

# Impact of Research and Extension Services on the Livelihood Programs of Adopted Barangays of Tawi-Tawi Regional Agricultural College

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## ABSTRACT:

While research and extension services are recognized as key drivers of rural development, existing literature in the BARMM region focuses mostly on activity reports rather than measurable outcomes, with limited evidence on how these services directly influence livelihood improvements (Acosta & Borres, 2023; MAFAR, 2024). This study assessed the impact of research and extension services provided by Tawi-Tawi Regional Agricultural College (TRAC) on the livelihood programs of its adopted barangays from 2022 to 2025. Using a mixed-methods sequential explanatory design, data were gathered from 120 randomly selected household beneficiaries, 26 key informants, and 8 focus groups. The survey instrument achieved Cronbach's Alpha = 0.91, confirming high reliability. Quantitative analysis was performed using IBM SPSS v27, while qualitative data underwent thematic analysis. Results showed that TRAC primarily delivered technology demonstrations (M = 4.2) and on-site consultancy (M = 4.1), while linkage assistance was limited (M = 2.9). Services yielded high to very high impact, improving knowledge and skills (M = 4.6), product quality (M = 4.5), production volume (M = 4.4), and household income by an average of 22%. A strong positive correlation ( $r = 0.69$ ,  $p < 0.01$ ) was found between frequency of service exposure and livelihood gains. However, impact on market access (M = 3.2) and employment (M = 3.5) remained moderate due to geographic isolation, budget constraints, and weak inter-agency coordination. This study fills the gap by providing empirical evidence from a local context, offering baseline data for planning, and demonstrating that while technical support is effective, it must be complemented with business and market services to ensure sustainability.

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## Introduction

Tawi-Tawi is an island province in the Bangsamoro Autonomous Region in Muslim

Mindanao (BARMM), characterized by a predominantly rural population whose livelihoods rely heavily on agriculture, fisheries, and small-scale enterprises. Despite its rich

natural resources, the province faces persistent challenges: low agricultural productivity, limited access to modern technologies, weak market linkages, and recurring poverty in many barangays (Ministry of Agriculture, Fisheries, and Agrarian Reform [MAFAR], 2024). Tawi-Tawi Regional Agricultural College (TRAC), as the leading higher education institution for agriculture in the region, carries a dual mandate—research and extension—aimed at generating knowledge and transferring appropriate technologies to improve community well-being (Cagasan et al., 2022).

Through its extension program, TRAC adopts selected barangays as priority areas for intervention. These “adopted barangays” receive technical assistance, training, demonstration projects, and access to research-based innovations designed to strengthen local livelihood initiatives.

### Research Gap and Significance

Most existing studies on agricultural extension in the Philippines focus on mainland areas or large-scale projects, with very few investigations conducted in island provinces like Tawi-Tawi. Available reports are often descriptive, focusing only on activities conducted rather than actual changes in income, production, and quality of life (Acosta & Borres, 2023). Furthermore, there is a lack of recent studies (2022–2025) that use mixed methods to measure both the extent of services and their economic and social impacts. This study differs from previous research by providing empirical, context-specific data from the BARMM region, combining quantitative measurements of change with qualitative insights on challenges and benefits. It establishes a clear link between the frequency of service delivery and livelihood improvements, offering evidence that can guide institutional policies and resource allocation.

### Theoretical and Conceptual Framework

This study is anchored on the Diffusion of Innovations Theory (Rogers, 2023), which explains how new technologies and practices spread through communities, with extension services acting as the primary channel for

adoption. It is also supported by the Agricultural Knowledge and Information System (AKIS) Framework (Leeuwis & van den Ban, 2023), which views research, extension, and farmers as interconnected components required for sustainable development. Additionally, the Sustainable Livelihoods Framework (Scoones, 2024) guides the assessment of outcomes across five dimensions: human, physical, natural, financial, and social capital.

### Objectives of the Study

The general objective of this study is to assess the impact of research and extension services provided by Tawi-Tawi Regional Agricultural College (TRAC) on the livelihood programs and outcomes of its adopted barangays from 2022 to 2025.

### Specific Objectives

1. Determine the types and frequency of research and extension services delivered by TRAC in terms of technology demonstrations, technical training, research-based information dissemination, consultancy and advisory services, and linkage assistance.
2. Evaluate the impact of these services on livelihood outcomes: volume of production, quality of products, household income, knowledge and skills, market access, and employment.
3. Identify benefits gained and challenges encountered in service delivery and utilization.
4. Formulate recommendations with clear implementation steps to improve service delivery and sustainability.

### Scope and Delimitation

This research covers the period 2022 to 2025 and focuses only on Barangay Sanga-Sanga and Barangay Tarawakan, the two officially adopted barangays of TRAC. It assesses services related to agriculture, fisheries, and agribusiness. Limitations include reliance on self-reported data for income and production, which may be subject to recall bias; the study is also limited to these two sites, so findings are most applicable to similar coastal and rural communities in the region.

## Methodology

### Research Design

This study employs a mixed-methods sequential explanatory design (Creswell & Plano Clark, 2024). The quantitative phase measures the extent of services and their impact, while the qualitative phase explains why and how changes occurred. This design allows for triangulation of data, ensuring more robust and valid results.

### Research Locale

The study was conducted in Barangay Sanga-Sanga and Barangay Tarawakan, Municipality of Bongao, Tawi-Tawi. These sites were selected because they represent different ecological zones (coastal, agricultural, and semi-urban) and have received continuous TRAC support for at least three years, providing sufficient time for impacts to be observed.

### Population and Sampling Design

### Sample Size Determination

The total population of beneficiary households was 185. Using Slovin's Formula with a margin of error of 5%, the required sample size was calculated at 120 households, ensuring statistical representativeness.

### Sampling Techniques

Beneficiaries totaling 120 were selected through simple random sampling from the official list of participants. Key informants totaling 26 were selected via purposive sampling, including barangay officials, TRAC extension staff, and LGU coordinators, chosen for their direct involvement in planning and implementation. FGD participants totaling 52 were composed of 8 groups with 6 to 8 members each, representing farmers, fisherfolk, and women's associations, and were selected purposively to capture collective experiences.

**Table 1 Distribution of Respondents**

| Category                | Number     | Sampling Method | Description                                 |
|-------------------------|------------|-----------------|---------------------------------------------|
| Household Beneficiaries | 120        | Simple Random   | Heads of families participating in programs |
| Key Informants          | 26         | Purposive       | Officials, staff, and coordinators          |
| FGD Participants        | 52         | Purposive       | Members of community organizations          |
| <b>Total</b>            | <b>198</b> | —               | —                                           |

### Research Instrument

A structured survey questionnaire was developed and adapted from validated tools by Cagasan et al. (2022) and Dela Cruz et al. (2024). It uses a 5-point Likert scale where frequency is rated as 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Always, and impact is rated as 1 = No Impact, 2 = Low Impact, 3 = Moderate Impact, 4 = High Impact, 5 = Very High Impact.

### Validation and Reliability

For content validity, the instrument was reviewed by three experts in agricultural education, economics, and statistics, yielding a Content Validity Index (CVI) of 0.94, which is above the acceptable threshold of 0.80. A pilot study was also conducted with 20 non-participant households; the results showed a Cronbach's Alpha coefficient of 0.91, indicating high internal consistency. For the measurement of improvements, production volume and income were measured by comparing baseline data from

2022 and the current status in 2025 using recall and available records, with percentage change calculated using the formula: % Change =  $[(\text{Current Value} - \text{Baseline Value}) / \text{Baseline Value}] \times 100$ .

### Ethical Considerations

Formal approval was obtained from the TRAC Research Ethics Committee and the Local Government Unit prior to any research activities. Informed consent was secured from all participants, confidentiality was assured, and no personal identifiers were recorded in the study documents. Participation was entirely voluntary, and respondents were informed that they could withdraw from the study at any time without penalty.

### Data Gathering Procedure

In the preparation phase, necessary permissions were secured, and the instruments were translated into the local dialect and back-translated to ensure accuracy. For data collection, surveys were administered via face-to-face interviews; interviews and focus group discussions were recorded with explicit permission and transcribed

verbatim. For verification purposes, secondary data from TRAC reports and barangay records were used to cross-check the responses provided by the participants.

### Data Analysis

For quantitative analysis, data were processed using IBM SPSS Version 27. Descriptive statistics including mean, percentage, and standard deviation were used to summarize respondent profiles and study outcomes; Pearson's  $r$  was applied to test relationships between variables, and paired t-tests were used to measure changes in income and production. All assumptions of normality and linearity were verified prior to conducting statistical tests. For qualitative analysis, data were analyzed using thematic analysis as outlined by Braun & Clarke (2023), following the steps of familiarization with the data, coding, theme generation, and interpretation. Triangulation was also applied to ensure consistency across different data sources.

## Results and Discussion

### Types and Frequency of Services

**Table 2 Types and Frequency of Services**

| Type of Service                | Mean | Verbal Rating |
|--------------------------------|------|---------------|
| Technology Demonstrations      | 4.2  | Often         |
| Consultancy & Advisory Visits  | 4.1  | Often         |
| Technical Training             | 3.8  | Sometimes     |
| Research-Based Information     | 3.5  | Sometimes     |
| Linkage & Financial Assistance | 2.9  | Rarely        |

### Results

Field-based services were the most frequent and preferred. Dela Cruz et al. (2024) confirm that demonstrations and on-site advice are most effective in island communities where visual and

practical learning is prioritized over written materials. The low rating for linkage assistance aligns with Pradhan et al. (2025), who note that most extension systems focus on production rather than business support.

## Perceived Impact on Livelihood Outcomes

**Table 3 Impact of Services**

| Indicator                | Mean | Verbal Rating | % Average Increase |
|--------------------------|------|---------------|--------------------|
| Knowledge & Skills       | 4.6  | Very High     | 45%                |
| Product Quality          | 4.5  | High          | 32%                |
| Production Volume        | 4.4  | High          | 28%                |
| Household Income         | 4.0  | High          | 22%                |
| Employment Opportunities | 3.5  | Moderate      | 10%                |
| Access to Markets        | 3.2  | Moderate      | 8%                 |

### Correlation Analysis

A strong positive relationship was found between service frequency and income improvement ( $r = 0.69$ ,  $p < 0.01$ ), confirming that more frequent exposure leads to better results. This supports Leeuwis & van den Ban (2023), who state that continuity of service is critical for technology adoption.

### Discussion

While technical gains were significant, market-related outcomes were limited. MAFAR (2024) reports that in BARMM, infrastructure gaps and isolation raise transport costs and reduce profit margins, even when production increases. This explains why income gains were lower than production gains.

### Benefits and Challenges

#### Benefits

The intervention has delivered several positive outcomes for the beneficiaries. These include improved crop and fish yields and reduced post-harvest and production losses. There has also been notable adoption of climate-resilient practices among the participants. Furthermore, the program has contributed to stronger

community organizations and enhanced social capital within the target areas.

#### Challenges

Despite these gains, the implementation faced key constraints. Limited budget and personnel restrict the frequency and scope of follow-up visits to beneficiaries. Geographical distance across the coverage areas also increases overall service delivery costs. Additionally, low literacy levels among some participants reduce the effectiveness of printed information and training materials. Finally, lack of access to credit and marketing support limits the full profit potential of improved production.

### Conclusions

TRAC's research and extension services are effective in improving technical capacity, production, and income, but their impact is constrained by limited support for market access and finance. The study confirms that technical knowledge alone is insufficient for sustainability; it must be integrated with value chain support.

### Study Limitations

This study has several limitations that should be considered when interpreting its findings. First, the reliance on self-reported data may introduce

recall bias, as respondents may not accurately remember past details or events. Second, the research is limited to only two barangays, so the results may not fully represent the conditions and experiences of all areas covered by the program. Third, the cross-sectional design captures information at only one point in time, meaning it cannot track long-term changes or trends over an extended period.

### **Practical Implications**

The findings carry clear practical implications for different stakeholders. For TRAC, there is a need to shift from purely production-focused extension approaches to more enterprise-oriented strategies that support business development. For Local Government Units (LGUs), infrastructure improvement and market development should be prioritized in rural development plans. For the beneficiaries themselves, strengthening producer and community associations will help improve their collective bargaining power and access to opportunities.

### **Recommendations with Implementation Steps**

To address identified gaps, specific actions are proposed with corresponding timelines. For strengthening existing services, implementers should maintain field demonstrations and regular follow-up visits, while also developing visual guides and learning materials in the local language; this activity will run from immediately up to six months. For expanding market and financial linkages, TRAC and partners should collaborate with MAFAR, DTI, and local banks to organize buyer-seller meetings and credit information seminars, with implementation

scheduled between six and twelve months. For improving resource management, training selected community volunteers to serve as “extension aides” will help reduce staff workload and widen service coverage, to be carried out within three to six months. Finally, for monitoring and evaluation, a quarterly tracking system should be established to regularly measure changes in production, income, and market access, which will be implemented on an ongoing basis.

### **Future Research**

To deepen understanding of the program’s long-term impact, several research directions are suggested. First, conduct a longitudinal study to track changes and outcomes over a period of five to ten years. Second, expand the scope to include more barangays across different municipalities for broader representation. Third, assess the economic rate of return on public and institutional investments in extension services to guide resource allocation.

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