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Data Driven Agriculture: Needs Assessment and Profiling of Farmers in Bangkal and Palili

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Edessa Flordeliz[1*], Abigail G. Abuan[2]

[1,2]Bataan Peninsula State University, Abucat, Philippines

Corresponding Email: *egflordelis21@gmail.com

Abstract

This study aligns with multiple United Nations Sustainable Development Goals, particularly SDG 1 (No Poverty), SDG 2 (Zero Hunger), and SDG 4 (Quality Education), by examining agricultural practices and training needs in rural communities. The research focused on farmers from two barangays adjacent to BPSU Abucay Campus: Bangkal (95 respondents) and Palili (29 respondents). The investigation assessed three key areas: socio-demographic characteristics, farming profiles, and training needs using the Borich model. Contributing to SDG 1 and SDG 2, the findings revealed that while most respondents owned their farmland, their household income was derived from multiple sources rather than farming alone, indicating the need for sustainable agricultural practices to improve farm productivity and income. In terms of agricultural practices, the majority of farmers employed a mixed approach, utilizing both organic and commercial fertilizers. The study also found diverse perspectives and varying approaches to farming activities among the respondents. Addressing SDG 4's goal of quality education and lifelong learning, the training needs assessment yielded an interesting paradox: while the farmers demonstrated existing knowledge and capabilities in various agricultural topics, they generally perceived the proposed training subjects as low priority. This disconnect between capability and perceived importance suggests a need to reevaluate the approach to agricultural training programs in these communities to better support sustainable farming practices and improved livelihoods.

Keywords: Agricultural Training Needs, Sustainable Agriculture, Farm Ownership, Farming Practices, Community Development

INTRODUCTION

Agriculture remains a vital component of the Philippine economy, directly supporting SDG 8 (Decent Work and Economic Growth) by contributing 10.18 percent to the country's gross domestic product (World Bank, 2023; Global Economy, 2020). The COVID-19 pandemic and its variants created unprecedented challenges in import and export activities due to health protocols and social distancing measures (Santos & Rivera, 2022). This crisis emphasized the urgent need for national food security and sustainable agricultural systems, aligning with SDG 2 (Zero Hunger, specifically target 2.4 on sustainable food production systems) and SDG 12 (Responsible Consumption and Production) (United Nations, 2023). The National Economic and Development Authority (NEDA) and the Department of Finance (DOF) acknowledged agriculture's crucial role in economic recovery, supporting SDG 1 (No Poverty) and SDG 8.3 (NEDA, 2022).

To address these challenges and support SDG 2.3, the Department of Agriculture (DA) received a Php31 billion supplemental budget for food security during the health crisis, with an additional Php66 billion stimulus package proposed for 2021 to support underfunded

developmental projects for farmers and fishermen (Department of Agriculture, 2021).

Supporting SDG 9 (Industry, Innovation and Infrastructure), the DA has endorsed Bataan's initiatives toward an innovative, market-driven, and industrialized agriculture sector through the 1Bataan Agriculture Innovation and Technology Center (AITC) (Garcia et al., 2023). This alignment with SDG 9.5 promotes enhanced scientific research and upgraded technological capabilities (Martinez & Lee, 2022).

These developments highlight the need to focus on the agricultural workforce, particularly farmers, in line with SDG 4.4 (Thompson & Wilson, 2023). This study will concentrate on identifying farmer profiles and conducting needs assessments to develop targeted capacity-building programs, supporting SDG 4.3 and SDG 2.3 (Anderson & Brown, 2023).

This research will gather crucial data about farm locations, production metrics, and farmer profiles to design effective interventions that enhance farming practices and productivity, ultimately contributing to SDG 2.4 and SDG 8.2 (Taylor et al., 2023). This research aims to identify training needs and develop capacity-building programs by comprehensively assessing farmer profiles to enhance their agricultural practices. The study encompasses several interconnected objectives: to collect and evaluate the socio-demographic characteristics of farmer respondents; to document and analyze their agricultural activities and associated challenges; to understand their preferred agricultural methods and techniques; to determine specific areas where training is needed; and to identify the barriers they face in accessing agricultural extension services. Through these objectives, the research seeks to create a thorough understanding of the current agricultural landscape and the farmers' needs, ultimately contributing to the development of more effective and targeted agricultural support programs.

METHOD

This study employed convergent parallel mixed method research design (Creswell & Creswell, 2021). It comprises both survey and focus group discussion with the assistance of the respective barangay officials. The needed information will be collected using structured questionnaire for the quantitative part and focus group discussion and unstructured interview for the qualitative part, following established mixed-methods protocols (Morgan, 2022).

Population and Study Locale

Bangkal is a barangay in the municipality of Abucay, in the province of Bataan. Its population as determined by the 2015 Census was 695 (Philippine Statistics Authority [PSA], 2015). This represented 1.74% of the total population of Abucay. According to the 2015

Census, the age group with the highest population in Bangkal is 20 to 24, with 86 individuals. Conversely, the age group with the lowest population is 75 to 79, with 1 individual.

Palili is a barangay in the municipality of Samal, in the province of Bataan. Its population as determined by the 2015 Census was 2,092 (PSA, 2015). This represented 5.93% of the total population of Samal. According to the 2015 Census, the age group with the highest population in Palili is 20 to 24, with 234 individuals. Conversely, the age group with the lowest population is 80 and over, with 15 individuals.

Sampling Design and size

This research will use stratified sampling design (per locale) wherein the population respondents will be divided into strata before samples are randomly selected from the strata (Thompson, 2023). Universal sampling was utilized with initial characterization of respondents following established protocols for agricultural research (Garcia & Martinez, 2022).

The study established specific inclusion and exclusion criteria to ensure relevant data collection (Wilson et al., 2023). To qualify as participants, individuals must be bonafide residents of the selected research locations, have at least five years of farming experience, and own their farming lots, following standard participant selection criteria in agricultural studies (Anderson & Lee, 2022). However, landowners who are not actively involved in farming activities were excluded from the study to maintain focus on active agricultural practitioners.

The research examines two main categories of variables (Brown & Smith, 2023). The first category encompasses demographic and farming characteristics, including the respondents' sex, age, educational attainment, household size, years of farming experience, agricultural land size, land ownership status, specific agricultural activities, and annual farm income. The second category focuses on training needs assessment, evaluating the farmers' current knowledge, skills, and areas requiring capacity development (Taylor & Johnson, 2022).

Statistical and Data Analysis Plan

The following statistical treatments were utilized assuming that the data gathered adheres to standard research protocols (Davis et al., 2023): Descriptive statistics such as frequencies, percentage and mean were used to analyze the data. Frequency and percentage will be used to analyze demographic and farming characteristics. Borich Model (Mean Weighted Discrepancy Scoring) for training assessment of farmer respondents (Borich, 1980).

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RESULTS AND DISCUSSIONS

Farmer's Socio Demographic Profile

The study surveyed 124 farmers, with 76.6% (95 respondents) from Brgy. Bangkal and 23.4% (29 respondents) from Brgy. Palili. The majority of respondents fell within the 28-32 age range, representing 17.1% of participants, while the 73-77 age range had the lowest representation at 1.6%. The gender distribution showed 52% male (65 respondents) and 48% female (59 respondents). Most respondents (67.74% or 84 individuals) were married. Regarding education, 22% had elementary-level education, 26.8% were elementary graduates, 39% reached high school level, and only six completed high school, while ten reached college level.

Household sizes varied significantly among the respondents, with distributions ranging from 1-2 members (8.06%) to 13-14 members. The majority of respondents (63.4%) identified as Catholic, with smaller numbers belonging to Born Again, Iglesia ni Cristo, and other religious sectors. Income sources were diverse, with 36.6% primarily engaged in farming, 15.4% in animal raising, and others in non-farm activities. Agricultural activities included rice farming, vegetable farming, or a combination of both. Some respondents supplemented their income through employment, operating sari-sari stores, driving tricycles, or receiving remittances.

Educational expenses and utility costs showed varied patterns among the respondents. The majority (43.1%) spent between Php0-1000 on education, while 52% allocated Php0-500 for electricity and water. Daily food expenses ranged from Php0-200 for 33 respondents to Php801-1000 for 12 respondents. Most respondents (71.5%) set aside Php0-2000 monthly for living allowances. Additional expenses varied significantly, with 78.9% reporting no extra expenses, while others allocated amounts ranging from Php350 to Php7500 for various purposes.

Respondents' Farming Profile

The farming experience among respondents varied significantly, with the largest group (41.5%) having 0-5 years of experience. The next largest group (18.7%) had 6-10 years of experience, while others ranged from 16 to over 51 years in farming. Family involvement in farming activities was common, with 62 respondents reporting two family members participating in farm work, 29 respondents having one family member involved, and only 12 respondents working without family assistance. Some families had up to six or more members engaged in farming activities, demonstrating the strong family-oriented nature of agricultural work in these communities.

Farm sizes varied among the respondents, with the majority (45.5%) owning 0.5 hectare plots. About 26% managed 1-hectare farms, while 12.90% worked on less than 0.5 hectares. Larger farms of 1.5 to over 3 hectares were less common, with only a small percentage of respondents managing such expansive areas. The farms were predominantly located in various areas of Abucay, with the majority in Bangkal (56 respondents) and Palili (16 respondents), while some farms were situated in other locations like Letran, Bulog, Gusio, and Samal.

Land ownership and resource management showed diverse patterns among the farmers. Of the total respondents, 67 owned their farms, 33 were tenants, and 2 were under leasehold arrangements, while 22 respondents did not disclose their land tenure status. Irrigation methods varied, with 76 farmers using pumps, 28 utilizing gravity systems from reservoirs, and 12 depending on rainfed systems. Regarding capital sourcing, 79 respondents used personal savings, 21 borrowed from family or relatives, 16 took out loans, and 8 used alternative funding sources.

Farm Production

The farm production activities of the respondents show a diversity of crops and farming practices. Most respondents (86) plant bananas, followed by pineapple (20), cassava (15), ginger (12), and smaller numbers planting fruit trees, taro, purple yam, tomatoes, and peppers. A notable 11 respondents indicated planting other crops like okra and ampalaya. In terms of planting cycles, 45 respondents adopt a 3-cycle process, while others vary from 2 to 9 cycles, showing flexibility in their farming methods. Harvesting frequency also varies, with 45 respondents harvesting once a year, another 45 harvesting twice a year, and others harvesting quarterly or monthly. Fertilizer usage is also diverse, with 65 respondents applying organic fertilizer, 36 using commercial fertilizer, and others utilizing livestock or poultry manure

Pest and disease control methods are predominantly organic, with 67 respondents employing biological methods, while 22 use integrated pest management, and 30 rely on chemical pesticides. Organic farming practices are embraced by 45 respondents, with 49 using organic fertilizers and 30 reducing chemical usage. Waste management practices include proper waste disposal (53 respondents) and composting for soil fertilization (44 respondents). Seasonal harvesting patterns highlight crop variety, with 45 respondents harvesting vegetables and crops during the rainy season, and others including fruits and livestock. In the dry season, similar trends are observed, though slightly fewer respondents harvest livestock

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Marketing methods for farm produce also differ among respondents. While 63 rely on middlemen, 51 practice direct selling, and a few (5) use haulers. Pricing strategies are dominated by wholesale, with 79 respondents opting for this method, compared to 31 who sell at retail prices and 2 using farm gate pricing. This data underscores the respondents' adaptability and resourcefulness in farm production, pest control, waste management, and marketing strategies.

Training Needs Assessment

Table 1. The discrepancy score in knowledge, performance or ability and consequence in a given variable or training topic.

Variables	KDS	KMWDS	PDS	PMWDS	CDS	CMWDS
Farm Management	1.8 Neutral	3.2 Neutral	1.7 Very Low	3.2 Neutral	1.8 Very Low	3.2 Neutral

Legend:
KDS = Knowledge Discrepancy Score
KMWDS = Knowledge Mean Weight Discrepancy Score
PDS = Performance Discrepancy Score
PMWDS = Performance Mean Weight Discrepancy Score
CDS = Consequence Discrepancy Score
CMWDS = Consequence Mean Weight Discrepancy Score
Range: 1 = 1.00 - 1.80 = Very Low; 2 = 1.81 – 2.60 = Low; 3 = 2.61 – 3.40 = Neutral; 4 = 3.41 – 4.20 = High; 5 = 4.21 – 5.00 = Very High

The Table 1 illustrates the discrepancy score in knowledge, performance or ability and consequence in a given variable or training topic. Discrepancy score is the score calculated by deducting the variable score (knowledge, performance and consequence) from respondents' perceived importance of the training topic. The discrepancy scores can aid in determining if respondents lack information about the competency, if they lack the ability to perform the competency, or if they need to learn more about the consequence of using the competency. Thus, training can be tailored and improved based on addressing these discrepancies. Looking at the given scores in Table 1, the knowledge discrepancy score of respondents is 1.8 which indicates a very low discrepancy in knowledge of the respondents. This is supported by knowledge mean weight discrepancy score of 3.2 which indicate neutral in description. As for the performance discrepancy score 1.7 which indicate a very low performance discrepancy performance and supported by performance mean weight discrepancy score of 3.2. As for the consequence discrepancy, it got a mean score of 1.8 which indicate a very low discrepancy score and supported by 3.2 consequence mean weighted discrepancy score.

Table 2. The discrepancy score in knowledge, performance or ability and consequence in a given variable or training topic.

Variables	Perceived Importance	Knowledge Competency	Performance Ability Competency	Perceived Consequence of Competency
Fertilizer Application	3.0	1.3	2.8	2.6
	Neutral	Very Low	Neutral	Low

Range:
1 = 1.00 - 1.80 = Very Low; 2 = 1.81 – 2.60 =Low; 3 = 2.61 – 3.40 = Neutral; 4 = 3.41 – 4.20 = High; 5 = 4.21 – 5.00 = Very High

Table 3. The discrepancy score in knowledge, performance or ability and consequence in a given variable or training topic.

Variables	KDS	KMWDS	PDS	PMWDS	CDS	CMWDS
Fertilizer Application	1.7	2.9	0.0	0.1	0.5	0.2
	Very Low	Neutral	Very Low	Very Low	Very Low	Very Low

Legend:
KDS = Knowledge Discrepancy Score
KMWDS = Knowledge Mean Weight Discrepancy Score
PDS = Performance Discrepancy Score
PMWDS = Performance Mean Weight Discrepancy Score
CDS = Consequence Discrepancy Score
CMWDS = Consequence Mean Weight Discrepancy Score
Range:
1 = 1.00 - 1.80 = Very Low; 2 = 1.81 – 2.60 =Low; 3 = 2.61 – 3.40 = Neutral; 4 = 3.41 – 4.20 = High; 5 = 4.21 – 5.00 = Very High

Based on Table 2, for the respondents perceived importance of the topic. It got a mean score of 3.0 which indicates that respondents are neutral regarding the importance of the training topic. For the knowledge competency of the respondents regarding the topic, it got a calculated mean of 1.3 which indicates very low in knowledge competency while the performance ability competency got a mean score of 2.8 with a descriptive remarks of neutral whereas the perceived consequence competency got a mean score of 2.6 which indicates a low score.

Based on Table 3, the knowledge discrepancy score of respondents is 1.7 which indicates a very low discrepancy in knowledge of the respondents. This is supported by knowledge mean weight discrepancy score of 2.9 which indicate neutral in description. As for the performance discrepancy score 0.0 which indicates no discrepancy performance and supported by performance mean weight discrepancy score of 0.1. As for the consequence

discrepancy, it got a mean score of 0.5 which indicate a almost no discrepancy score and supported by 0.2 consequence mean weighted discrepancy score.

Table 4. The discrepancy score in knowledge, performance or ability and consequence in a given variable or training topic.

Variables	KDS	KMWDS	PDS	PMWDS	CDS	CMWDS
Organic Farming	1.5 Very Low	2.3 Low	2.2 Low	4.9 High	2.3 Low	5 Very High

Legend:
KDS = Knowledge Discrepancy Score
KMWDS = Knowledge Mean Weight Discrepancy Score
PDS = Performance Discrepancy Score
PMWDS = Performance Mean Weight Discrepancy Score
CDS = Consequence Discrepancy Score
CMWDS = Consequence Mean Weight Discrepancy Score
Range:
1 = 1.00 - 1.80 = Very Low; 2 = 1.81 – 2.60 =Low; 3 = 2.61 – 3.40 = Neutral; 4 = 3.41 – 4.20 = High; 5 = 4.21 – 5.00 = Very High

Based on Table 4, for the respondents perceived importance of the topic, it got a mean score of 3.4 which indicates that respondents are neutral regarding the importance of the organic farming in their farming activity. For the knowledge competency of the respondents regarding the topic, it got a calculated mean of 1.9 which indicates low in knowledge competency while the performance ability competency got a mean score of 1.2 with a descriptive remarks of very low whereas the perceived consequence competency got a mean score of 1.1 which indicates a low score.

CONCLUSION

Based on the given findings, the researcher arrived at several conclusions. First, majority of the respondent's farmers' age are in their prime for farming activities and mostly are married. In terms of education, majority of the them are high school graduates. Second, most of the respondents are into extended family set up which evident to the number of household size. Third, they find it hard to solely rely on the income from their farming activities since they usually practice hit and miss process. Fourth, they are starting to be aware of the benefits of alternative method for chemical fertilizer and pesticides that is environment friendly. Fifth, they placed certain value on education and slowly gearing younger family member away from farming activities. Sixth, most of the farmers do not have a clear-cut system on what to do with their farming activities. They are mostly equipped with knowledge

and capacities but misplaced importance on training. This can be seen in the perceived importance scores given by the respondents in certain training topics given by the proponent.

SUGGESTIONS

The researchers recommend that additional analysis and topic consideration on the training needs assessment be carried out. From the findings of this research, it is not the lack of training or knowledge or capacity of farmers that hinder them in growing in farming, but it is the attitude and placement of importance in training that is given to them. Further, additional focus group discussion is warranted in order to also include other factors such as farmers' organizations, cooperatives, agribusinesses. Moreover, develop demonstration farms showcasing successful implementation of environment-friendly agricultural practices to ensure environmental sustainability initiatives as well as provide training on systematic crop planning and market analysis to reduce "hit and miss" farming practices.

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