

Sustainable Fishing And Financial Management: Enhancing Small-Scale Fisherfolks Economic Growth And Resilience – Evidence From Calatrava, Romblon, Philippines

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Abstract

Controlled by unsustainable fishing and improper financial management, small fishing communities in coastal areas often require assistance to maintain economic stability and sustainable livelihoods. The study investigated how sustainable fishing practices and financial management strategies contribute to economic growth and livelihood resilience among small-scale fisherfolk in Calatrava, Romblon, Philippines. The data were gathered from among 112 registered fisherfolk quantitatively, and mean, regression, and Pearson's correlation analyses were used to investigate economic growth and livelihood resilience. The study found a positive effect on fish effort and catch composition in sustainable fishing practices and a considerable positive impact on financial literacy education, market access, and sales strategies. Likewise, a significant correlation was found between sustainable fishing practices, financial management strategies, and economic growth and resilience. Combining sustainable fishing practices with financial education programs can significantly improve the well-being of fishing communities.

Keywords: *economic growth, financial management, resilience, sustainable fishing*

INTRODUCTION

The economic sustainability of fisherfolk in coastal towns depends on ecologically sound forms of fishing practices and sound management in monetary terms. Fisherfolk provide food security, employment, and poverty alleviation services, but suffer serious aggravating elements of overfishing, climate change, and economic insecurity.

In the Philippines, the government enacted Republic Act 10654 to prevent illegal fishing and Republic Act No. 9275 to safeguard the quality of fresh and marine waters. Many fisherfolk encounter challenges in financial literacy education (Pomeroy et al., 2020). Having limited financial literacy, fisherfolk in remote locations away from financial institutions cannot provide collateral.

To improve the livelihood of Filipino fisherfolk and alleviate poverty in the fisheries sector, the Bureau of Fisheries and Aquatic Resources Department (2021), the agency governing fishing activities, launched financial education programs to capacitate fisherfolk on economic management. Despite the implementation of government programs, fisherfolk experience hardship in basic financial management, observable as a real decline in fish populations, even if their supposed methods meet the sustainability set forth for fishing.

Small fisherfolk in Calatrava, located in Romblon Province, find an entrance into a livelihood that greatly depends upon sustainable fishing and sound financial management. The fisherfolk find it increasingly more difficult to fish as large vessels enter their fishing waters, drastically limiting the number of fish available for their catches, and posing a long-term threat to the sustainability of these marine resources. Since fishing nets are widespread among the traders, fisherfolk with limited financial resources have no money to purchase essential fishing gear. Directly with peril for fisherfolk with small boats would be due to harsh weather conditions that tend to stop fishing activities, leaving them out of income and the opportunity to earn their daily food.

It has been commented by Béné et al. (2015) that fish have been able to provide more than 4.5 billion of the world population with at least 15% of their average per capita intake of animal protein, contributing highly to the health and income of people and so to their food security, especially for more than 10% of the world population in the developing and emerging countries. According to Serpetti et al. (2017), the growing demand for sustainable fisheries is posed by environmental and socioeconomic issues like rapid population growth,

impacts of climate change, sustainable seafood, and the development of life and food security in developing countries.

While there are studies on sustainable fishing methods and financial management in small-scale fisheries, very few consider the two together to determine their cumulative effect on development and livelihood resilience. Filling in this knowledge gap is crucial for designing sustainable policies and programs to support small-scale fishers.

The primary purpose of this study was to assess the small-scale fisherfolk's sustainable fishing practices and financial management strategies, including its influence and association to the factors of economic growth and resilience in relation to economic, social, environmental, institutional, technological, and market, and to propose strategy that could be developed from the study's findings.

This research helps policymakers and project implementers design targeted measures that put environmental and economic challenges in place, identifying areas of success and those that require more attention to shore up Calatrava's fishing communities, ensuring their growth and sustainable development for posterity.

REVIEW OF LITERATURE

Sustainable fishing and financial management are increasingly recognized as interlinked drivers of resilience in small-scale fisheries. In previous research, it has been shown that financial literacy, savings behavior, and cooperative help all work to improve the livelihoods of fisherfolk; sustainable harvest protects marine resources so they may achieve ecological balance and socioeconomic development in vulnerable coastal communities worldwide.

Fish are widely recognized as one of the most efficient converters of feed into high-quality protein, with a lower carbon footprint than other animal production systems. Globally, fisheries, aquaculture, and related activities support the income and food security of more than 10% of the world's population, particularly in developing and emerging economies (Béné et al., 2015). Conversely, undervaluing fish species by national food security and nutrition policies leads to underutilized livelihood improvement and resilience-building measures. More recent literature sees small-scale fisheries as being multidimensionally contributing to food provision systems, poverty erosion, and the maintenance of cultural identity and ecological stewardship (Basurto et al., 2025).

The two unfortunate spills, which occurred in 2019 and the other in 2021, with 1.3 tons of plastics and oil from creek deposits over the Fernando de Noronha Archipelago, have highlighted some acute ecological hazards to unique ecosystems harboring seagrass beds, rhodolith beds, and mangroves. The study findings have shown that the marine surveillance system is still ineffective and provides no means for polluters to be held accountable, thus limiting its strength to respond effectively to such events. The incidents portray the landscape of exposures to the South Atlantic coastal and insular ecosystems created by marine debris, the fossil fuel accident, and here-strengthening climate barriers (Magalhães et al., 2022).

By declining catches, invasive species, and shifting reproductive cycles, the productivity of the fisheries has been increasingly undermined through vulnerabilities posed by climate change (Macusi et al., 2023; Mozumder et al., 2023). Kluger et al. (2025) determined that fishers demonstrate adaptive capacity through archetypes and developed a theoretical fisher motif that models adaptive capacity within social-ecological networks. Supporting a variety of value chains would improve resilience so that fishers, as primary agents of adaptive decision making, can undertake such actions.

According to Macusi et al. (2021), the most influencing factors rendering fishermen vulnerable are coral bleaching, insufficient food availability, lack of credit access, changes in weather patterns, and increasing sea surface temperatures, suggesting that ecological and socioeconomic stressors in tandem shape the vulnerability of small-scale fisheries. Pomeroy et al. (2020), fishing households on a small generation face constraints in terms of financial literacy, collateral, and informal credit, which would have otherwise made them resilient, mainly regarding microinsurance and insurance literacy projects in the Philippines to provide resilience among fisher households to climate shocks, storms, and income volatility. Recently, much emphasis has been put upon sustainable fishing and ecosystem-based conservation as two pillars of the much-needed financial stability.

Roberts et al. (2024) said stronger sustainability norms should allow fisheries to adapt to biodiversity loss, climate change, and market pressures. They propose ecological measures that go together with socioeconomic measures for them to succeed. Small-scale fisheries have been declared a source of livelihood, but they are very vulnerable to environmental shocks and economic changes.

Solomon (2023) emphasized that the integrated ecosystem model revealed that the sustainable fishing method can aid in the recovery of historically overexploited stocks such as cod and whiting while climate conditions remain stable. Rising temperature, however, spells doom for the boreal species of cod, herring, haddock, and grey seals due to sharp population declines. Temperature-tolerant, or eurythermal species, were resilient, whereas whiting populations thrived on the change of heat and the diminution of predators. The report emphasized that with a view to sustainability, future fisheries management must factor both fishing pressure and climate change.

Establishing specialized financial institutions and public-private partnerships, including adequate data collection infrastructure, is vital to foster development in fisheries and aquaculture. Funding for commercial Caribbean fisheries and aquaculture has traditionally met many restrictions due to stakeholders' significant lack of awareness regarding available financing opportunities and financing mechanisms, and the enabling environment for funding blue Economy sectors (Bennet et al., 2024). According to Lopez et al. (2024), grants that go through national agencies are quite important when given to fisheries and fishing communities, especially those in small-scale fisheries in the Global South, for these grants are shaping new investments in the small-scale fisheries' sustainability through strengthening both community agreements and public and private coordination.

Ecological sustainability should go hand in hand with financial strategies to achieve long-term viability. Roberts et al. (2024) claim that marine fisheries require an upward adjustment in sustainability criteria owing to several manifestations of biodiversity loss and climate change; hence, socioeconomic interventions are considered to have their desired effect only when set alongside ecological safeguards. Islam & Chuenpagdee (2022) pointed out that, similar to the five-dimensional divisions of sustainability, small-scale fisherfolk vulnerabilities are fairly categorized into five major factors: biophysical, social, economic, technological, and governance factors. Knowledge about vulnerability, therefore, informs the crafting of management strategies and policies to lessen the aggravation and further a viable direction for small-scale fisherfolk, thus aligning with the goals of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries.

According to studies in these geographical areas, tight relations between variables develop green finance by strengthening cooperatives and sustainable resource management to engage fisherfolk towards building resilience. Such literature strongly argues for multi-stakeholder cooperation joining ecological and financial approaches to attain sustainable development goals. Small-scale fishing drawn from Calatrava, Romblon, stands on sustainable fishing and financial management pillars. Their fisherfolk mainly depend on fisheries to earn incomes and sustain their livelihoods.

THEORETICAL FRAMEWORK

Several perspectives make up the theory in this paper, contesting the dynamics of sustainable fishing and the financial management thereof. The Sustainable Livelihoods Framework (SLF) insists on five types of capital: economic, natural, human, social, and physical, which jointly support sustainable fishing practices and financial strategies. The Resource-Based View, in turn, recognizes the increased real value conferred on available resources through sound financial management, encouraging economic growth and sustainability of fishing activities.

Similarly, the Triple Bottom Line theory provides a viewpoint to analyze how small-scale fisheries maintain economic development, social responsibility, and environmental conservation across their activities toward greater sustainable development goals. In such a way, the Institution Theory from the governance perspective includes the character of government regulations, local policies, and financial institutions in enforcing sustainable fisheries and financial decisions, which, in turn, affect fisherfolk's resilience and economic growth. In contrast, the Resilience Theory provides an understanding of how fishing communities face and respond to economic, social, and environmental stressors, emphasizing challenges posed by climate change, over-fishing, and economic uncertainty from the sustainability and financial stability view.

Conceptual Framework

The SEA Framework diagram shown in Figure 1 was developed as the conceptual framework of the study.

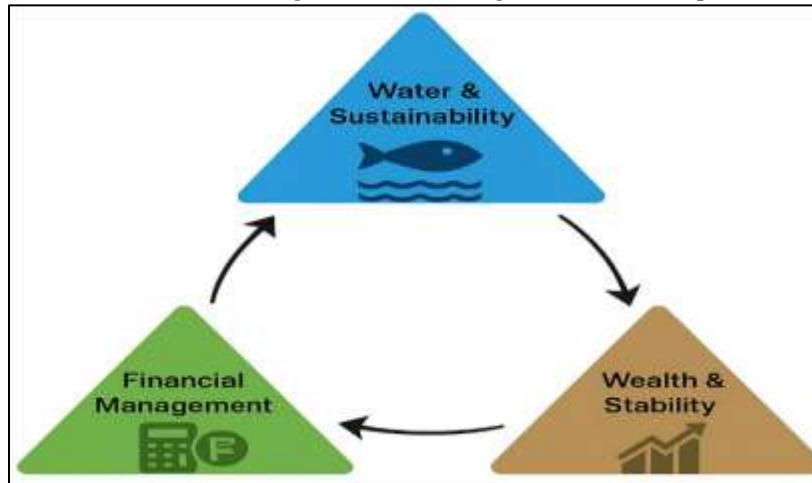


Figure 1. Conceptual Framework

The **SEA Framework** (for Sustainability-Economy-Advancement) is a conceptual framework that describes the ecological, economic, and livelihood dimensions of small-scale fisheries. It rests on three interdependent pillars - Water and Sustainability, Financial Management, and Wealth and Stability - all ostensibly to emphasize sustainable fishing practices that maintain marine ecosystems, sound financial planning strategies that increase income security, and socioeconomic status that promotes community resilience. It is through this cyclical relationship that sustainability in fishing generates income in the economy, which ultimately feeds back into proper economic management and thus sustaining economic resilience needed for sustainability. It combines all these into the more complete SEA Framework that promises real environmental stewardship and economic advancement for fisherfolk-most especially the coastal communities like Calatrava, Romblon, Philippines.

METHODOLOGY

Study Design

A quantitatively correlational research design was utilized in the study to develop and understand how sustainable fishing practices and financial management strategies were related to the growth and resilience of small-scale fisherfolk. The initial quantitative part consisted of administering structured surveys to obtain measurable data, followed by the conduction of unstructured interviews not specified in the instruments. These were primarily meant to garner more qualitative findings concerning the experiences, problems, and adaptive strategies of fisherfolk. Conversely, the correlational section studied the relationship and effect of sustainable fishing practices alongside the financial management strategies of fisherfolk.

Study Site

The research was conducted in the coastal areas of Barangay Pangulo, Talisay, Pagsangahan, Linao, and San Roque situated in Calatrava, Romblon, Philippines, a coastal municipality known for its agricultural and fishing industries, where small-scale fisherfolk's dependence on fisheries and vulnerable to climate variability play a critical role in household income and community livelihood.

Participants

Registered small-scale fisherfolk in Calatrava, Romblon, were part of the target population in which stratified random sampling was employed. The participants were selected on a random basis according to the number of registered small-scale fisherfolk per barangay. The sample size was computed from 157 total population of 157 registered small-scale fisherfolk in the coastal areas in Calatrava province of Romblon. Based on data from the Rao Soft calculator model, the researcher calculated the total sample size to achieve

an error of 5%. Of the 112 total sample size, it was distributed among the selected Barangays in Pangulo N=15, Talisay N=38, San Roque N=36, Pagsangahan N=11, and Linao N=12 to ensure representativeness across the selected barangays.

Instruments

The designed structured questionnaire to collect quantitative data covered the sustainable fishing and financial management strategies employed, the economic growth and livelihood resilience of fisherfolk about the economic, social, environmental, institutional, technological, and market factors, and the effect and association of sustainable fishing and financial management strategies on the economic growth and resilience of fisherfolk in the coastal areas. Before reliability testing, experts in fisheries and finance validated the structured tool, and it was subjected to reliability testing with a Cronbach's alpha of = 0.70, indicating internal consistency and acceptability.

Data Collection

Informed consent was obtained from the Mayor's Office, including the Barangay Officials, the President of the Association of Fisherfolk, and the participants. Data collection was conducted over two months. Enumerators administered the survey in person to ensure inclusivity among fisherfolk. The informal interview has a local dialect with 10 representatives, so precise meanings were gleaned, observing the ethical protocol and maintaining the confidentiality of the responses.

Data Analysis

Data were coded and analyzed quantitatively using SPSS version 20. Using such descriptive statistics as means and standard deviations, one studied fishing and financial sustainability, economic factors affecting development, and livelihood resilience. In contrast, inferential statistics like regression analysis and Pearson correlation were used to analyze the effect and association of sustainable fishing practices and financial management strategies on small-scale fisherfolk's growth and livelihood resilience.

DISCUSSION, RESULTS, AND FINDINGS

1. The analysis of sustainable fishing practices employed by small-scale fisherfolk.

Fishermen practicing sustainable fishing were necessary for marine habitats' long-term survival and livelihoods. Adopting ecologically sustainable fishing methods, such as utilizing environmentally selective gear and abiding by the rules and regulations imposed by the local government units in preserving fish habitats and safeguarding ecosystems, ensures the economic stability of coastal communities. The results of the data analysis employed by fisherfolk was presented in tabular formats as shown in Table 1.

Table 1. Sustainable fishing practiced by small-scale fisherfolk

Indicators	Mean	SD
<i>Fishing method:</i>		
1. Using traditional fishing methods such as hand-lines and fish traps.	3.77	1.34889
2. Using environmentally friendly fishing gear like biodegradable nets.	3.88	1.27163
3. Avoid using destructive fishing methods such as dynamite or cyanide fishing	3.88	1.43171
4. Adopting modern fishing techniques like pole and line fishing	3.96	1.14206
5. Maintaining and inspecting fishing gear regularly.	4.09	1.08681
6. Adhere to local fishing regulations and seasonal bans.	3.96	1.13414
7. Participating in community-based conservation programs	4.06	1.11728
8. Using sustainable fishing techniques like selective fishing and avoiding overfishing	4.05	1.13772
9. Educating fellow fisherfolks on best practices	3.77	1.24468
Overall Mean	3.94	0.93198
<i>Fishing effort:</i>		
1. Adhere to seasonal fishing bans and closures to protect fish populations	3.96	1.15773
2. Complying with daily or weekly fishing limits to prevent overfishing	3.89	1.29000

3.	Involve in restocking programs aimed at replenishing fish populations	4.02	1.11486
4.	Monitoring fishing efforts and time to prevent overfishing	3.97	1.17374
5.	Adopting sustainable practices by avoiding spawning grounds	3.80	1.19939
Overall Mean		3.93	0.912
<i>Catch composition and monitoring:</i>			
1.	Target non-endangered species to ensure sustainable fishing practices	3.83	1.36156
2.	Record catch data regularly like species, quantity, and size for monitoring purposes	3.88	1.24297
3.	Monitor and reduce bycatch by using bycatch reduction devices to minimize waste	3.98	1.29435
4.	Modifying gear and avoiding sensitive habitats to protect marine life	3.59	1.30525
5.	Comply with minimum size limits for target species	3.61	1.36466
Overall Mean		3.78	1.094
<i>Fishing equipment and gear:</i>			
1.	Using biodegradable fishing nets or gear to minimize environmental impact	3.67	1.35825
2.	Implement gear modifications like escape panels and size-selective meshes	3.78	1.24271
3.	Maintain and inspect fishing equipment regularly to ensure it is in good	3.85	1.33700
4.	Adopt technology for sustainable fishing like GPS and fish finders	3.36	1.56457
5.	Adhere to gear regulations regarding fishing gear like mesh size and type of gear	3.80	1.30722
Overall Mean		3.69	1.238
<i>Community involvement and governance:</i>			
1.	Involve in local fishing cooperatives or associations	3.22	1.54050
2.	Participates in decision-making processes for local fishing regulations	3.42	1.47434
3.	Engage in monitoring and enforcing compliance with fishing regulations	3.54	1.49406
4.	Support awareness and education among fisherfolks for sustainable fishing practices	3.39	1.49689
5.	Participate in conservation and resource management initiatives	3.23	1.51260
Overall Mean		3.36	1.765
<i>Environmental awareness and education:</i>			
1.	Attending workshops and training sessions on sustainable fishing practices	3.34	1.55125
2.	Know the location and purpose of marine protected areas and no-take zones.	3.53	1.40116
3.	Using proper gear and habitat protection learned from educational programs.	3.38	1.49018
4.	Aware of the environmental impacts of different fishing practices	3.35	1.39955
5.	Engage in activities that promote environmental conservation	3.22	1.51098
Overall Mean		3.36	1.497
<i>Economic practices:</i>			
1.	Engage in alternative livelihoods during off-seasons to diversify income sources	3.64	1.29188
2.	To ensure financial stability, have multiple income sources outside fishing	3.31	1.39517
3.	Investing in value-added processing of fish products to increase income.	3.79	1.27441
4.	Involve in eco-tourism activities or fish farming as additional sources of income	3.55	1.25087
5.	Implementing practices that reduce costs, like fuel-efficient engines and equipment.	3.43	1.29944
Overall Mean		3.54	1.274

5=always (5.00-4.21); 4=often (3.41-4.20); 3=sometimes (2.61-3.40); 2=rarely (1.81-2.60); 1=never (1.00-1.80)

Fishing methods

Table 1 shows evidence of fisherfolk exhibiting mostly high adherence to sustainable fishing practices, with the overall means spanning from 3.36 to 3.94 in various dimensions. The highest overall mean score was recorded for fishing methods ($\bar{x} = 3.94$, $SD = 0.9318$), especially the inspection and upkeep of fishing gear ($\bar{x} = 4.09$), often participation in conservation programs ($\bar{x} = 4.06$), using traditional fishing, and educating fellow fisherfolk on sustainable fishing ($\bar{x} = 3.77$) indicating that while fisherfolk appreciate how proper management of gear and collective action can contribute to long-term sustainability, they adhere to that thinking, this agrees with Pauly & Zeller (2016), who noted that small-scale fisheries play a significant role in the sustainable use of the oceans through low-impact and selective means.

Fishing Effort

The fishing effort dimension was ranked higher ($\bar{x} = 3.93$, $SD = 0.912$), with the active involvement in restocking programs ($\bar{x} = 4.02$) and abiding by seasonal bans protecting fish populations ($\bar{x} = 3.96$), and avoiding spawning grounds ($\bar{x}=3.80$; $SD = 1.19939$) showing that fisherfolk do comply with regulations that are meant to reduce pressure from overfishing. Lidström & Johnson (2019) acknowledged limiting fishing effort and protecting the spawning grounds as essential strategies to sustain the fish populations and build resilience in the small-scale fisherfolk.

Catch Composition and Monitoring

These practices in the catch composition and monitoring were moderately high ($\bar{x} = 3.78$, $SD = 1.09$). Fisherfolk indicated that they used bycatch reduction devices ($\bar{x} = 3.98$), recorded catch data ($\bar{x} = 3.88$), catch limit per species ($\bar{x} = 3.61$; $SD = 1.36466$), and modifying gear and avoided sensitive habitat ($\bar{x} = 3.59$; $SD = 1.30525$). The idea is that such activities increase monitoring accuracy and reduce waste. The finding is in alignment with the statement by Frazao (2018) that monitoring the catch composition is an essential issue in the conservation of biodiversity and fisheries management.

Fishing Equipment and Gear

The mean score of 3.69 ($SD = 1.23$) shows fish gear and fishing equipment scoring below average. Maintenance scores are relatively high at 3.85. On the other hand, GPS and fish finder technologies, with the lowest score of 3.36, are affected by economic and technical constraints that prevent fishers from fully applying modern-day technologies in their livelihood, which goes hand in hand with what Szymkowiak (2020) said: small-scale fishers are constrained in accessing advanced technologies due to the lack of financial resources, affecting efficiency and sustainability.

Community Involvement and Governance

The general low scores were on the community involvement and governance, with a mean of 3.36 with an SD of 1.76. The participation indicators in cooperatives ($\bar{x} = 3.22$) and resource management initiatives ($\bar{x} = 3.23$) reflected weak community participation, showcasing the gap for governance structures and collective management. According to Jentoft and Chuenpagdee (2015), the empowerment of fisherfolk to participate in decision-making and compliance with regulations is rooted in strong institutions and co-management regimes.

Environmental Awareness and Education

As did governance, environmental awareness, and education scored poorly ($\bar{x}=3.36$, $SD = 1.49$). Participation in training workshops on conservation activities was also limited ($\bar{x} = 3.34$, $\bar{x} = 3.22$), thus indicating a need for intensified capacity-building programs. According to FAO (2020), raising awareness among the small-scale fishers through education and training is the linchpin for behavioral changes toward long-term resolutions and sustainable fisheries.

Economic Diversification

The mean values across economic variables were often relatively high ($\bar{x} = 3.54$, $SD = 1.274$). Fisherfolk engaged in value-added processing ($\bar{x} = 3.79$) and eco-tourism ($\bar{x} = 3.55$). Diversification of income opportunities ($\bar{x} = 3.31$) was somewhat less developed; thus, there is a pressing need for its intervention, whereas economic sustainability programs are ongoing. Allison and Ellis (2001) opine that livelihood diversification leads to resilience by reducing income dependency on fishing, especially in ecological or financial stress.

In general, the study highlights that small-scale fisherfolk take sustainable methods of fishing and management of effort seriously. Nevertheless, they churned out community governance challenges of their own with weak cooperative involvement and resource management initiatives. Environmental education offers little access, if any, to training workshops on sustainable fishing and conservation initiatives. On economic diversification, fisherfolk may sometimes hold multiple income sources outside of fishing. While there is good maintenance of gear and observance of regulations, institutional participation and awareness show weaknesses. This finding practically suggests that integrated policies should be established on ecological, social, and economic considerations, including training activities run by strengthened cooperative bodies and livelihood support, for the full realization of sustainable fisheries.

2. The financial management strategies employed by small-scale fisherfolk.

Managing finances is essential for fisherfolk's economic sustainability and livelihood resiliency. These techniques include budgeting, savings mechanisms, investment decisions, and managing the risk that helps fishermen overcome market swings, seasonal variances, and operational issues while keeping their fishing businesses viable. Table 2 highlights the financial management strategies practiced by small-scale fisherfolks.

Table 2. Financial management strategies practiced by small-scale fisherfolk

Indicators	Mean	SD
<i>Budgeting and financial planning:</i>		
1. Prepared personal and business budgets to manage income and expenses	3.06	1.29530
2. Review and adjust the budget	2.94	1.25405
3. Have long-term financial plans of goals	2.96	1.14992
4. Use various financial planning tools and resources to manage finances effectively	2.73	1.12292
5. Allocate a portion of income from fishing for savings and investment	2.90	1.07351
Overall Mean	2.92	0.992
<i>Saving and investment:</i>		
1. Regularly set aside a portion of income to savings accounts	2.79	1.09164
2. Held different types of investments like time deposit, real estate, cooperative shares	2.76	1.07591
3. Involved in community savings and investment programs like cooperatives	2.54	1.22943
4. Allocate a proportion of income from fishing for an emergency savings fund	2.59	1.19725
5. Reinvested profits to improve fishing operations like purchasing new equipment	2.48	1.15456
Overall Mean	2.63	0.840
<i>Access to credit and loans:</i>		
1. Availed various credit and loan options like microfinance and cooperatives.	2.60	1.13841
2. Utilized credit or loan services in the past year.	2.65	1.16501
3. Make timely repayments of loans.	2.81	1.19708
4. Ease of access to credit and loan institutions.	2.74	1.12902
5. Credit and loans impact the financial stability and improvement of livelihoods.	2.72	1.07561
Overall Mean	2.70	0.949
<i>Debt management:</i>		
1. Aware of total debt and outstanding balances	2.70	1.10037
2. Created structured plans to repay debts	2.70	1.08087
3. Regularly monitor debt levels and repayment progress	2.72	1.17181
4. Utilize debt consolidation strategies to manage multiple debts more effectively	2.63	1.11497
5. Able to meet debt obligations without experiencing significant financial hardship	2.60	1.13471

Overall Mean	2.67	0.917
<i>Financial literacy education:</i>		
1. Attended financial literacy training programs or workshops	2.63	1.17784
2. Understand basic financial concepts such as budgeting, saving, investing, and debt.	2.71	1.15023
3. Apply financial knowledge in daily financial decisions and practices	2.57	1.19845
4. Utilized available financial education resources like books, and online courses	2.54	1.14599
5. Confidence among fisherfolks in managing personal finances effectively.	2.61	1.16128
Overall Mean	2.61	0.951
<i>Income and expenditure tracking:</i>		
1. Recorded income and expenses regularly	2.51	1.22287
2. Utilized financial tracking tools like notebooks to monitor income and expenses	2.29	1.18275
3. Categorize expenditures, necessities, discretionary spending, and fishing expenses	2.50	1.20060
4. Compared planned budget against actual spending regularly.	2.44	1.12130
5. Review and adjust financial records to reflect actual income and expenditure	2.41	1.18210
Overall Mean	2.43	1.075
<i>Market access and sales strategy:</i>		
1. Aware of current market prices for fishes	2.79	1.13446
2. Use multiple channels like local markets, cooperatives, direct consumer sales, and online platforms to sell catch fish.	2.57	1.17569
3. Able to negotiate better prices for catch fish	2.98	1.13885
4. Implement quality control measures and value-added processing like cleaning	2.88	1.00221
5. Access relevant market data on demand trends to guide sales strategies.	2.98	1.02212
Overall Mean	2.84	0.854

4=*always* (3.26-4.00); 3=*often* (2.51-3.25); 2=*sometimes* (1.76-2.50); 1=*never* (1.00-1.75)

Table 2 substantiates the results, which were indicative of varying extents of adoption of the financial management strategies by the respondents across domains. The area of activity with the highest level was *budgeting and financial planning* ($\bar{x} = 2.92$; $SD=0.992$), whereby respondents indicated they had "often" prepared budgets, set financial goals for a long period, adjusted financial plans, and allocated part of income for saving and investment activities. Budgeting is basically habitual, but tools and resources for financial planning are not heavily relied upon, aligns with that of Fabinyi et al. (2022), who found that small-scale fishers in Southeast Asia concentrate on meeting their immediate livelihoods, making them less likely to adopt any systematic, future-oriented financial practices. The implication is that while a foundation for financial discipline exists, training should prioritize strengthening structured budgeting techniques and encouraging multi-year financial planning.

Another strong domain was *market access and sales strategy* ($\bar{x}=2.84$; $SD=0.854$), where respondents often negotiated better prices, monitored demand trends, and applied basic quality standards, indicating some awareness of market dynamics and the ability to adapt sales practices depending on those dynamics. However, the relatively low engagement in multi-channel marketing indicates that some barriers to diversification still exist. Research findings substantiate Ababouch et al. (2023) regarding small-scale aquaculture producers that have become more market-oriented with limited access to transport logistics and institutional linkages. They add that working with improved cooperative-based marketing and facilitating new sales access would probably improve even the integration within the value chain.

Access to credit and loans had a mean score of 2.70; $SD=0.949$, indicating that fishers are often aware of the loan terms and are willing to repay. Debt management ($\bar{x}=2.67$; $SD=0.917$) referred to shorter repayment

periods, with less observation of long-term planning/consolidation strategies. The result is corroborated by the findings of Badiola et al. (2021), asserting that while microfinance enhances the situation, structural constraints such as collateral requirements with documentary barriers hinder its inclusiveness. According to Gietzen et al. (2022), repayment performance is still strong among fishers, although not often accompanied by any strategies for reducing debt, resulting in a cycle of indebtedness, indicating the need for interventions aiming at making affordable credit more accessible while building the capacities to manage debt proactively. *Saving and investment* were rated even lower ($\bar{x} = 2.63$, $SD = 0.840$). While saving was applied mainly through regular savings, the creation of an emergency fund was rarely rated only as "sometimes," and reinvestment back into the fishing operations was similarly rare. The Agricultural Credit Policy Council (2023) reports that, although smallholders formally save at low rates, many turn to informal avenues. Such practices curtail the ability to withstand an income shock and avenues for capital formation. Addressing the problems of access and availability may be shortest through saving mechanisms embedded in loan products and matched savings schemes. Another concern is the discounted average score for financial literacy education, which is 2.61 with a standard deviation of 0.951. Respondents demonstrated an understanding of basic economic concepts but struggled to apply them consistently in their daily decision-making. Formal *financial literacy programs* and resources remain almost unreachable. The findings of Chakraborty et al. (2025) bring home the point that financial education should strive not only to create theoretical knowledge but, more importantly, to bring about changes in behavior so that fishers may be able to practice these skills in their daily livelihood activities. Thus, it presupposes action-based learning modules that would require experiential, local training, such as simple bookkeeping and loan calendar tracking.

Finally, *income and expenditure tracking* was the weakest area ($\bar{x} = 2.43$; $SD = 1.075$), a practice held sometimes. Respondents occasionally recorded transactions, categorized spending, or reconciled accounts. Even now, tracking tools have been relatively sparse, lying at a crucial bottleneck because record-keeping is the bedrock for effective budgeting, creditworthiness, and resilience. FAO and INFOFISH (2022) also noted that bookkeeping is a common problem for small-scale fisheries, as it prevents fishermen from meeting the requirements of financial institutions and prohibits any long-term planning. Addressing this gap with a simple, mobile-based cashbook or cooperative-supported monitoring could significantly improve financial capability.

In general, these findings tell us that small-scale fishers strongly repay their loans and are very much aware of the *markets*, with resilience undermined by poor record-keeping, low levels of reinvestment, and savings culture. The results thus fit with general trends recorded from 2020 to 2025: Although financial inclusion schemes have indeed increased opportunities for market access and credit, the durability of these gains remains linked to strengthening daily financial practices, ensuring that education is coupled with practical application, and developing mechanisms that nurture their resilience to various shocks.

3. The factors of economic growth and resilience of small-scale fisherfolks

Small-scale fisherfolk are essential to the coastal economy and food security. Access to resources, financial management, market participation, social capital, and adaptive strategy all empower the economic growth and resilience of small-scale fisherfolk. It is essential to understand these factors if we are to strengthen livelihoods and promote sustainable development of fisheries. Table 3 presents the aspects of economic growth and resilience of small-scale fisherfolk.

Table 3. Factors of economic growth and resilience of small-scale fisherfolk

Indicators	Mean	SD
<i>Economic:</i>		
1. Engage in supplementary activities such as agri-tourism, or off-farm work.	3.44	1.43182
2. Engage in activities to adapt to fish stock and price changes.	3.62	1.23205
3. Proximity to markets and good infrastructure lower transport costs.	3.56	1.31369
4. Access to finance boosts investment and resilience in fishing.	3.49	1.25199
5. High input costs affect the profitability of fishing.	3.85	1.24633
Overall Mean	3.59	1.124

<i>Social:</i>		
1. Higher literacy rates, educational attainment, and access to training programs.	4.00	1.23025
2. Support and cooperation among fisherfolk communities.	3.80	1.08917
3. Strengthening social networks and relationships within and outside the community.	3.78	1.17565
4. Access to healthcare services and maintaining good nutritional status.	3.82	1.18713
5. Trust and cooperation build a supportive community	3.94	1.12531
Overall Mean	3.87	0.947
<i>Environmental:</i>		
1. Typhoons and storms can damage boats, equipment, and fishing areas.	3.96	1.28321
2. Climate change disrupts fishing grounds and reduces fish stocks.	3.99	1.11092
3. Health and diversity of marine ecosystems.	3.96	1.09370
4. Quality of water in fishing areas.	4.02	1.10675
5. The availability and abundance of fish stocks and marine resources.	3.92	1.17655
Overall Mean	3.97	1.010
<i>Institutional:</i>		
1. Local government effectiveness in helping fisherfolk.	4.17	1.13016
2. Access to subsidies and support system.	3.93	1.12076
3. Use of new tech and practices from institutions.	3.91	1.07010
4. Availability of loans and credit.	4.06	1.03350
5. Access to roads, ports, storage, and ice plants.	3.82	1.27494
Overall Mean	3.98	0.810
<i>Technological:</i>		
1. Use of apps for market and weather info.	3.24	1.65080
2. Fuel-efficient and eco-friendly vessels.	2.92	1.45279
3. Use of tech to add value to catch.	2.75	1.41740
4. Use of efficient fishing equipment.	2.88	1.49320
5. Adoption of sustainable fish farming.	2.83	1.54155
Overall Mean	2.93	1.773
Indicators	Mean	SD
<i>Market:</i>		
1. Consistency of fish prices	3.62	1.49018
2. Market demand for specific types of fish	3.96	1.21499
3. Impact of other fishers on income	3.80	1.16896
4. Access to branding and promotion	3.77	1.26621
5. Demand for quality, sustainable fish.	3.70	1.30722
Overall Mean	3.77	0.937

Economic Factors

The economic indicators have an overall mean of 3.59, with a standard deviation of 1.124, which smaller fisherfolk moderately agreed upon, as financial conditions influence their vulnerability. While prohibitive input costs have a direct bearing on profit margins (3.85), this variable ranked the highest in the fishing-related industries, addressing an age-old malaise of ever-rising fuel, gear, and maintenance costs cutting into profits. The finding corresponds with Putri et al. (2025), highlighting the fact that seasonal and climatic variability induce income volatility while poor infrastructural facilities and reliance on intermediaries restrict market accessibility and hence diminish bargaining power. Then, the high operational costs, fuel, and gear maintenance in particular, erode any profitability gains. The lowest scores were awarded to adaptive activities such as supplementary livelihoods (3.44), thus indicating some limited but increasing diversification

initiatives. Diversification has been advocated as one of the resilience strategies in small-scale fishery contexts (Fabinyi et al., 2022).

Social Factors

The social dimension had an overall mean of 3.87 (SD = 0.947), giving much importance to education, cooperation, and social networks. Notably, items "Higher literacy rates, educational attainment, and access to training programs" (4.00), and "Trust and cooperation build a supportive community" (3.94) ranked the highest, stressing social capital and collective action; consistent with Bene et al.'s (2016) findings that social cohesion enhances both adaptive capacity and livelihood security. Health services or the right to access it gained a 3.82-mark score, implying the tide of acceptance that fisherfolk's well-being is the direct factor of their productivity and resilience (Howson, 2020).

Environmental Factors

Environmental indicators got an average score of 3.97 (SD = 1.010), second from the top in all dimensions. Perception of the quality of water in fishing areas remained the strongest concern (4.02), climate change disruption being just a close second (3.99), which highlighted the elevated vulnerability of fisherfolk to climate change and environmental degradation. Similar results were reported by Cinner et al. (2018), who found that environmental stressors, such as coral bleaching, storm surges, and declining fish stocks, significantly reduce the sustainability of livelihoods. The high mean score urges immediate action on policy implications to strengthen ecosystem management.

The highest mean score of 3.98 (SD=0.810) for institutional support indicates that local government effectiveness in helping fisherfolk was adjudged highest at 4.17, implying that the fisherfolk esteem highly state intervention, subsidies, and credit access. Skerritt (2024) emphasized that the role of government and institutions is crucial, asserting that the transparency promises often do poorly for fisheries once these promises have been systematically transitioned from concept to legislation to practice. Paniagua & Rayamajhee (2024) assert that while the understanding of overfishing has evolved, the solutions remain either too generic or too specific, essentially viewing fisheries depletion as interconnected collective action issues. This result confirms the perception of local fishers that the support from formal institutions acts as a

Institutional Factors

stabilizing factor in times of economic and environmental uncertainties. They further explain that conservation had to take place under adaptive institutional rules laid down at the local level so that incentives were aligned for the generation of positive externalities at different levels of governance.

Technological Factors

The lowest overall mean score (2.93, SD = 1.773) attained for technological factors indicates the low adoption of modern tools and sustainable technologies. With a mean score given, the lowest mean score was given to the "use of tech to add value to catch" with 2.75, meaning that this is a wasted opportunity on the side of value-chain upgrading. The difficult access to fuel-efficient vessels (2.92) and to good practices in fish farming (2.83) seems, therefore, to indicate that there is still quite a long way to go with respect to technology transfer and adoption. Mbalaji et al. (2023) underwent a review of all the technological transformations brought about in fisheries management. Their work then illustrates how technology could promote sustainability, efficiency, and transparency of fisheries, thus favoring a future wherein ethical fishing coexists with healthy marine ecosystems.

Market Factors

Market indicators received a mean of 3.77 (SD = 0.937). The highest was "Market demand for specific types of fish" (M = 3.96), reflecting the economic opportunities that arise when consumer preferences align with the catch of fisherfolk. However, issues such as branding and promotion (M = 3.77) and price consistency (M = 3.62) highlight persistent market instability. The findings corresponds with those by Rosales et al. (2017), who found that small-scale fishers in the Philippines have the least control of aquatic resource value. In contrast, trade intermediaries enjoy larger margins due to their relatively greater access to capital, infrastructure, and market information, as well as constraints such as inadequate post-harvest facilities, poor handling practices, and limited value addition, which serve to undermine fishers' incomes and their ability to compete. They thus conclude that Value Chain Analysis, governance reforms, co-management, and targeted

institutional support all need to be integrated to ensure a more equitable distribution of benefits and sustainable management of the fisheries.

The study revealed that institutional variables (3.98) and environmental variables (3.97) largely uplift economic development and risk of destabilization among small-scale fisherfolk. But a weak average score of 2.93 for technology-based factors indicates general nonchalance about these factors. Thus, modernization is much needed in fishing and its technologies in terms of value addition. Social cohesion and market engagement are crucial factors in strengthening resilience. Therefore, it can be said that a multidimensional approach is necessary; it needs to address climate vulnerabilities and problems, as well as governance strengthening, simultaneously with social capital and technological innovations, for sustainable and resilient fisheries.

4. Effect of sustainable fishing and financial management strategies practiced by small-scale fisherfolks with the factors of economic growth and resilience

Table 4 analysis examines the impact of various sustainable fishing practices, including fishing methods, fishing effort, catch composition, fishing equipment, community involvement, environmental awareness, economic practices, and financial management strategies, on the economic growth and livelihood resilience of small-scale fisherfolk.

Table 4. Regression analysis on the effect of sustainable fishing and financial management practices

<i>Category</i>	<i>Unstandardized Coefficients</i>		<i>Standardized Coefficients</i>	<i>t</i>	<i>Sig.</i>
	<i>B</i>	<i>Std. Error</i>	<i>Beta</i>		
<i>Sustainable Fishing Practiced:</i>					
Sustainable fishing practices (Constant)	1.617	0.235		6.869	0.000
Fishing method	-0.073	0.081	-0.101	-0.899	0.371 ^{ns}
Fishing effort	0.328	0.067	0.465	4.862	0.000
Catch composition	0.179	0.069	0.278	2.576	0.011
Fishing equipment	0.001	0.060	0.001	0.013	0.990 ^{ns}
Community involvement	0.078	0.045	0.155	1.736	0.086 ^{ns}
Environmental awareness	0.045	0.058	0.082	0.771	0.443 ^{ns}
Economic practices	-0.008	0.059	-0.013	-0.134	0.893 ^{ns}
<i>Financial Management Strategies Practiced:</i>					
Financial Management (Constant)	2.470	0.247		9.996	0.000
Budgeting and financial planning	0.113	0.068	0.167	1.671	0.098 ^{ns}
Savings and investment	0.039	0.090	0.053	.431	0.667 ^{ns}
Access to credit and loan	0.013	0.111	0.019	.119	0.905 ^{ns}
Debt management	-0.070	0.099	-0.100	-.712	0.478 ^{ns}
Financial literacy education	0.189	0.079	0.274	2.391	0.019
Insurance and risk management	-0.017	0.081	-0.027	-.216	0.829 ^{ns}
Income and expenditure	-0.020	0.088	-0.031	-.230	0.818 ^{ns}
Market access and sales strategies	0.187	0.087	0.257	2.152	0.034

Regarding sustainable fishing practices, fishing effort ($\beta = 0.465$, $p < 0.001$) is the strongest positive predictor of economic growth and livelihood resilience, with a one-unit increase resulting in a 0.328-unit rise in the outcome. Significant positive impact was observed on catch composition ($\beta = 0.278$, $p = 0.011$). Other factors, including fishing methods, equipment, community involvement, environmental awareness, and economic practices, statistically have no considerable effect. Therefore, to improve fishermen's livelihoods, it is essential to develop training programs that increase fishing efficiency and promote sustainable catch diversification. The resulting regression equation model can be portrayed as:

$$Y = 1.617 - 0.073(\text{Fishing Method}) + 0.328(\text{Fishing Effort}) + 0.179(\text{Catch Composition}) + 0.001(\text{Fishing Equipment}) + 0.078(\text{Community Involvement}) + 0.045(\text{Environmental Awareness}) - 0.008(\text{Economic Practices})$$

The results suggest that economic stability of the fisherfolk can be enhanced by increasing fishing efforts and optimizing catch composition through some form of training. Sustainable fishing practices should then be integrated into the broader framework of economic practices to ensure resilience on a long-term basis. Therefore, to improve fishermen's livelihoods, it is essential to develop training programs that increase fishing efficiency and promote sustainable catch diversification.

The data in Table 4 also examines how financial management strategies impact the economic growth and livelihood resilience of small-scale fishermen. The model presents several financial management strategies, including budgeting and financial planning, savings and investment, access to credit and loans, debt management, financial literacy education, insurance and risk management, income and expenditure tracking, and market access and sales strategies.

As shown in the table, financial literacy ($\beta = 0.274$, $p = 0.019$) and market access strategies ($\beta = 0.257$, $p = 0.034$) significantly enhance the economic growth and resilience of fisherfolk. At the same time, other factors have no significant effect. The regression equation model can be represented as:

$$Y = 2.470 + 0.113(\text{Budgeting}) + 0.039(\text{Savings}) + 0.013(\text{Credit Access}) - 0.070(\text{Debt Management}) + 0.189(\text{Financial Literacy}) - 0.017(\text{Insurance}) - 0.020(\text{Income Management}) + 0.187(\text{Market Access})$$

Moreover, it can be seen that there were 0.189 units of economic increase associated with financial literacy, while an additional 0.187 units were attributed to improved market access and strategies. Yet, budgeting, savings, and debt management showed no significant impact. It is, therefore, necessary to focus on strengthening financial literacy programs and improving access to markets to enhance the income and security of fisherfolk. Save for issues related to saving and debt management, a more comprehensive financial package can be offered to them.

5. The relationship of sustainable fishing practices and financial management strategies with the factors of economic growth and resilience

The correlation between sustainable fishing practices and financial management strategies on the economic growth and livelihood resilience among small-scale fisherfolks was presented on Table 5 and 6.

Table 5. Pearson's correlation between sustainable fishing practices with the factors of economic growth and resilience

<i>Sustainable Fishing Practices</i>		<i>Factors of Economic Growth and Resilience</i>					
		<i>Economic</i>	<i>Social</i>	<i>Environmental</i>	<i>Institutional</i>	<i>Technological</i>	<i>Market</i>
Fishing method	<i>r</i>	0.241*	0.281**	0.337**	0.317**	0.154	0.481**
	<i>p-value</i>	0.010	0.003	0.000	0.001	0.106 ^{ns}	0.000
Fishing effort and practices	<i>r</i>	0.260**	0.367**	0.371**	0.510**	0.351**	0.574**
	<i>p-value</i>	0.006	0.000	0.000	0.000	0.000	0.000
Catch composition	<i>r</i>	0.265**	0.346**	0.219*	0.432**	0.267**	0.501**
	<i>p-value</i>	0.005	0.000	0.020	0.000	0.004	0.000
Fishing equipment	<i>r</i>	0.260**	0.191*	0.362**	0.323**	0.256**	0.247**
	<i>p-value</i>	0.006	0.044	0.000	0.001	0.007	0.009
Community involvement	<i>r</i>	0.269**	0.290**	0.191*	0.320**	0.370**	0.267**
	<i>p-value</i>	0.004	0.002	0.043	0.001	0.000	0.004
Environmental awareness	<i>r</i>	0.168	0.297**	0.189*	0.333**	0.375**	0.322**
	<i>p-value</i>	0.077 ^{ns}	0.001	0.046	0.000	0.000	0.001
Economic practices	<i>r</i>	0.201*	0.352**	0.135	0.361**	0.194*	0.360**
	<i>p-value</i>	0.033	0.000	0.156	0.000	0.040	0.000

Fishing methods and market-driven factors had an r-value of 0.481 ($p < 0.01$). In contrast, fishing effort and market-driven factors were correlated with an r-value of 0.574 ($p < 0.01$), highlighting the significant importance of access to markets in achieving sustainable fishing practices. Institutional factors showed a strong correlation with fishing effort ($r = 0.510$, $p < 0.01$) and a moderate correlation with catch composition ($r = 0.432$, $p < 0.01$), countering the notion that governance and policy support are irrelevant. Environmental factors correlate moderately (r values ranging from 0.189 to 0.371), providing further support for the ecological sustainability nexus in fishing operations. Social variables exhibit a fair correlation with fishing effort ($r = 0.367$, $p < 0.01$), revealing a story of community dynamics intertwined with sustainability.

On the contrary, much weaker correlations featured from the interaction of technical factors with the environmental awareness ($r = 0.154$, $p > 0.05$) and economic factors ($r = 0.168$, $p > 0.05$), which would point towards barriers like higher costs, lack of access, and absent incentives. The result suggests that, as sustainable tools become cheaper and more accessible, economic incentives such as subsidies or market rewards will drive the adoption of sustainable fishing, becoming a focus of efforts to enhance market access and strengthen governance support.

Table 6 presented the relationship of financial management practices with the factors of economic growth and resilience.

Table 6. Pearson's correlation between financial management practices with the factors of economic growth and resilience

Pearson Correlation		<i>Factors of economic growth and livelihood resilience</i>					
<i>Financial Management Practices</i>		Economic	Social	Environmental	Institutional	Technological	Market
Budgeting and financial planning	<i>r</i>	0.128	0.145	0.233*	0.249**	0.221*	0.242*
	<i>p-value</i>	0.180 ^{ns}	0.127 ^{ns}	0.013	0.008	0.019	0.010
Savings and investment	<i>r</i>	0.111	0.138	0.062	0.020	0.388**	0.090
	<i>p-value</i>	0.245 ^{ns}	0.146 ^{ns}	0.517 ^{ns}	0.833 ^{ns}	0.000	0.347 ^{ns}
Access to credit	<i>r</i>	0.088	0.177	0.064	0.129	0.171	0.143
	<i>p-value</i>	0.356 ^{ns}	0.061 ^{ns}	0.501 ^{ns}	0.176 ^{ns}	0.072 ^{ns}	0.133 ^{ns}
Debt management	<i>r</i>	0.094	0.049	0.146	0.065	0.133	0.145
	<i>p-value</i>	0.324 ^{ns}	0.608 ^{ns}	0.124 ^{ns}	0.497 ^{ns}	0.163 ^{ns}	0.128 ^{ns}
Financial literacy	<i>r</i>	0.251**	0.264**	0.197*	0.122	0.339**	0.300**
	<i>p-value</i>	0.007	0.005	0.038	0.202 ^{ns}	0.000	0.001
Insurance risk	<i>r</i>	0.140	0.148	0.066	0.039	0.278**	0.180
	<i>p-value</i>	0.141 ^{ns}	0.121 ^{ns}	0.491 ^{ns}	0.683 ^{ns}	0.003	0.058 ^{ns}
Income and expenditure	<i>r</i>	0.140	0.061	0.246**	0.092	0.370**	0.227*
	<i>p-value</i>	0.142 ^{ns}	0.524 ^{ns}	0.009	0.334 ^{ns}	0.000	0.016
Market access	<i>r</i>	0.278**	0.176	0.146	0.214*	0.306**	0.424**
	<i>p-value</i>	0.003	0.064 ^{ns}	0.124 ^{ns}	0.023	0.001	0.000

Technological factors turned out to be strongly correlated with savings and investment ($r = 0.388$, $p < 0.01$), income and expenditure management ($r = 0.370$, $p < 0.01$), and market access ($r = 0.306$, $p < 0.01$). This greatly emphasized the role of technology in enhancing financial management among the fisherfolk.

Market-related factors are significantly correlated with market access ($r = 0.424$, $p < 0.01$) and more moderately correlated with budgeting and financial planning ($r = 0.242$, $p < 0.01$), indicating the importance of market integration as an economic catalyst. Reinforcing a crucial role in financial capacity building also shows that financial literacy was positively correlated with economic ($r = 0.251$, $p < 0.01$), social ($r = 0.264$, $p < 0.01$), and technological ($r = 0.339$, $p < 0.01$) factors.

Following this line of thought, the weakness of the fishing communities may be due to their members' inability to provide proper collateral for loans from institutions. The financial sector of fisherfolk must be strengthened by enhancing digital financial solutions and by improving market access to genuinely offer for the economic sustainability and resilience of these fisherfolk.

SUMMARY AND CONCLUSION

1. The analysis of sustainable fishing practices employed by small-scale fisherfolk

Small-scale fisherfolk demonstrated strong adherence to sustainable practices in fishing methods (3.94) and fishing effort (3.93), particularly in gear maintenance, conservation participation, compliance with seasonal bans, and restocking programs. Unlike this, the composition of the catch and its monitoring (3.78) showed moderate adherence through bycatch reduction and catch recording, with some gaps remaining. Challenges arose in fishing equipment and gear (3.69) due to limited access to modern technologies, as well as community involvement and governance (3.36) and environmental awareness and education (3.36); these conditions indicate poor cooperative involvement and inadequate conservation training. Economic diversification (3.54) was observed to be weak, as some fisherfolk engage in value-added processing and eco-tourism; however, much remains to be explored regarding income diversification.

2. The financial management strategies employed by small-scale fisherfolk

Budgeting and financial planning demonstrated best practices, with small-scale fisherfolk preparing budgets and similar plans, showing aspirations for income generation (2.92). In the second place were the access to markets and sales strategies (2.84), where prices are negotiated and demand is monitored, yet sets of marketing channels are limited. There was a moderate level of adoption in credit and loans (2.70), characterized by good repayment discipline, but limited by collateral requirements and inadequate debt management (2.67). The worst practices included savings and investments (2.63), characterized by sparse reinvestments and insufficient emergency funds, as well as financial literacy education (2.61), where existing knowledge was not fully applied in everyday financial decisions. The very worst of all, however, became income and expenditure tracking (2.43), where there was so little record-keeping that it became a problem when budgeting, establishing one's creditworthiness, and planning for the long term.

3. The factors of economic growth and resilience of small-scale fisherfolks

Multiple factors influence the economic growth and resilience for sustainable development of small-scale fisherfolk, where the institutional factor comes at the top of the list of perceived factors, with a mean value of 3.98. The fisherfolk strongly rely on government programs for subsidies, credit, and governance. Environmental factors come next, with a mean value of 3.97. Water quality (4.02) and climate change (3.99) indicate ecological vulnerability. Social factors also substantially influence resilience, with a mean effect score of 3.87. However, market factors present opportunities, implying demand, but adverse pricing, a branding gap, and dependency on intermediaries' limit market operations. Economic factors suggest that high input costs erode profits and that diversification remains limited, with scores averaging 3.59. Technological factors resulted in the lowest mean of 2.93, primarily due to the poor adoption of sustainable techniques, which was hindered by economic and technical constraints.

4. Effect of sustainable fishing and financial management strategies practiced by small-scale fisherfolks with the factors of economic growth and resilience

A case study revealed that fishing effort ($\beta = 0.465$, $p < 0.001$) was the strongest predictor of economic growth and resilience among indicators related to sustainable fishing, followed by catch composition ($\beta = 0.278$, $p = 0.011$), indicating that efficient practices and diversified catches improve fisherfolk's livelihoods. On the other hand, fishing methods, equipment, governance, and awareness, among others, were not found to have a direct effect. Among the financial management strategies, financial literacy education ($\beta=0.274$, $p=0.019$) and market access and sales strategies ($\beta=0.257$, $p=0.034$) were significantly important, stressing the importance of economic knowledge and stronger market linkages. However, budgeting, savings, access to credit, debt management, insurance, and income tracking were all not significant under this model. However, they remain supportive practices for long-term resilience.

5. The relationship of sustainable fishing practices and financial management strategies with the factors of economic growth and resilience

The study revealed that sustainable fishing practices such as fishing effort and method had high correlations with market factors ($r = 0.574$; $r = 0.481$, $p < 0.01$), whereas institutional support was highly correlated with fishing effort ($r = 0.510$) and moderately correlated with catch composition ($r = 0.432$), highlighting the role of governance in resilience. Environmental factors exhibited moderate correlations, while social factors were

positively associated with fishing effort ($r = 0.367$), highlighting ecological sustainability and community cooperation as key enablers of effective fishing practices. Distance softened the significance of technological and environmental awareness factors, particularly where barriers such as cost and limited access to resources were prohibitively high. In terms of financial management strategies, technology was strongly correlated with savings, income tracking, and market access. Market integration, on the other hand, was strongly associated with market access ($r = 0.424$) and budgeting. Better financial literacy is seen as strengthening capacity building through economics, social, and technological. However, the gaps in credit access, liability and savings strategies, infrastructure limit financial inclusiveness and stability for fisherfolk.

CONCLUSIONS

Small-scale fisherfolk practice sustainable fishing and follow regulations on fishing effort and methods. Governance, awareness, and technology then hinder the full achievement of sustainability. There is limited livelihood diversification, indicating that integrated ecological, social, and economic strategies are necessary for achieving balance in conservation and stability of livelihoods. Because such fishermen powerfully demonstrate their ability to budget, do market analysis, or repay credit, to have financial resilience. On the other hand, record-keeping can be weak, a savings culture is hardly retained, and financial literacy is poor for sustainability. Simultaneously, with the lack of tools and capacity building, challenges in accessing credit make fisherfolk terribly vulnerable. Thus, strengthening their day-to-day finances through inclusive programs is an urgent need to support and stabilize their livelihoods. Such favorable attributes that can improve the lives of fishermen and fisherwomen vary with respect to the degree of institutional, governance, or environmental consideration. Social capital increases adaptive and recovery capability while lessening the effects of rising input costs, thus being averse to profitability while enhancing sustainability. While stakeholders would limit technology adoption, exploitation would target intermediaries.

On one hand, businesses find opportunities to exploit the market while inequalities continue. Stakeholders themselves will have to take care of these problems through the entire scope of governance, ecosystem management, social capital, and technological innovation approaches. The fisherfolk's resilience is best increased by promoting sustainable fishing activities on the fishing effort and catches composition level, as well as other financial drivers like literacy and market access. While these other practices have limited direct impact on fisherfolk resilience, they remain relevant as long-term support. It is where the holistic approach to ecological sustainability and financial empowerment through concerted interventions achieves maximum fishery resilience. Sustainable fishing is considered most effective with good markets, institutions, and social cohesion.

In contrast, financial measures are strengthened by technology and literacy, which integrate with the market. Weak usage of technology, little credit or savings institutions, make things even tougher. A maximum level of resilience is reached when ecological practices are integrated with systems of financial and institutional support.

Recommendations

Local government agencies should devise and implement a holistic and integrated approach that combines ecological, financial, institutional, and social interventions to establish a livelihood resilience framework for small-scale fisherfolk.

Through empowering fisherfolk participate in decision-making during meetings that pertain to their issues and concerns. The monitoring systems should be made transparent so that sustainable fishing is truly practiced and not subverted by intermediaries. Ecological sustainability objectives must be incorporated into poverty alleviation and livelihood programs to achieve inclusive coastal development. Municipalities, in collaboration with educational institutions, must impart financial literacy to fisherfolk with particular attention paid to budget preparation, savings, and record-keeping. Micro-finance institutions may give opportunities for credit and savings to fisherfolk. Market-determination research and entrepreneur training for fisherfolk will increase their incomes while reducing instances of financial stress, including grants to start the enterprises and incubation programs offered through the proper government agencies to foster enterprise development. Embedding diversification projects in development plans ensures long-term sustainability and reduces training dependency on capture fishing.

Subsidies or shared services can be provided to environmentally friendlier cutters/vessels, as well as GPS systems and more efficient gears to modernize the various fishing methods. Technology centers in the community may become new meeting points in the neighborhood, fostering adoption among fisherfolk. Strengthening fisherfolk cooperatives as fish farmers promotes cooperation, risk-sharing, and bargaining power.

Overall, local government agencies must integrate ecological sustainability with financial empowerment and institutional support to grant fisherfolk maximum resilience. The Local Government Units can build sustainable coastal communities where fisherfolk prosper economically and at the same time conserve marine resources by addressing weak financial literacy skills, limited access to credit, low adoption of technology, and vulnerable livelihoods.

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