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IMPROVING FISHERMEN'S PRODUCTIVITY AND SUSTAINABILITY THROUGH DIGITALIZATION OF ACCOUNTING, MARKETING, AND UTILIZATION OF FISHERIES SCIENCE IN THE SEGARA AYU KEDONGANAN FISHERMEN GROUP

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Abstract:
This community empowerment program aimed to enhance the productivity and sustainability of the Segara Ayu Kedonganan Fishermen Group by integrating digital accounting systems, digital marketing strategies, and fisheries science applications. The program addressed key challenges in financial management, marketing, and sustainable fisheries practices. The program adopted a participatory and educational approach to ensure that members of the Segara Ayu Kedonganan Fishermen Group were not merely passive recipients of assistance but were actively engaged in every stage of the process. Through a five-stage participatory approach—preparation, socialization, integrated training, field implementation, and evaluation—fishermen adopted digital financial recording, expanded online marketing channels, and improved post-harvest processing techniques. The outcomes included increased financial literacy, market access, product diversification, and environmental sustainability practices. The program also fostered collaboration between academia and local communities, contributing to the Sustainable Development Goals (SDGs) related to economic growth, responsible consumption, and life below water. The implementation of the program has proven to be highly effective in enhancing the business capacity and operational efficiency of the Segara Ayu Kedonganan Fishermen Group.

INTRODUCTION

The Segara Ayu Kedonganan Fishermen Group is a coastal community of more than 40 active members who depend heavily on fishing and seafood processing for their livelihoods. Situated in a region with abundant marine resources, the group has the potential to supply fresh, high-quality seafood such as fish, shrimp, and squid, as well as processed products like dried fish and shrimp paste (Ahmad et al., 2024). However, despite this potential, they face a range of persistent challenges that hinder their ability to grow and compete in the increasingly modern and competitive seafood market. Financial management remains one of the most pressing issues (Nyantakyi et al., 2023). The group relies on manual bookkeeping methods without a structured accounting system, resulting in disorganized financial records and making it difficult to manage cash flow, track profits, or plan for future investments (Monitoring, 2024). This lack of proper financial documentation also limits their access to formal credit, as they cannot meet the requirements for loan applications from banks or cooperatives. Low financial literacy further compounds these problems, reducing their ability to optimize profits and manage risks effectively (Yovita, 2025).

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From a marketing perspective, the group's dependence on traditional distribution channels—mainly selling to intermediaries—reduces their bargaining power and often forces them to accept lower prices. They have yet to take full advantage of digital marketing platforms, e-commerce, or social media to expand their customer base and reach higher-value markets (Tito Wira Eka Suryawijaya et al., 2024). Without branding strategies or attractive product presentation, their offerings remain relatively unknown beyond local buyers. The use of fisheries science and innovative post-harvest handling techniques is also underdeveloped. Many members are unfamiliar with sustainable fishing practices, efficient aquaculture methods, or processing technologies that could extend product shelf life and enhance quality (Iriyadi et al., 2023). The absence of value-added product diversification, such as smoked fish, fish floss, or vacuum-sealed seafood, limits their competitiveness. In addition, inadequate waste management from seafood processing poses environmental concerns, potentially affecting local marine ecosystems (Barefoot et al., 2018). To address these challenges, this program integrates three main interventions: the digitalization of accounting systems, the enhancement of online marketing capabilities, and the introduction of sustainable fisheries practices, including better post-harvest handling and waste utilization. Beyond direct community benefits, the program is also designed to align with Indonesia's Merdeka Belajar Kampus Merdeka (MBKM) policy, creating opportunities for students to gain real-world experience while contributing to meaningful social change. Students from multiple disciplines are actively involved in training, mentoring, and implementation, allowing them to apply classroom knowledge to real economic and environmental challenges.

The initiative further supports key university performance indicators (Indikator Kinerja Utama, IKU), including facilitating student learning outside the classroom (IKU 2), encouraging faculty engagement with community partners (IKU 5), and ensuring that the outputs of academic work are adopted by stakeholders (IKU 6). Ultimately, the program seeks not only to improve the economic resilience and competitiveness of the Segara Ayu Kedonganan Fishermen Group but also to promote environmentally responsible practices that sustain both livelihoods and marine resources for the long term.

METHODS

Design, Time, Location, and Implementation Target. The program adopted a participatory and educational approach to ensure that members of the Segara Ayu Kedonganan Fishermen Group were not merely passive recipients of assistance but were actively engaged in every stage of the process. This approach was designed to combine hands-on learning with practical application, fostering both knowledge transfer and long-term skill retention (Ridho & Rachmawati, 2025). Activities were implemented in Kedonganan Village, a coastal area well known for its rich marine resources yet challenged by traditional management practices. The target beneficiaries were the more than 40 active members of the Segara Ayu Kedonganan Fishermen Group, who are engaged in fishing, seafood processing, and small-scale marketing. Recognizing that sustainable improvement requires systematic steps, the program was executed in five sequential stages:

a. Preparation Stage – Conducted through coordination meetings with village authorities and group leaders, initial site visits, and needs assessments. This stage included surveys, direct observation, and stakeholder mapping to identify priority issues in financial management, marketing, and fisheries processing. Training materials and modules were then developed based on these findings.

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b. Socialization Stage – Involving formal and informal gatherings with the fishermen group to introduce the program objectives, explain the potential benefits of digitalization and sustainable practices, and build motivation for active participation.
c. Integrated Training Stage – Delivered through a combination of presentations, live demonstrations, and interactive workshops covering digital accounting systems, online marketing strategies, and post-harvest handling innovations.
d. Implementation and Field Assistance Stage – Participants were guided in applying the learned skills in their daily operations, with facilitators providing one-on-one and group mentoring. It ensured that technology adoption and new practices were embedded into routine workflows.
e. Evaluation Stage – Final assessments measured the progress achieved, challenges faced, and readiness for independent application of the introduced systems and technologies.

Materials and Tools. To support the capacity-building process, the program equipped the fishermen with a range of practical tools and resources carefully tailored to their needs and the existing infrastructure in Kedonganan Village. In the area of financial management, they were introduced to digital accounting tools such as the BukuKas mobile application, Google Sheets for collaborative online record-keeping, and customized Excel templates designed to simplify bookkeeping and facilitate accurate financial reporting (Yovita, 2025). For marketing, the program provided access to platforms that could expand their market reach, including WhatsApp Business for direct sales and customer interaction, Tokopedia for tapping into broader e-commerce networks, and Instagram for visually showcasing products (Monitoring, 2024). To strengthen their branding capabilities, Canva was used as a creative tool for producing appealing digital content and promotional materials. On the production side, post-harvest technology was introduced using low-cost, locally sourced materials to build fish drying racks, smoking equipment, and fermentation containers, enabling the development of value-added products (Zhang et al., 2024). In line with zero-waste principles and environmental sustainability goals, the program also trained participants to process fish waste into organic fertilizer, turning what was once discarded into an additional source of income and environmental benefit.

Evaluation Design. The evaluation process was designed to capture both quantitative and qualitative changes in capacity, technology adoption, and market performance. Assessments were carried out at baseline (before program activities) and endline (after program completion) using surveys, semi-structured interviews, and direct observations.

Table 1. Evaluation Design Framework

Evaluation Aspect	Indicators	Data Collection Method	Timing
Skill Acquisition	Ability to operate accounting tools, create digital marketing accounts, and apply post-harvest methods	Pre- and post-training skills assessment	Baseline & Endline
Technology Adoption	Frequency and consistency of using digital tools and marketing platforms	Observation, usage logs, interviews	Monthly Monitoring
Market Outcomes	Change in customer reach, sales volume, price per unit, and number of product types	Sales records, interviews, digital analytics	Baseline & Endline
Sustainability Practices	Implementation of waste management, sustainable fishing, and improved processing techniques	Field visits, photo/video documentation	Endline

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RESULTS AND DISCUSSION

Material Selection. The selection of training materials was carried out strategically to address the core challenges identified during the initial needs assessment (Nepal et al., 2025). Modules on financial literacy were designed to equip participants with a practical understanding of bookkeeping, cash flow management, and profit calculation. These were complemented by digital marketing guides that introduced participants to modern selling strategies, from setting up online store accounts to crafting compelling product descriptions and visuals (Zhang et al., 2024). Additionally, fisheries science-based post-harvest processing techniques were included to enhance product quality, extend shelf life, and ensure compliance with sustainable and environmentally friendly practices. The materials were developed in both printed and digital formats to accommodate different levels of digital literacy among the fishermen. Step-by-step tutorials, visual aids, and local language translations were used to ensure comprehension and ease of adoption.

Product Development. The program successfully developed and introduced a range of practical tools and innovations tailored to the operational realities of small-scale fishing enterprises. Financial Tools – Simplified digital bookkeeping templates, compatible with mobile applications such as BukuKas and Google Sheets, were customized to fit the transaction patterns of fishermen (Liu et al., 2024). These tools allowed for the recording of daily catches, expenses, operational costs, and profit margins with minimal technical complexity. Marketing Outputs – Online product catalogs were created for participating fishermen, accompanied by basic branding designs such as logos, color schemes, and packaging concepts. Participants were trained to create and post social media content on platforms like WhatsApp Business, Tokopedia, and Instagram, with visual materials developed using Canva. Fisheries Innovations – New value-added products were developed, including dried fish, fish floss (abon ikan), and organic fertilizer derived from fish waste. These innovations not only diversified the product range but also provided opportunities for higher profit margins while reducing waste.

Final Product Testing. To ensure practical applicability, a final product testing phase was conducted. Participants demonstrated their ability to operate digital accounting applications and record daily transactions accurately, create and manage online store profiles, upload product images, set appropriate pricing strategies, apply fish preservation methods such as drying and smoking, and produce goods ready for sale in both offline and online markets. The fish waste recycling process was also piloted, producing organic fertilizer that could be used in local agriculture or sold as an additional income source (Nuhu & Alam, 2024).

Socialization. Before the technical training began, the program was formally introduced through a series of group meetings attended by over 25 members of the Segara Ayu Kedonganan Fishermen Group. During these sessions, the project team explained the objectives, benefits, and scope of the program, emphasizing the importance of digital transformation for increasing business efficiency and competitiveness. Interactive discussions allowed participants to share their experiences and concerns, fostering a sense of ownership over the program's direction. This engagement helped build trust and encouraged active participation in subsequent training sessions.

Activity Achievements. The implementation of the program resulted in tangible and measurable improvements across various aspects of the Segara Ayu Kedonganan Fishermen Group's operations. These achievements reflect progress not only in adopting new tools and technologies but also in enhancing skills, diversifying products, and fostering collaborations that support long-term sustainability. The summary of these accomplishments is presented in the table below.

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Table 2. The summary of these accomplishments

Achievement Area	Description	Impact
Digital Financial Management	80% of participants adopted digital bookkeeping tools, with several members fully transitioning from manual to digital record-keeping.	Improved accuracy, transparency, and efficiency in financial management.
Online Market Access	70% of participants successfully launched online sales accounts, expanding their reach beyond the local market.	Increased customer base and potential revenue growth.
Product Diversification	Introduction of two new processed fish products—dried fish and fish floss—specifically for online sale, offering higher value and longer shelf life.	Expanded product range and improved competitiveness.
Waste Utilization	Initial adoption of fish waste recycling techniques to produce organic fertilizer.	Reduced environmental impact and created an additional income stream.
Capacity Building	Significant increases in financial literacy and digital marketing skills, enabling better product pricing and more effective communication with customers.	Strengthened business skills and market positioning.
Partnership Development	Established ongoing collaboration with the Faculty of Fisheries for technical support in sustainable post-harvest processing and waste management.	Ensured long-term sustainability and access to expert guidance.

CONCLUSION

The implementation of the program has proven to be highly effective in enhancing the business capacity and operational efficiency of the Segara Ayu Kedonganan Fishermen Group. Through the systematic application of participatory training, mentoring, and hands-on assistance, the program successfully facilitated the adoption of simple yet practical digital accounting systems that have improved the accuracy, transparency, and timeliness of financial record-keeping within the group. This transformation has not only streamlined daily financial management but also opened up opportunities for better access to credit and more informed decision-making. In addition, the program has significantly improved the digital marketing and branding capabilities of the fishermen by equipping them with the skills and tools necessary to create engaging online product catalogs, design attractive packaging, and reach a broader customer base through social media and e-commerce platforms. These improvements have contributed to increasing their visibility in the marketplace and enhancing their competitiveness against more established players in the seafood industry. Equally important, the initiative has promoted the application of sustainable fisheries science in both product processing and waste management. It includes the adoption of improved post-harvest techniques such as drying and smoking to extend product shelf life, as well as innovative methods for converting fish waste into organic fertilizer. These environmentally friendly practices not only add value to the fishermen's production chain but also contribute to the preservation of local marine ecosystems.

Recommendations. To ensure the long-term success and scalability of the program, the following recommendations are proposed.

a. Continue regular mentoring and technical support to sustain the consistent use of digital tools and prevent regression to manual, less efficient systems.

b. Replicate the program model in other fishing communities, with appropriate adaptations to local cultural, economic, and environmental conditions, to expand its positive impact.
c. Strengthen partnerships with government agencies, cooperatives, and industry stakeholders to secure broader market access, facilitate participation in certification programs, and unlock new business opportunities.
d. Implement a long-term monitoring and evaluation framework to measure the program's impact on participants' income levels, market expansion, and environmental sustainability over time, ensuring that future improvements are evidence-based

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