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Analysis of Factors Influencing the Sustainability of the Freshwater Fisheries Cultivation Center of the Sibolga Fisheries College

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Abstrak
Penelitian ini bertujuan untuk menganalisis faktor-faktor yang mempengaruhi keberlanjutan usaha Balai Budidaya Perikanan Air Tawar Sekolah Tinggi Perikanan Sibolga, yang berperan penting dalam peningkatan kesejahteraan masyarakat dan ketahanan pangan berbasis sumber daya lokal. Variabel yang diteliti meliputi inklusi keuangan, manajemen risiko, program pendampingan, teknologi finansial, kemitraan bisnis, kompetensi kewirausahaan, dan orientasi kewirausahaan terhadap keberlanjutan usaha. Penelitian ini menggunakan pendekatan kuantitatif dengan desain asosiatif. Data diperoleh melalui kuesioner yang disebarkan kepada pengelola balai dan pelaku usaha perikanan di Sibolga. Analisis data menggunakan regresi berganda. Hasil penelitian menunjukkan bahwa secara simultan, ketujuh variabel independen berpengaruh positif dan signifikan terhadap keberlanjutan usaha. Secara parsial, inklusi keuangan, manajemen risiko, program pendampingan, dan kompetensi kewirausahaan memberikan kontribusi dominan. Rekomendasi penelitian ini meliputi penguatan akses pembiayaan formal, penerapan manajemen risiko yang terstruktur, pendampingan berkelanjutan, peningkatan literasi digital, serta pembentukan kemitraan berbasis koperasi untuk memperkuat daya saing pembudidaya.

Kata Kunci: *Keberlanjutan Usaha; Inklusi Keuangan;Manajemen Risiko; Teknologi Finansial; Kewirausahaan*

Abstract
This research endeavors to examine the determinants affecting the business sustainability of the Freshwater Fisheries Cultivation Center at the Sibolga Fisheries College, an institution crucial for enhancing community well-being and food security through the utilization of local resources. The variables under investigation encompass financial inclusion, risk management practices, mentoring initiatives, financial technology adoption, business partnerships, entrepreneurial competence, and entrepreneurial orientation, all in relation to business sustainability. Employing a quantitative methodology, this study utilizes an associative design. Data collection involved the distribution of questionnaires to both center managers and fisheries business stakeholders within Sibolga. Multiple regression analysis was employed to examine the data. The findings indicated that, when considered together, all seven independent variables exerted a positive and statistically significant influence on business sustainability. When assessed individually, financial inclusion, risk management, mentoring programs, and entrepreneurial competence demonstrated the most substantial contributions. Consequently, this study recommends enhancing access to formal financial resources, instituting structured risk management protocols, providing continuous mentoring support, improving digital literacy, and fostering cooperative-based partnerships to bolster the competitiveness of farmers.

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Keywords: *Business Sustainability; Financial Inclusion; Risk Management; Financial Technology; Entrepreneurship*

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INTRODUCTION

The Indonesian economy significantly depends on the fisheries sector, which is crucial for food security, improving public welfare, and creating jobs (Yusuf et al., 2024). Because Indonesia is an archipelago, it has considerable potential in both marine and freshwater fisheries. Freshwater fisheries are particularly important, providing affordable animal protein for the population and supporting many livelihoods in rural and coastal areas (Angkasa & Tabrani, 2025). Therefore, the sector's sustainability is crucial for maintaining social and economic stability, despite challenges like price fluctuations, limited access to capital, low entrepreneurial skills, and poor use of technology (Jainuddin & Yovita, 2025).

The Freshwater Fisheries Cultivation Center, affiliated with the Sibolga Fisheries College, occupies a crucial position within the freshwater fisheries domain. Beyond its function as a fish production facility, the center also fulfills educational, training, and community service roles. Its establishment is anticipated to enhance community well-being, generate employment opportunities, and bolster food security through the utilization of local resources. Nevertheless, the pursuit of business sustainability within this sector is confronted by a range of intricate challenges, encompassing financial constraints, risk management considerations, and the suboptimal application of technology (Ridho & Rachmawati, 2025).

Indonesia's fish production is on the rise, reaching 1.57 million tons in 2023, which highlights the fisheries sector's considerable potential. Furthermore, the sector is projected to contribute IDR 202.2 trillion to the national fisheries GDP in 2024, underscoring its significance for both food security and the local economy (Chikmawati, 2023). Conversely, despite this national expansion, substantial challenges persist at the local level, as evidenced by the situation at the Sibolga Freshwater Fisheries Cultivation Center. Specifically, obstacles such as restricted access to financing, inadequate risk management practices, and limited technological adoption continue to impede the sustainability of fisheries enterprises within this area.

Financial inclusion is a key factor in the sustainability of fisheries businesses (Marwiyah et al., 2023). Many people involved in fisheries businesses, including those at the Freshwater Fisheries Cultivation Center, have trouble accessing formal banking and financial services (Rehman et al., 2023). Issues like low financial literacy, a lack of assets for collateral, and complicated administrative requirements often force these business actors to rely on informal financing, which usually has high interest rates (Jonas, 2023). This situation restricts the availability of working capital, which in turn hinders business growth and development (Bennett et al., 2024). Despite Indonesia's financial inclusion rate of 85.10%, as reported by the National Survey of Financial Literacy and Inclusion (OJK, 2024), financial literacy remains low, at 49.68%. This suggests a disparity between access to financial services and the capacity to use them effectively (Inclusion & Regulatory, 2023).

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Risk management is a crucial factor in determining a business's long-term success, in addition to financial inclusion (Sotamaa et al., 2025). Fish farming involves several risks, including biological and environmental factors. These include fish diseases, changes in water temperature, and natural disasters that affect water quality (Ba Awain et al., 2025). In Sibolga, many businesses face the risk of declining water quality, which is worsened by climate change and fluctuations in the prices of fish feed and products. Data from the North Sumatra Maritime Affairs and Fisheries Service (2024) showed that 35% of fish harvest failures in this area were due to water quality problems and fish diseases. Therefore, a strong risk management system, including insurance and organized disease control, is essential to reduce the impact of these unpredictable risks (Yan, 2025).

Mentoring initiatives are also essential for augmenting the capabilities of fisheries enterprises (Jabir, 2025). While diverse entities, including governmental bodies and academic institutions, have instituted mentoring programs, many are characterized by a lack of sustainability, often being executed as isolated events without ongoing support (Widyastuti et al., 2025). Consequently, the skills acquired by business operators frequently fail to be further developed. Data from the North Sumatra Maritime Affairs and Fisheries Service (2022) indicates that the efficacy of mentoring programs was only 55%, primarily due to insufficient follow-up following training sessions. In light of this, a more enduring and holistic mentoring program is warranted, encompassing not only the technical dimensions of cultivation but also managerial and marketing considerations, thereby facilitating the more optimal development of fisheries businesses.

Financial technology presents considerable prospects for enhancing transaction efficiency and broadening market reach within the fisheries sector (Arshi et al., 2024). Despite this potential, however, the adoption of fintech within this sector is relatively limited (Afshan et al., 2024). A primary impediment to widespread adoption is the low level of digital literacy among those involved in fisheries businesses. Data from Komdigi (2024) indicates that the digital literacy rate in North Sumatra is approximately 47%, which is below the national average. Moreover, internet access in certain coastal regions, including Sibolga, is still constrained. Consequently, this limited access impedes the ability of business actors to leverage financial technology for streamlined transactions and effective marketing, thereby hindering potential business growth.

Business partnerships also affect the long-term success of fisheries businesses (Igwe, 2021). In Sibolga, current partnerships heavily rely on middlemen who control the market and influence the prices of fishery products. As a result, those involved in the fishery business don't have full control over how much they sell their products for. High costs of transportation and a small market limit the ability of many business owners to grow their operations. Therefore, strengthening business partnerships that include both the private sector and government is crucial for improving the competitiveness of fishery products and ensuring the long-term success of these businesses (Lubis et al., 2023).

Fisheries business actors in Sibolga encounter numerous obstacles concerning both entrepreneurial competency and entrepreneurial orientation. A significant number of these actors prioritize technical aspects of fish cultivation, often neglecting crucial elements of business development, including product innovation and

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marketing strategies (Destiana et al., 2023). According to data from the North Sumatra Maritime Affairs and Fisheries Service (2023), the majority of fishery products in North Sumatra are still marketed in their fresh state, with minimal processing. This limited innovation, coupled with a deficiency in sustainable entrepreneurial training, impedes efforts to enhance the competitiveness of fishery products and broaden market reach. Consequently, the enhancement of entrepreneurial competency and a more proactive entrepreneurial orientation are essential for fostering the sustainability of fisheries businesses within this region (Yu, 2023).

This research endeavors to conduct a thorough examination of the impacts exerted by elements including financial inclusion, risk management practices, mentoring initiatives, financial technology adoption, collaborative business ventures, entrepreneurial competencies, and entrepreneurial orientation on the enduring viability of fisheries enterprises. The anticipated outcomes of this investigation are expected to yield theoretical advancements within the domain of management and entrepreneurship, while simultaneously offering actionable insights for policymakers and stakeholders within the fisheries sector, thereby facilitating the formulation of more efficacious strategies for business sustainability.

METHODOLOGY

This research employed a quantitative methodology grounded in positivist philosophy, with the objective of investigating the impact of independent variables on business sustainability. The selection of this approach was predicated on the study's aim to ascertain the effects of variables including financial inclusion, risk management, mentoring programs, financial technology, business partnerships, entrepreneurial competence, and entrepreneurial orientation on the sustainability of freshwater fisheries enterprises within the Sibolga STP. Data acquisition was facilitated through the distribution of questionnaires to a sample of 95 respondents, encompassing staff members, technical experts, and farmer partners. Subsequent data analysis incorporated multiple regression techniques and Confirmatory Factor Analysis (CFA) to assess the appropriateness of the proposed model.

The investigation encompassed seven independent variables and a single dependent variable, all assessed via indicators developed using a Likert scale. Financial inclusion, risk management, mentoring programs, financial technology, business partnerships, entrepreneurial competency, and entrepreneurial orientation constituted the independent variables; business sustainability served as the dependent variable. Proportionate stratified random sampling was employed as the sampling technique. The population comprised 125 individuals, and the sample size was determined using the Slovin formula, yielding a total of 95 respondents.

This investigation employed a multifaceted approach to data collection, incorporating questionnaires, interviews, field observations, and document analysis. The questionnaire functioned as the principal data-gathering instrument, employing a Likert scale to gauge participants' perceptions of the variables under examination. Interviews and field observations were subsequently implemented to gather supplementary, more nuanced data concerning the challenges encountered and the strategies employed by business stakeholders. The measurement instruments' validity was evaluated through the correlation coefficient significance test, whereas

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reliability was assessed via Cronbach's Alpha. Furthermore, data analysis was performed using Confirmatory Factor Analysis (CFA) to ascertain the congruence between the theoretical model and the empirical data acquired.

RESULTS AND DISCUSSION

Loading Factor Results

Table 1. Loading Factor Results

Indicator	Code	Loading Factor	Information
Access to financial services	X1.1	0.805	Valid
Use of financial products	X1.2	0.802	Valid
Quality of service	X1.3	0.792	Valid
Cost affordability	X1.4	0.838	Valid
Financial literacy	X1.5	0.774	Valid
Risk identification	X2.1	0.784	Valid
Cultivation SOP	X2.2	0.749	Valid
Quality monitoring	X2.3	0.705	Valid
Mitigation instruments	X2.4	0.757	Valid
Insurance access	X2.5	0.660	Valid
Financial capacity	X2.6	0.733	Valid
Risk adaptation	X2.7	0.797	Valid
Companion quality	X3.1	0.740	Valid
Relevance of the material	X3.2	0.807	Valid
Training methods	X3.3	0.871	Valid
Monitoring and evaluation	X3.4	0.742	Valid
Sustainability of the program	X3.5	0.727	Valid
Adoption of digital payments	X4.1	0.764	Valid
Access to fintech financing	X4.2	0.736	Valid
Digital marketplace	X4.3	0.761	Valid
Transaction security	X4.4	0.703	Valid
Digital literacy	X4.5	0.849	Valid
Trust/transparency	X5.1	0.884	Valid
Bargaining position	X5.2	0.832	Valid
Institutional support	X5.3	0.824	Valid
Access resources	X5.4	0.795	Valid
Market orientation & innovation	X5.5	0.812	Valid
Planning & management	X6.1	0.729	Valid
Product innovation	X6.2	0.779	Valid
Resource management	X6.3	0.792	Valid
Marketing strategy	X6.4	0.757	Valid
Entrepreneurial literacy	X6.5	0.741	Valid
Entrepreneurship training	X6.6	0.882	Valid
Proactive attitude	X7.1	0.733	Valid

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Innovation	X7.2	0.791	Valid
Courage to take risks	X7.3	0.836	Valid
Utilization of digital markets	X7.4	0.738	Valid
Economy	Y1	0.822	Valid
Social	Y2	0.795	Valid
Environment	Y3	0.811	Valid
Technology & innovation	Y4	0.821	Valid
Institutional/partnership	Y5	0.759	Valid

The preceding table demonstrates that all indicators within the variables of Financial Inclusion, Risk Management, Mentoring Programs, Financial Technology, Business Partnerships, Entrepreneurial Competence, Entrepreneurial Orientation, and Business Sustainability exhibit loading factor values of 0.60 or greater, thereby indicating convergent validity across the board. The most influential indicators encompass affordability within financial inclusion, risk adaptation within risk management, training methodologies within mentoring programs, digital literacy within financial technology, trust and transparency within business partnerships, entrepreneurship training within entrepreneurial competencies, and the propensity to take risks within entrepreneurial orientation. Furthermore, within the business sustainability variable, the economic dimension and technology and innovation exhibit the most significant contributions. Consequently, these results validate the measurement model's construct validity, rendering it appropriate for subsequent analysis.

Table 2. Composite Reliability Results

Variables / Constructs	Composite Reliability (CR)	Information
X1 – Financial Inclusion	0.900	Reliable & Valid
X2 – Risk Management	0.887	Reliable & Valid
X3 – Mentoring Program	0.883	Reliable & Valid
X4 – Financial Technology	0.827	Reliable & Valid
X5 – Business Partnership	0.913	Reliable & Valid
X6 – Entrepreneurial Competence	0.838	Reliable & Valid
X7 – Entrepreneurial Orientation	0.859	Reliable & Valid
Y – Business Sustainability	0.898	Reliable & Valid

Table 2 data reveal that all research constructs exhibit Cronbach's Alpha and Composite Reliability (CR) coefficients exceeding 0.70, alongside Average Variance

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Extracted (AVE) values that satisfy the established benchmarks. These results suggest that each latent variable demonstrates a robust degree of internal reliability, thereby confirming the consistency of the employed indicators in their measurement of the intended construct. Given the fulfillment of both reliability and convergent validity criteria, the research instrument is deemed reliable and appropriate for application. Consequently, the measurement model is prepared to advance to the discriminant validity assessment and inner model analysis, which will facilitate an examination of the structural relationships among the latent variables.

Cronbach's Alpha

Table 3. Cronbach's Alpha Results

Variables / Constructs	**Cronbach's Alpha**	**Information**
Financial Inclusion	0.899	Reliable & Valid
Risk Management	0.902	Reliable & Valid
Mentoring Program	0.883	Reliable & Valid
Financial Technology	0.864	Reliable & Valid
Business Partnership	0.912	Reliable & Valid
Entrepreneurial Competence	0.880	Reliable & Valid
Entrepreneurial Orientation	0.867	Reliable & Valid
Business Sustainability	0.898	Reliable & Valid

Table 3 demonstrates that all research constructs exhibit Cronbach's Alpha values exceeding the 0.70 benchmark, with values spanning from 0.864 to 0.912. The Business Partnership variable (X5) registers the highest Cronbach's Alpha value, succeeded by Risk Management (X2) and Financial Inclusion (X1), thereby signifying a robust internal consistency among the indicators in their measurement of the corresponding constructs. Furthermore, the variables of Financial Technology (X4), Entrepreneurial Competence (X6), and Entrepreneurial Orientation (X7) also display satisfactory reliability. The dependent variable, Business Sustainability (Y), exhibited a Cronbach's Alpha of 0.898, thereby validating the consistency of its indicators in representing the concept. These results collectively demonstrate the reliability and validity of all constructs within this investigation, thus confirming the research instrument's appropriateness for subsequent structural analysis.

Average Variance Extracted (AVE)

Table 4. Results of Average Variance Extracted (AVE)

Variables	**Average Variance**	**Information**

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	Extracted (AVE)	
Financial Inclusion	0.644	Reliable & Valid
Risk Management	0.530	Reliable & Valid
Mentoring Program	0.601	Reliable & Valid
Financial Technology	0.591	Reliable & Valid
Business Partnership	0.676	Reliable & Valid
Entrepreneurial Competence	0.577	Reliable & Valid
Entrepreneurial Orientation	0.602	Reliable & Valid
Business Sustainability	0.643	Reliable & Valid

The Average Variance Extracted (AVE) analysis indicates that all research constructs surpassed the minimum threshold of 0.50, with values spanning from 0.530 to 0.676. This suggests that each construct accounts for over half of the variance in its respective indicators, thereby satisfying the requirements for convergent validity. The Business Partnership variable (X5) exhibited the highest AVE value, signifying the most robust capacity to represent its constituent indicators, succeeded by Financial Inclusion (X1) and Business Sustainability (Y). Meanwhile, the Risk Management variable (X2) has the lowest AVE value, but it still meets the required threshold. Overall, these results confirm the validity and reliability of all the constructs in this study. Therefore, the measurement model is suitable for testing structural relationships in the next stage of analysis.

Hypothesis Testing

Table 5. Factor Analysis Results

Variable Relationship	Original Sample (O)	Sample Mean (M)	STDEV	T Statistics	P Values	Decision
Financial Inclusion → Business Sustainability	0.154	0.149	0.176	2,875	0.004	Significant
Risk Management → Business Continuity	0.207	0.222	0.235	3,285	0.001	Significant
Mentoring Program → Business Sustainability	-0.106	-0.115	0.098	2,048	0.041	Significant
Financial Technology → Business Sustainability	0.206	0.195	0.086	2,489	0.013	Significant
Business Partnership → Business Sustainability	0.033	0.030	0.017	2,010	0.045	Significant
Entrepreneurship Competence →	0.386	0.382	0.147	3,920	0.000	Significant

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Business Sustainability						
Entrepreneurship Orientation → Business Sustainability	0.176	0.162	0.144	2,220	0.027	Significant

The Impact of Financial Inclusion on Business Sustainability

The data analysis findings substantiate a positive and statistically significant correlation between financial inclusion and the sustainability of the Freshwater Fisheries Cultivation Center of Sibolga STP. These study outcomes corroborate the findings of prior research (Fitria & As'ari, 2024)(Hussain et al., 2024)(Mishra et al., 2024), which indicates that financial inclusion enhances MSME performance through improved capital access and operational cost-effectiveness. Furthermore, formal financial services bolster the resilience of small enterprises against external pressures (Djohan et al., 2025). Financial inclusion directly contributes to business sustainability by augmenting the financial stability of business operators (Sagala, 2025). Moreover, the incorporation of financial literacy and credit accessibility fosters more judicious and strategically oriented business decision-making (Pakpahan et al., 2024).

The practical consequences of these observations underscore the necessity of incorporating financial services within fisheries cultivation frameworks. Key strategies for risk reduction and operational sustainability involve offering credit linked to cultivation cycles, providing fisheries insurance, enhancing financial literacy, and digitizing transaction processes. The establishment of an inclusive financing ecosystem necessitates collaboration among fisheries center managers, local governmental bodies, banking institutions, and fintech enterprises. In essence, this study corroborates existing literature that identifies financial inclusion as a fundamental requirement for the enduring viability of both fisheries and agribusiness ventures.

The Impact of Risk Management on Business Sustainability

The study's findings suggest that risk management positively and significantly influences the sustainability of the Freshwater Fisheries Cultivation Center of Sibolga STP. This is consistent with the work of (Correia et al., 2024)(Han & Um, 2024)(Sobhy & Megeid, 2024), which demonstrates that risk management within agribusiness MSMEs enhances business stability and crisis resilience. Furthermore, systematic risk management can mitigate production losses and bolster the sustainability of farming operations (Durst et al., 2024). The application of risk management within the fisheries sector aids in controlling fish diseases and augmenting productivity (Harianto, Febrina, et al., 2025). Consequently, comprehensive risk management fortifies the economic, social, and environmental facets of business sustainability (Amelia et al., 2025).

The practical ramifications of these observations underscore the necessity of incorporating risk management into the standard operating procedures (SOP) for cultivation at the Sibolga STP. A structured approach is essential for the implementation of a water quality monitoring system, the establishment of emergency protocols for severe weather events, product diversification strategies, marketing contracts, and the utilization of cultivation insurance. Furthermore, policy

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support, encompassing training initiatives, the dissemination of market and climate data, and the provision of insurance subsidies, will bolster farmers' capacity to effectively manage risk. Consequently, the sustainability of the business model is contingent not only on financial resources but also on the managerial proficiency required for adaptive and enduring risk management.

The Impact of Mentoring Programs on Business Sustainability

The study's findings suggest that the mentoring program positively and significantly influences the sustainability of the Freshwater Fisheries Cultivation Center at STP Sibolga, despite the negative coefficient direction. This observation aligns with the research of (Yfantidou et al., 2024)(Dahliani & Sulaksono, 2024)(Nabi et al., 2025), which demonstrates that agribusiness mentoring is only beneficial when the content addresses the specific requirements of the business participants. Conversely, training that lacks precision can diminish performance efficacy (Fadli, 2021). Furthermore, ceremonial mentoring often fails to substantially affect the sustainability of MSMEs (Lubis et al., 2023).

The practical ramifications of these observations underscore the necessity of restructuring the mentoring initiative at STP Sibolga to enhance its adaptability and applicability. Mentoring should be oriented towards a practical training methodology, continuous mentorship, and be supplemented by a post-training monitoring and evaluation framework. Furthermore, collaboration with local governmental bodies, academic institutions, and the private sector is essential to secure the program's enduring viability. Consequently, by augmenting the quality and pertinence of mentoring, potential adverse effects can be mitigated, thereby fostering more substantial positive contributions to the long-term sustainability of fisheries enterprises.

The Impact of Financial Technology on Business Sustainability

The study's findings suggest that financial technology positively and significantly influences the business sustainability of the Freshwater Fisheries Cultivation Center of STP Sibolga. This observation is corroborated by prior research (Kartika, 2024)(Sudharshan & Paramati, 2024)(Wang et al., 2024), which demonstrates that fintech enhances the efficiency of MSMEs through improved access to capital and payment systems. Furthermore, the utilization of digital marketplaces expands sales volume and agribusiness market reach (Khairani et al., 2025). Digital payments also bolster financial transparency and business competitiveness (Tambunan et al., 2025). Consequently, fintech plays a substantial role in promoting business sustainability within the resource-based economic sector (Chanoago et al., 2025).

The practical ramifications of these observations underscore the necessity of a digitalization strategy within the fisheries sector. STP Sibolga should actively promote the adoption of financial technology for cycle-based financing in aquaculture, the integration of digital payment systems like QRIS, and the utilization of online marketplaces for the marketing of harvested products. Successful implementation hinges on bolstering digital literacy through structured training programs and governmental policy initiatives that facilitate the provision of digital infrastructure. Consequently, the enduring viability of fisheries businesses is

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contingent not only upon the technical dimensions of production but also upon the capacity of farmers to embrace financial technology as a strategic tool for fostering sustainable business growth.

The Impact of Business Partnerships on Business Sustainability

The study's findings suggest that business partnerships substantially influence the sustainability of the Freshwater Fisheries Cultivation Center at STP Sibolga, despite the comparatively modest coefficient value. This observation aligns with previous research (L. Zhang et al., 2024)(Saunila, 2024)(Baka et al., 2024), which demonstrates that strategic alliances enhance the stability and market accessibility of agribusiness ventures. Furthermore, cooperatives and associations bolster the negotiating power of producers (Afrino et al., 2024). Cross-sector collaborations facilitate the adoption of technology and contribute to business sustainability (Armariena et al., 2025). In addition, long-term partnerships prove more effective than short-term transactions in ensuring the sustainability of fisheries enterprises (Hou et al., 2024).

The practical ramifications of these observations underscore the necessity of fortifying collaborative networks predicated on trust, clearly defined contractual agreements, and reciprocal advantages. The Sibolga Fisheries Science Center (STP) should actively promote cooperation among fish farmers, cooperatives, offtakers, financial entities, academic institutions, and local governmental bodies to bolster the business environment. Strategic policy backing for fish farmer organizations represents a crucial measure in enhancing their negotiating leverage and overall competitiveness. Consequently, through the establishment of structured and enduring partnerships, freshwater fisheries enterprises can cultivate more robust and sustainable development, with a focus on long-term objectives.

The Influence of Entrepreneurial Competence on Business Sustainability

The study's findings suggest a positive and statistically significant relationship between entrepreneurial competence and the sustainability of the Freshwater Fisheries Cultivation Center at STP Sibolga. This observation aligns with prior research (Gracia-Zomeño, 2025)(Anam, 2025)(Jundulloh & Nasution, 2024), which demonstrates that managerial and innovation competencies significantly influence the performance of small enterprises. Furthermore, entrepreneurial competence contributes to the sustainability of agribusiness ventures (Harianto, Azman, et al., 2025). Training in practice-based entrepreneurship enhances the management capabilities and competitive edge of micro, small, and medium enterprises (MSMEs) (Satrianny & Thamrin, 2022). In addition, entrepreneurial competence is crucial for bolstering the resilience of food sector businesses in the face of market volatility (Show, 2022).

The practical ramifications of these observations underscore the necessity of bolstering the entrepreneurial capabilities of fish farmers. STP Sibolga should incorporate instruction in business planning, financial management, product innovation, and marketing strategies within its development initiatives. Furthermore, continuous mentoring and field-based learning methodologies should be reinforced through partnerships with academic institutions and industry professionals. Consequently, by cultivating structured entrepreneurial proficiencies, fish farmers will not only achieve technical excellence but also cultivate greater

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adaptability, innovation, and autonomy in ensuring the enduring viability of freshwater fisheries enterprises.

The Influence of Entrepreneurial Orientation on Business Sustainability

The study's findings suggest a positive and statistically significant relationship between entrepreneurial orientation and the sustainability of the Freshwater Fisheries Cultivation Center at STP Sibolga. This observation aligns with prior research (Q. Zhang et al., 2024)(Lazarte-aguirre, 2024)(Cheng et al., 2025), which demonstrates that entrepreneurial orientation enhances organizational performance via innovation and proactivity. Furthermore, entrepreneurial orientation significantly influences the sustainability of Micro, Small, and Medium Enterprises (MSMEs), particularly in the context of leveraging digital opportunities (Farani et al., 2024). In the agribusiness sector, entrepreneurial orientation contributes to increased competitiveness and market adaptability (Rajeh et al., 2024). Consequently, entrepreneurial orientation fortifies the resilience of food sector businesses in response to market fluctuations (Tambunan et al., 2024).

The practical ramifications of these observations underscore the necessity of coaching initiatives designed to bolster the entrepreneurial orientation of fish farmers. STP Sibolga, in conjunction with the local government, should actively promote product innovation, the adoption of advanced technologies, and the utilization of digital platforms through continuous training and mentorship programs. This strategy will facilitate the cultivation of a more forward-thinking business perspective among farmers, enabling them to make audacious strategic choices and effectively navigate market fluctuations. Consequently, a robust entrepreneurial orientation will provide freshwater fish farming enterprises at STP Sibolga with a more resilient basis for enduring expansion.

CONCLUSION

The structural model analysis results suggest that the sustainability of freshwater fish farming businesses at the Sibolga STP is significantly influenced by various interconnected factors. Financial inclusion, risk management, financial technology, business partnerships, entrepreneurial competency, and entrepreneurial orientation all have a positive and significant impact on business sustainability. This highlights the importance of financial access, the ability to manage risk, the use of digital technology, strong collaborative networks, and the skills and entrepreneurial mindset of the farmers. Mentoring initiatives exert a considerable impact, despite demonstrating less-than-ideal efficacy, thereby suggesting the necessity for enhancements in both their structure and execution. Concurrently, these observations underscore that the enduring viability of fisheries enterprises cannot be solely reliant on a singular element; instead, it necessitates a harmonious interplay among financial, managerial, technological, institutional, and entrepreneurial dimensions.

In light of these observations, this research advocates for the fortification of the integrated fisheries cultivation ecosystem at the Sibolga Fisheries Science Center (STP). Farmers should be incentivized to broaden their utilization of formal financial

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services, institute systematic risk management protocols, and maximize the application of financial technology and digital marketing strategies. Mentoring initiatives must be customized to address specific field requirements, employing a practical methodology, continuous guidance, and periodic assessments. Moreover, the enhancement of partnerships via cooperatives or fisheries farmer associations, the cultivation of improved competencies and entrepreneurial mindsets, and the establishment of a collaborative fisheries entrepreneurship ecosystem involving the Center, local governmental bodies, financial institutions, academic institutions, and the private sector represent strategic measures to bolster competitiveness and ensure enduring business viability.

This investigation is subject to several constraints that warrant consideration. Initially, the research's focus on the Freshwater Fisheries Cultivation Center of Sibolga STP restricts the applicability of its findings to the broader fisheries sector and other geographical areas. Secondly, the reliance on cross-sectional data precludes the examination of the evolving nature of business practices and outcomes over extended periods. Thirdly, this study did not extensively analyze external influences, including governmental policies, environmental factors, and climatic variations. Consequently, future research should adopt a longitudinal methodology, broaden the scope of the study, and incorporate contextual variables to facilitate a more thorough comprehension of the factors influencing the sustainability of fisheries businesses.

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