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BRIDGING THE GAP IN RICE FARMING: A SYSTEMATIC REVIEW OF CHALLENGES AND SOLUTIONS WITH A FOCUS ON BRAULIO E. DUJALI, DAVAO DEL NORTE

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ABSTRACT

Rice farming still plays a very important role in Philippine agriculture but also faces several problems that hamper its sustainability and profitability. This study will examine economic, environmental, social, and institutional problems encountered by rice farmers in Braulio E. Dujali, Davao del Norte. The problems identified and discussed are high production cost, lack of access to credit, impact of climate change, shortage of manpower, and inequitable government policies.

The study provides recommendations for improving access to subsidies, credit, irrigation, and post-harvest infrastructure; adopting climate-smart agriculture; empowering women and youth in farming; and strengthening land tenure and farmer-to-farmer extension programs. It recommends collaborative efforts to ensure resilient and sustainable rice farming in the region and similar areas across the Philippines.

Keywords: Rice Farming Challenges, Sustainable Agriculture, Policy and Institutional Reforms, Agricultural Productivity

1. INTRODUCTION

Rice farming is one of the vital components of the food network around the world, especially in Asia, because it serves as a fundamental food source for more than one-third of the population around the globe Barker et al. (2014). However, rice farming in the Philippines is confronted with various issues since rice producers deal with agricultural skills, starting from preparing the land to post-harvest management. These problems also include the infestations by rodents and insects causing pests and diseases affecting the rice. This has negatively impacted its production, coupled with irrigation services scarcity leading to decrease in yield and productivity; the cost is also elevated with regards to the reduced access to the agricultural machineries and post-harvest facilities that increase the total costs of productions Hung, et al. (2022). The agricultural sector represents one of the areas most significantly impacted by climate change Zougmoré et al. (2019), particularly as rice cultivation is profoundly dependent on environmental conditions.

However, if these challenges cannot be addressed, farmers may choose to convert from rice production. This can lead to a reduction in supply, incapable of covering the needs of an expanding population Davidson (2016) and eventually cause negative long-term impacts on our economy.

This study will also tackle the high cost of production, with low returns or even the possibility for a harvest failure. This will also check on the availability of infrastructure projects relevant to farming such as farm-to-market roads, pre- and post-harvest facilities, flood control facilities, etc.; access to technical assistance such as crop management trainings; and the availability of financial support (grants, loans, or subsidies) for inputs such as seedlings, fertilizers, pesticides.

This will also be a measure to determine how effective the government measures works in that area and its effect in rice production. Some of these are the Rice Tariffication Act; and Free Irrigation Service Act, as seen by the farmers in the municipality. These endeavors are key in improving the practices of farmers, issuing required help and budgetary aid to farmers by pushing-forward an effectively arranged rice production program Aliyeva, et al. (2019).

With these challenges, to implement interventions aimed at the realization of sustainable enhancements in rice productivity, it is important that these evaluations take into consideration economic, environmental, technological, and socio-cultural determinants influencing rice production Devkota et al. (2019). By evaluating these, it helps boost the resilience of rice farmers against climate change changes, and might help realize rice self-sufficiency for the country.

2. RESEARCH OBJECTIVES

General Objective- This study is set to conduct a systematic literature review to identify and evaluate the main challenges and support deficiencies encountered by rice farmers in Braulio E. Dujali, Davao del Norte, with the aim of informing strategies for improvement.

Specific Objectives

1. Economic problems of rice farmers including high production cost, competition of rice farmers in market, and scarcity of resources

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2. To assess the environmental and climatic drivers of rice production productivity and sustainability.
3. To evaluate the effectiveness of government policies, including the Rice Tariffication Law, in addressing the challenges of rice farming.
4. To help identify where the gaps in support are in current agricultural programs and suggest how to fill those gaps.

3. METHODS

Search Strategy

In a bid to identify and enthrall the predicaments and assistance mechanisms among rice farmers with Braulio E. Dujali, Davao del Norte as case study, this study systematically reviewed the literature. To ensure the relevance of guidelines to current agricultural practice and policy frameworks, only primary and secondary sources published within the last five years were analyzed. Relevant literature was gleaned from various online databases; to include Google Scholar and EJournals as well as governmental repositories. The search terms included "issues involved in rice farming, climatic impact on rice farming, economic problems on rice production, rice growers and government policies, Rice Tariffication Act," and "farmers support programs."

Inclusion Criteria

Relevant literature were obtained from established academic databases, peer-reviewed journals, scholarly books, government publications and reputable research articles. The selection process for the systematic review of literature was directed by essential search terms such as Rice Farming Challenges, Sustainable Agriculture, Agricultural Productivity, and Policy and Institutional Reform.

This study focused on works from 2014 to 2024 to ensure the timeliness of findings. This focused on literature that specifically addressed the economic, environmental, and policy challenges faced by rice farmers. Moreover, we invoked references with similar cultivation methods for rice in the Philippines or comparable Southeast Asian context to enhance the study relevance and timeline relative to the objectives of the study.

Exclusion Criteria

Any study published prior to 2014 was excluded. Studies out of the rice-farming sector, or those whose aims were not relevant to the study were as well excluded.

Data Analysis

This data interpretation was explored through thematic approaches to identify recurring themes and trends and within the selected studies. Emergent themes included economic barriers such as high production costs and market fluctuations, environmental and climatic impacts such as episodes of flooding and drought (particularly mentioned in davao), and effects and impacts of government policies, such as the Rice Tariffication Law on agricultural productivity and livelihoods of farmers and also deficits in agricultural support systems and the implications of these for the sustainability of rice production.

These findings were synthesized to inform recommendations aimed to address the unmet needs as well as persistent challenges on rice farmers.

4. RESULTS AND DISCUSSIONS

ECONOMIC CHALLENGES IN RICE FARMING

High Costs of Production and Profitability

Rice farming in the Philippines is known to have high production costs, which greatly impacts profitability. According to Cañete et al. (2017), the effect of rice yields in Isabela was studied as well, and significant factors were determined as cost of farm services, cost of seed, use of fertilizer, and labor. But these inputs come at a high price, making profitability a challenge for many farmers.

Lirag (2019) examined the challenges of scaling alternate wetting and drying (AWD) technology for rice cultivation in the Philippines, offering insights into improving resource efficiency and reducing costs. However, widespread adoption of AWD faces hurdles such as lack of awareness, limited access to technology, and resource constraints, further exacerbating economic pressures on farmers.

The comparative studies are aimed at the regional competitiveness problems of rice farmers in the Philippines. According to Moya et al. (2016), Filipino farmers are less competitive with their neighbors in Vietnam and Thailand due to the relatively high cost of production that is largely labor and machinery.

Along similar lines, Briones (2019) discussed the economic impacts of the Rice Tariffication Law (RTL), projecting probable increases in earnings as well as significant financial vulnerabilities emerging from competition with cheaper imported rice. Together, these studies point to the precarious economic context in which Filipino rice farmers operate, both compounded by internal cost issues and exposed to external market pressures.

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POLICY AND INSTITUTIONAL BARRIERS

Impact of Government Policies

It can be assumed that government policies significantly decide the agricultural landscape; in particular, the ability to aid rice farmers in becoming sustainable is highly debatable. According to Philstar (2022), despite having the National Rice Program, inefficiencies prevailed under it, especially from the year 2020 through 2021 when essential fertilizer and seed subsidies by farmers were unavailability caused, and response time remained very slow and, sometimes budgets were underutilized as well, causing benefits failure to the program. Besides, Ituriaga et al. (2024) postulate that government intervention for agricultural development in the Philippines should be more focused and farmer-oriented to adequately address gaps in existence.

Kazumi (2020) and Montesclaros (2023) probe further into the issues in broader governance affecting rice farming. Kazumi (2020) focuses on the political economy of agricultural biotechnology, with attention to regulatory hurdles facing innovation such as Golden Rice. Montesclaros (2023) makes use of Rational Choice Institutionalism (RCI) to identify the institutional hurdles that comprise currency overvaluation, trade protectionism, and capital scarcity impacting the agricultural innovation. The two articles point out the need for an all-round policy reforms as well as more robust structures of governance to help facilitate sustainable rice farming.

ENVIRONMENTAL AND CLIMATE-RELATED CHALLENGES

Climate Change and Natural Disasters

Climate and other environmental factors significantly impact rice cultivation in the Philippines. Thuy et al. (2015) emphasize that in the Mekong Delta region, flooding, salt intrusion, and climate variability have seriously decreased rice production and caused great damage to agricultural infrastructure. Such conditions signify the challenges that Filipino rice producers are facing, particularly since climatic conditions similar to these are altering production and, at the same time, the source of their livelihood. Unless there are adaptive interventions, such effects are likely to worsen, which will threaten the sustainability of rice agriculture in the region.

For example, in Davao del Norte, Hilario et al. (2024) examined persistent flood problems in Sto. Tomas. Despite efforts such as riverbank rehabilitation and dredging, challenges remain due to inadequate drainage systems and sediment control. These infrastructural gaps exacerbate the vulnerability of rice farming communities to flooding. Hung et al. (2022) further highlight that climate variability fosters pest and disease infestations, which increase production costs and lower yields.

Adaptive strategies will also have to face salinization and erratic rainfalls, among other compounding effects of climate change that strain water resources and reduce arable land. According to Thuy et al. (2015), integrated water resource management, along with sustainable farming, is the key to mitigating these risks. For the Philippines, investments in such measures will need to go into climate-smart technologies and the policy support needed to implement it.

The producers of rice in vulnerable areas face extreme challenges that emanate from the interaction between environmental degradation and stresses due to climate change. Efforts to adapt will continue in the form of technology improvement and policy reform, and these will be important in making rice production sustainable in the Philippines.

SOCIAL AND CULTURAL DYNAMICS

Labor Shortages and Generational Shifts

Social and cultural factors have been very impactful on rice farm practices and sustainability. According to Talhelm et al. (2022), the intensive nature of paddy farming creates interdependence, cooperation, and powerful social norms in farming communities. Competition and rigidity can also be results of this; therefore, innovation can be suppressed. Saisema and Pagdee (2015) pointed out that the socioeconomic restrictions of lesser income levels and the intergenerational changes, where youth seek job opportunities in the cities, has been considered a threat to family farms.

Gender Inequalities in Farming

Gender dynamics inform farming practices and access to productive resources. As stated by Yaméogo et al. (2018), because of a lack of access to these resources, men are likely to exploit rice whereas women subsist on rice for survival purposes. The study suggests that for better productivity and the food situation should improve security of women to landholdings for its tenuring.

INFRASTRUCTURE AND MECHANIZATION

Irrigation and Post-Harvest Facilities

Poor infrastructure is still a major problem in increasing rice production in the Philippines, especially in places like Braulio E. Dujali, Davao del Norte. As stated in the study of Hung et al. (2022) and Moya et al. (2016), a lack of irrigation systems, good roads to markets, and proper facilities for handling crops makes it very difficult for farmers in Braulio E. Dujali to sell their products and reap as much as they can from their production. Without infrastructure development, post-harvest processes become difficult to improve in quality for farmers. This changes the amount of

money earned and how they compete with others in rice farming. More of this is discussed by Cogay et al. (2020) in Davao del Norte, including Braulio E. Dujali. For the method, they proposed the use of GIS-Based Land Suitability Analysis for a Solar-Powered Irrigation System. From the study, it indicated that this was one way of irrigating, aside from the typical ones. This would include the non-irrigated lands in Davao del Norte, which are located in Braulio E. Dujali. The findings suggest that solar-powered irrigation could help people access water better, fix problems with irrigation, and lead to more sustainable and productive rice farming practices. However, the study also notes that using solar-powered irrigation systems is currently limited by money issues, highlighting the need for better planning and resource use in this area.

The land features of Davao del Norte, such as Braulio E. Dujali, also impact farming. The paper by Belizario et al. (2017) gives information about the geography of the province, which includes mountains and large flat areas. All towns in Davao del Norte, including Braulio E. Dujali, are on relatively flat grounds near some important rivers such as Libuganon River and Tuganay River. These rivers offer significant irrigation but can also flood some parts, especially the lowland areas. Braulio E. Dujali is near rivers. Since most flood-prone areas in the municipality are along the rivers, rice farmers face special problems. The study illustrates how geography and climate impact rice farming. It also highlights that places close to big rivers are more susceptible to flooding, making irrigation and farm productivity even harder.

Technology Adoption

Adoption of modern agricultural technologies is necessary for enhancing productivity and sustainability. Nakano et al. (2018) analyzed farmer-to-farmer extension programs in Tanzania, and results show that such programs are helpful in knowledge transfer and yield improvement. Social networks also played a crucial role because informal farmers connected with professional peers experienced yield improvements over time. If similar programs were initiated in Braulio E. Dujali, the existing productivity gaps would be addressed through the adoption of advanced farming techniques and technologies.

ACCESS TO CREDIT AND FINANCIAL BARRIERS

Credit Accessibility and Financial Constraints

Access to affordable credit is a major challenge that rice farmers face. This significantly limits their investment in modern inputs and technologies. High interest rates, lack of collateral, and complex application procedures are critical barriers identified by Katabaro and Magasi (2024) as hindrances in accessing credit by farmers. The study of Van Hon et al. (2020) of Vietnam's Mekong River Delta depict how credit rationing diminishes capital utilization for the basic inputs fertilizers and labor, without touching seeds and pesticides. Such financial restrictions hinder farmer's productivity improvements and practice of sustainability.

Socioeconomic Influences on Credit Access

Kambali and Panakaje (2022) examine the socioeconomic aspects of education, marital status, and farm size influencing access to agricultural loans. High interest rates, long time lags, and approval challenges are factors affecting smallholders, limiting them from investing in farm improvement. The study suggests a streamlined credit system, reduction in interest rates, and investment in rural infrastructure in order to reduce these financial barriers and enhance productivity.

GOVERNANCE AND SUSTAINABILITY IN RICE PRODUCTION

Sustainability and Governance Structures

Sustainable rice production systems require effective governance. Roy et al. (2016) rated rice sustainability with 12 indicators; only 44% of the rice growers achieved sustainability across the economic, environmental, and social dimensions. Pluralistic agricultural advisory services and long-term multi-year planning are crucial factors that can improve sustainability.

Siripong (2024) examines government policies of Thailand and indicates that whereas price support policies stabilize farmers' incomes in the short run, they encourage reliance on subsidies, thus suppressing the incentive to innovate. Polices regarding water management and technology adoption seem promising but were applied unevenly across the region, suggesting an urgent need for balanced applications. Montesclaros (2023) presents how institutional barriers like protectionism and scarcity of capitals prevent agricultural innovation, which could be achieved by implementing needed reforms that can help support transformation in agriculture through focused interventions.

ADOPTION OF SUSTAINABLE PRACTICES

Predictors and Barriers to Sustainable Agriculture

Sustainable agricultural practices are vital for long-term productivity and environmental conservation. Terano et al. (2015) have identified the predictors for the adoption of sustainable practices. The predictors included positive attitudes, perceived behavioral control, proper storage of chemical inputs, use of protective equipment, and awareness of

integrated pest management (IPM). However, actual adoption was limited, even with high intentions, thus necessitating education, training, and availability of resources such as demonstration plots and informational booklets.

Kumar et al. (2021) assessed the sustainability of rice-cultivation systems in the Indo-Gangetic Plains of India, which highlighted degradation of the natural resources due to high-intensity traditional practices. The study calls for more integrated and sustainable approaches toward managing resources, with an encouragement of practices that are more equitable between productivity and environmental protection.

LAND TENURE AND OWNERSHIP IN RICE FARMING

Impact of Land Tenure Security

Land tenure and ownership significantly impact the productivity of rice farming and the economic stability of a region. Koirala et al. (2016) emphasized that insecure land tenure is the main issue in the Philippines, specifically for the leasehold farmers covered by the Comprehensive Agrarian Reform Program (CARP). Rental market constraints and disputes limit the production of tenant farmers. This study underlines the urgency to reform and address the issue of tenure insecurity for tenant farmers' enhanced production efficiency.

On the contrary, Pochanasomboon et al. (2020) showed that in Thailand full land-owning farmers experienced yield improvements, a better chance of accessing form credit and reduced informal borrowing. They found that weak-landowning farmers only had scarce access to resources with little or no incentive to undertake long-term investments because the land was not transferable or even sold freely. Secure tenure over land empowers farmers to overcome liquidity constraints, make investments in modernization, and achieve improvements in economic performance; it shows how land ownership plays a significant role in developing sustainable agricultural practices.

GOVERNANCE AND INSTITUTIONAL INNOVATIONS

Participatory Governance and Institutional Support

The multifaceted issues of rice farming are therefore solved by governance structures and institutional support. According to Saleh et al. (2021), some of the institutional innovations emphasized include the Rice Estate Community model, which promotes collective land management and productivity and welfare through technology transfer. A key author in the exploration of cultural values that maintain agrobiodiversity and traditional practices is Tekken et al. (2017) who, with the background of dangers of intensive farming and reliance on agrochemicals, maintains such activities. Such studies enhance participation in governance, management of efficient resources, and involvement in climate-smart agricultural technologies.

5. CONCLUSION

These issues among rice farmers in Braulio E. Dujali, Davao del Norte, are complex economic, environmental, social, and infrastructural problems. Based on the findings, it has been shown that problems of the government programs, lack of access to cheap loans, lack of infrastructure, and risks from natural calamities seriously affect how much a farmer can produce and bring home. The urgency to have comprehensive and appropriate solutions to such problems is very much in need to effectively address them. It is important to make it easier to obtain subsidized supplies and machinery, simplify government programs, and use climate-friendly farming methods in order to achieve sustainable farming productivity. Including gender-focused initiatives and programs for young people will boost participation and new ideas in the sector.

These specific actions will meet the different needs of rice farmers and help them face challenges and improve their lives. Progressing activities would involve investments in the physical and institutional infrastructures that would include irrigation systems, transportation networks, and storage facilities to reduce post-harvest losses and increase market access. Strengthening governance structures will also be necessary in order to facilitate better coordination among stakeholders and effective policy implementation. Interagency cooperation among governments, the private sector, and farming communities will be key in formulating sustainable and equitable approaches in the rice sector. This research further enhances the belief that, through the overcoming of systemic barriers and harnessing of local endowments, long-term resilience and productivity in the rice-farming industry can be assured. Indeed, an agricultural industry embracing a whole strategy with both economic, environmental, and social dimensions could contribute to the more affluent and sustainable futures of rice farmers in the Philippines.

6. RECOMMENDATIONS

1. **Economic and Financial Interventions**

   Strengthening the availability of cheap inputs like fertilizers and seeds while encouraging mechanization to decrease labor costs should be adopted in relieving economic pressures. Facilitating credit application and low-interest loans programs, which should be adapted to the special needs of smallholder farmers, are also to be considered in making finances accessible and sustainable.

2. **Policy and Institutional Reforms**

Streamlining government programs such as the National Rice Program (NRP) for the implementation of these interventions is critical in addressing inefficiencies and ensuring on-time delivery of subsidies and support. Participatory policy design should be prioritized for farmers and stakeholders to have a say in policymaking processes; interventions should therefore address real-world challenges, and equitably.

3. **Environmental and Climate Adaptation Strategies**

Investments in measures to reduce the risk of floods such as river bank rehabilitation, dredging and improved drainage should be included. There will also be climate-smart agriculture. Adaptive practices on IPM, crop diversification, and sustainable water management are good steps to assist the farmers to adapt to and mitigate impacts of climate change.

4. **Social and Cultural Interventions**

Gender-inclusive programs need to be developed so that women farmers have equal access to land, resources, and training; productivity and livelihoods can improve. Simultaneously, programs that attract the younger generation to agriculture by modern technology, entrepreneurship, and education need to be developed to deal with generational shifts and labor shortages in the sector.

5. **Infrastructure and Technological Innovations**

Upgrading irrigation systems, constructing farm-to-market roads, and establishing adequate storage facilities are essential to reducing post-harvest losses and improving market access. Poor road networks and inadequate electricity supply hinder rice productivity, making investments in rural infrastructure critical to enhancing farmers' efficiency and profitability. Efforts should also include expanding educational programs and improving access to reliable electricity to address broader systemic challenges.

Additionally, farmer-to-farmer extension programs are vital in areas with limited access to traditional extension systems. These programs utilize social networks to disseminate knowledge and promote the adoption of modern farming technologies, bridging resource gaps and enabling farmers to achieve higher productivity and competitiveness.

6. **Sustainability and Governance**

Land tenure security must be enhanced to spur investment in long-term productivity improvements. There is also a need for integrated governance frameworks that can facilitate collaboration between government agencies, local governments, and private stakeholders to ensure cohesive and sustained support for the rice farming sector.

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