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SUSTAINABLE LIVELIHOODS AND COASTAL RESILIENCE: LESSONS FROM FISHERFOLK COMMUNITIES IN DUMARAN AND ARACELI

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ABSTRACT: Alternative livelihood programs have been promoted to reduce fishing pressure and improve coastal community resilience. In Palawan, Philippines, fisherfolk from Dumaran and Araceli participated in training programs supported by WPU-ATBI and PBCAI, covering aquaculture, processing, and enterprise management. This study assessed training outcomes using a survey adapted from USAID and analyzed responses with descriptive and inferential statistics. Results showed that men and lower-income households (≤ ₱10,000) perceived training as more effective, while no significant differences were observed by household size, education, or policy participation. Women represented a majority (53.70%), reflecting their cultural assignment to post-harvest and marketing roles, as well as their growing participation in fisheries value chains.

Program outcomes revealed mixed results: 63.89% of participants continued their projects, yet nearly half of initiatives faced discontinuation due to financial and management challenges. Aquaculture and processing were the most frequently adopted livelihoods, showing alignment with local skills and resources. Financial literacy and business management training helped some participants sustain enterprises, but limited time, market access, and contextual gaps constrained broader success. Income improvements were reported by 70.67% of households, though gains in housing and education were modest.

The findings underscore that one-time training is insufficient; sustained support, access to finance, and stronger market linkages are crucial. Tailoring training to local contexts, fostering collective organization, and building long-term support systems can enhance the sustainability of alternative livelihoods. By addressing financial and operational barriers while leveraging women's active roles, livelihood programs can strengthen both household resilience and resource sustainability in coastal communities.

Keywords: Alternative Livelihoods, Fisherfolk, Training Effectiveness, Sustainable Development, Welch's ANOVA.

RESUMO: *Os programas de meios de subsistência alternativos têm sido promovidos com o objetivo de reduzir a pressão sobre a pesca e reforçar a resiliência das comunidades costeiras. Em Palawan, nas Filipinas, pescadores de Dumaran e Araceli participaram em ações de formação apoiadas pela WPU-ATBI e pela PBCAI, abrangendo áreas como a aquacultura, o processamento e a gestão de empresas. Este estudo avaliou os resultados das formações através de um inquérito adaptado da USAID e analisou as respostas com recurso a estatísticas descritivas e inferenciais. Os resultados mostraram que os homens e os agregados familiares de menor rendimento (≤ ₱10 000) consideraram a formação mais eficaz, não se tendo verificado diferenças significativas em função da dimensão do agregado, do nível de escolaridade ou da participação em políticas públicas. As mulheres representaram a maioria (53,70%), refletindo a sua tradicional associação às atividades pós-colheita e de comercialização, bem como a sua crescente participação nas cadeias de valor das pescas.*

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Os resultados do programa revelaram um impacto misto: 63,89% dos participantes continuaram com os seus projetos, embora quase metade das iniciativas tenham sido interrompidas devido a dificuldades financeiras e de gestão. A aquacultura e o processamento foram as atividades alternativas mais frequentemente adotadas, demonstrando coerência com as competências e recursos locais. A formação em literacia financeira e gestão empresarial ajudou alguns participantes a manter as suas iniciativas, mas o tempo limitado, o difícil acesso aos mercados e as lacunas contextuais limitaram o sucesso mais amplo. Verificou-se uma melhoria nos rendimentos em 70,67% dos agregados familiares, embora os progressos ao nível da habitação e da educação tenham sido modestos. As conclusões sublinham que uma formação pontual é insuficiente; são essenciais um apoio continuado, o acesso a financiamento e ligações mais fortes aos mercados. A adaptação das formações aos contextos locais, a promoção da organização coletiva e a criação de sistemas de apoio a longo prazo podem reforçar a sustentabilidade dos meios de subsistência alternativos. Ao ultrapassar barreiras financeiras e operacionais e ao valorizar o papel ativo das mulheres, estes programas podem fortalecer simultaneamente a resiliência das famílias e a sustentabilidade dos recursos nas comunidades costeiras.

Palavras-chave: Meios de Subsistência Alternativos, Pescadores, Eficácia da Formação, Desenvolvimento Sustentável, ANOVA de Welch.

1. INTRODUCTION

Coastal community, specifically small sacale fishers livelihood and survival depend on healthy marine systems (Funk *et al*., 2022). Across Asia, fishery resources show clear signs of overexploitation (Lungren *et al*., 2006), particularly in coastal areas where habitat degradation intensifies fishing pressure (Etongo and Arrisol, 2021; Tahiluddin and Sarri, 2022; Guimmayen *et al*., 2024), and in inshore waters where weak governance undermines effective resource management (Daw *et al*., 2009). In the Philippines and Southeast Asia, serial depletion of local stocks and unchecked fishing effort have further driven long-term declines (Anticamara & Go, 2016; Suh & Pomeroy, 2020), while illegal and unreported fishing exacerbates biodiversity loss and resource competition from industrial fleets (Arbiol and Minh, 2023). To address these pressures, agencies promote alternative livelihoods—such as jewelry-making and handicrafts (Aguilar, 2022; Isip, 2022), aquaculture (Plasus, 2024), eco-tourism, value-adding enterprises, and even innovative projects in waste reclamation and repurposing (Serrona & Yu, 2009)—to reduce dependence on capture fisheries and build economic resilience (FAO, 2020). These efforts are particularly critical in coastal communities, where poverty rates are high and dependence on fishing leaves households especially vulnerable to environmental and economic shocks (Etongo & Arrisol, 2021). These initiatives not only provide new income streams but also offer long-term ecological and economic benefits by reducing reliance on marine and coastal resources.

In Palawan, particularly in Barangays Tinintinan and Dalayawan in the Municipality of Araceli, as well as Barangays Catep, Bacao, and Calasag in the Municipality of Dumaran, several alternative livelihood training programs have been rolled out. These aim to empower fisherfolk with the knowledge and skills necessary to choose and establish sustainable sources of income. However, the success and longevity of these efforts vary across individuals and households, often influenced by a mix of social, economic, and environmental factors.

This study looks into how the training programs have made a difference and where the alternative livelihood efforts currently stand in Dumaran and Araceli, Palawan. More specifically, we employ descriptive statistics and regression analysis to examine the relationship between household socioeconomic conditions, fishing dependence, and access to alternative livelihoods, as these methods allow us to capture both trends and explanatory factors influencing livelihood choices. The case study focuses on small-scale fisherfolk in Dumaran and Araceli, Palawan, with key variables including household income, fishing effort, livelihood diversification, and access to support programs.

The findings of this study can be directly applied by government agencies and development organizations in designing targeted livelihood support programs for small-scale fisherfolk. By identifying the socioeconomic and ecological factors that influence the adoption of alternative livelihoods, policymakers can allocate resources more efficiently—such as prioritizing training, microfinance, or market linkages for households most dependent on fishing—thereby reducing pressure on overexploited fisheries while strengthening coastal community resilience.

2. MATERIALS AND METHODS

2.1 Study site and selection of participants

In the third quarter of 2023, planning for the initiative for awarding of alternatice livelihood for fisherfolk in Dumaran and Araceli, Palawan, Philippines began through the collaboration

of Western Philippines University-Agri-Aqua Technology Business Incubation (WPU-ATBI) and Palawan Biodiversity Conservation Advocates Inc. (PBCAI), a non-government organization based in Palawan. The WPU-ATBI, support the incubation, development, and commercialization of Agri-aqua technologies and innovations in the province of Palawan through a funding of Department of Science and Technology- Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD). By November 2023, WPU-ATBI and PBCAI initiated discussions with the local government units (LGUs) of Dumaran and Araceli, along with fisherfolk associations from these municipalities. A total of eight fisherfolk associations—four from Dumaran and four from Araceli—were identified as beneficiaries of alternative livelihood assistance approximately USD 3,000 per association. Each association, composed of 30–50 members, participated in a one-year series of training programs. These covered the selection of suitable alternative livelihoods—such as milkfish culture, oyster culture, mud crab culture, fish processing, giant freshwater prawn culture, and sea cucumber culture—together with site suitability assessments, business planning, bookkeeping, enterprise management, aquaculture techniques, and marketing, among other skills. Trainings were conducted across the barangays of Tinintinan and Dalayawan in Araceli, and Catep, Bacao, and Calasag in Dumaran, Palawan. To evaluate the impact of these trainings and the NGO's provision of livelihood support, a survey was also administered in the eight barangays where the beneficiary associations were located. Figure 1 presents the map of the study site locations.

The participants for the survey were 108 fisherfolk beneficiaries of alternative livelihood training courses and events. Using simple random sampling, participants were chosen to guarantee thorough data representation, where qualified and available beneficiaries were involved.

2.2 Survey questionnaire

The survey questionnaire used in the study was adopted from the published report of United States Agency for International Development (USAID) (Crawford and Herrera, 2008). The questionnaire was divided into three sections: the first section consisted of the socio-demographic profile of the respondents, capturing essential details regarding the respondents' age, household composition, educational attainment, length of stay in the area, religion, and sources of income; second section covered the status of the individual prior to the intervention of the training and establishment of alternative livelihood; while the last section assessed the socio-economic status of the fisherfolk after the establishment and management of their respective livelihood initiatives.

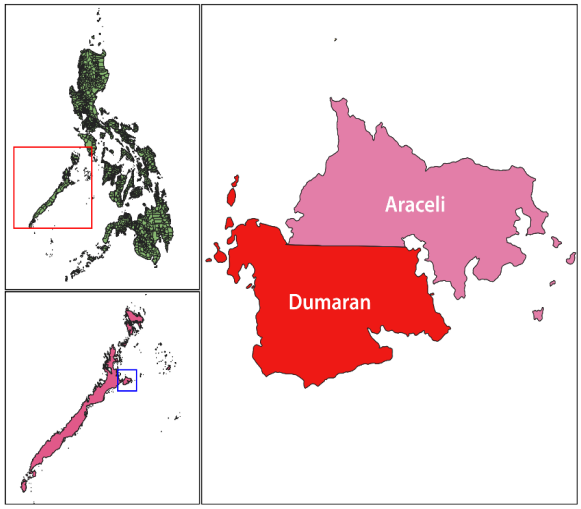

Figure 1. Map of the Study Site.

The survey covered a total of 108 respondents drawn from fisherfolk association beneficiaries in Municipality of Dumaran and Araceli. Respondents were distributed across eight barangays, ensuring representation of both coastal and island communities. The sample included a mix of male and female household members, with most respondents falling within the 21-67 age bracket. For analysis, answers were classified into major categories such as demographic information (age, education, household size), livelihood and income sources, fishing effort and practices, and access to alternative livelihood or support programs. This sampling strategy provides a representative snapshot of the socioeconomic conditions of small-scale fisherfolk in the study area.

2.3 Data Gathering Instrument

A structured survey questionnaire was developed to collect data corresponding to the study objectives. Part I identified the participants' profile (age, sex, educational attainment, household size, income, etc.). Parts II, III, and IV focus on training relevance and satisfaction, application of learnings and livelihood ventures pursued, and implementation outcomes and household improvements, respectively. Lastly, Part V was used to gather feedback and suggestions for future training. The questionnaire included closed-ended questions (multiple response scale and Likert scale). To ensure the validity and reliability of the survey form, the instrument was pilot-tested by trained enumerators with WPU-ATBI incubatees to check its consistency.

2.4 Data Collection Procedure and Analysis

Before data collection, orientation was conducted, and consent was secured from participants. Participants voluntarily responded to the study and were assured anonymity and privacy. Trained enumerators facilitated data collection through face-to-face surveys, ensuring that responses were accurately recorded, especially for participants with limited literacy. The collected data were only used for the research.

The collected data were analyzed using descriptive statistics such as frequency, percentage, mean, and standard deviation to interpret participants' profiles and training effectiveness. To see if the results varied based on different participant profiles, tests like the Mann-Whitney U and Welch's were applied. Tables were used to clearly present the findings and make comparisons easier. All the data were organized, cleaned, and processed in a spreadsheet, then analyzed using the jamovi software (The jamovi project, 2022; R Core Team, 2021).

3. RESULTS AND DISCUSSION

3.1 Profile of the Participants

The profiles of the participants give a hopeful view of how alternative livelihood programs can truly impact the lives of fisherfolk in Dumaran and Araceli. The data shows promising signs, suggesting that these initiatives have the potential to create real, lasting change (Table 1).

Sex. In the fishing communities of Dumaran and Araceli, women account for 53.70% of surveyed participants, reflecting a majority presence that aligns with broader evidence showing women's predominance in post-harvest, processing, and market functions within small-scale fisheries. These shore-based, value-adding roles both reproduce culturally embedded gender divisions of labour and provide strategic pathways for women's economic agency and increased participation in local fisheries governance. Thus, the observed female majority likely indicates a combination of persistent traditional role differentiation and a potential shift toward greater gender equity – particularly if interventions support women's access to alternative livelihood activities, organizational leadership, and market-level resources. (Alonso-Población & Siar, 2018; Harper *et al*., 2013; Pedroza-Gutiérrez & Hapke, 2022; Siar, 2003).

Educational Attainment. Educational backgrounds vary, with the majority comprising both those who have reached the high school level and those who are high school graduates (53.71%), followed by those who have reached and finished the elementary level (31.48%). Amadu *et al*. (2021) noted that fisherfolk with some level of formal education—whether it's primary, secondary, or higher—often have more stable and resilient livelihoods. Education likely gives them the tools to understand and take advantage of alternative livelihood options. This highlights just how important it is to keep investing in skills training and to actively involve local stakeholders if we want to see real, lasting improvements in places like Dumaran and Araceli.

Household Size. Household sizes range, with the largest group having four members (39.81%), followed by those having five members (22.22%). This reflects the existence of a nuclear family among the fishing villages in Dumaran and Araceli. Household size can impact the distribution of resources, labor availability for other livelihood activities, and general family economic resilience (Muallil *et al*., 2013; Nguyen and Le, 2020). While smaller households may have a limited workforce and fewer dependents to support them, larger homes may benefit from more working-age members.

Years Stay in the Area. Most participants (97.22%) have lived in the area for over five years. Living in the same place for a long time often means people develop a deep understanding of their environment, local resources, and how their community works. This kind of rootedness can make alternative livelihood projects more sustainable, as locals are more likely to support efforts that benefit their surroundings. Their firsthand experience and traditional knowledge also help ensure these efforts are practical and respectful of local culture and the environment (Pukkalla & Rama Mohan, 2021).

Religion. The predominant religion is Roman Catholicism (92.59%). This common religious affiliation could help to foster great community cohesiveness and group involvement in livelihood projects. In many fishing communities, faith-based values and church groups do more than offer spiritual support—they often serve as trusted spaces where people come together, share knowledge, and work toward common goals. In Catanduanes, for example, a church-sponsored livelihood project led by the Diocese of Virac helped women not only earn income but also build confidence, take part in community decisions, and care more deeply for the environment (Pesimo, 1997). This shows how religious networks can play a vital role in supporting alternative livelihoods and strengthening community ties. In Dumaran and Araceli, religious events and church-based groups could efficiently share knowledge, organize involvement, and support alternative livelihood projects.

Sources of Income. Fishing remained the primary source of income (94.44%), followed by farming (86.11%) and livestock (81.48%), with women demonstrating a strong presence in fisheries-related activities. This pattern was shaped not only by household labor dynamics but also by broader cultural, economic, and institutional drivers. In this study, the category "fisheries" encompassed processing activities that used fish as the primary raw material, which partly explains why many female respondents reported fisheries as their main livelihood. Women's roles were often concentrated in shore-based and post-harvest tasks traditionally regarded as extensions of domestic responsibilities (Siar, 2003). Beyond cultural assignment, processing and marketing provided more stable and immediate income streams compared to the risks and seasonality of capture fishing (Harper *et al*., 2013). Their prominence was further reinforced by fisherfolk organizations and development programs that actively promoted women's participation in training, microfinance, and decision-making processes (Alonso-Población & Siar, 2018). Moreover, women's simultaneous engagement in farming, fisheries, and small-scale enterprises reflected broader livelihood diversification strategies that enhanced household resilience to environmental and market shocks (Pedroza-Gutiérrez & Hapke, 2022).

Household Income per Month. In Dumaran and Araceli, most households (67.59%) earn ₱10,000.00 or less per month during the fishing season, with 26.85% earning between ₱10,001.00 and ₱15,000.00. In the off-season, income drops sharply, with 98.15% earning ₱10,000.00 or less. These fluctuations highlight the economic vulnerability of fishing communities, as seen in other coastal areas, where seasonal changes impact household income and food security (Joquiño *et al*., 2021; Macusi *et al*., 2021; Gonzales and Plasus, 2023). The pandemic further exposed how income instability worsens food insecurity (Palanca-Tan, 2020; Ungkakay-Bagsit *et al*., 2025). This emphasizes the need for alternative livelihoods to reduce reliance on fishing and improve year-round financial stability.

House Structure. The majority (65.74%) of the households surveyed live in houses made of light materials such as bamboo, wood, or nipa. Others reside in concrete (17.59%) or semi-concrete 16.67% structures. The predominance of light-material housing reflects the limited financial capability of many fisherfolk families to make more durable house investments. Apart from increasing their vulnerability during typhoons and floods, this condition emphasizes the need for housing improvement support in livelihood and community development initiatives in Dumaran and Araceli.

Revenues Generated from the Alternative Livelihood Project. Many fisherfolk in Dumaran and Araceli are still in the early stages of their alternative livelihood projects. Nearly half (48.15%) have yet to earn, while 36.11% report modest earnings of ₱10,000.00 or less. Despite these small returns, they signal progress in diversifying income and reducing dependence on uncertain fishing yields. Similar trends have been seen in other Philippine communities, such as in Moalboal, Cebu, where marine ecotourism provided new income through herring aggregations (Cusack *et al*., 2021), and in Negros Occidental, where organic farming improved financial stability (Makita, 2016). These examples show that with proper support and training, alternative livelihoods can become vital sources of income and community empowerment.

Association Membership. The participants belong to several community associations, with the largest groups being the Calasag Fisherfolk/Farmers Association and the Catep Fisherfolk Association, each making up 25.93% of the total. According

Table 1. Frequency distribution of the participants' profiles. (n = sample size).

Profile Variables	Categories	Frequency (n = 108)	Percentage (%)
Sex	Male	50	46.30
	Female	58	53.70
Educational Attainment	Did Not Attend School	1	0.93
	Elementary Level	14	12.96
	Elementary Graduate	20	18.52
	High School Level	33	30.56
	High School Graduate	25	23.15
	College Level	10	9.26
	College Graduate	5	4.63

Table 1. (cont) Frequency distribution of the participants' profiles. (n = sample size).

Profile Variables	Categories	Frequency (n = 108)		Percentage (%)	
Household Size	1	1		0.93	
	2	11		10.19	
	3	17		15.74	
	4	43		39.81	
	5	24		22.22	
	More than 5	12		11.11	
Years of Stay in the Area	5 years or less	3		2.78	
	More than 5 years	105		97.22	
Religion	No Religion	1		0.93	
	Roman Catholic	100		92.59	
	Christian	5		4.63	
	Baptist	2		1.85	
Sources of Income (multiple responses)	Fishing	102		94.44	
	Aquaculture	1		0.93	
	Construction	13		12.04	
	Farming	93		86.11	
	Livestock	88		81.48	
	Tourism	2		1.85	
	Salary from the Government	6		5.56	
	Others	5		4.63	
		Fishing Season	Off-season	Fishing Season	Off-season
Household Income per Month	Less than or equal to ₱10,000.00	73	106	67.59	98.15
	₱10,001.00 to ₱15,000.00	29	1	26.85	0.93
	₱15,001.00 to ₱20,000.00	5	0	4.63	0.00
	₱20,001.00 to ₱25,000.00	0	1	0.00	0.93
	₱25,001.00 to ₱30,000.00	1	0	0.93	0.00
House Structure	Light Materials	71		65.74	
	Concrete	19		17.59	
	Semi-Concrete	18		16.67	
Revenues Generated from the Alternative Livelihood Project	Not Yet Harvested	52		48.15	
	Less than or equal to ₱10,000.00	39		36.11	
	₱10,001.00 to ₱15,000.00	4		3.70	
	₱20,001.00 to ₱25,000.00	1		0.93	
	₱60,001.00 to ₱100,000.00	12		11.11	
Association Membership	No Fisherfolk/Farmers Association Identified	4		3.70	
	Bacao Fisherfolk/Farmers Association	22		20.37	
	Catep Fisherfolk Association	27		25.00	
	Calasag Fisherfolk/Farmers Association	28		25.93	
	Dalayawan Fisherfolk/Farmers Association	12		11.11	
	Tinintinan Fisherfolk Association	15		13.89	
Participation in Fisheries Policy Decision-Making	Participated	63		58.33	
	Did Not Participate	45		41.67	

to the Food and Agriculture Organization (FAO), strong local organizations play a vital role in supporting small-scale fisherfolk. Beyond simply organizing members, these associations serve as spaces where skills are sharpened, resources are shared, and collective goals are pursued. With consistent support and capacity-building, these groups can become even stronger—helping fisherfolk in Dumaran and Araceli build more stable and sustainable livelihoods.

Participation in Fisheries Policy Decision-Making. Just over half of the participants (58.33%) reported participated in fisheries policy decisions, which is a positive sign that more fisherfolk are becoming engaged and aware of the issues that impact them. However, this also means that many are still left out of these important discussions. To change that, it's crucial to strengthen community involvement and provide more training and support. By doing so, more people in Dumaran and Araceli will be empowered to speak up and contribute to decision-making, ensuring that their local knowledge and experiences play a key role in shaping more sustainable fisheries management (Cusack *et al*., 2021; Gonzales *et al*., 2021; Almendras *et al*., 2022; Mololos *et al*., 2024).

3.2 Effectiveness of Training and Skills Development in Alternative Livelihoods

With a mean score of 3.01 (Table 2), the overall effectiveness of the training is considered *high*, suggesting that participants found it successful in building their skills and preparing them for alternative livelihood activities. Specifically, the applicability of the training received a mean score of 2.96 (SD = 1.02), reflecting participants' belief that the content was generally relevant to their daily work and community needs. Meanwhile, improvements in management and social skills scored 3.04 (SD = 0.97 and 0.95, respectively), pointing to meaningful growth in both practical business abilities and interpersonal communication. While these scores are encouraging, they remain just below the *very high* range. This suggests room for enhancement in how training programs are designed and delivered—particularly in ensuring that skills are not only learned but effectively applied in real-life settings across communities like Dumaran and Araceli.

These findings align with other research that highlights the powerful impact of well-designed livelihood programs. For instance, Aguilar and Tabujara (2022) found that fisherfolk in Negros Occidental who took part in conservation-based livelihood projects gained practical skills that were closely tied to their environment and daily lives. This hands-on approach not only helped them build useful skills but also led to stronger engagement and a greater sense of ownership over their work. Similarly, Cosejo (2025) shared that fisherfolk involved in the DOLE Integrated Livelihood Program became more confident in running small businesses. They learned valuable skills in budgeting, planning, and managing resources—essential tools for supporting their families. Beyond just the technical skills, these programs also helped build a sense of community. Participants often worked together in groups, which improved their ability to communicate, make decisions, and collaborate—skills that are key to individual success and the overall resilience of the group (Aguilar & Tabujara, 2022). Taken together, these insights show that alternative livelihood training isn't just about surviving financially; it's about empowering communities to grow, adapt, and thrive.

3.3 Profile Differences in the Effectiveness of Training and Skills Development in Alternative Livelihoods

Significant profile differences [e.g., sex, household size, and household income (fishing season)] were observed in the effectiveness of training and skills development in alternative livelihoods (Table 3). Male participants (Mean = 3.39) view the training effectiveness significantly differently than females (Mean = 2.68), $t = 807$, $p < .01$. This gender-based difference can reflect different access to resources, possibilities, or society expectations about livelihood roles for men and women. Men often report higher effectiveness. Thus, more research on gendered experiences and opportunities in the training process could provide an understanding of how training programs could be customized to meet the particular needs of female participants more successfully.

Table 2. Descriptive analysis of the effectiveness of training and skills development in alternative livelihoods. [1.00-1.75 (Low), 1.76-2.50 (Moderate), 2.51-3.25 (High), 3.26-4.00 (Very High)]

Indicators	Mean	SD
Level of Applicability of Training for Alternative Livelihoods Provided	2.96	1.02
Level of Improvement in the Level of Managing Skills Upon the Grant of Alternative Livelihood	3.04	0.97
Level of Social Skills Developed Upon the Grant of Alternative Livelihood	3.04	0.95
Overall Effectiveness	3.01	0.98

In addition, the analysis reveals a significant difference between participants with household incomes equal to ₱10,000 or less (Mean = 3.29) and those with incomes over ₱10,000 (Mean = 2.89), $t = 920$, $p < .05$. Lower-income participants believe the training to be more successful, which could reflect the

direct advantages they gain from livelihood training. For those from lower-income backgrounds, the training could be a crucial chance to raise their standard of living, thus enhancing their evaluation. Higher-income participants might already have access to other sources of income or might be more critical of the training if it does not fit their expectations or needs. Furthermore, participants who generated greater than ₱10,000.00 (Mean = 3.24) view the project more favorably, compared to those who earned less than or equal to ₱10,000.00 (Mean = 2.62), $t = 194$, $p < .05$. Those who made more money from the alternative livelihood project often have better opinions. This could result from their direct gains from the project, increasing their impression of its success. On the other hand, those who produced smaller income could view the project as less successful, maybe because of difficulties scaling or implementing the initiative. These findings underline the need for income generation in assessing the success and influence of livelihood programs and imply that projects could have to concentrate on increasing income potential to raise participant satisfaction and perceived effectiveness.

On the other hand, the study reveals that the perceived effectiveness of the alternative livelihood training is not much influenced by household size, educational level, or involvement in fisheries policy decision-making ($p > .05$). Participants' view of the training's effectiveness is not influenced by educational level. This implies that people with different educational backgrounds view the effectiveness of the alternative livelihood training in same terms. It could suggest that, independent of the participants' official education, the skills being taught in the livelihood program are sufficiently broad and pragmatic to be useful. The effectiveness of the training is not influenced with the size of the household. One could argue that the effect of the training is more individualistic than family-oriented, thus each participant may evaluate its relevance and impact depending on their personal experience instead of on the structure of the house regardless of the number of household members.

The type of household structure also does not influence perceptions of training effectiveness. Although household structure could reflect elements like socioeconomic level or living circumstances, in this case these elements seem to have no bearing on how valuable or relevant the training participants got. This could be the result of the practical character of the training, in which participants concentrate more on the acquired skills than on their living surroundings. The degree of training effectiveness is not influenced by involvement in fisheries policy decisions. This could imply that although participation in policy decision-making offers some insights or benefits, it has no direct influence on the impressions of the training received by individuals. It could be that the content of the training is seen as equally relevant to both groups, independent of their involvement in policy decisions, or that other elements, such personal experiences or outside conditions, exceed the impact of policy participation on the general impression of the effectiveness of the training.

3.3 Implementation Outcomes and Stakeholder Feedback on Alternative Livelihood Projects

Implementation Outcomes and Stakeholder Feedback on Alternative Livelihood Projects were determined by understanding the participants' Continuation of the Management of Alternative Livelihood, Success of the Alternative Livelihood, Factors Appreciated Much in the Training, Application of Learnings Regarding Alternative Livelihood in Daily Life, Household Improvement after Engaging in Alternative Livelihood, and Things to Improve in Future Alternative Livelihood Training (Table 4).

Continuation of the Management of Alternative Livelihood. In evaluating the sustainability of alternative livelihood programs, it was observed that 63.89% of the 108 participants continued operating their livelihood projects, suggesting a promising level of program continuity and a strong community drive toward diversified income generation. However, 36.11% discontinued their initiatives, pointing to underlying issues such as a lack of ongoing support, insufficient monitoring, and burnout. This pattern aligns with findings from Roe *et al*. (2015), who emphasized that many alternative livelihood programs fail to achieve long-term success due to inadequate post-project support and weak institutional follow-through. The need for continued engagement is particularly relevant in fishing communities, where alternative livelihoods often involve a transition to entirely new skill sets and market environments. Supporting this, Fabinyi *et al*. (2014) examined livelihood diversification among coastal fishers in Southeast Asia and noted that while many were willing to engage in new activities, sustained participation heavily depended on the availability of financial resources, training, and follow-up mechanisms.

Success of the Alternative Livelihood. An evaluation of the outcomes from alternative livelihood programs for fisherfolk showed a nearly equal split: 50.93% of the projects were considered successful, while 49.07% faced challenges that led to their discontinuation. The main reasons for these setbacks included financial struggles (47.17%), issues with management and operations (32.08%), product and market-related problems (18.87%), and other external factors (1.89%). This balance

between successes and failures highlights important gaps in how these programs are designed and implemented.

Table 3. Comparative analysis determining profile differences in the effectiveness of training and skills development in alternative livelihoods.

Profile	Group	Mean	Statistic	p
Sex	Female	2.68	807a	.001
	Male	3.39		
Educational Attainment	Elementary Level/Graduate	3.18	1.27b	.291
	High School Level/ Graduate	2.99		
	College Level/Graduate	2.73		
Household Size	1 to 2	3.39	1.20b	.315
	3 to 4	2.95		
	5 to 6	2.99		
Household Income (Fishing Season)	Less than or equal to ₱10,000	2.88	920a	.011
	More than ₱10,001	3.29		
Household Structure	Light Materials	2.96	1170a	.335
	Semi-concrete/Concrete	3.12		
Revenues Generated from the Alternative Livelihood Project	Less than or equal to ₱10,000.00 (*n* = 39)	2.62	194a	.010
	Greater than ₱10,000.00 (*n* = 17)	3.24		
Association Membership	Bacao Fisherfolk/Farmers Association	2.95	3.06b	.062
	Catep Fisherfolk Association	2.56		
	Calasag Fisherfolk/Farmers Association	3.30		
	Dalayawan Fisherfolk/ Farmers Association	3.36		
	Tinintinan Fisherfolk Association	3.18		
Participation in Fisheries Policy Decision-Making	Participated	2.81	1192a	.143
	Did Not Participate	3.15		

Note: aMann-Whitney U was used. bWelch's was used.

One of the biggest challenges for small-scale fishers is financial pressure, mainly due to limited access to formal loans. Many end up relying on informal lenders, leading to debt and instability (Mozumder *et al*., 2024). To address this, the alternative livelihood training in Dumaran and Araceli included modules on financial literacy and business management. However, due to limited time and budget, these topics may not have been explored in enough depth—possibly contributing to why financial and management issues remain the most common challenges faced by fisherfolk associations in sustaining their projects. The findings highlight that financial literacy and business management are essential components of alternative livelihood training, as they help fisherfolk manage income and sustain500 small businesses—an approach proven effective in other regions (Tilley *et al*., 2020).

But one of the biggest challenges is securing a stable market for their products. Without it, fisherfolk may struggle to sell what they produce, putting both their income and motivation at risk (Lovita *et al*., 2020). This shows the need for a more well-rounded approach—one that not only builds skills but also connects communities to reliable markets and long-term support. That kind of strategy is crucial for making livelihood programs truly sustainable.

Factors Appreciated Much in the Training. The training provided under the alternative livelihood program was generally well-received. The most appreciated aspects included assistance in livelihood setup (85.19%), knowledge and skills gained (64.81%), support from the speaker or consultant (56.48%), and food provisions (38.89%). High satisfaction rates with setup assistance and skill acquisition underscore the value of practical, hands-on training. Positive feedback about facilitators and logistical support (e.g., food provisions) highlights the importance of well-organized and client-centered training environments.

Application of Learnings Regarding Alternative Livelihood in Daily Life. In assessing the practical application of alternative livelihood training among fisherfolk, it was observed that 70.37% of participants implemented the skills they acquired, while 29.63% did not. Among the 76 alternative livelihoods pursued, oyster culture and bangus (milkfish) cage farming were the most common, each accounting for 23.68%, followed by sea cucumber culture and food processing (17.11% each), mud crab culture (11.84%), and dishwashing soap making (6.58%). The high uptake of aquaculture-based livelihoods, such as oyster and bangus culture, suggests that these activities align well with the local knowledge and resource availability of the communities involved. This trend is consistent with findings from Baticados (2015), who noted that aquaculture technologies, when tailored to the capacities and contexts of rural communities, are more likely to be adopted and sustained. Furthermore, the integration of social capital through fish farmers' associations has been shown to enhance the agency of small-scale aquaculture producers, facilitating better access to resources and support systems (Marin *et al*., 2023). These insights underscore the importance of aligning livelihood training programs with the existing skills and environmental contexts of fisherfolk to ensure higher rates of application and sustainability.

Household Improvement after Engaging in Alternative Livelihood. The program's favorable results were seen in household improvement; 69.44% of participants reported improvements mostly in household income (70.67%), then, to a lesser degree, in house structure (17.33%) and education (12.00%). Though gains in housing and education remain limited, participants' household income shows that alternative livelihoods can favorably impact economic well-being. This implies that income increases could be modest rather than long-term investments, or given top priority for urgent needs.

Things to Improve in Future Alternative Livelihood Training (multiple responses). In evaluating the outcomes of alternative livelihood training programs for fisherfolk, participants highlighted several areas for improvement to enhance the effectiveness and sustainability of such initiatives. A significant 67.59% of participants emphasized the need for better production processes, while 54.63% pointed to improvements in packaging and marketing strategies. Additionally, 38.89% underscored the importance of tailoring livelihoods to fit the local context, and 20.37% identified the enhancement of managerial skills as crucial. These insights underscore the necessity for comprehensive, context-sensitive capacity-building approaches in future training programs.

Research supports these findings, emphasizing that aligning livelihood interventions with local contexts and needs is vital for their success. According to the study by Tilley *et al*. (2021), small-scale fisheries programs need to be supported over an appropriate period and use participatory methods that build capacity in order to achieve positive outcomes. Similarly, Nuraini *et al*. (2022) show that teaching fishermen effective marketing strategies and better product packaging can significantly improve their access to markets and reduce their reliance on middlemen, leading to better economic outcomes.

4. CONCLUSIONS

The alternative livelihood training programs in Dumaran and Araceli had a positive impact, helping participants build practical skills, improve their management abilities, and strengthen social ties. While there was noticeable progress, the results also highlighted areas that need improvement in both the content and delivery of the training. About 63.89% of participants continued with their livelihood projects, but nearly half faced challenges, mostly related to financial and management issues. The training on financial literacy and business management was especially helpful, with 70.37% of participants successfully applying what they learned. However, there's still room to improve, particularly in areas like production, marketing, and tailoring the training to better fit local needs. These findings show that while the programs can boost household income, ongoing support is essential for ensuring their long-term success.

CONTRIBUTIONS

Leo N. Plasus – Conceptualized the study, conducted the training sessions, and contributed to the writing and revision of the paper. Jupeth T. Pentang – Performed statistical analysis, interpreted the data/ result, assisted in drafting the manuscript, and contributed to the revision of the paper. Maria Cristina Rosero – Conducted the training and facilitated the survey process. Elleonor Abatay – Led the training sessions and facilitated the survey process. Vincent Gacer – Conducted the survey. Mary Divina Nicolas – Conducted the survey and provided support in drafting the manuscript. Maria Mojena G. Plasus – Conceptualized the research, secured funding, designed the survey form, and contributed to writing the draft and revising the manuscript.

RECOMMENDATIONS

To make future alternative livelihood training more effective, it's essential to focus on hands-on learning that connects directly to the daily lives of fisherfolk. Training should teach practical skills like financial literacy, planning, and marketing to help ensure the programs are sustainable. Regular support and check-ins can help tackle any challenges and reinforce what participants have learned. Encouraging group-based learning can also strengthen community ties and create a sense of shared responsibility.

For long-term success, the training programs need to be more closely tailored to the local context, especially in areas like production, marketing, and management. Improving market access and aligning activities with local resources will be crucial for sustainability. Rather than offering one-time training, it's important to establish ongoing, community-based support systems that foster skill development and incorporate local knowledge. This approach will make the programs more resilient and impactful.

Table 4. Frequency distribution of the implementation outcomes and stakeholder feedback on alternative livelihood projects. (n = sample size)

Factors	Categories	Frequency (n = 108)	Percentage (%)
Continuation of the Management of Alternative Livelihood	Continued	69	63.89
	Did Not Continue	39	36.11
Success of the Alternative Livelihood	Successful	55	50.93
	Not Successful1	53	49.07
Reasons Why it Was not Successful (n = 53)1	Financial Issues	25	47.17
	Managerial/Operational Challenges	17	32.08
	Product and Market Challenges	10	18.87
	External Factors	1	1.89
Factors Appreciated Much in the Training (multiple responses)	Assistance in Alternative Livelihood Setup	92	85.19
	Speaker/Consultant	61	56.48
	Knowledge and Skills	70	64.81
	Food	42	38.89
Application of Learnings Regarding Alternative Livelihood in Daily Life	Applied2	76	70.37
	Did Not Apply	32	29.63
Alternative Livelihood Implemented (n = 76)2	Dishwashing Soap Making	5	6.58
	Sea Cucumber Culture	13	17.11
	Mud Crab Culture	9	11.84
	Oyster Culture	18	23.68
	Food Processing	13	17.11
	Bangus Fish Cage	18	23.68
Household Improvement after Engaging in Alternative Livelihood	Improved3	75	69.44
	Did Not Improve	33	30.56
Ranked Improvement upon Engagement in the Alternative Livelihood (n = 76)3	House Structure	13	17.33
	Income	53	70.67
	Education	9	12.00
Things to Improve in Future Alternative Livelihood Training (multiple responses)	Improve the Production Process	73	67.59
	Improve the Packaging and Marketing	59	54.63
	Improve the Managerial Skills	22	20.37
	Livelihood Suitable for the Location	42	38.89

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