Rice Production in Davao Region: A Time Series Model

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ABSTRACT

This study generates trend analysis on the data of rice production and farm gate price, insights on the initiatives to address issues on rice production and farm gate price and relevance of the quantitative data and initiatives. This paper employed the five-tier model of the Theory of Needs by Abraham Maslow which solidifies the urgency of analyzing trends in rice production and farm gate prices to gauge their implication for the food security of humans (Mcleod, 2020). As such, this study utilized a mixed method of quantitative and qualitative design. Trend analysis and moving average were used for the quantitative aspect while content analysis and systems synthesis for the qualitative part. This study did not require any interviews because it used secondary data from open-source statistics. Findings show that rice production and farm gate prices seemed to be affected following the Rice Tariffication Law (RTL) passage. Following the deregulation, rice imports have significantly increased, resulting in the prices at the farm gate declining (Briones, 2019). Moreover, the communal irrigation initiative for the Davao Region should also be examined for the decrease in rice production during the 13th (January-March 2020) and 17th (January-March 2021) caused by the periodic dry season of rice. As this study focuses on a regional scope, the researchers recommend future researchers conduct national studies on a broader spectrum, to examine government actions on rice production and farm gate prices, and to provide a nationally appropriate hypothesis. Other techniques may also be used by future researchers such as in-depth interviews with farmers providing a more comprehensive view of the data and evaluating the impact of government efforts.

Keywords: rice production, farm gate price, initiatives, Davao Region, Philippines

INTRODUCTION

Rice is essential for food security for more than half of the global population. Roughly half of the inhabitants get their sustenance from the rice crop (Mohidem et al., 2022). 90% of the world's rice is refined and produced in Asia. But, throughout the rice-growing continents of Asia, Africa, and South America, 400 million people typically suffer from starvation (Riaz & Zaman, 2021).

The Philippines passed the Rice Tariffication Law in March 2019 to modify the laws governing rice imports. It has drastically changed the policy environment affecting the rice business and spurred heated debates about how it will affect food security and poverty (Balié, Minot, & Valera, 2021). The role of law is crucial for agricultural productivity because it provides farmers with a safe, legal environment to grow their products

(Ropong'o, 2018). Rice production and price alterations are two central elements that harm farmers (Salam et al., 2019). The decline in rice prices has led Filipino farmers to experience price collapse and have to live with absurdly low prices (Scientia, 2020). The poverty and food security for families are influenced by rice farmers' capacity to meet their nutritional demands in proportion to their income from growing rice (Rajindra et al., 2021).

Davao Region, in particular, is situated near the Davao Gulf in the southeasterly part of the island of Mindanao, where the islands of Agusan del Sur, Surigao del Sur, and Bukidnon make up its northern border, and the East and west borders are shared by the Philippine Sea and the provinces of Central Mindanao respectively, (Agri Info Davao, 2022) agriculture considerably impact Regions' economic and long-term sustainability (NEDA XI, 2020). On November 17, 2021, during a 4th quarter meeting via zoom, the Regional Land Use Committee XI addressed concerns regarding agricultural lands in the Davao Region and jurisdictions on various land control agencies. Engr. Mercado, in his report to Regional Land Use Committee (RLUC) XI that Davao Region still imports rice to cover its basic needs because its production is just 4.54 MT/ha and its sufficiency is only 53% (Yparraguirre, 2021).

The interest of each stakeholder takes hold of how efficiently the food and agriculture system functions. The inefficiencies make it more challenging to provide food security, and these drive up food costs and risk the livelihood of smallholder farmers (Hualda, 2022). The Department of Agriculture and other government organizations responsible for strengthening the agricultural industry and guaranteeing food security and safety have made substantial efforts and yet, continue to fall short (Galang, 2022).

Thus, government initiatives and development programs should collaborate to assist farmers in producing grains more sustainably, implementing environmentally conscious projects, improving their quality of life, and supporting rural development at the local and regional level. Policy development and implementation are critical. Putting a policy into practice, governments should be able to make thorough plans for it and continuously improve those that have already been implemented (Connor et al., 2021; Gassner et al., 2019; Barbosa, 2024).

The researchers undertook this study because there is no study of this kind at UM Panabo College and since the vast majority of farmers in developing countries are smallholders, less is understood about the relationship between rice production and farm gate prices (Smith et al., 2023). The objectives of this study are to generate trend analysis on the data of rice production and farm gate price, generate insights on the initiatives to address issues on rice production and farm gate price and generate relevance of the quantitative data and initiatives.

The findings of this study will provide the government, the different agencies and the people with the knowledge that rice is a staple food and the production of rice is a key source of employment and income. Despite that, farmers are still among the poorest and underprivileged members of society. Therefore, all relevant parties must cooperate and engage in collaborative research and development to integrate policies and programs to ensure the production of rice and farm gate prices above what the market otherwise would have offered.

METHODS

Dataset

This study utilized secondary data through open-source statistics on rice production and farm gate prices provided by the Philippine Statistics Authority. The Philippine Statistics Authority has the fundamental duty of carrying out the provisions and goals of R.A. 10625, R.A 11055, and R.A 11315. Its main mandate includes the construction of national accounts, the consolidation of some administrative recording systems, all national

censuses and surveys, sectoral statistics, community-based statistics, and other related activities (PSA, 2022a).

On the other hand, the list of initiatives and programs was gathered from the website of the Department of Agriculture, the main development organization of the Davao Region. It was in charge of fostering agricultural development by offering the regulatory framework, financial assistance, and other services required. As Petrović et al. (2022) declare, open government data promotes transparency and the development of better and more comprehensive solutions, while also allowing other stakeholders to acquire additional information and derive value from it. Hence, open data is important not only at the corporate or national level but also as a determining driver for the emergence of a more democratic society (Hengl et al., 2018).

Materials and Instruments

The use of interviews or surveys of any kind is no longer necessary for this study because secondary data is used as an alternative in collecting information. This is associated with the study of (Martins et al., 2018) that fetching relevant information has become easier with secondary data usage in research and should be adopted more often. This expedited research without compromising its validity or efficacy.

Design and Procedure

The researcher used a mixed method of quantitative and qualitative research designs in this study. Shorten, and Smith (2017) utters that a mixed-method approach to research involves collecting and examining quantitative and qualitative data regarding a single study. This research employed an explanatory sequential mixed method design which starts with obtaining and analyzing quantitative data to support the quantitative findings of the first phase and concludes with designing the qualitative part of the second phase based on the quantitative findings (Dawadi et al., 2021).

The time series model was also applied. The time series model is an analytical technique for identifying chronological dimensions in the data and highlighting important figures and associated patterns (Xu, 2021). The underlying natural behavior, the pattern of change over time, or the results of an intended or inadvertent intervention by using time series analysis was discerned.

In the **quantitative aspect,** trend analysis was devised first. It allows for comparing data points across a set period (Coresignal, 2022). Following was the moving average, which was used to determine the study's upward and downward trend. Salkind (2022) disclosed that when scores drop below the moving average or rise above the moving average, a long-term moving average may be used to predict probable trouble or improvement in the data.

As for the **qualitative component,** researchers utilized content analysis which quantifies the frequency of particular words, sentences, themes, or notions (Lou, 2022). Lastly, a synthesis involves merging new data with previously conducted problem-specific research. Combining these findings, synthesis strives to refine generality and applicability while generating new knowledge (Wyborn et al., 2018).

RESULTS AND DISCUSSION

Generate Trend Analysis on the Data of Rice Production and Farm Gate Price

The highest volume of rice yielded based on Figure 1 happened in Q3(July-September 2018), with a total production of 150,425 metric tons with the largest harvested area of 32,009 (ha) and a yield of 4.70 yield/hectare. On the other hand, the lowest volume of rice yielded occurred during Q2 (April-June 2017), which had a total production of 74, 890 metric tons with the smallest harvested area of 19,276 (ha) and the

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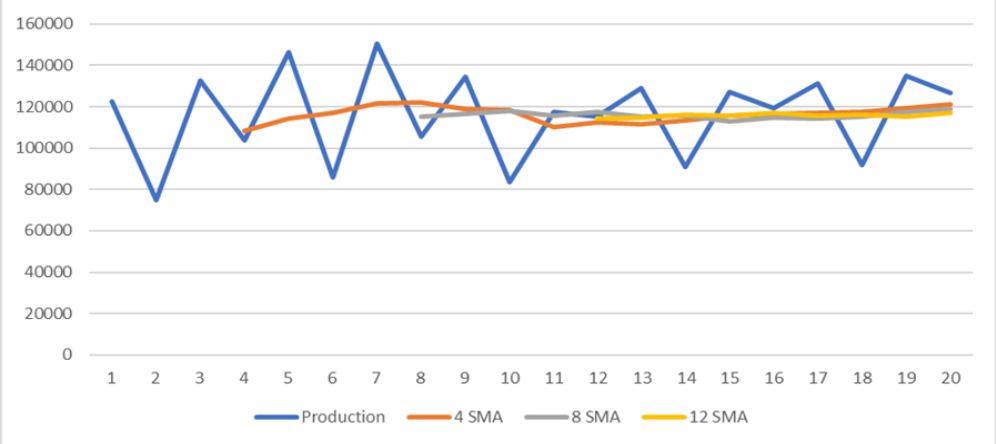
lowest yield of 3.89 yield/hectare.

In addition, the seasonality variation of both the highest and lowest production was observed. The Philippine Rice Research Institute in Agusan (PhilRice-Agusan), which includes Regions: 10, 11, and 13, discussed that the dry season begins in January and ends in June, while the wet season begins in July and ends in December (Lopez, 2022). It can be seen that the highest production transpired during the wet season while the lowest during the dry season. This suggests that seasonality can also immediately impact production activity (Priyadi et al., 2020).

The government plays a major role in rice production and distribution to guarantee that consumers always have enough and a steady supply at reasonable prices and that rice farmers will receive an appropriate return (Cororaton & Corong, 2023). Consonantly, the function of the government and regulatory agency is essential to boost output and achieve national rice self-sufficiency (Cornejo & Cornejo, 2022).

Figure 1. Rice Production in Davao Region



Moving on, Figure 2. shows the moving average (M.A.) of rice production in the Davao Region. Longer-term moving average intervals are seen to be more reliable trend indicators and less susceptible to momentary changes (Maverick, 2021). The trend began to move by Q4 (October-December 2017) until Q4 (October-December 2021). The number of productions fell below the (M.A.) two times (highlighted in red) and rose above the (M.A.) three times (highlighted in green). The uptrends began on the 12th (October-December 2019), 15th (July-September 2020), and 19th (July-September 2021).

As previously mentioned, Republic Act No. 11203 also known as the Rice Tariffication Law of 2019 created the Rice Competitiveness Enhancement Fund (RCEF) financed by the tariff income ranging from 35 to 40 percent, which removes the quantitative restrictions on imported rice. To support farmers, the collected tariff incomes were used as funding for RCEF, which aimed to increase rice productivity, lower production costs, direct financial aid, titling of agricultural rice fields, crop insurance program, and crop diversification to connect farmers to the value chain (NEDA, 2022).

In contrast, the downtrend began on the 13th (January-March 2020) and 17th (January-March 2021). As Devcic (2021) put forward, whenever the volume of production falls below the forecasts, it implies that the initiatives undertaken are insufficient or ineffective. Inversely, when the volume of production goes beyond the forecasted figures, it implies the effectiveness of the steps undertaken to food sufficiency. With this, the data demonstrate a correlation between rice production and initiatives.

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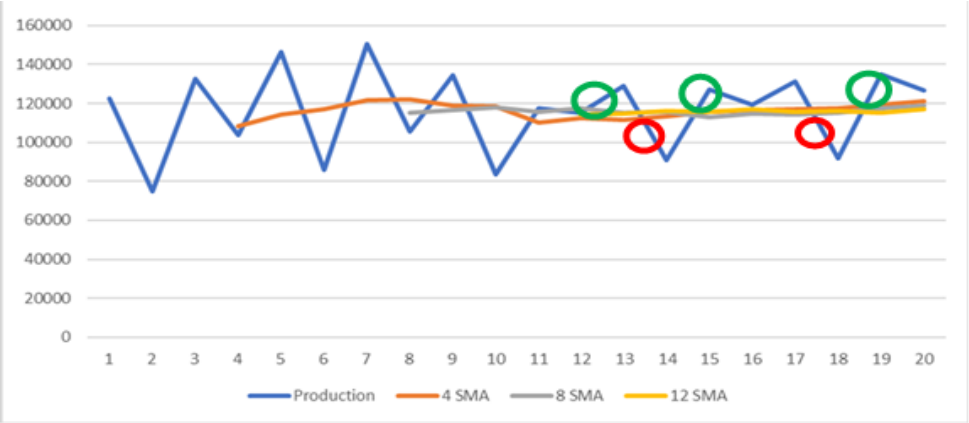
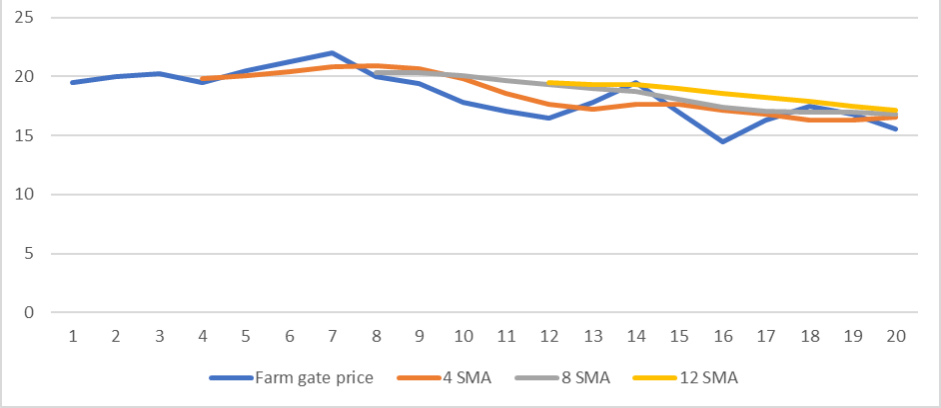
Figure 2. Moving Average of Rice Production in the Davao Region



Moving forward, the highest recorded farm gate price based on Figure 3. occurred during Q3 (July-September 2018) with 22.02 pesos per kilogram. On the contrary, the lowest farm gate price recorded was in Q4 (October-December 2020). Presidential Decree No. 1770, dated January 14, 1981, mandated the National Food Authority to foster the integrated growth and development of the agriculture industry, maintain food security in staple crops, and stabilize supply and pricing at the farm gate and consumer levels (COA, 2023).

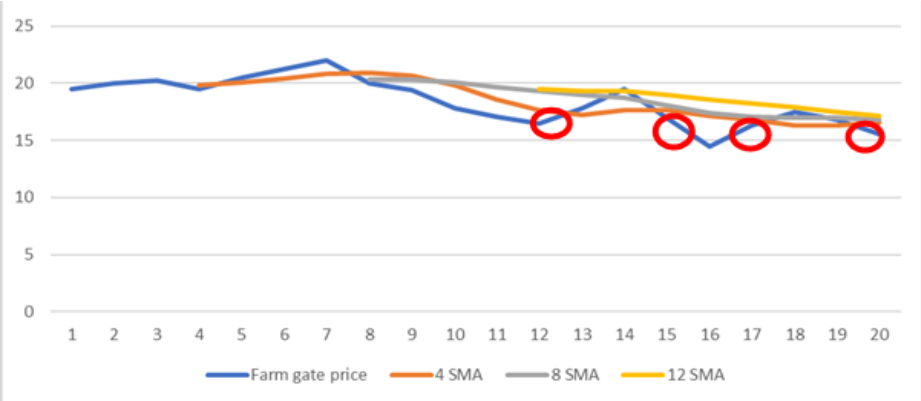
Given that rice is a major agricultural product and a staple food on every Filipino table, it is also a highly political good in the Philippines. Price policies are crucial tools to boost output, reduce farmer risks and keep consumer prices stable to support food self-sufficiency and provide substantial earnings for farmers. For this reason, it is critical to keep rice prices steady (Tobias, 2023; Bhattarai & GC, 2020; Santos et al., 2018).

Figure 3. Farm gate price in Davao Region



Lastly, Figure 4. shows the moving average (M.A.) of farm gate prices in the Davao Region. The trend began to move by Q4 (October-December 2017) until Q4 (October-December 2021). The farm gate price fell below the M.A. four times (highlighted in red), beginning 12th (October-December 2019), 15th (July-September 2020), 17th (January-March 2021), and 19th (July-September 2021) which implies that the farm gate price continues to decline. Quantitative restrictions (Q.R.) have long been employed by the Philippine government for rice prices to increase due to limits on rice imports (Balie & Valera, 2020). However, the passing of the Rice Tariffication Law (RTL) impacted domestic farmers. Thus, imported rice lowers farm gate prices and farmers' income (Ocampo & Pobre, 2021).

Figure 4. Moving Average of Farm gate price in the Davao Region



Generate Insights on the Initiatives to Address Issues on Rice Production and Farm Gate Prices

The researchers have identified seven major themes after analyzing the contents of the initiatives gathered from the period 2010-2022. These initiatives are confined within the borders of the Davao Region. The initiatives are coming from the Department of Agriculture with co-agency of the Department of Public Works and Highways and Land Bank of the Philippines. The followings are the areas where initiatives are put into effect: Sulop, Davao Del Sur; Mati, Davao Oriental; Asuncion, Davao del Norte; Magsaysay, Davao del Sur; New Corella, Davao del Norte; Lupon, Davao Oriental; Compostela and Nabunturan, Davao de Oro.

Table 1. Themes of Initiatives and Programs for Rice Production

Major Themes	**Core Ideas**
Communal Irrigation System	Construction of communal irrigation
Farm Mechanization	Machinery and equipment
Organic Farming	Organic rice farming
Credit	Loans; financial assistance
Infrastructure	Post-harvest facility
Transportation Infrastructure	Farm-to-market roads
Hybrid Rice Farming	Seeds and fertilizers

1. **Communal Irrigation System**

The National Irrigation Administration (NIA) constructs communal irrigation systems (CIS) with proposals from farmers who directly benefit from the project. These irrigations are managed and maintained through the Irrigator's Associations (I.A.s). Particularly between 1995 and 2010, the government significantly increased its investments in the CIS. It can operate on either a pump system which elevates water through mechanical action, or a gravity system, where a dam or a weir raises the water level and flows by gravity (Luyun & Elazegui, 2021). To boost rice production in the Davao Region, the Department of Agriculture under the Mindanao Rural Development Program carried out communal irrigation projects (CIPs) at Sulop, Davao del Sur:

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> *…The MRDP is also supporting the construction of a couple of communal irrigation projects (CIPs), with a total service area of 800 hectares. Director. Oscar Mandalope, president of Sulop Irrigators' Association Inc., said they badly need an irrigation system, as their farms are mostly rainfed…*

Communal irrigation systems, which use effective water management methods, can considerably increase yield. The majority of farmers in the communal irrigation area of operation are smallholder farmers (IFAD, 2023). A service area for communal irrigation systems is less than 1,000 hectares. In the cost recovery agreement, Irrigator's Associations (I.A.s) are granted control over the maintenance once the project is finished. Farmers amortize the invoiced cost for a maximum of 50 years at 0% interest (PSA, 2022b). This communal irrigation project which involves fewer agricultural operations marks a turning point for contemporary farming. Regardless of the season, a sufficient yield is guaranteed since it provides the crops with enough water.

2. Farm Mechanization

Mechanization is a crucial component in the production of agricultural crops. Increasing the energy supply to agriculture enables more tasks to be completed on time and more lands to be farmed while protecting natural resources. By utilizing modern and environmentally friendly technologies, farmers can produce crops with greater efficacy while using less energy (FAO, 2023a). These farm types of machinery and equipment can improve farmers' quality of life and increase productivity. The Department of Agriculture through Philippine Center for Post-harvest Development and Mechanization (PhilMech) spearheaded the program on farm mechanization at Mati, Davao Oriental:

> *… The Department of Agriculture (DA), through the Philippine Center for Post-harvest Development and Mechanization (PhilMech), has turned over agricultural machineries to 18 farmer cooperatives and associations in the province of Davao Oriental. Implemented as part of the Rice Competitiveness Enhancement Fund (RCEF) of the provincial government, the farm machineries and equipment distributed, amounting to a total of P72.2 million, include 29 FCAs, 19 four-wheel tractors, 26 hand tractors, 55 floating tillers, 2 precision seeders, 7 walk behind transplanters, 7 riding type transplanters, 2 reapers, 10 combine harvesters, and a mobile rice mill…*

Department of Agriculture XI Regional Director Abel James Monteagudo professes that the purpose of mechanization is to increase efficiency and reduce production costs so that farmers can do their jobs with greater effectivity while producing rice and other agricultural products with the intent of reaching food sufficiency (Fernandez, 2023). Equally, mechanization encourages the expansion of sustainable agriculture and ultimately food security with the aid of agricultural equipment (Emami et al., 2018). The level of mechanization has a substantial impact on cost, production value, and income, all of which positively affect rural redevelopment (Peng et al., 2022).

3. Organic Farming

This comprised all farming methods that helped produce food in a useful, economically viable, and generally acceptable way. This method decreased farm input costs, improved soil fertility, and biodiversity, lessened pollution and environmental degradation, and prevents future loss of natural resources and the welfare of farmers and consumers (DA, 2023b). To mitigate the negative effects of commercial and intensive cultivation, organic farming initiatives promote sustainable agriculture (Digal & Placencia, 2019). Accordingly, the Department of Agriculture enacted the program under the Organic Rice Production Enhancement Program (ORPEP) at Asuncion, Davao del Norte:

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> *... The rice farmers here strengthened the goal of rice self-sufficiency in Davao region as most of them converted into organic rice farming. In 2013, the town was granted a P2 million worth of special project dubbed as Organic Rice Production Enhancement Program (ORPEP) by the Department of Agriculture (DA) 11 under the Grassroots Participatory Budgeting Process (GPBP). The project aims to gradually convert conventional rice farmers to organic farmers within a period of three years where they will be prohibited to use insecticide…*

Mayor Joseph Nilo Fareñas set forth that, the program had a positive economic and environmental impact on the city. Compared to the traditional method where farmers used a lot of fertilizers and pesticides. Organic farming minimizes the number of toxins that infiltrate rivers and lands that could harm locals (Department of Agriculture [DA], 2023c). Organic agriculture combines custom, innovation, and research to enrich everyone's quality of life, the environment as a whole, and equitable relationships (Bureau of Agriculture and Fisheries Standards [BAFS], 2021). This method makes greater use of the environment to boost agricultural output by eliminating the usage of chemical-based fertilizers and pesticides.

4. Credit

Given that most small Filipino farmers and rural households rely on food farming for their consumption and income, government support is crucial to encourage domestic production or self-sufficiency. Addressing poverty and food insecurity while also providing a critical component to long-term economic stability (BARMM, 2023). Financial support is provided to qualifying rice farmers as compensation for the anticipated reduction or loss of agricultural revenue (DA, 2023d). The Department of Agriculture along with the Land Bank of the Philippines enact the program at Magsaysay, Davao del Sur:

> *... Agrarian Reform Beneficiaries Organizations (ARBOs) signed loan documents to access loans from the Land Bank of the Philippines (LBP). Dalawinon Farmers Multi-Purpose Cooperative of Poblacion, Magsaysay, Davao del Sur with 144 ARB members Dalawinon Farmers MPC getting Php9 Million as working capital for its palay trading project. This intends to provide credit assistance to projects of ARBs in both Agrarian Reform and non-Agrarian Reform Communities....*

The purpose of the agricultural financing program is to boost the competitiveness of the target beneficiaries or sectors, mainly smallholder farmers. Provide credit to farmers, their cooperatives, organizations, and micro businesses so that they can become more productive Land Bank (Land Bank of the Philippines [LBP], 2018). This cash assistance helps farmers meet their financial needs especially, in times of health crisis (Department of Agrarian Reform [DAR], 2020). Also, provides aid to the rice farmers in securing farm inputs such as fertilizer and oil farm machinery (Tecson, 2022).

5. Infrastructure

There are usually two main planting seasons in the Philippines: the wet and dry seasons (Gutierrez et al., 2019). Given the situation, DA Regional Executive Director Crispulo Bautista Jr. argues that it is essential to maintain the quality of agricultural products and always ensure an adequate supply to meet the needs. Post-harvest facilities like cold storage, drying, and milling are necessary (PIA, 2022). The Department of Agriculture executed the intervention under the Mindanao Rural Development Program (MRDP) at New Corella, Davao del Norte:

> *...Aside from inadequate milling facilities, lack of other postharvest facility such as thresher also affected quality of their produce. To address the need for adequate post-harvest facilities,*

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NECOMASFA sought the assistance of the Department of Agriculture (DA) The DA endorsed their proposal to the Mindanao Rural Development Program (MRDP) and access funds worth P500,000…

DA Regional Director Remeleyn Recoter expressed that; post-harvest facilities are among the top projects. This is done to help small farmers increase their output and income. Aside from lowering losses and raising crop quality and yield, adequate postharvest facilities would assist farmers in starting their own farm-level value-added processing operations (DA, 2014). 2nd District Engineer Ulysses Llado attests that this would help manage and store produced rice effectively. By allowing farmers access to post-harvest facilities, the city's economic stability would increase (Datu, 2022). This will prevent harvest from spoiling and stop rice prices from dropping, especially during the wet or rainy season.

6. Transportation Infrastructure

Farm-to-market roads (FMRs) connect farmers to the market, making transporting goods from producers to consumers easier. These roads help farmers increase the value of their products, strengthen the economy, and give rural communities more authority (DA, 2023e). The Department of Agriculture (DA), with its co-agency the Department of Public Works and Highways (DPWH) enacted the program farm-to-market road at Lupon, Davao Oriental:

… Public Works and Highways Secretary Mark A. Villar is optimistic that the ongoing construction of farm-to-market road (FMR) in the Municipality of Lupon will usher better mobility and improve productivity of residents and farmers in Davao Oriental.

"The new 2.37-kilometer FMR shall boost local agricultural production of coconut, corn, and rice in the resource-rich province," announced Secretary Villar.

A total of P45-million was allotted under the 2018 General Appropriations Act for the improvement of access road traversing Barangay Maragatas to Barangay Langka Road which started in July 2019.…

DPWH Region 11 Allan Borromeo outlines that, the development and improvement of the farm-to-market road leading to Lupon Public Terminal is expected to reduce the cost of shipping farm outputs and decrease post-harvest losses (DPWH, 2019). Davao del Norte Governor Rodolfo del Rosario speaks up that, farm-to-market roads increase agricultural revenue, productivity, and the number of jobs in rural areas. The road would refine living conditions in addition to making it easier to provide agricultural and social services (DA, 2023f). Hence, building farm-to-market roads is essential to boost the economy and revitalize rural regions.

7. Hybrid Rice Farming

Hybrid rice is a type of rice that has undergone cross-breeding between two dissimilar parent types. In comparison to other varieties, it can yield a lot more rice. Considering that it can outperform other varieties in yield, hybrid rice is a significant technological advancement that aids in fulfilling the rising demand for rice. It increases the likelihood of a higher yield, substantial farmer income, and high-quality grain, which can resist pests and diseases and can adapt to the changing environment (IRRI, 2018). Farmers reportedly collected 7 to 15 metric tons (M.T.) per hectare during the past two years, as opposed to an average of 3.6 MT/hectare for native seeds (PIA, 2023). The Department of Agriculture XI implemented hybrid rice farming under Community Hybrid Rice Farming (CHRF) program at Compostela and Nabunturan, Davao de Oro:

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> *... A significant step up in the agriculture sector in Davao de Oro came into light right after the successful harvest of the Community Hybrid Rice Model Farm: a community model of hybrid rice variety established in selected barangays in the municipalities of Compostela and Nabunturan ranging up to 200 hectares of land area.The project yields a significant rack-up in the province's rice sector by using four (4) hybrid rice varieties: Bigante Plus, NK5017, SL 20H, and M20. These hybrid rice varieties showed the potential to adapt to climate changes and generate a higher income for the local farmers. ...*

This effort of the provincial government acts as a prototype for modern, effective, and productive rice farming practices that would soon be adopted by nearby provinces. Provincial Agriculture Office (PAGRO) Head Dr. Jaime Anter assured that the government will continue to support farmers by providing subsidies, lower farming expenses, and raising income (Abella, 2022). DA-XI Regional Executive Director Ricardo M. Oñate, Jr. claims that the goal is to convert farmers from being solely rice producers to palay traders. He also underlined the importance of high-yielding technology for maximizing rice output and ensuring the region's rice supply, such as hybrid rice types (DA, 2023g). The country can achieve rice sufficiency with continuing technical training in learning new crop kinds that can adapt to varying weather patterns.

Generate Relevance of the Quantitative Data and Initiatives

During the uptrends of rice production beginning the 12th (October-December 2019), 15th (July-September 2020), and 19th (July-September 2021), the Rice Tariffication Law was already in operation. On February 14, 2019, former President Rodrigo Roa Duterte signed RA 11203, or Rice Tariffication Law (RTL). This law replaced quantitative restrictions (Q.R.s) on rice imports (DOF, 2022). The ₱ 10 billion Rice Competitiveness Enhancement Fund (RCEF) was created as a countermeasure that seeks to increase local rice farmers' productivity and competitiveness while increasing their income through the provision of farm machinery and equipment, breeding, propagation, and promotion of rice seeds, expansion of rice credit assistance and rice extension services (DBM, 2022). Beginning on March 5, 2019, import taxes on rice began to fund the Rice Competitiveness Enhancement Fund (RCEF). The Department of Finance (DOF) announced that in the year 2021, the RTL's initiatives effectively raised palay farmers' productivity by 15.6% (DA, 2022).

On the other hand, the downtrends of rice production on the 13th (January-March 2020) and 17th (January-March 2021) can be linked to the weather conditions as the lowest production fell in the dry season. Periodic dry conditions have contributed to the region's occasional droughts and water shortages, which have been made worse by the El Nino weather phenomenon, climate change, and issues with water supply (ADB, 2016). Dry spells impact crop productivity as it cause water shortages, agricultural planting lands are reduced in size, planting seasons are pushed back, and agricultural yields are lower (UN OCHA, 2019). Given this situation, one of the initiatives put in place, notably the project for a communal irrigation system, fails. The lack of water supply makes it difficult to increase productivity and fight poverty in some rural areas (Colina, 2019).

In terms of the downtrends in farm gate prices, beginning the 12th (October-December 2019), 15th (July-September 2020), 17th (January-March 2021), and 19th (July-September 2021), the setbacks in palay prices were expected. Following the deregulation, rice imports have significantly increased, resulting in the prices at the farm gate declining (Briones, 2019). The farmers' group stressed that the government had not supported palay farm gate prices in the same manner. The first year of the RTL's implementation completely differed from what the proponents promised (Simeon, 2020). For this reason, the extremely low farm gate prices in Mindanao, which are below the cost of production, have a negative financial impact on the palay rice farmers (Arado,2020).

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CONCLUSIONS AND RECOMMENDATIONS

Initiatives from the government in the field of agriculture are crucial to address issues such as providing enough production of goods at reasonable prices for people, promoting creative, proactive, and economically viable projects, and developing environmentally responsible industrial methods that are more resilient to threats like climate change.

The trend analysis of rice production and farm gate price has been significantly affected by the passing of The Rice Tarrification Law as the liberalization of rice imports eliminates the previous quota and substitutes higher import tariffs on rice, so enabling traders to import nearly an infinite quantity of rice which made the farm gate price to drop. Although the government guarantees appropriate procedures and implementation will be followed, the country cannot always depend on rice imports since the liberalization it brought about is not a solution that can be sustained in the long run.

The researchers have classified the initiatives into 7 themes, wit: (i) communal irrigation system, (ii) farm mechanization, (iii) organic farming, (iv) credit, (v) infrastructure (vi) transportation infrastructure, and (vii) hybrid rice farming.

Upon analyzing the relevance of initiatives gathered from the period 2010-2022, only the communal irrigation project falls short as the data showed a drop in rice production throughout the periodic dry season. With this, the government must reevaluate and enhance irrigation infrastructure in the Davao Region to ensure adequate water supply which will immediately increase rice production's sustainability and sufficiency.

Overall, agriculture is one of the most important sectors in the Philippines, accounting for 32% of land use, 10% of national GDP, and 31% of employed Filipinos in 2013 (Madayag & Estanislao, 2021). However, the government failed to protect farmers' interests in favor of globalization and commercialization, resulting in a sustained decrease in productivity, efficiency, and competitiveness, particularly in areas where the Philippines had an advantage.

As this study focuses on a regional scope, the researchers recommend future researchers conduct national studies on a broader spectrum, to examine government actions on rice production and farm gate prices, and to provide a nationally appropriate hypothesis. Other techniques may also be used by future researchers such as in-depth interviews with farmers providing a more comprehensive view of the data and evaluating the impact of government efforts.

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