



# Fostering Resilience: Assessing the Role of Green Public Procurement in Strengthening the Agricultural Sector at the Philippine Rice Research Institute

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**Abstract**— This study investigates how Green Public Procurement (GPP) can strengthen the resilience of the rice sector in the Philippines, highlighting sustainability - with the primary efforts of the Philippine Rice Research Institute (DA-PhilRice) being centered in the research. The Philippines, a major rice-producing country, has undergone several troubles and challenges in the mentioned commodity production such as environmental degradation, unpredictable weather patterns caused by climate change, and various social and economic susceptibility. GPP offers a strategic approach to addressing these issues by promoting agricultural practices that reduce negative environmental impact while supporting local economies. Through qualitative methods such as key informant interviews, field observations, and secondary data analysis, the study assesses how DA-PhilRice's GPP strategy—including sustainable farming techniques, pest management, and climate-resilient technologies—contributes to agricultural sustainability. It also highlights key challenges such as institutional barriers, market volatility, and resistance to innovation, while evaluating the broader market impacts of GPP on pricing and access for farmers. The research provides valuable insights for policymakers and stakeholders offering recommendations to improve GPP frameworks and strengthen the agricultural sector's resilience through enhanced sustainability practices and stakeholder engagement in the Philippines.

**Keywords**— agricultural resilience, environmental impact, Green Public Procurement, rice production, sustainable farming practices, sustainability

## I. INTRODUCTION

### Green Procurement and Sustainable Agriculture

Green Procurement (GP), particularly Green Public Procurement (GPP) when applied in the public sector, refers to the purchasing of goods, services, and works that reduce environmental impacts throughout their life cycle. It ensures that procurement decisions favor products that are eco-friendly and resource-efficient, thereby promoting sustainability (Philippine Green Public Procurement Roadmap Foreword, 2017). GPP ponders into environmental impacts to reduce ecological damage while

attaining the same functional needs, unlike the conventional procurement methods that center the procedure on cost-efficient practices.

Governments and other prominent market stakeholders are increasingly adopting GPP policies to drive sustainable consumption, which can influence production patterns to become eco-friendlier. By encouraging demand for sustainable goods and services, GPP helps shift market dynamics, pushing producers toward greener, more sustainable practices (Philippine Green Public Procurement Roadmap Policy Brief, 2017).

The role of GPP in the agricultural sector is "fundamental" or "substantial". It is a well-known fact that agriculture, as important as it is, is a major contributor to ecological degradation due to many factors like excessive usage of chemicals, resource abuse due to a particular need for volume, and synthetic alternatives. By promoting sustainable inputs such as organic fertilizers, water-saving technologies, and renewable energy, GPP can mitigate the negative impacts of farming (Bratt et al., 2013). These align well with achieving sustainability since they balance economic prosperity and environmental preservation.

Green procurement in agriculture not only reduces environmental harm but also supports long-term sustainability. This approach helps drive the transition toward a circular economy, where waste is minimized, and resources are reused or recycled. As such, green procurement supports the broader goals of sustainable development (Balaria, et al., 2017) by ensuring that economic activities today do not compromise future generations' ability to meet their own needs.

According to Bratt et al. (2013), green procurement fosters innovation by encouraging producers to adopt environmentally friendly technologies and practices. Walker et al. (2012) further emphasize that GPP can result in long-term cost savings by reducing resource consumption, minimizing energy usage, and diminishing waste produced. Also, Darnall et al. (2008) noted that green procurement policies can induce market transformation that provides an opportunity for a demand for sustainable products that inspires industries to switch to environmentally friendly practices.

When talking about rice farming, many problems are already encountered by the local farmers (Fronza, 2023) that disparege productivity both in farming practice and harvesting yield. Environmental and socio-economic challenges encountered by the rice industry in the Philippines are deforestation, soil erosion, climate change, and the predominance of smallholder farming (David, 2020). Many researches have shown that climate change, in particular, poses a significant risk to rice yields, necessitating the adoption of sustainable practices to ensure long-term resilience (Rosenzweig et al., 2014).

The Philippine Rice Research Institute is engaged in a vital role in fostering sustainable production of rice and advancing it through any means. Through research and the promotion of climate-resilient rice varieties and farming practices. The adoption of green procurement by DA-PhilRice can further strengthen its sustainability efforts and influence the entire rice value chain. By implementing green procurement practices, DA-PhilRice can reduce its environmental impact and encourage its suppliers to adopt

sustainable technologies, contributing to the resilience of the agricultural sector (DA-PhilRice, 2019).

By evaluating the overall potency of GPP initiatives, this study aims to give a valuable understanding of how this special type of procurement practices may impact the overall agriculture industry in the country. The problems are as follows:

1. Assess how GPP initiatives administered/adapted by the DA-PhilRice assist in strengthening agricultural sector resilience, especially in rice farming in the Philippines.
2. Point out challenges faced by the agency in the implementation/adaptation of GPP practices in the agricultural sector and evaluate how these deficiencies affect the resiliency efforts that have been made so far.
3. Explore the scope into which GPP practices of the agency stimulate sustainable agricultural efforts and practices.
4. Explore how GPP initiatives impact market behavior and market performance within the agricultural sector and its constituents.
5. Provide policy recommendations for enhancing the GPP system/framework and its associated strategies at both micro and macro levels in assisting the resilience-building efforts of the agricultural sector.

## II. METHODOLOGY

A qualitative approach was applied in the research to value the efforts of GPP initiatives towards agricultural resilience. Programs from DA-PhilRice were the focus of this study. The research paper begins with a comprehensive literature review in which the basis or source comes from academic data, government reports, and various documents focusing on the GPP practices in sustainable agriculture. This features pest control and waste management that utilizes sustainable farming techniques and climate-resilient technologies.

All Project Managers, researchers, and farmers participating in GPP programs were interviewed through a key informant interview (KII) to share practical insights into the types of challenges and benefits that these programs bring. Field observations were also done in the rice fields being managed by DA-PhilRice during the period of the study on the different changes in the physical farming practices regarding water usage, soil health, and pest control. Secondary data analysis from already existing reports on GPP and rice production complemented the findings.

Thematic analysis was done on the interview and observational data gathered, extracting relevant themes such as farmer perceptions, institutional barriers, and cultural factors that influence sustainable practices. Triangulation is

a means of establishing validity through the comparison of literature with interviews and field observation data sources. Informed consent and confidentiality would be observed in all participants. This methodology combines data sources into a strong assessment of GPP on agricultural resilience.

### III. RESULTS AND DISCUSSIONS

#### 1. Evaluating the Contribution of GPP Initiatives to Agricultural Resilience

##### 1.1. Waste Management Projects

###### 1.1.1. Alternate Wetting and Drying (AWD) Technique

Alternative Wetting and Drying (AWD) is a method used for rice farming that involves irregularly drying the fields instead of the usual practice of continuously flooding them. This not only conserves the usage of water up to 30% but also produces a result of decreased emission of methane, thus providing a vital role in environmental sustainability. DA-PhilRice adapts the AWD system thoroughly through detailed training on the involved farmers and farm demonstrations which enhances their overall understanding and application of the said technique.

###### 1.1.2. Rice-Specific Weather Forecasting Tools

Weather forecasting also plays a huge role in agriculture. In this regard, DA-PhilRice developed a tool to make this possible, which is specially tailored to rice farming and enables farmers to respond accordingly to weather changes and optimize their resources such as the usage of irrigation/water. This is implemented through various features such as mobile apps and extension services. An example of such a mobile app is the "Rice Crop Manager" which provides irrigation advice based on weather forecasts and assists farmers in setting water usage to a conservative amount and increasing resilience against drought.

##### 1.2. Development of Pest-Resistant Rice Varieties

###### 1.2.1. Golden Rice Project

"Golden Rice", is a variety of rice that is genetically modified to address shortcomings such as Vitamin A deficiency and resistance to usual pests. The agency conducted field trials and various efforts to assure the safety and effectiveness of the mentioned variety. This innovation is of great assistance to farmers since it also, in turn, reduces the need for pesticides, enhances the resilience of crops, and supports food security.

###### 1.2.2. NSIC Rc222 (Tubigan 18) Variety

Another variety to be included is the NSIC Rc222. This variety of rice is a high-yielding, pest-resistant rice variety developed by the agency. From the aforementioned characteristics, it is an undeniable fact that farmers greatly

benefit from higher yield numbers and reduced costs due to reduced pesticide use which ultimately leads to lower environmental harm. The agency facilitated the widespread adoption of the variety through large-scale seed distribution and training programs.

##### 1.3. Sustainable Farming Techniques

###### 1.3.1. Organic Fertilizer Use

Modern agriculture gives special emphasis on resourcefulness through different means. One of these means is the use of biodegradable agricultural waste and residues as an agent of a utilizable organic fertilizer which can enhance the fertility of the soil, better water retention, and improve the structure of the land. DA-PhilRice promotes the usage of such fertilizers which may foster sustainability in agriculture for a considerable length of time while also reducing farmer's dependence on chemical alternatives.

Also, DA-PhilRice encourages composting as an essential to sustainable rice farming and actually has a program called the "Palayamanan" system where rice farmers are suggested to use composted residues that results in better soil fertility (richer), water retention, and also provide necessary nutrients for strengthening and enhancing crop growth.

Aside from such adapted practices by the institution, trainings are also implemented to further enhance farmer's knowledge and expertise in sustainable farming.

###### 1.3.2. Integrated Pest Management (IPM)

DA-PhilRice places special emphasis on Integrated Pest Management (IPM) through different educational programs and initiatives that target the improvement of the rice production of farmers. Farmer Field Schools (FFS), which are somehow similar to Farm Business Schools (FBS) have proven to have of significant impact when it comes to knowledge and skills enhancement, particularly in the topic of pest and disease management. Participants decided to adopt the taught methods and strategies from the said program such as reducing dependence on chemical pesticides which highlights the use of natural alternatives instead.

The Rice Competitiveness Enhancement Fund (RCEF) training lectures and courses also highlight environment-friendly approaches that encourages the use of pest-resistant rice varieties.

All of these community-based efforts resulted in many important changes that improved pest management among farmers.

##### 1.4. Climate-Resilient Technologies

###### 1.4.1. Stress-Tolerant Rice for Africa and South Asia (STRASA) Project

The Stress-Tolerant Rice for Africa and South Asia (STRASA) project, a rice variety that can withstand events such as drought and flooding, is a resilient rice variety that is handled by the International Rice Research Institute (IRRI) together with the Philippine Rice Research Institute (DA-PhilRice). The project centers on ensuring these adaptive varieties provide the expected performance in varying conditions through extensive trials. This project aims to help farmers adapt to rapidly changing climate conditions that significantly affect agriculture which in turn enhances food production capability in vulnerable regions thus, securing farmers' income and food sources.

**2. Barriers and Challenges Faced by DA-PhilRice in Implementing GPP Strategies**

**2.1 Institutional Barriers**

**2.1.1. Lack of Funding**

DA-PhilRice relies on national funding to carry out its respective mandates. Constraints in securing adequate funding despite the agency's efforts to do so, can significantly affect its outputs negatively in Research and Development (R&D). This includes funding for pest-resistance projects on a multi-year scale - which may force the agency's researchers to either downsize the project's development and goals or cast aside the project resulting in a jeopardized rice production potential breakthrough.

**2.1.2. Bureaucratic Red Tape**

Bureaucratic procedures are part of every organization's framework of operations. Being vital as it is, it still hinders the punctuality of response to immediate agricultural challenges. This can provide inefficiency especially to prompt needs in rice farming. An example of this is when a new and promising rice variety has emerged, the variety still needs to undergo a process of multiple approvals before being deployed. Although this is essential to ensure its potential and safety, unnecessary administrative processes can be trimmed down just to the important ones so the deployment can be hateful as possible.

**2.1.3. Insufficient Training**

Knowledgeable staff with real expertise is the backbone of any organization and one contributing factor to this is exposing them to necessary training and seminars. Being limited to this, DA-PhilRice personnel are deprived of being equipped with the latest knowledge in technologies and various methodologies. This can affect the overall productivity and efficiency of the agency, especially on the side of R&D activities.

**2.2 External Barriers**

**2.2.1. Market Volatility**

One factor that is uncontrollable on the side of the agency is

the global price fluctuations of rice. This fluctuation can provide constraints in developing and implementing research necessities that may help the stakeholders. This is due to price drops having a significant effect on rice programs and R&D funding, which in turn impacts the focus on GPP strategies as well. This will also affect the long-term sustainability of rice farming in the nation.

**2.2.2. Climate Change Impacts**

Climate change proves to be a challenge, especially in the agriculture sector. Rapidly changing weather and unpredictability in its pattern may induce the risk of different pests and diseases and can also result in a deviation in sustainable farming practices. To possibly diminish its effect, the agency should also provide emphasis on research efforts regarding this which will require more resources to be depleted.

**2.2.3. Resistance from Traditional Practices**

Cultural or traditional embracement is often a thing for many societies and communities and this includes farmers. They usually deviate from adapting new techniques, despite their known benefits and advantages compared to traditional ways. This is possibly caused by various reasons such as a lack of awareness or readiness (Subia, Jocson & Florencondia, 2019), or simply just rejecting the idea of the technology entirely due to distrust. The agency should be proactive in engaging educational programs such as training and dissemination of information materials explaining the benefits and advantages of adopting these new technologies. Overcoming this ordeal is highly crucial in ensuring that GPP practices are widely accepted and adapted in the future.

**3. Promoting Sustainable Agricultural Practices through Green Public Procurement**

**3.1. Resource Conservation**

Initiative	Approach	Impact
Water-Saving Technologies	PhilRice emphasizes the procurement of technologies that save water such as drip irrigation and the AWD technique.	Incorporating strategies such as the GPP approach provides the rice farmers with the idea of how to reduce usage of water thus applying the technique in their practices. As aforementioned, the practice decreases the usage by up to 30% when compared to the traditional method of continuously flooding fields which improves



		resource efficiency, supports resilience against droughts, and cuts significant costs.
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DA-PhilRice gave priority to the adaptation of technologies that reduce water usage such as drip irrigation and the AWD system. As explained before, the process of AWD is the irregular drying of fields in between irrigation schedules/cycles instead of the usual practice of continuously flooding them. So far, the results have been promising and by including this under the GPP, DA-PhilRice can promote the continuous reduction in water consumption. The practice has several benefits such as saving a significant number of resources (e.g. water and energy for irrigation use) and supporting resilience against droughts which makes it in line with sustainable agricultural practices.

**3.2. Chemical Inputs Reduction**

Initiative	Approach	Impact
Integrated Pest Management (IPM)	IPM ideas and techniques are adapted by DA-PhilRice in procuring pest control maintenance such as biological alternatives, pheromone traps, and resistant crop varieties. This is to promote the use of natural methods instead of chemical ones.	DA-PhilRice supports rice farmers by implementing the IPM approach through GPP. This generally reduces hazards in the environment and the use of natural alternatives eliminates the health hazards that chemical solutions may possibly pose. This practice also provides solutions such as better soil health and lower costs of production which is highly beneficial for farmers.

DA-PhilRice has adapted IPM principles and incorporated them into their procurement standards such as procuring biological alternatives to reduce or totally remove dependence on chemical ones, pheromone traps, and a resistant variety of different crops. Through GPP and by educating farmers and all related stakeholders, the agency can encourage them to adapt the practices, reducing both environmental and health hazards that chemical pesticides may pose. Also, this practice may promote better soil health

and lower production costs in the future.

**3.3. Environmentally Friendly Techniques**

Initiative	Approach	Impact
Agroforestry Systems	DA-PhilRice promotes and involves agroforestry in their procurement policies which fosters a variety of cropping systems (e.g. intercropping, integrated, etc.) which strengthens biodiversity and soil health, and isolates carbon.	Using agroforestry through GPP practices, the agency assists farmers promote a mixed source of income with timber and non-timber products. Agroforestry also assists in diminishing climate change's impact on agriculture by isolating carbon dioxide, which may help in sustaining ease of land management and ecological resilience.
no-till Farming	DA-PhilRice promotes the use of a method called "no-till farming" in agriculture through their procurement policies which support practices that reduce or avoid soil erosion, strengthen soil health, and also conserve energy, and reduce labor needs that lead to cutting-down costs.	Through incentivizing the practice of no-till farming through GPP, the agency improves the soil fertility in the fields and the productivity as well, reducing the need for additional labor and fuel. This supports the conservation of biodiversity and sustainable agricultural practices.

DA-PhilRice involves agroforestry in their procurement policies which fosters a variety of cropping systems such as intercropping and integrated cropping that not only show a strong illustration of biodiversity but also help in improving soil health, and sequester carbon. The agency's use of agroforestry adaptation through GPP practices assists the farmers in having mixed timber and non-timber products as their source of income.

DA-PhilRice also promotes the use of *no-till farming* in agriculture through its procurement policies. The practice minimizes or eliminates soil erosion possibilities, thus strengthening soil health, and also reduces the use of energy and labor. This incentivized practice under GPP supports the conservation of biodiversity and sustainable agricultural practices.

#### **4. Influence of Green Public Procurement on Market Dynamics**

##### **4.1. Procurement Processes**

The procurement policies of DA-PhilRice are in accordance with Green Public Procurement (GPP) principles, which therefore promotes viable agricultural inputs. This further reaches to even sourcing different materials/equipment such as laboratory equipment and apparatus, appliances like Energy Star-rated freezers, and air conditioners. By incorporating the practice of GPP throughout the operations, the agency supports sustainability in both administrative and research functions.

##### **4.2. Pricing Mechanisms**

The GPP practices of DA-PhilRice create a demand from concerned suppliers thus, affecting the prices that are offered in the procurement/bidding efforts of the agency. This forms a competitive pricing standard for the agency's suppliers which will be beneficial to the agency in the long run. For example, often putting a procurement request for a pest-resistant varieties for various crops creates a steady market demand. This will be beneficial to farmers due to the fact that more competition will further reduce costs and also, and sustainable agricultural products are often marked as premium products, thus attaching premium prices which will ultimately result in an increased profitability on the side of the farmers and incentivize eco-friendly practices.

##### **4.3. Market Access for Small-Scale Farmers**

The GPP program of DA-PhilRice helps farmers gain access to larger or better markets through methods like partnership and fair-trade certifications. There are specific market segments or niche markets that emphasize the demand for organically-grown food products which are willing to pay premium prices to avail some. The initiative greatly assists in helping farmers build a steady income source over periods.

To summarize, the agency's GPP practices give a focal point to sustainability, promote innovation, and provide better economic opportunities for farmers, which provides the Philippines with a more sustainable agricultural sector.

#### **5. Policy Recommendations for Improving GPP Frameworks and Strategies**

##### **5.1 Improving GPP Frameworks**

The DA-PhilRice might want to adapt existing GPP policies and practices which are already refined and may provide a more comprehensive sustainability criterion that is beyond just environmental impacts (e.g. social and economic factors) such as GPP benchmarks from international models like Sweden and Netherlands. These countries' GPP models or frameworks highlight clear criteria for sustainability and meticulous evaluations. Ensuring that the procurement staff/personnel and stakeholders are equipped with the right capacity-building initiatives paves the way to an effective GPP implementation across one organization, enhancing transparency and accountability within the processes of the procurement.

##### **5.2 National-Level Strategies**

DA-PhilRice is a renowned attached agency of the Department of Agriculture and with its reputation, the agency can advocate for policies that center on GPP application across the agricultural sector at a national level. Such advocacies may include eco-friendly agricultural inputs, tax incentives for businesses with strict GPP compliance, and generally, a well-built regulatory framework mandating GPP in government/public procurement. These mentioned strategies can induce a condition that enables sustainable and economically viable practices which develops innovation while making the associated sustainable agricultural technologies cheaper and more affordable even for farmers.

##### **5.3 Stakeholder Engagement**

In the end, the key to successful and widespread GPP execution comes down to enticing stakeholders such as farmers, NGOs, businesses, and even the private sector to adopt the GPP framework. To make this possible, the agency can establish forums and consultations that give a chance to the concerned parties to integrate their decisions and perspectives into procurement decisions. This can ensure that the sustainable practices being promoted by the agency are viable and practical on the side of the other party. Also, capacity-building efforts that center on educating farmers about the benefits of adapting GPP and then training them to adopt sustainable practices are vital in incorporating this scheme. For other stakeholders such as NGOs, the private sector, and other businesses, beneficial collaborations and joint initiatives that promote sustainable procurement can be arranged.

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