INDIGENOUS KNOWLEDGE AND PRACTICES (IKPs) AS RESPONSE TO AGRICULTURAL RISKS OF IP FARMERS IN BAAO, CAMARINES SUR

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Abstract

Agricultural risks such as climate variability, pest outbreaks, and declining soil productivity pose significant challenges to farming communities, particularly among Indigenous People (IP) farmers who depend heavily on natural resources for their livelihood. This study assessed the Indigenous Knowledge and Practices (IKPs) utilized by IP farmers in Baao, Camarines Sur, as a response to agricultural risks. Specifically, it examined the socio-economic characteristics of farmers, their level of knowledge on agricultural risks, the indigenous practices used to cope with these risks, and the challenges encountered in their farming activities. A mixed-method research design was employed using survey questionnaires administered to 179 IP farmers identified through the Registry System for Basic Sectors in Agriculture (RSBSA). Data were analyzed using frequency, percentage, weighted mean, and Pearson correlation analysis. Results showed that rice farmers had the highest level of knowledge on agricultural risks, followed by corn and vegetable farmers, while root crop farmers had relatively lower knowledge levels. Indigenous practices, including environmental observations and traditional rituals, play an important role in enhancing resilience and sustaining indigenous farming systems.

Keywords: *Indigenous Knowledge and Practices; Agricultural Risks; Indigenous Farmers; Climate Resilience; Sustainable Agriculture.*

1. Introduction

Agriculture plays a significant role in sustaining rural livelihoods and ensuring food security, particularly in developing countries like the Philippines. However, the agricultural sector continues to face persistent challenges such as low farm incomes, limited rural employment opportunities, and increasing vulnerability to environmental risks. These challenges contribute to low agricultural productivity and limit the competitiveness of the sector in national and global markets (Sanchez, 2015).

One of the major threats to farmers' livelihoods is the occurrence of agricultural risks such as extreme weather events, pest and disease outbreaks, drought, and flooding. These risks significantly affect agricultural productivity and income stability, especially among smallholder farmers and indigenous communities who depend heavily on natural resources for their livelihood. Indigenous farmers are particularly vulnerable to these risks because their farming activities are closely tied to environmental conditions and traditional agricultural practices (Harvey et al., 2014).

The impact of agricultural risks on farming systems is influenced not only by the magnitude of environmental shocks but also by the vulnerability and resilience of the agricultural system itself. According to Gitz and Meybeck (2012), the effects of risks depend on the capacity of farming communities to anticipate, respond to, and recover from these shocks.

Despite their vulnerability, indigenous communities possess rich Indigenous Knowledge and Practices (IKPs) that have been developed through generations of interaction with their environment. Indigenous knowledge represents the accumulated experiences, observations, and cultural practices of local communities that guide their decision-making in managing natural resources and agricultural production (Ryser, 2011).

These traditional knowledge systems play an important role in promoting sustainable agriculture and food security. Indigenous knowledge in farming is based on centuries of experimentation and observation, allowing farmers to develop adaptive strategies suited to their local environments. These practices are passed from one generation to another and often include crop diversification, weather prediction through environmental signs, and the use of traditional rituals and cultural practices in farming activities (Perroni, 2017).

Globally, there has been increasing recognition of the role of Indigenous Knowledge and Practices in enhancing climate resilience and sustainable agriculture. Studies have shown that traditional practices, when combined with selected modern technologies, can help indigenous communities adapt to climate change and improve their agricultural productivity. For instance, a study published in the Journal of Environmental Science and Management reported that the Suludnon and Ati indigenous groups were able to sustain their farming systems through the integration of traditional practices with modern agricultural innovations (Journal of Environmental Science and Management, 2019).

However, despite their potential contributions to sustainable development, indigenous knowledge systems are gradually disappearing due to modernization, technological changes in agriculture, and the limited documentation of traditional practices. Magni (2016) emphasized that although indigenous knowledge systems have proven effective in addressing environmental challenges, they are not sufficient on their own and must be supported through appropriate policies and development initiatives.

Furthermore, research on disaster risk reduction highlights the importance of integrating indigenous knowledge into formal risk management frameworks. McAdoo et al. (2009) noted that indigenous knowledge has often been overlooked in disaster risk management strategies, despite its value in early warning systems, preparedness, and recovery processes. Similarly, Rautela and Karki (2015) emphasized that indigenous knowledge plays a vital role in mitigating the impacts of natural disasters and improving community resilience.

In the municipality of Baao, Camarines Sur, indigenous communities—particularly the Agta people—depend heavily on agriculture for their livelihood. These communities inhabit upland and mountainous areas within their ancestral domain, where agricultural activities such as rice farming, corn production, vegetable gardening, and root crop cultivation are common sources of income and food supply.

However, these communities continue to face numerous agricultural challenges, including climate variability, pest and disease outbreaks, and declining soil productivity. As a result, indigenous farmers rely on their traditional knowledge systems to cope with these risks and sustain their agricultural livelihoods. Given the limited documentation of these practices, there is a need to examine how Indigenous Knowledge and Practices contribute to agricultural risk management among IP farmers.

Thus, this study was conducted to assess the Indigenous Knowledge and Practices used by Indigenous People farmers in Baao, Camarines Sur, as a response to agricultural risks and to determine how these practices contribute to resilience and sustainability in indigenous farming communities.

2. Methodology

2.1 Research Design

The study employed a mixed-method research design, integrating both quantitative and qualitative approaches to assess the Indigenous Knowledge and Practices (IKPs) used by Indigenous People (IP) farmers in response to agricultural risks in Baao, Camarines Sur. The descriptive component was used to determine the socio-economic characteristics of the respondents and their level of knowledge regarding agricultural risks, while the evaluative aspect examined the indigenous practices utilized by farmers to cope with these risks. The mixed-method approach enabled the researcher to obtain both statistical data and contextual insights regarding traditional farming practices and risk management strategies among indigenous communities. This design provided a comprehensive understanding of how Indigenous Knowledge and Practices contribute to agricultural resilience and sustainability.

2.2 Research Location and Population

The study was conducted in selected barangays within the municipality of Baao, Camarines Sur, Philippines, particularly in areas inhabited by Indigenous People (IP) communities. These barangays include Tapol, Cristo Rey, Sta. Teresa, Iyagan, Buluang, Caranday, Pugay, Lourdes, Sta. Isabel, Del Pilar, San Rafael, Antipolo, San Vicente, Salvacion, and Nababarera. These areas are part of the ancestral domains where indigenous farmers rely heavily on agricultural activities such as rice farming, corn production, vegetable gardening, and root crop cultivation.

The target respondents of the study were Indigenous People farmers registered in the Registry System for Basic Sectors in Agriculture (RSBSA) in the Municipality of Baao. A total of 179 IP farmers participated in the study. These respondents were grouped according to the primary crops they cultivated, including rice, corn, vegetables, and root crops.

2.3 Sampling Procedure

A purposive sampling technique was used in selecting the respondents of the study. The list of Indigenous People farmers was obtained from the Registry System for Basic Sectors in Agriculture (RSBSA) maintained by the Municipal Agriculture Office of Baao. From the identified population of IP farmers, 179 respondents were selected to participate in the survey. The respondents were classified according to the type of crops they cultivated to determine variations in knowledge and practices related to agricultural risks across different farming clusters.

2.4 Research Instrument

Data were collected using a researcher-developed structured questionnaire designed to capture the relevant information needed to achieve the objectives of the study. The questionnaire consisted of three major sections: (1) the socio-economic profile of the respondents, including age, educational attainment, household size, and farming experience; (2) the level of knowledge of Indigenous People farmers regarding agricultural risks affecting crop production; and (3) the Indigenous Knowledge and Practices used by farmers in coping with agricultural risks.

The perception statements utilized a four-point Likert scale ranging from 1 (Strongly Disagree) to 4 (Strongly Agree). The instrument was validated by experts in agriculture and rural development to ensure clarity, relevance, and reliability of the statements included in the questionnaire.

2.5 Data Collection Procedure

Prior to data collection, permission was sought from the Municipal Agriculture Office of Baao and the National Commission on Indigenous People to conduct the study among Indigenous People farmers listed in the RSBSA database. Coordination with local barangay officials and community leaders was also undertaken to facilitate the survey process.

The questionnaires were personally administered to the selected respondents. The researcher explained the purpose of the study and provided clear instructions on how to answer the questionnaire to ensure accurate responses. Respondents were assured that their participation was voluntary and that the information collected would be used solely for academic purposes. Completed questionnaires were collected, checked for completeness, and encoded into a spreadsheet for data analysis.

2.6 Data Analysis

The data gathered from the survey were analyzed using descriptive and inferential statistical methods. Frequency counts and percentages were used to describe the socio-economic characteristics of the respondents. The weighted mean was utilized to determine the level of knowledge of farmers regarding agricultural risks and the extent of Indigenous Knowledge and Practices used in coping with these risks.

In addition, Pearson Product-Moment Correlation analysis was used to examine the relationship between the level of knowledge of agricultural risks and the Indigenous Knowledge and Practices adopted by IP farmers.

2.7 Ethical Considerations

Ethical standards were strictly observed throughout the conduct of the study. Participation of the respondents was voluntary, and informed consent was obtained prior to the administration of the questionnaire. Respondents were assured that their identities and personal information would be treated with strict confidentiality and would only be used for research purposes. Furthermore, respect for the cultural traditions and values of the Indigenous People communities was maintained during the data collection process.

3. Results and Discussion

The results of the study are presented and discussed in relation to the objectives of assessing the Indigenous Knowledge and Practices (IKPs) utilized by Indigenous People (IP) farmers in Baao, Camarines Sur, in response to agricultural risks. The findings provide insights into the socio-economic characteristics of the respondents, their level of knowledge on agricultural risks, the indigenous practices they employ, the challenges they encounter, and the relationship between knowledge and practices in managing agricultural risks.

3.1 Socio-Economic Characteristics of the Respondents

The socio-economic profile of the Indigenous People (IP) farmers in Baao, Camarines Sur, revealed that most of the respondents were married and had relatively large household sizes, commonly ranging from six to ten

members. In terms of educational attainment, a significant number of farmers had only reached elementary or secondary education, indicating limited access to formal education among indigenous communities. Farming remained the primary source of livelihood for most respondents, with rice, corn, vegetable, and root crop farming serving as the main agricultural activities within their communities.

These findings suggest that indigenous farmers largely depend on agriculture for subsistence and income generation. However, limited education and financial resources may affect their ability to access modern agricultural technologies and risk management strategies. Similar observations were reported by Harvey et al. (2014), who noted that smallholder and indigenous farmers are often highly vulnerable to agricultural risks due to limited access to resources, extension services, and technological innovations. Nevertheless, indigenous communities continue to rely on traditional knowledge systems and cultural practices that guide their agricultural decision-making and resource management.

3.2 Level of Knowledge of IP Farmers on Agricultural Risks

The results of the study revealed variations in the level of knowledge of Indigenous People farmers regarding agricultural risks across different crop clusters. Rice farmers obtained the highest level of knowledge with a weighted mean of 2.95, followed by corn farmers with 2.90 and vegetable farmers with 2.63, all interpreted as having a high level of knowledge. On the other hand, root crop farmers recorded a relatively lower level of knowledge with a weighted mean of 2.49.

The higher knowledge levels among rice and corn farmers may be attributed to their longer farming experience and greater exposure to agricultural extension programs and farming practices. Rice and corn are among the most widely cultivated crops in the municipality, which may have contributed to farmers' familiarity with risks such as pest infestation, drought, flooding, and crop diseases. In contrast, root crop farmers may have fewer opportunities to receive agricultural training or extension support, which could influence their awareness of agricultural risks.

These results support the findings of Duong et al. (2019), who emphasized that farmers' perception and understanding of agricultural risks are influenced by their farming experience, exposure to information sources, and participation in agricultural programs. Knowledge of risks plays a crucial role in enabling farmers to adopt appropriate strategies that minimize potential losses and enhance farm productivity.

3.3 Indigenous Knowledge and Practices Used by IP Farmers

The study found that Indigenous People farmers in Baao continue to practice various forms of Indigenous Knowledge and Practices (IKPs) in managing agricultural risks. These practices are largely influenced by cultural beliefs, environmental observations, and traditional rituals passed down through generations. Farmers often perform rituals before planting or harvesting crops as a way of seeking protection, a good harvest, and favorable weather conditions. They also observe natural indicators such as the behavior of animals, cloud formations, and seasonal changes to predict weather patterns and guide farming decisions.

In addition, farmers utilize traditional practices such as crop diversification, natural pest control methods, and soil management techniques that are adapted to their local environment. These indigenous practices enable farmers to sustain agricultural production despite limited access to modern technologies.

The continued use of IKPs reflects the strong relationship between indigenous communities and their natural environment. According to Ryser (2011), indigenous knowledge systems represent the accumulated experiences and wisdom of local communities that guide their interactions with nature. Similarly, Perroni (2017) emphasized that traditional agricultural knowledge contributes to biodiversity conservation and sustainable resource management, particularly in rural and indigenous communities.

3.4 Challenges Encountered by IP Farmers in Managing Agricultural Risks

Despite the presence of indigenous knowledge systems, the study revealed that IP farmers still face several challenges that affect their agricultural productivity. Among the most reported challenges were pest and disease outbreaks, drought conditions, declining soil fertility, reduced crop yield, and livestock losses. These environmental and agricultural risks significantly impact the livelihood and food security of indigenous farming households.

Another notable challenge identified in the study was the migration of community members to other areas in search of alternative sources of income. This migration often occurs when farming activities become less productive due to unfavorable environmental conditions or limited economic opportunities within the community.

These findings are consistent with the observations of Gitz and Meybeck (2012), who noted that agricultural systems are increasingly exposed to environmental risks that threaten the stability of food production. Indigenous communities, in particular, are highly vulnerable to these risks because of their dependence on natural resources and limited access to technological and financial support systems.

3.5 Relationship Between Knowledge and Indigenous Practices

The correlation analysis conducted in the study revealed that there was generally a negative relationship between the level of knowledge on agricultural risks and the Indigenous Knowledge and Practices adopted by most farmer clusters, except for rice farmers. This result indicates that variations in knowledge levels may influence the adoption and application of indigenous practices in managing agricultural risks.

The findings suggest that improving farmers' knowledge through agricultural education and extension services could enhance their ability to effectively respond to agricultural risks. Integrating indigenous knowledge with modern agricultural technologies may further strengthen the adaptive capacity of indigenous communities.

As emphasized by Magni (2016), indigenous knowledge systems remain valuable resources for sustainable development, but they should be complemented with modern scientific knowledge and institutional support. Such integration can contribute to more resilient and sustainable agricultural systems, particularly among vulnerable farming communities.

4. Conclusion

The study assessed the Indigenous Knowledge and Practices (IKPs) utilized by Indigenous People (IP) farmers in Baao, Camarines Sur, in response to agricultural risks. The findings revealed that most IP farmers depend heavily on agriculture as their primary source of livelihood, with rice, corn, vegetable, and root crop farming as the dominant agricultural activities. The results further showed that farmers generally possess a considerable level of knowledge regarding agricultural risks, particularly among rice and corn farmers, while root crop farmers demonstrated relatively lower levels of knowledge. Indigenous farming practices, including environmental observations, traditional rituals, and locally developed resource management strategies, continue to play an important role in guiding agricultural activities within indigenous communities.

Despite the presence of these traditional practices, IP farmers still encounter several challenges, such as pest and disease outbreaks, drought, declining soil fertility, and reduced crop productivity. These risks affect the livelihood stability and food security of indigenous households. The findings also indicate that Indigenous Knowledge and Practices remain a valuable component of agricultural risk management and community resilience. However, strengthening the integration of indigenous knowledge with modern agricultural technologies and extension support is necessary to improve the adaptive capacity and sustainability of indigenous farming systems.

5. Recommendation

Based on the findings and conclusions of the study, the following recommendations are proposed:

1. **Strengthening Agricultural Extension Services.** Government agencies, particularly the Municipal Agriculture Office and the Department of Agriculture, should strengthen agricultural extension programs to enhance farmers' knowledge and awareness of agricultural risks and risk management strategies.
2. **Documentation and Preservation of Indigenous Knowledge.** Indigenous Knowledge and Practices used by IP farmers should be properly documented and preserved to prevent the loss of valuable traditional agricultural knowledge and to promote its recognition as an important resource for sustainable agriculture.
3. **Integration of Indigenous Knowledge and Modern Technologies.** Development programs should promote the integration of indigenous farming practices with modern agricultural technologies to improve productivity while maintaining the ecological balance of indigenous farming systems.
4. **Capacity Building and Training Programs.** Training programs and capacity-building activities should be provided to Indigenous People farmers to enhance their knowledge of climate-resilient agriculture, pest management, soil conservation, and sustainable farming practices.
5. **Policy Support for Indigenous Farming Communities.** Local government units and policymakers should develop programs and policies that support the needs of indigenous farmers, including access to agricultural resources, credit assistance, and climate adaptation programs.

References

Duong, T. T., Brewer, T., Luck, J., & Zander, K. (2019). A global review of farmers' perceptions of agricultural risks and risk management strategies. Agriculture, 9(1), 10. https://doi.org/10.3390/agriculture9010010

Gitz, V., & Meybeck, A. (2012). Risks, vulnerabilities and resilience in a context of climate change. Food and Agriculture Organization of the United Nations.

Harvey, C. A., Rakotobe, Z. L., Rao, N. S., Dave, R., Razafimahatratra, H., Rabarijohn, R., Rajaofara, H., & MacKinnon, J. L. (2014). Extreme vulnerability of smallholder farmers to agricultural risks and climate change in Madagascar. Global Environmental Change, 28, 116–126. https://doi.org/10.1016/j.gloenvcha.2014.06.005

Journal of Environmental Science and Management. (2019). Indigenous knowledge systems and sustainable agricultural practices among the Suludnon and Ati communities. Journal of Environmental Science and Management, 22(2), 45–56.

Magni, G. (2016). Indigenous knowledge and implications for the sustainable development agenda. European Journal of Education, 51(4), 437–447. https://doi.org/10.1111/ejed.12192

McAdoo, B. G., Moore, A., & Baumwoll, J. (2009). Indigenous knowledge and the near-field population response during the 2007 Solomon Islands tsunami. Natural Hazards, 48(1), 73–82. https://doi.org/10.1007/s11069-008-9249-z

Perroni, N. (2017). Traditional agricultural knowledge and biodiversity conservation in indigenous farming systems. Journal of Ethnobiology and Ethnomedicine, 13(1), 1–12. https://doi.org/10.1186/s13002-017-0175-6

Rautela, P., & Karki, B. (2015). Indigenous knowledge in disaster risk reduction: A case study from the Indian Himalayas. Journal of Disaster Risk Studies, 7(1), 1–10. https://doi.org/10.4102/jamba.v7i1.221

Ryser, R. (2011). Indigenous peoples and knowledge systems. Center for World Indigenous Studies.

Sanchez, P. A. (2015). Enabling smallholder farmers to improve food security and livelihoods. Nature Plants, 1(15003), 1–2. https://doi.org/10.1038/nplants.2015.3