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Success Indicators Of A Capability Enhancement On Butterfly Farming: Implication For Designing And Implementing Of Training Programs

Jazzer A. Loto[1*], Ma. Teresita A. Ferrer[2], Rosarie R. Paras[3], Arnolfo M. Monleon[4]
[1,2,3]TESDA, Torrijos Poblacion School or Arts and Trades, Marinduque, Philippines
[4]Marinduque State University, Marinduque, Philippines
[1]jalotto@tesda.gov.ph; [2]mtaferrer@tesda.gov.ph; [3]rrparas@tesda.gov.ph;[4]arnolfommonleon@gmail.com

Abstract– *Butterfly farming is a household-based livelihood with broadened economic benefits at the larger-scale. Considering its market niche, particularly in live butterfly exhibits abroad, this really has been a source of providing additional income to the rural economy. These economic activities, are indeed, must be sustained and enhanced to maximize benefits, expand or diversify income source, and lead in ecological conservation wherein butterflies are indicators of a healthy environment. As an intervention in support to the butterfly farming, a competency-based training program on butterfly production was held in five (5) training sites with intent to encourage and provide equal opportunities to the general public. A total of 179 individuals, majority was residents within the locality of the training site (86.03%), mostly women (4:1), married (86.67%), at productive age (43.3 ±4.0 years old) with earned secondary education (36.31%) were admitted to the training program. All trainees had the essential literacy and numeracy skills as required under the training program. They have varied social and economic status which are common in the rural setting. The majority had no prior knowledge on butterfly farming (88.83%) but ventured thereafter the training (5.03%) highlighting interest thereby ensuring sustainability of butterfly farming in Marinduque.*
Keywords– *competency, gender, economics, livelihood, skills training*

INTRODUCTION

The butterfly farming is a household-based, localized, or specialized livelihood in Marinduque. It is a household-based livelihood or family-enterprise wherein almost all members of the family or household (8±4) have specific or special tasks to do. It is localized being situated in few communities (barangay) only, and specialized considering the physical factors, legal requirements, and the complexities from investing to trading (selling) (Rodelas et al., 2010). The household-farmers composed of the collectors of butterflies and/or pupae from the natural habitat, collector-producers and producer-traders of butterflies and/or pupae are the basic actors of the butterfly sector. These farmers (actors), however, had disclosed (n=36) sporadic earnings from the butterfly farming associated to several factors from quality of the products to availability of buyers (demand) (Rodelas et al., 2010).The quality of butterflies in terms of longevity, encounter rate, and behavior or aesthetic appeal (puddling) for live exhibits is one among several economic considerations (Brewster and Otis, 2009; Robson et al., 2009). Moreover, several countries are now progressively pursuing efforts and initiatives in restoring their ecosystems, and advancing conservation and management of biological resources among those are the butterflies, and possibly later be the source of butterflies for trade. Reports showed favorable improvement in inventory, diversity, abundance, richness, and distribution of several species of butterflies (Baral et al., 2025; Boieiro et al., 2025; Deoramnauth et al., 2025; Dong et al., 2025; Jones et al., 2025; Zeng et al., 2025). While the province of Marinduque is known for butterflies for live exhibits abroad, there must have initiatives and efforts in anticipation of impending competition in trade based on change of preference, quality of products, custom requirements, or relevant standards. Timely, the competency-based curriculum for butterfly production level II will leverage competencies and skills of those who are involved or engaged in butterfly farming, train other interested individuals, and open opportunities towards advancing technology, ensuring sustainability, and casting impact for economic progress (Morales and Pacia, 2024). This paper reports the outputs of a training program on butterfly production held in five (5) training sites in Torrijos, Marinduque within the period 2023 to 2024. The success indicators like women participation, diversity in age, educational attainment, and social status, and involvement of novices or beginners were documented.

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MATERIALS AND METHOD

Training Module

The training program was conducted using the competency-based curriculum on butterfly production having a complete package for achieving the learning outcomes and meeting the industry standards (Morales and Pacia, 2024). The resources, tools, materials, and relevant inputs were provided to all trainees, through the assistance of the Local Government Unit of Torrijos (LGU Torrijos) and TPSAT. Throughout the training period, trainees were provided with comprehensive knowledge and skills on various aspects of butterfly production, including planning and preparing for a successful butterfly farm. The specific lessons include but not limited to: 1. growing of healthy host plants and nectar-rich flowering plants, 2. raising butterflies from pupae to adults, 3. providing the right environment, 4. how to spot and manage pests and diseases, 5. best harvesting technique for both pupae and live butterflies, and 6. techniques to preserve butterfly specimens and turn it into beautiful decorative arts.

Training Site

The training program was conducted in five (5) training sites (coded as M, P, B, Tig, and Tal) all in the Municipality of Torrijos, Province of Marinduque within 23 days duration period from May 2023 to October 2024.

Assessment and Evaluation

The demographic prolife of trainees were taken during the registration period as part of the assessment and evaluation of the learning outcomes. The prior knowledge of the trainees on butterfly farming was assessed to establish the potential change in understanding and interest. After each lesson, an institutional assessment was administered by the Trainer to assess and evaluate the learnings and the skills acquired by the trainees. The assessment tools include the written test and verbal test or recitation method.

Statistical analysis

The chi square test ($\chi 2$) was used in determining the significant difference between the observed and expected values. The variables such as “sex ratio,” “civil status,” “age,” “educational attainment,” and “training completion rate” were assessed. The expected sex ratio was fitted at 1:1, civil status (for married trainees at 90%), mean age at 48.5 years old, educational attainment (mostly high school graduate at 45%), and training completion rate at 95%. Generally, the low $\chi 2$ value indicates resemblance with the null hypothesis whereas a large $\chi 2$ might lead to refute the null hypothesis. Thereafter, the numerical values of each variable were presented as frequency or percentage, mean ± standard deviation, and/or coefficient of variation (CV), as the need arises.

Result and Discussion

Profile of Trainees

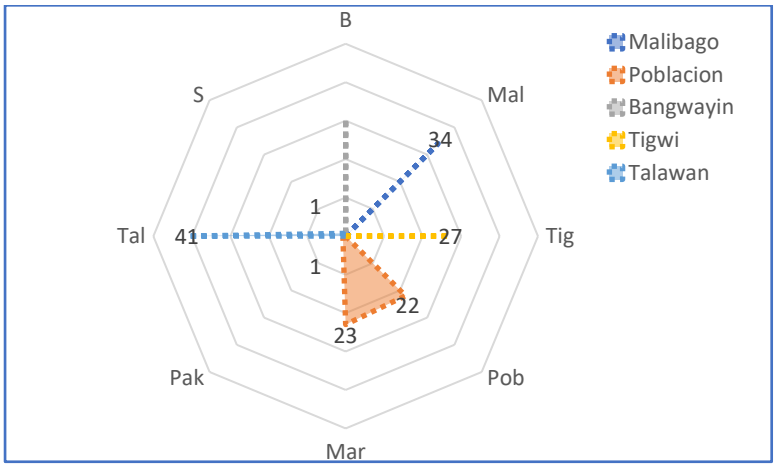

Fig. 1 Spatial distribution of trainees (n = 179).

Locality. A total of 179 individuals (enrollees/trainees) who were admitted to the training program on butterfly farming resides within or nearby the locality of the five (5) training sites. Those who are residents within the locality of the training sites had composed the majority of the trainees (86.03%). For impartiality; the training sites served only as the venue of the training program but the admission of trainees was open to all, giving equal opportunities to all interested individuals either from the outside

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or within the locality of the training sites (Figure 1). The training program was designed and implemented to enhance the technical capability of the existing butterfly farmers and encourage or motivate interest of other residents to engage into butterfly farming as an additional livelihood. Moreover, all trainees were expected to produce outputs and earn income similar from those in other butterfly farming communities in the province.

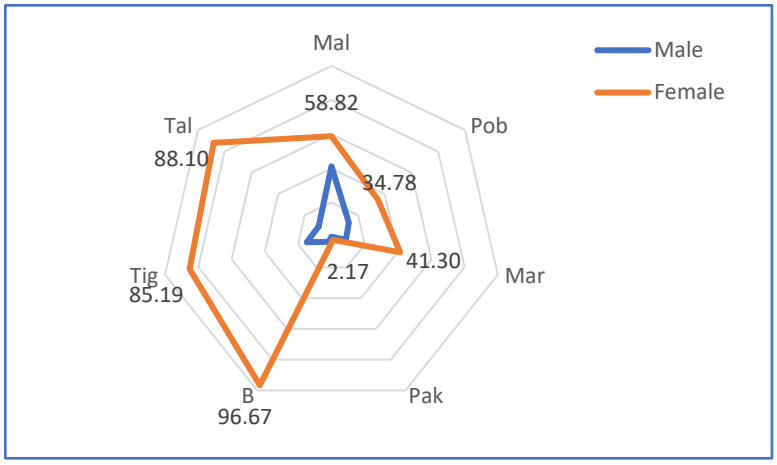

Fig. 2 Spatial distribution based on sex (4F:1M) of the trainees (n trainees = 179).

Sex Ratio. The women dominate (4:1) on the training list all across the five (5) training sites ($p<\alpha$). The two (2) training sites, (Tal and B) had the most number of women-trainees (90.48% and 96.67%, respectively) while M had the least (58.82%) (Figure 2). The women-trainees from across all training sites are mostly married (54.75%) (Figure 3). In relevant report, the married women had special and vital roles in butterfly farming particularly on the rearing of pupae and larvae as well as in trading (Rodelas et al., 2010). Similarly, the women had active roles in the livestock farming (Monleon, 2012; Banayo et al., 2024). This finding suggests that cultural, social or economic factors may influence greater inclination of women to participate in the training programs.

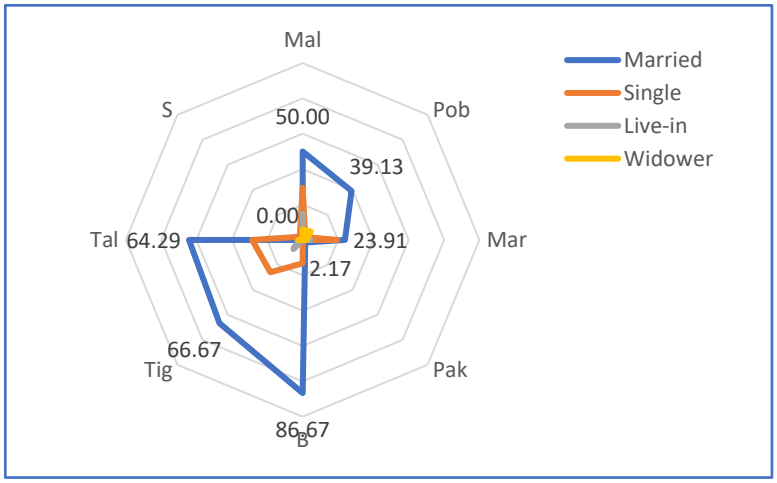

Fig. 3 Spatial distribution of civil status of trainees (n=179)

Civil Status. The majority of married trainees was found in B (86.67%) while M, the least (50%) ($p<\alpha$). The majority who disclosed as married was women (54.82%) while those who declared as single composed the 25.14% (Figure 3). The participation of married women was viewed as an economic opportunity considering as well that butterfly farming is a household-based livelihood. province.

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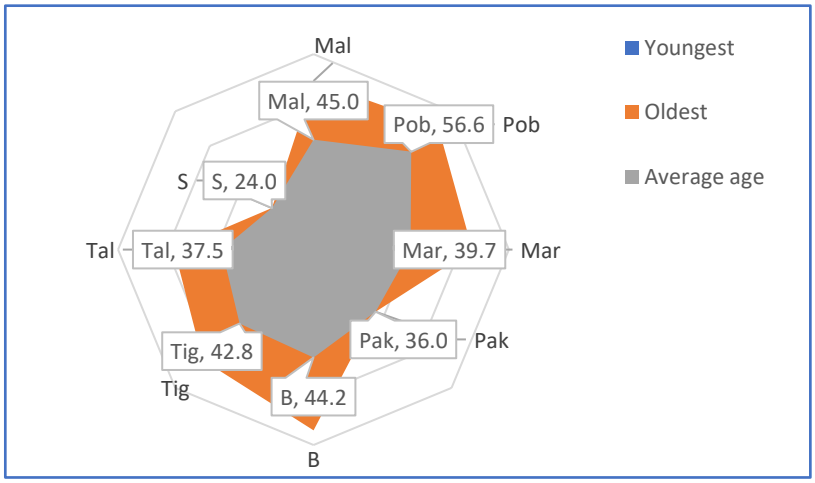

Fig. 4 Spatial distribution based on age of the trainees (n trainees = 179).

Age. The age of trainees was highly variable ranges from 18 to 74 years old with the youngest from M while the oldest was from B (Figure 4). The mean (±SD) age of 43.3 (±4.0) years old of the trainees indicates productive period and comparatively similar from earlier findings in Marinduque (Rodelas et al., 2010; Monleon, 2012; Banayo et al, 2024).

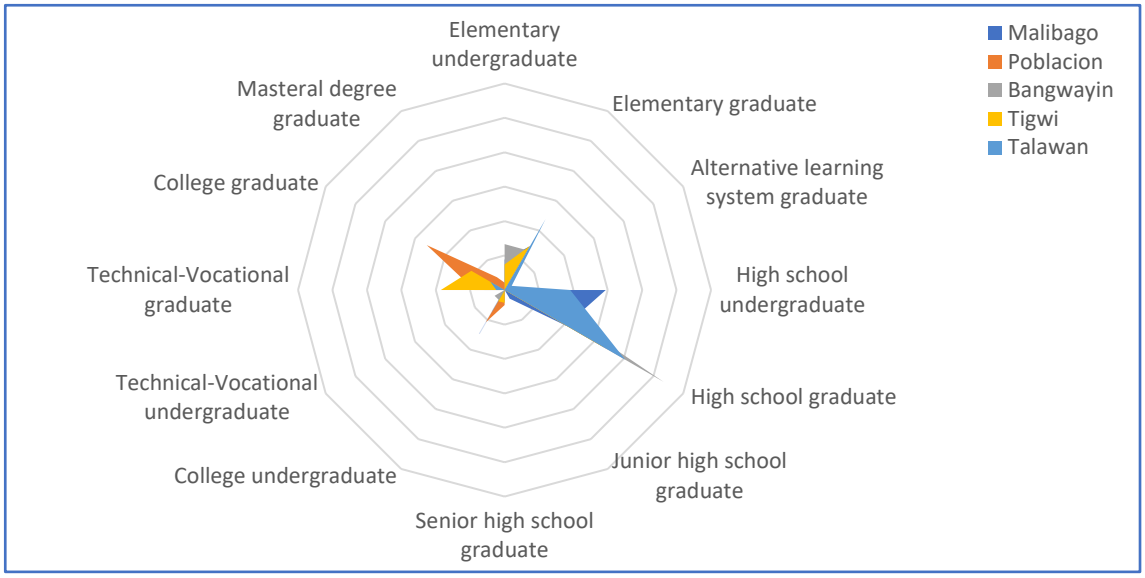

Fig. 5 Spatial distribution of educational attainment of the trainees (n trainees = 179).

Highest Educational Attainment. The trainees had varying levels of educational attainment that ranges from the elementary undergraduate (5.59%) to master's degree graduate (1.12%) (Figure 5). The majority from across all the five training sites had finished secondary level (36.31%) followed by those who declared to have earned post-secondary education (either graduate or did not graduate (27.37%). The P training site had the most number of trainees who obtained post-secondary education (12.85%) while the B had the least (1.68%). This finding corroborates that those in the agriculture sector had low educational attainment (Rodelas et al., 2010; Monleon, 2012; Banayo et al., 2024). Nevertheless, the trainees likely possessed essential literacy and numeracy skills, which helped them understand the course content. On the other hand, those with post-secondary education had participated to enhance their skills and venture into additional source of livelihood.

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Client type or occupation. The trainees had varying occupation (or social status) that ranges from being an under-employed (0.48%) to farmer and/or fisherman (55.09%) (Figure 6). The majority across all the five training sites had disclosed that they are farmers and/or fishermen (CV = 21.96%), which is common and/or prevalent in the farming communities. Notably, the participation of those in the farming and/or fishing sectors highlight the relevance of the training program to the needs of the sector.

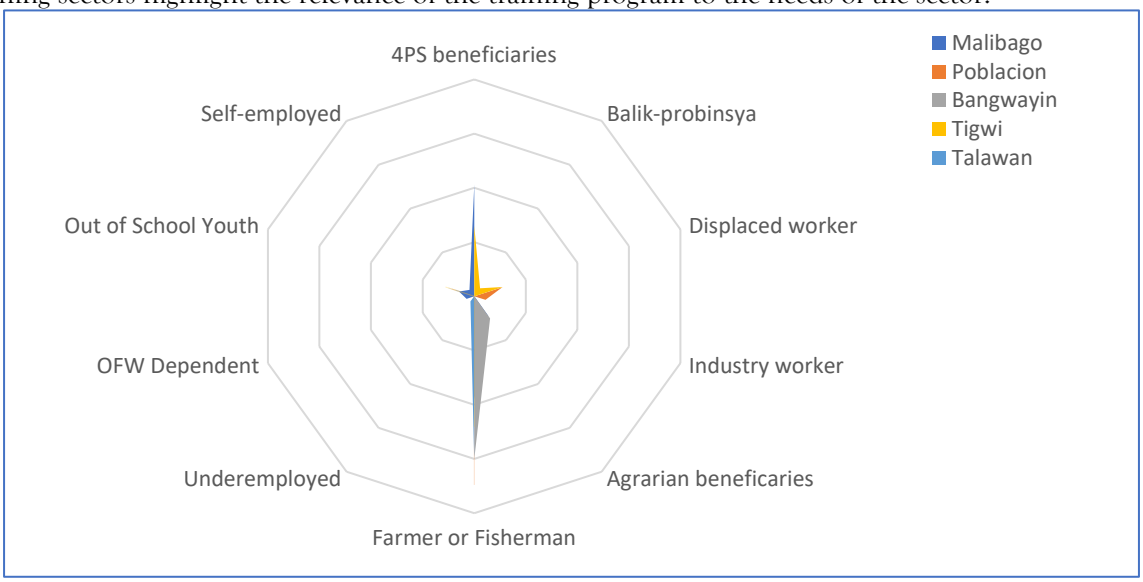

Fig. 6 Spatial distribution of client type or occupation of the trainees (n trainees = 179).

Interest and Motivation of Trainees

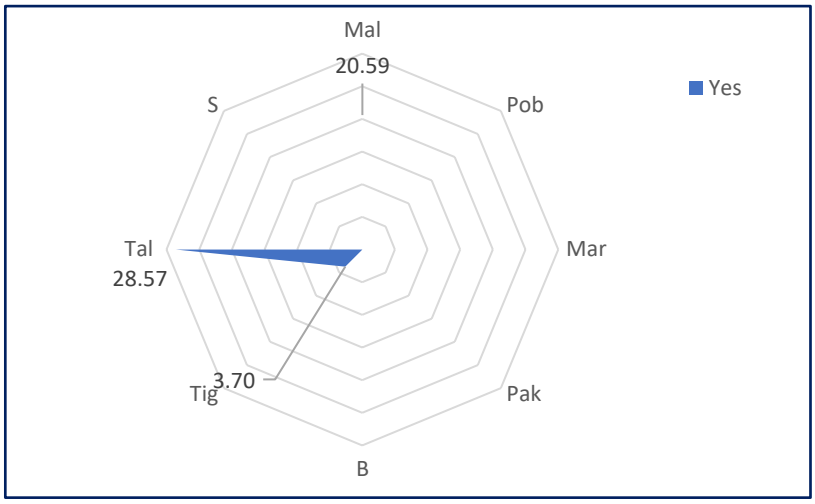

Fig. 7 Spatial distribution on prior knowledge of the trainees (n trainees = 179).

Prior knowledge. The training module was designed to engage and/or motivate the trainees on technical, practical and new techniques leading to capability enhancement particularly of those who had prior knowledge and/or currently engaged on butterfly farming. However, the majority of trainees had declared to have no prior knowledge on butterfly farming (88.83%) particularly from the two (2) training sites, (P and B, Figure 7). This observation indicates that most of the trainees were new entrants or beginners and part of those who were encouraged and/or motivated to engage into the butterfly farming. It highlights the relevance of the training program in providing livelihood opportunities, income diversification, and sustainable farming. Moreover, it underscores the importance of targeting individuals with limited prior

exposure to butterfly farming thereby offering them a gateway to new agricultural practices that could contribute to rural livelihoods.

Completion rate. All trainees were expected to finish the training program and thereafter engage into practice or business venture. However, a provisional completion rate was set at 95% for possible or unexpected drop-out or loss of interest among the trainees. This expected completion rate, however, did not achieve as there were 144 trainees only (80.45%) who completed the training program ($p<\alpha$). Only the T training site had achieved the expected completion rate with 97.62% (41 completers out of 42 trainees) (Figure 8).

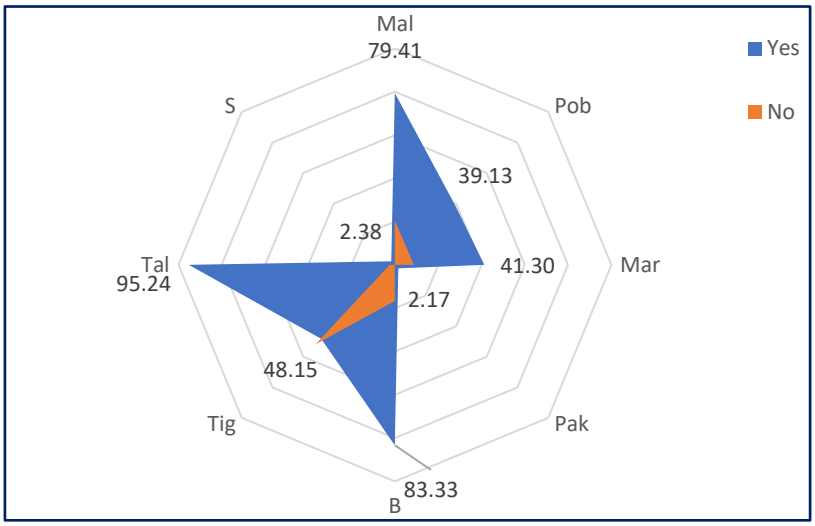

Fig. 8 Spatial distribution on completion rate of training (80.45%).

The discrepancies in completion rate were attributed to the training's duration and the lack of daily allowances for trainees (compared to other TESDA Programs with scholarship program). The training duration of 23 days was a significant period requiring commitment from the trainees who particularly engaged or tending on their family-based livelihoods. Several trainees, especially those with dependents, prefer to prioritize work over attending the training due to immediate financial needs. Having no daily allowance, trainees were unable to afford the opportunity cost of taking time away from income-generating activities. As a result, these trainees had opted to discontinue in attending to the training program, as they need to provide for their families. This financial pressure and the lack of compensation during the training period contribute to a significant dropout rate (19.55%).It is noteworthy that women-trainees showed higher completion rates (80.14%), probably associated to various factors, including the possible prioritization of women to family-based farming activities, which may align with the objectives of the training program. Additionally, women might experience more consistent social or familial support, enabling them to stay committed to the program despite potential challenges such as time constraints or household responsibilities.However, the relatively low completion rate, in general, indicates the need for more robust engagement strategies. Some factors like financial assistance and the substantial time commitment must be considered for the future training program. In particular, the variation in completion rates across different sites, as well as the higher completion rate among female trainees, highlights the importance of considering both financial and social factors when designing of training programs.*Venturing rate.* There were 20 completers (out of 179 trainees or 11.17%) who venture into butterfly farming thereafter the training. The M training site had the most number of completers who venture (9 out of 34) (Figure 9). A key feature of the training program was the provision of start-up toolkits, aimed at motivating trainees to engage into butterfly farming. These toolkits were designed to equip participants with the essential tools and resources to complete the course successfully and transition smoothly into practical application. In addition, the continuous monitoring and technical assistance

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played a crucial role in boosting the trainees' confidence and enhancing their farming techniques. This ongoing support ensured that they had access to expert advice, troubleshooting help, and guidance to overcome challenges during the implementation phase. The hands-on approach in the training module had a positive impact, as evidenced by the early-adopters who successfully ventured into butterfly farming after completing the course. However, some completers have yet to construct their butterfly cages. The delays were primarily due to factors like; 1. the need to propagate host plants, and 2. challenges associated to location or place that is free from pollution (e.g. smoke or pesticide risks). Most noteworthy, butterflies are highly susceptible to several stressors, pollutants and diseases (Van Deynze et al., 2024; Mach et al., 2025; Ryalls et al., 2025; Silva et al., 2025; Ursul et al., 2025;) Additionally, the availability of buyers for their butterfly products is essential to maintain motivation and ensure long-term success.

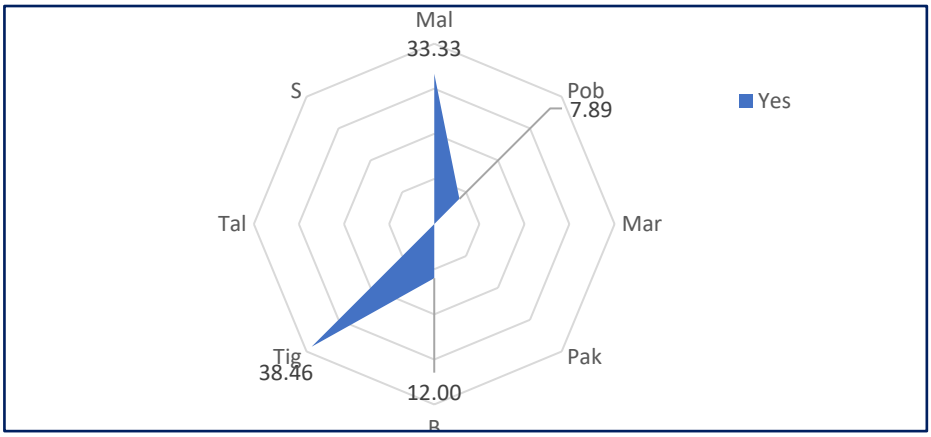

Fig. 9 Spatial distribution on venturing rate into butterfly farming (13.89%).

Motivating beginners. The training program on butterfly farming was designed and implemented as an open admission, giving equal opportunities to all interested individuals. Of the 179 enrollees, there were 159 (88.83%) who disclosed to have no prior knowledge on butterfly farming. This large number of beginners or novices indicates awareness and curiosity to learning opportunities and potential livelihood. Among these beginners were women who had completed the training program and thereafter venture into butterfly farming (Figure 10). This observation indicates success, posting favorable opportunities, for the continuing growth of the butterfly sector of Marinduque (Figure 11).

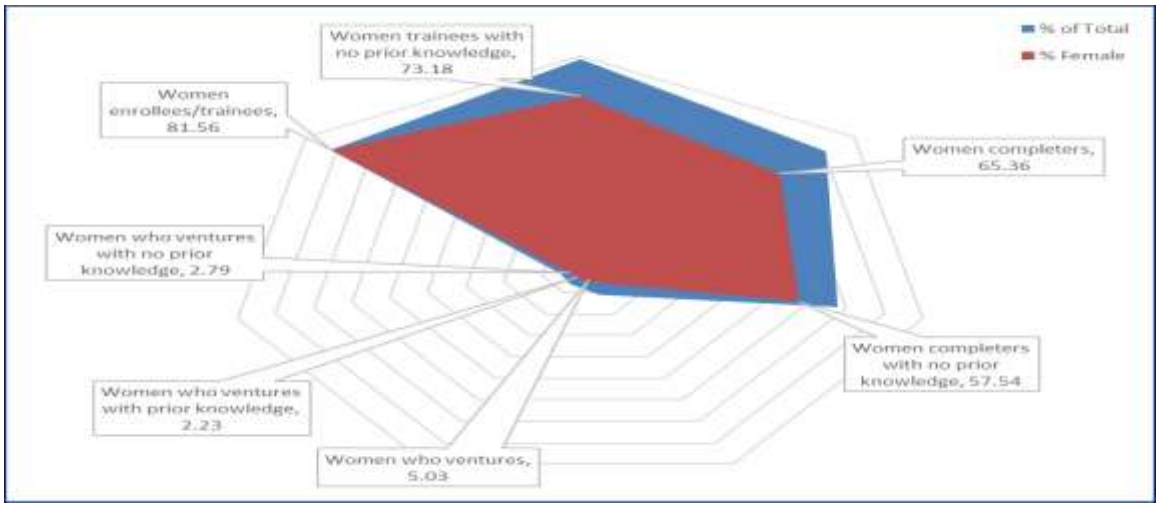

Figure 10. Distribution of women's participation to a training program on butterfly farming (women completers = 117).

Figure 11. Sample photo-documentation of the activities and discussions during the training.

CONCLUSIONS

Butterfly farming is a household-based livelihood in Marinduque. Those engaged have specific roles to sustain the sector and maintain its good standing in the world markets. Hence, an intervention was introduced using a competency-based curriculum to advance knowledge, skills and competencies along with quality standards.A total of 179 individuals, majority was residents within the locality of the training site (86.03%), mostly women (4:1), married (86.67%), at productive age (43.3 ±4.0 years old) with earned secondary education (36.31%) were admitted to the training program. All trainees had the essential literacy and numeracy skills as required under the training program. They have varied social and economic status which are common in the rural setting. The majority had no prior knowledge on butterfly farming (88.83%) but ventured thereafter the training (5.03%).Although the training program was flexible in terms of schedule and location, some factors such as the training duration and the lack of financial assistance had posed challenge especially to those with family responsibilities or limited financial resources. These factors prohibited some trainees to fully commit and complete the training program. Thereby, it is crucial to address these identified challenges to better support the trainees.Furthermore, there shall have an oversight committee to review the curriculum for enhancement or strengthening of competency or elective competency (e.g. butterfly framing and processing). These relevant skills will allow innovation and emergent livelihoods by maximizing utility or value-addition to all derived-resources from butterfly farming. This initiative would be an excellent part of tourism promotion in which Marinduque is called as the “butterfly capital” of the Philippines. Likewise, a continuous provision of technical, marketing, and linkaging assistance is recommended and shall be part of the extension program of the institution.

Author Contributions

Jazzer A. Loto was the trainer, led in data collection, assessed and monitored the progress of the training program, and provided substantial inputs to the manuscript. Ma. Teresita A. Ferrer was the research supervisor, and provided substantial inputs to the manuscript. Rosarie R. Paras was the administrative supervisor and provided substantial inputs to the manuscript. Arnolfo M. Monleon was the mentor in the consolidation, statistical analyses, interpretation of findings, and provided substantial inputs to the manuscript. All authors contributed substantially to the manuscript and gave final approval for publication.

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