, climate change, and marine pollution. Possible approaches include strengthening corporate institutions, building marketing alliances, enhancing human resources capacity, and diversifying products to maintain business sustainability.

Figure 3: Positioning Strategy of SWOT Diagram



Source: Authors' elaboration

Calculation of Diagonal Line Intersections

$$\frac{y - y1}{y2 - y1} = \frac{x - x1}{x2 - x1}$$

Diagonal AC

$$\frac{y - 1.84}{-3.71 - 1.84} = \frac{x - (-2.91)}{2.82 - (-2.91)}$$

5.73y-10.54= -5.55x-16.15

5.73y+5.55x=-5.61

Diagonal BD

$$\frac{y - 1.84}{-3.71 - 1{,}84} = \frac{x - 2.82}{-2.91 - 2.82}$$

-5.73y+10.54= -5.55x+15.65

-5.73y+5.55 x=5.11

$$5.73y+5.55x=-5.61$$
$$-5.73y+5.55\ x=5.11$$
$$11.10x=-0.50$$
$$x= -0.045$$

$$5.73y+5.55(-0.045) =-5.61$$
$$5.73y=-5.61+0.24975$$
$$Y=-0.935$$

The intersection of the diagonal lines is on the axis (-0.045, -0.935), which is in quadrant III.

The W–T quadrant of the SWOT matrix calls for a defensive strategy to reduce internal weaknesses and mitigate external threats. For women fishers pursuing sustainable blue entrepreneurship, this involves strengthening resilience, reducing vulnerability, and protecting socio-economic capital while minimizing environmental, market, and structural risks. The conceptual foundation of this defense strategy for fisherwomen is:

1) Resilience and vulnerability concepts that emphasize the importance of the adaptive capacity of communities to cope with external shocks such as climate change, price volatility, and declining catches (Hung et al., 2024). In practice, this dimension targets external threats such as climate-related supply disruptions and market volatility through income diversification, the adoption of low-cost technologies, and the build-up of emergency financial reserves (Lanlan et al., 2023).
2) Social capital & collective action emphasizes the role of cooperatives or women's groups in transforming social capital into economic power, reducing dependence on intermediaries, and strengthening marketing networks. Social capital includes trust, norms, and networks that facilitate cooperation among community members (Halstead et al., 2022). Collective action strengthens the group's bargaining position, reducing dependence on intermediaries and expanding market access (Ahmad et al., 2024). In a defensive strategy, this social power becomes a "shield" that protects companies from external shocks through mutual support (Pham et al., 2021). This mitigates fragmented supply chains and weak bargaining power by fostering trust-based networks and collective marketing, enabling women entrepreneurs to secure fairer prices and wider market access.

3) Adaptive co-management & quadruple helix offer a collaborative management approach that involves communities, academics, government, and the private sector, enabling more integrated and sustainable interventions (Sampaolo et al., 2021; Widjajanti et al., 2020). The adaptive co-management approach combines community-based resource management with support from external actors (Galappaththi et al., 2022). In the quadruple helix, four parties work together to develop mutually reinforcing policies, technologies, and markets (Widjajanti et al., 2020). This defensive strategy leverages collaboration to build adaptive systems addressing threats and policy gaps through coordinated advocacy and evidence-based policymaking. However, challenges such as limited institutional capacity, power imbalances, and conflicts of interest must be managed to ensure inclusive and equitable outcomes.

Defensive strategies in fisherwomen's entrepreneurship are not merely about surviving threats but about building structural buffers for business sustainability amid uncertainty. Grounded in three interrelated concepts, the W–T defensive strategy highlights the need to strengthen structural resilience and develop adaptive systems for long-term sustainability, aligning with the smart governance framework that fosters multi-stakeholder coordination, evidence-based planning, and integrated environmental–economic policies to enhance coastal community resilience (Salamzadeh et al., 2024). The W–T strategy in fisherwomen's entrepreneurship seeks to minimize internal weaknesses while anticipating external threats to business sustainability, particularly those from climate change—such as disrupted seafood supplies, price fluctuations, competition from large producers, and coastal ecosystem degradation. Institutionally, it also addresses weak legal protection, limited infrastructure, and the lack of recognition of women's roles.

Strengthening the basic capacities of economic actors is the first step to reducing dependence on intermediaries and expanding markets beyond local areas. This includes diversifying raw materials, applying simple processing technologies, and obtaining product certification to access formal markets. Strategic partnerships with cooperatives, village enterprises, larger MSMEs, and the tourism sector help mitigate market risks. Digitalization and technological literacy are vital for enabling women entrepreneurs to reach wider markets, reduce dependence, and increase efficiency. Digital

empowerment also bridges gender gaps and promotes environmental sustainability. Integrating social capital, adaptive co-management, and technological innovation enhances competitiveness while supporting the SDGs (Salamzadeh et al., 2025). In the long term, the strategy aims to embed women fishers in a gender-equitable blue economy through eco-friendly innovation and active political participation. Table 7 outlines three key dimensions of these defensive strategies addressing women entrepreneurs' weaknesses and threats.

Table 7: Mapping W–T Defensive Strategies for Women Fisherfolk Entrepreneurs

Defensive Strategy Pillars	Weaknesses Addressed (W)	Threats Addressed (T)	Strategic Approach/Action
Resilience & Vulnerability Management	- W1: Limited access to financing - W2: Weak financial management - W5: Uncertified products - W13: Sub-optimal business management - W14: Decline in marine production	- T1: Climate change disrupts marine supply - T3: Fluctuating raw material prices - T9: Marine pollution & industrial waste - T11: Ecosystem deterioration - T12: Limited fishing areas	- Diversification of income sources (marine products, marine tourism) - Financial literacy & reserve fund formation - Technology adaptation (cold storage, simple processing) - Gradual certification & product quality improvement
Social Capital & Collective Action	- W6: Traditional production equipment - W7: Dependent on middlemen - W8: Inconsistent product quality - W9: The dual role of working women	- T2: Competition from manufactured products - T7: Small local market - T10: Dependence	- Strengthening cooperatives/women's groups - Collective marketing & customer networks - Internal mentoring and group-based training - Resource sharing mechanisms & social

Defensive Strategy Pillars	Weaknesses Addressed (W)	Threats Addressed (T)	Strategic Approach/Action
	- W10: No training/mentoring - W15: Low gender participation in decision-making	on middlemen	support to reduce women's double burden
Adaptive Co-management & Quadruple Helix Collaboration	- W3: Low digital literacy - W4: Minimal formal education - W11: Low gender equality awareness - W12: Lack of data/information on coastal businesses	- T5: Inadequate infrastructure - T6: Minimal legal protection - T8: Women's roles under-recognized - T14: Occupational health risks	- Collaboration with academics for digital training and market research - Advocacy for inclusive policies and micro-business protection - Provision of infrastructure (warehouses, market access) through government and CSR - Technology platform for promotion and sales

Source: Authors' elaboration

Defensive strategies for women entrepreneurs in fisheries are built on three pillars addressing internal weaknesses and external threats. Resilience & Vulnerability Management enhances adaptive capacity through better financial access, simple technologies, certification, and income diversification to reduce exposure to price, climate, and ecosystem risks. Social Capital & Collective Action leverages networks and cooperatives to cut middlemen dependence, expand markets, and provide mentoring to overcome low digital literacy and dual burdens. Adaptive Co-Management & Quadruple Helix Collaboration links communities, academia, government, and industry to deliver training, technology, legal protection, and stronger participation of women in decision-making. Together, these pillars create a complementary defence system that strengthens the resilience and sustainability of women fishers' enterprises.

Conclusion

An integrated defensive strategy for fisherwomen toward sustainable blue entrepreneurship emphasizes strengthening adaptive capacity against external pressures and internal constraints. Through resilience and vulnerability management, women fishers build capacity to withstand climate and market shocks; social capital and collective action reduce dependence on middlemen; and adaptive co-management within the quadruple helix fosters collaboration among communities, academia, government, and the private sector. This strategy goes beyond survival, creating structural buffers—institutions, human capacity, and business diversification—that enable fisherwomen to become sustainable and resilient blue entrepreneurs. However, this single-case study limits generalisability to other coastal contexts, suggesting future comparative research across regions.

Policy recommendations include: (1) microcredit programs tailored to women-led fisheries, (2) formal recognition of women's roles through local regulations, (3) capacity-building in digital literacy, certification, and cooperative management, and (4) strengthened quadruple helix cooperation for coordinated policy, market, and technology support. These measures can shift women fishers from defensive survival to proactive participation in the sustainable blue economy.

Acknowledgments

The research presented in this paper was funded by the Ministry of Higher Education, Science and Technology of the Republic of Indonesia, contract number 016/LL6/PL/AL.04/2025. The author would also like to thank LPPM Universitas Semarang for its support.

References

[1] **Ahmad, S. R., Shadbolt, N., & Reid, J.** (2024). Collective action for rice smallholder's value chain: Insight from Yogyakarta, Indonesia. *Journal of Co-Operative Organization and Management*, *12*(1), 100236. https://doi.org/10.1016/j.jcom.2024.100236

[2] **Amon, D., Metaxas, A., Stentiford, G., Escovar-Fadul, X., Walker, T. R., Diana, Z., Karathanasi, F., Voyer, M., & Hemery, L.** (2022). Blue

economy for a sustainable future. In *One Earth* (Vol. 5, Issue 9, pp. 960–963). Cell Press. https://doi.org/10.1016/j.oneear.2022.08.017

[3] **Anand, A., Argade, P., Barkemeyer, R., & Salignac, F**. (2021). Trends and patterns in sustainable entrepreneurship research: A bibliometric review and research agenda. *Journal of Business Venturing*, *36*(3). https://doi.org/10.1016/j.jbusvent.2021.106092

[4] **Ayu, D., Pitaloka, D., Herlina, D., Suci, S. C., & Harahap, M. N.** (2025). Response of Indonesia's Fisheries GDP to Interest Rates, Inflation, Exchange Rates and Fisheries Sector Performance: A Blue Economy Perspective. *Jurnal Ilmu Manajemen Dan Ekonomika*, *17*(2). https://doi.org/10.35384/jime.v17i2.793

[5] **Bokayev, B., Utepova, G., Baktiyarova, G., & Baitassova, U.** (2024). Empowering Non-Governmental Organization Representatives: Enhancing Collaborative and Participatory Governance Through Training Initiatives. *Journal of Governance and Regulation*, *13*(2 Special issue), 419–430. https://doi.org/10.22495/jgrv13i2siart17

[6] **BPS-Statistics Indonesia**. (2021). *Statistical Year Book of Indonesia 2021* (Directorate of Statistical Dissemination, Ed.). BPS-Statistics Indonesia.

[7] **Carayannis, E. G., Campbell, D. F. J., & Grigoroudis, E.** (2022). Helix Trilogy: the Triple, Quadruple, and Quintuple Innovation Helices from a Theory, Policy, and Practice Set of Perspectives. *Journal of the Knowledge Economy*, *13*(3), 2272–2301. https://doi.org/10.1007/s13132-021-00813-x

[8] **Chambon, M., Miñarro, S., Alvarez Fernandez, S., Porcher, V., Reyes-Garcia, V., Tonalli Drouet, H., & Ziveri, P.** (2024). A synthesis of women's participation in small-scale fisheries management: why women's voices matter. *Reviews in Fish Biology and Fisheries*, *34*(1), 43–63. https://doi.org/10.1007/s11160-023-09806-2

[9] **Dijkstra, H., van Beukering, P., & Brouwer, R.** (2022). Marine plastic entrepreneurship; Exploring drivers, barriers and value creation in the blue economy. *Sustainable Technology and Entrepreneurship*, *1*(3). https://doi.org/10.1016/j.stae.2022.100018

[10] **Elston, J., Pinto, H., & Nogueira, C.** (2024). Tides of Change for a Sustainable Blue Economy: A Systematic Literature Review of Innovation in Maritime Activities. *Sustainability*, *16*(24), 11141. https://doi.org/10.3390/su162411141

[11] **Evans, L. S., Buchan, P. M., Fortnam, M., Honig, M., & Heaps, L.** (2023). Putting coastal communities at the center of a sustainable blue economy: A review of risks, opportunities, and strategies. *Frontiers in Political Science*, *4*. https://doi.org/10.3389/fpos.2022.1032204

[12] **Fan, P., Zhu, Y., Ye, Z., Zhang, G., Gu, S., Shen, Q., Meshram, S. G., & Alvandi, E.** (2023). Identification and Prioritization of Tourism Development Strategies Using SWOT, QSPM, and AHP: A Case Study of

Changbai Mountain in China. *Sustainability (Switzerland)*, *15*(6). https://doi.org/10.3390/su15064962

[13] **Figueiredo, R., Soliman, M., & Al-Alawi, A. N.** (2023). *Deep Blue Entrepreneurship: Ocean Venturing and Infinite Opportunity* (pp. 5–17). https://doi.org/10.1108/S2040-724620230000016002

[14] **Franzke, S., Wu, J., Froese, F. J., & Chan, Z. X.** (2022). Female entrepreneurship in Asia: a critical review and future directions. *Asian Business & Management*, *21*(3), 343–372. https://doi.org/10.1057/s41291-022-00186-2

[15] **Freeman, R., & Svels, K.** (2022). Women's empowerment in small-scale fisheries: The impact of Fisheries Local Action Groups. *Marine Policy*, *136*, 104907. https://doi.org/10.1016/j.marpol.2021.104907

[16] **Galappaththi, E. K., Falardeau, M., Harris, L. N., Rocha, J. C., Moore, J.-S., & Berkes, F.** (2022). Resilience-based steps for adaptive co-management of Arctic small-scale fisheries. *Environmental Research Letters*, *17*(8), 083004. https://doi.org/10.1088/1748-9326/ac7b37

[17] **Halstead, J. M., Deller, S. C., & Leyden, K. M.** (2022). Social capital and community development: Where do we go from here? *Community Development*, *53*(1), 92–108. https://doi.org/10.1080/15575330.2021.1943696

[18] **Hung, C.-H., Hung, H.-C., & Hsu, M.-C.** (2024). Linking the interplay of resilience, vulnerability, and adaptation to long-term changes in metropolitan spaces for climate-related disaster risk management. *Climate Risk Management*, *44*, 100618. https://doi.org/10.1016/j.crm.2024.100618

[19] **Joseph, D., Miri, D., & Mswaka, W.** (2025). Digital technology affordance and constraints in informal economies: a micro-entrepreneurial study. *Journal of Small Business and Enterprise Development*. https://doi.org/10.1108/JSBED-10-2023-0480

[20] **Kyvelou, S. S., Marava, N., & Ierapetritis, D. G.** (2025). Leveraging Maritime Cultural Heritage to Drive Smart Specialization Strategies: Fostering Innovation, Blue Economy, and Sustainable Development. *Heritage*, *8*(6), 192. https://doi.org/10.3390/heritage8060192

[21] **Lanlan, J., Sarker, M. N. I., Ali, I., Firdaus, R. B. R., & Hossin, M. A.** (2023). Vulnerability and resilience in the context of natural hazards: a critical conceptual analysis. *Environment, Development and Sustainability*, *26*(8), 19069–19092. https://doi.org/10.1007/s10668-023-03440-5

[22] **Loizidou, X. I., Orthodoxou, D. L., Rupić, I. B., & Kassinis, G.** (2024). Developing a Joint Strategy for Fostering Sustainable Blue Economies in Cyprus and Croatia: The Work of the SeaTecHub project. *Journal of Coastal Research*, *113*(sp1). https://doi.org/10.2112/JCR-SI113-017.1

[23] **Mardiyana, M., Ihsan, M., Adrial, A., Parida, H., Sidiq, S., & Hidayat, T.** (2022). A SWOT (Strength Weakness Opportunity and Threat) Analysis

as a Strategy to Enhance Competitiveness. *International Journal of Management Science and Application*, *1*(1), 18–27. https://doi.org/10.58291/ijmsa.v1i1.8

[24] **Martínez-Vázquez, R. M., Milán-García, J., & de Pablo Valenciano, J.** (2021). Challenges of the Blue Economy: evidence and research trends. *Environmental Sciences Europe*, *33*(1). https://doi.org/10.1186/s12302-021-00502-1

[25] **Mihajlović, I., Perišić, M., Brkić, V. S., Milošević, I., & Milijić, N.** (2024). Digitalization of Strategic Decision-Making in Manufacturing SMEs: A Quantitative SWOT-TOWS Analysis. *Precision Mechanics & Digital Fabrication*, *1*(3), 176–188. https://doi.org/10.56578/pmdf010305

[26] **Mittal, V., & Raman, T. V.** (2021). Examining the determinants and consequences of financial constraints faced by Micro, Small and Medium Enterprises' owners. *World Journal of Entrepreneurship, Management and Sustainable Development*, *ahead-of-print* (ahead-of-print). https://doi.org/10.1108/WJEMSD-07-2020-0089

[27] **Morawska-Jancelewicz, J.** (2022). The Role of Universities in Social Innovation Within Quadruple/Quintuple Helix Model: Practical Implications from Polish Experience. *Journal of the Knowledge Economy*, *13*(3), 2230–2271. https://doi.org/10.1007/s13132-021-00804-y

[28] **Nashrullah, A. H., Wati, I. K., Sudarmiatin, & Firmansyah, R.** (2024). Collaborative Strategies Between Government and SMEs In The Northern Coastal Region: Integrating Entrepreneurship Education To Support SDGS. *Economics and Business Journal (ECBIS)*, *3*(1), 101–116. https://doi.org/10.47353/ecbis.v3i1.164

[29] **Nicolosi, A., Di Gregorio, D., Arena, G., Laganà, V. R., & Privitera, D.** (2021). Small-Scale Coastal Fisheries in the Midst of Adaptation and Diversification: Insights from Southern Italy. *Sustainability*, *13*(13), 7393. https://doi.org/10.3390/su13137393

[30] **Petersen-Rockney, M., Baur, P., Guzman, A., Bender, S. F., Calo, A., Castillo, F., De Master, K., Dumont, A., Esquivel, K., Kremen, C., LaChance, J., Mooshammer, M., Ory, J., Price, M. J., Socolar, Y., Stanley, P., Iles, A., & Bowles, T.** (2021). Narrow and Brittle or Broad and Nimble? Comparing Adaptive Capacity in Simplifying and Diversifying Farming Systems. *Frontiers in Sustainable Food Systems*, *5*. https://doi.org/10.3389/fsufs.2021.564900

[31] **Pham, L. D. Q., Coles, T., Ritchie, B. W., & Wang, J.** (2021). Building business resilience to external shocks: Conceptualising the role of social networks to small tourism & hospitality businesses. *Journal of Hospitality and Tourism Management*, *48*, 210–219. https://doi.org/10.1016/j.jhtm.2021.06.012

[32] **Putra, A. H., Sompa, A. T., & Syafari, M. R.** (2021). Empowerment of Fishermen Community Joint Business Group (KUB) - A 2018 Case Study on Fishing Boat Relief in Kusan Hilir District, South Borneo, Indonesia. *European Journal of Human Resource Management Studies*, *5*(1). https://doi.org/10.46827/ejhrms.v5i1.1027

[33] **Rahaman, Md. S., Dana, L. P., & Anjum, N.** (2024). Empowering Women in Building a Sustainable Blue Economy. In *Handbook of Sustainable Blue Economy* (pp. 1–20). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-32671-4_6-1

[34] **Rahmiyati, N., & Rachmawati, T.** (2023). Economic Empowerment Strategy Model For Coastal Women On The Basis Of Blue Economy And Local Potential In Surabaya. *International Journal of Artificial Intelegence Research*, *7*(1), 1. https://doi.org/10.29099/ijair.v7i1.1.1043

[35] **Rashid, N. K. A., Lani, M. N., Ariffin, E. H., Mohamad, Z., & Ismail, I. R.** (2024). Community Engagement and Social Innovation Through Knowledge Transfer: Micro Evidence from Setiu Fishermen in Terengganu, Malaysia. *Journal of the Knowledge Economy*, *15*(1), 1069–1086. https://doi.org/10.1007/s13132-023-01102-5

[36] **Roy, A., Manna, R. K., Ghosh, S., Sahu, S. K., & Das, B. K.** (2023). Assessment of women's contribution in small-scale fisheries in Indian Sundarbans: Issues, strategies, and way forward for sustainability. *Fisheries Management and Ecology*, *30*(4), 378–391. https://doi.org/10.1111/fme.12630

[37] **Sabado, W.** (2025). Artificial intelligence in higher-level education: A SWOT analysis and 20-year bibliometric analysis using VOSviewer. *Heritage and Sustainable Development*, *7*(2), 783–798. https://doi.org/10.37868/hsd.v7i2.1272

[38] **Salamzadeh, A., Dana, L. P., Hadizadeh, M., & Yazdanpanah, Y.** (2024). Smart Governance and Sustainable Blue Economy. In *Handbook of Sustainable Blue Economy* (pp. 1–23). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-32671-4_1-1

[39] **Salamzadeh, A., Salamzadeh, Y., & Hadizadeh, M.** (2025). Digital empowerment of women entrepreneurs in emerging markets: bridging the gender gap for environmental sustainability. *International Journal of Organizational Analysis*. https://doi.org/10.1108/IJOA-01-2025-5120

[40] **Sampaolo, G., Lepore, D., & Spigarelli, F.** (2021). Blue economy and the quadruple helix model: the case of Qingdao. *Environment, Development and Sustainability*, *23*(11), 16803–16818. https://doi.org/10.1007/s10668-021-01378-0

[41] **Selim, S., Zahid, A., Ahmad, B., Hasan, Md. R., & Hossain, Md. A.** (2025). Factors Influencing Women's Participation in Nonfarm Economic

Activities: Insights From the Fishing Community of Chandpur, Bangladesh. *Diversity & Inclusion Research*, *2*(3). https://doi.org/10.1002/dvr2.70034

[42] **Sugiyanto, E. K., Perdhana, M. S., Rahmawati, S. N., & Ariefiantoro, T.** (2021). Psychological Empowerment and Women Entrepreneurial Success: the Mediating Role of Proactive Behavior. *Academy of Entrepreneurship Journal*, *27*(Special Issue 4), 1–10.

[43] **Sugiyanto, E. K., Suharnomo, & Perdhana, M. S.** (2024). Women's Empowerment in The Framework of Developing Innovative Behavior for Women's Entrepreneurial Success. *Journal of Women's Entrepreneurship and Education*. https://doi.org/10.28934/jwee24.34.pp50-72

[44] **Sugiyanto, E. K., & Wijayanti, R.** (2023). How Innovativeness Influence on Women Business Performance. *International Research Journal of Business Studies*, *15*(3), 219–227.

[45] **Sugiyanto, E. K., & Wijayanti, R**. (2024). Driver Factors of Successful Woman Entrepreneurs Go Green: A Systematic Literature Review and Future Research Agenda. In B. Alareeni & A. Hamdan (Eds.), *Technology: Toward Business Sustainability. ICBT 2023* (pp. 342–356). Springer. https://doi.org/10.1007/978-3-031-54009-7_32

[46] **Swathi Lekshmi, P. S., Radhakrishnan, K., Narayanakumar, R., Vipinkumar, V. P., Parappurathu, S., Salim, S. S., Johnson, B., & Pattnaik, P.** (2022). Gender and small-scale fisheries: Contribution to livelihood and local economies. *Marine Policy*, *136*, 104913. https://doi.org/10.1016/j.marpol.2021.104913

[47] **Veríssimo, N. V., Mussagy, C. U., Oshiro, A. A., Mendonça, C. M. N., Santos-Ebinuma, V. de C., Pessoa, A., Oliveira, R. P. de S., & Pereira, J. F. B.** (2021). From green to blue economy: Marine biorefineries for a sustainable ocean-based economy. *Green Chemistry*, *23*(23), 9377–9400. https://doi.org/10.1039/D1GC03191K

[48] **Widjajanti, K., Nuryakin, & Sugiyanto, E. K.** (2020). The synergy between academic support, government regulation, business sector, and civil society to enhancing innovation ecosystem Indonesian SMEs. *Journal of Educational and Social Research*, *10*(5), 108–118. https://doi.org/10.36941/JESR-2020-0092

Article history: Received: August 20, 2025

Accepted: October 24, 2025

First Online: October 27, 2025