JOURNAL OF INTERDISCIPLINARY PERSPECTIVES

ISSN Print: 2984-8288, ISSN Online: 2984-8385
Vol. 2, No. 12, pp. 146-155, December 2024

Exploring the Impact of Modern Rice Farming Technologies on Small-Scale Rice Farmers in Tanauan, Leyte, Philippines

John Paul Villanueva*,Samuel S. Sudario, Jenny Babe V. Vertudes,
Gil Patrick P. Carrata, April Rose C. Advincula
Engineering Department, Eastern Visayas State University-Tanauan Campus, Tanauan, Leyte, Philippines

*Corresponding Author Email: johnpaul.villanueva@evsu.edu.ph

Date received: September 7, 2024
Date revised: October 17, 2024
Date accepted: November 2, 2024

Originality: 90%
Grammarly Score: 99%
Similarity: 10%

Recommended citation:
Villanueva, J.P., Sudario, S., Vertudes, J.B., Carrata, G.P., Advincula, A.R. (2024). Exploring the impact of modern rice farming technologies on small-scale rice farmers in Tanauan, Leyte, Philippines. *Journal of Interdisciplinary Perspectives*, 2(12), 146-155. https://doi.org/10.69569/jip.2024.0484

Abstract. The use of modern rice farming technologies in modern agriculture plays a big role in developing countries like the Philippines in terms of food security and farmers' earnings. Hence, it has undoubtedly brought advantages to rice farmers. However, it also brought disadvantages to them. This phenomenological research aimed to understand the lived experiences of small-scale rice farmers using modern rice farming technologies. Fifteen (15) farmers from Brgy. Sta. Elena, Tanauan, Leyte were purposively selected as the study participants. The data were collected using open-ended questions and semi-structured interviews and were analyzed using Braun and Clarke's method of data analysis. Based on the findings, the results of modern rice farming technologies were categorized into positive and negative impacts. Moreover, farmers have also experienced problems with new technologies, which they find financially challenging because new farming technologies are costly and require high maintenance. Farmers also encountered the ineffectiveness of Agri-systems and programs, such as inadequate government backing and the insufficient implementation of farm-to-market options, which the farmers are looking into to attain sustainability. The researcher implicates the collaboration of Civil Organizations, the partnership between private sectors and Local Government Unit (LGU), a continuous training session covering topics involving new methods from the Department of Agriculture (DA), and the increase and sustainable supply of hybrid seed varieties, fertilizers, and pesticides in order for the small-scale rice farmers to have a sustainable livelihood.

Keywords: Department of Agriculture; Modern rice farming technologies; Rice farmers; Technology Impacts.

1.0 Introduction

Farming has always been done using conventional techniques until the introduction of modern rice farming technologies across the world (Folnovic, 2016). According to Bhattacharya and Ali (2015), in many countries in Asia, rice is still harvested by hand sickle. In contrast, combined harvesting is more common in industrialized countries with large farm holdings and expensive labor. On the other hand, manual harvesting can be a difficult, time-consuming, labor-intensive, and expensive process at times. As a result, several Asian rice-producing countries have made significant efforts to adopt modern rice farming technologies suitable for the current situation (Alizadeh & Allameh, 2013).

In the Philippines, modern farming technologies played an important role in the development of the rice industry (Villano et al., 2014). Modern-day rice farming technologies are being created and made on hand to farmers through Research and Development (Villano et al., 2014). Using these techniques provides a wide variety of potential benefits for customers, farmers, and the country's economy. One of the key motives rice yields have accelerated in the Philippines is the usage of high-yielding seeds. Using more advanced technology by rice growers may increase agricultural output (Villano et al., 2014). According to the Department of Agriculture (2020), its National Rice Program (NRP) offers assistance to elevate farm production and increase income as farmers struggle to deliver these technologies.

Although the adoption of rice farming technology in the Philippines is extensive, a few regions still exercise the traditional approaches to rice farming, like Tuguegarao City (Gallibu & Tindowen, 2015). Itawes rice farmers still cultivate and harvest rice grains with traditional tools and machinery. The farmers practice their traditional animistic beliefs for thanksgiving and good luck (Gallibu & Tindowen, 2015). At the recent Project Rebound webinar, panelists noted that Filipino farmers are already aging and not as open to learning, much less adopting, new technologies. (Boledo, 2021). According to the Philippine Statistic Authority, rice production in Eastern Visayas has increased by 6.7 percent in the first three months of 2021 compared to the same period in 2020, largely due to the expansion of areas devoted to staple food production (Meniano, 2021). Leyte province contributed the biggest share in rice yield in Eastern Visayas at 139,207 MT during the period, comprising more than half or 51.6 percent of the total palay production in the region.

Modern rice farming is defined as the mechanized systems that provide opportunities for rice farmers to boost input efficiency, agricultural industry profitability, and income, reduce labor costs, and have easier access to food security (Hasan et al., 2020). Meena and Meena (2014) also agree that to ensure the sustainable production of rice, the mechanization of the cropping system indeed increases productivity. In Ghana, the adoption of better rice seeds and fertilizer increases rice farmers' net income significantly, and farmers' choice of the selected agricultural technologies lowers income inequality among the sample population, indicating that adopting the technologies has an equalizing effect on rice farmers (Addison et al., 2022). Farmers lag far behind in Bangladesh in adopting mechanization in the land preparation phase using tractors (Hasan et al., 2020). However, throughout the span of the learning process, the technology adopter farmers were able to learn that their intensity of technology adoption has increased over the time period. In Eastern Ethiopia, for instance, Wordofa et al. (2021) discovered that improved adoption of farming technologies led to higher annual farm revenue per household than non-adopters. In Mozambique, a study showed that using improved seeds and tractors increased household income, particularly for those households with better market access (Cunguara & Darnhofer, 2011). However, the increase in input costs, unsustainable production practices, and climate change are all adding to rice farmers' risks and susceptibility (Segal & Minh, 2019).

In the Philippines, insufficient financial capital is found to be the most common need in rice farming; farmers are found to manage and cope with this problem by borrowing money from informal lenders. However, they are being charged with high interest rates (Palis, 2015). The Philippine Rice Research Institute [PRRI] has implemented a "PalaySikatan" RCEF-Seed Program highlighting the advantages of employing suggested rice varieties and cutting-edge farming techniques in a few key areas nationwide. The program provides information on recent technologies to rice farmers. Farmers took advantage of this chance to improve their agricultural knowledge, which will help them boost their yield and revenue (PRRI, 2022). The program was conducted to help Filipino farmers alleviate their economic status by having high-yielding rice varieties, whether inbred or hybrid, and to lessen their burdens on farm work through modern rice farming technologies (Castillo et al., 2016).

As presented in the following literature review section, most of the studies focused on the effect of modern rice farming on income and increase in rice production of the technology adopter farmers. However, very few studies have explored the impact of modern rice farming on small-scale farmers. Some rice farmers have found it challenging to shift from traditional farming practices to more modern ones, particularly without adequate training opportunities. This phenomenon leads to the conduct of the present study. This study is significant for understanding the impacts of modern rice farming technologies among small-scale rice farmers in Tanauan, Leyte. Specifically, the researchers entirely believe that the study was advantageous to the farmers it will describe the challenges encountered in rice farming and provide information to improve their rice production and familiarize

them with recent rice farming technologies. The Local Government Unit (LGU) would understand the impacts of modern rice farming technologies and the challenges encountered by rice farmers in using these technologies to formulate programs and policies that would benefit the rice farmers. To the researchers, the results of the study will provide baseline information for further studies regarding modern rice farming. The outcomes of this study will offer valuable insights into the lived experiences and challenges of small-scale rice farmers in adopting modern rice farming technologies. These insights can guide engineers in designing and implementing practical, user-centered solutions that address specific technological gaps, optimize farming processes, and enhance the accessibility and efficiency of agricultural innovations.

2.0 Methodology

2.1 Research Design

This study utilized a qualitative research method, specifically a phenomenological research design that tends to describe a phenomenon by exploring the insights of those subjected to it (Neubauer et al., 2019). A phenomenological study explores one's lived experience that delineates meaning independent of personal biases and preconceptions (Vagle, 2014). A key element of phenomenology is exploring how people define and describe their lives (Cridland et al., 2014). The researchers used this design to capture the lived experiences of the participants and describe the meaning of these experiences to determine the impacts of modern rice farming technologies among farmers and the challenges experienced by rice farmers towards using these technologies.

2.2 Research Locale

The study was conducted in Brgy. Sta. Elena, Tanauan, Leyte, Philippines, a barangay located in District IV and known as a top rice-producing community. Among the 54 barangays in Tanauan, Sta. Elena ranks at the top, with 121 rice farmers producing the most rice, according to data from the Municipal Agriculture Office. This barangay was selected not only for its prominence in rice production but also due to its farmers' diversity of farming practices, ranging from traditional to modern methods. Moreover, its socioeconomic significance, accessibility to agricultural resources, and active participation in development programs make it an ideal location for assessing the impacts of modern rice farming technologies on small-scale farmers.

2.3 Research Participants

The participants were rice farmers of Brgy. Sta. Elena, Tanauan, Leyte There were 120 rice farmers, and 30% of them had experienced the use of modern farming technology. Hennink and Kaiser (2022) suggested that a qualitative approach should have 9-17 participants. Hence a sample of fifteen (15) was chosen purposively based on specified criteria. Also, the participants were selected based on their registration with the Municipal Agriculture Office, with no age restrictions and a minimum of three years of farming experience. This ensured that participants had adequate exposure to farming practices and technologies, while unregistered farmers and those with less than three years of experience were excluded. These criteria ensured a diverse yet experienced group of farmers for the study.

2.4 Research Instrument

The semi-structured interview guide served as the main research tool in this study. Semi-structured interviews were used so participants could respond freely while having a uniform experience. The interview guide was developed based on the research objectives. It consisted of open-ended questions designed to explore participants' experiences, perceptions, and opinions on the impacts of modern rice farming. This method also allowed the researcher to delve further into relevant discussion topics when new themes surfaced during the interviews. The survey questionnaire underwent a comprehensive validation process to ensure its credibility and reliability. It was peer-reviewed by experts in the field of research, and a dry run was conducted with a small group to identify potential issues. The questionnaire's validity was also confirmed through a thorough literature review, ensuring that all relevant constructs were effectively addressed.

2.5 Data Gathering Procedure

The researchers conducted in-depth interviews in a one-on-one conversation with the participants to collect data about the researcher's study. The interview utilized open-ended questions and semi-structured interviews. Moreover, follow-up questions were made so that the participants could elaborate further on their thoughts. This allowed a discussion between the participants and the researchers to unfold a better understanding of the answers

from the interviewee. Furthermore, with the participants' permission, the interviewees were recorded through an audio recorder to precisely capture the data.

2.6 Ethical Considerations

For ethical reasons, the researcher will seek participants' consent before conducting the interview. Participants will be asked to complete an informed consent form. The researcher will assure participants that all information submitted will be treated with the highest secrecy and will be used only for the purposes of the study.

3.0 Results and Discussion

3.1 Impact of Modern Rice Farming Technologies

Positive Impact of Modern Rice Farming Technologies

There are three subthemes identified and grouped under the theme "Positive Impacts of Modern Rice Farming Technologies." These are (a) producing high yields, (b) increasing farmers' income, and (c) convenient and fast. Participants 1, 2, 5, and 15 are farmers who have experienced high-yield harvests by utilizing modern rice farming technologies. According to Xu et al. (2021), modern rice farming technologies (i.e., hybrid rice, use of fertilizers and pesticides) indeed produce higher yields and more than other rice varieties, such as inbred.

"Well, hybrid is quite good because it produces high yield, unlike the inbred. Lately, we got few harvests." P2

"Firstly, about rice variety, the good thing about it is its weight, and it is pretty good because of the higher yield." P5

"The good thing about it is, if it is well maintained with fertilizers and pesticides, then it produces a higher yield. If it is not treated well, it produces a lower yield." P15

Another positive impact of modern rice farming technologies on farmers is increased income. Through the use of modern rice farming technologies, the farmers' income is increasing, which was unlikely to happen previously. According to Ojo et al. (2018), accepting new technologies in agricultural activities can lead to a significant increase in productivity, hence an increase in income and improved livelihood. Additionally, Addison et al. (2022) claimed that the preferred agricultural technologies have an equalizing impact on the income of rice farmers.

"…the higher yield you got, the higher the income" P1

"Modern rice farming technologies are better, as for me, it is not time-consuming, and results in higher income." P3

"…fast in harvesting, then sometimes you get more harvest, higher income." P10

Farmers expressed satisfaction with modern rice farming technologies because they are convenient and less labor-intensive. Technologies certainly improved the farmers' farming methods, one of which is the quick response to upcoming calamities (e.g., typhoons). According to the Philippine Rice Research Institute (PhilRice), traditional harvesting would take at least a week per hectare, whereas new farming technologies would take 4-5 hectares daily.

"The modern technologies are better to use nowadays because it is not labor intensive, unlike in traditional ways it was a hassle because you have to maneuver and follow the carabao." P4

"The modern technologies are better because rice is being harvested fast." P10

"That cultivator is fast; no matter how many hectares you work on, it will be done quickly." P12

Negative Impact of Modern Rice Farming Technologies

Rice farmers are also experiencing the negative impacts of modern rice farming technologies. Some farmers do not use modern rice farming technologies, specifically machinery, since it destroys the paddy field. According to Kirchhof et al. (2011), soil structure is destroyed by mechanical breaking and dispersal of soil aggregates, which

creates a puddled zone. The wheels of heavy equipment are the common cause of such destruction; they perforate the saturated soil and result in a deeper paddy field, making it difficult to use modern machinery in farming. Additionally, fertilizer overuse causes serious environmental degradation.

"The problem is, when your field is too muddy, the wheels of tractors deepen the soil; the same goes for the use of harvesters. As a result, it is difficult to use land masters because it will embed into the soil." P1

"We do not use those cultivators and harvesters because it destroy the paddy field." P2

"The bad thing is, the wheels perforate the paddy field." P4

However, Kirchhof et al. (2011) state that through effective weed control and soil softening, puddling reduces water use by reducing percolation losses and assisting in the manual transplantation of rice seedlings. Puddling of the soil over time also results in forming a compacted layer beneath the puddled area, further reducing percolation losses. Hence, it suggests that it is a good practice. Despite increased productivity, modern rice farming technologies hurt the outcome, particularly in rice quality (e.g., discoloration). According to Raghu et al. (2020), grain discoloration indicates the poor yield and quality of rice, resulting in low market value. Shafiekhani et al. (2018) also stated that rice discoloration presents a significant loss to farmers and processors. Moreover, the farmers in this study are experiencing an unclean harvest, and with harvesters, farmers tend to harvest a lot of rice chaff.

"In terms of machinery, the bad thing is that farm fields tend to get deeper, so the rice is not clean; it has a lot of harvested chaffs." P2

"…harvester somewhat harvests some rice chaffs that is all, but not much." P5

"This harvester somewhat harvests rice chaff and the weight of rice is lighter." P12

Due to the effectiveness of technology, modern rice farming technologies mostly do farm work that is considerably labor-intensive back in traditional ways (e.g., harvesting). It would only take machinery and several operators or farm laborers to do the job. Although it may seem positive, this resulted in the availability of farm laborers. Most agricultural research found a negative relationship between labor input and machinery, suggesting that using machinery could replace unskilled laborers to increase output and decrease labor costs (Kea, 2016).

"Focus more on having the farmers because only a few farmers are left working here in rice farms." P3

"…prioritize the farmers because humanity relies on them for the food source." P5

"We are struggling to find farmers so if there are farmers available, much better." P3

3.2 Challenges Experienced by the Rice Farmers Towards New Farming Technologies

Financial Challenges

There are three (3) sub-themes identified under "Modern Rice farming technologies are financially challenging." These are (a) new farming technologies that are costly, (b) require high maintenance, and (c) loan. Although new rice farming technologies positively impact rice farmers, some rice farmers face difficulties in administering modern rice farming technologies because they are costly. Additionally, Signh (2010) reported that the high cost of high-yielding variety seeds was a problem for rice farmers. Moreover, according to Rhaman (2019), income is not significantly different, mainly due to the high cost of modern rice farming technologies (i.e., fertilizers).

"The fertilizers are now three times their previous price; the same goes for pesticides, which is the number one challenge to farmers. Even though there is a small subsidy given to farmers." P11

"… that is the only problem, the petroleum. We cannot afford to buy it." P13

"…lesser because fertilizers are costly." P13

As stated, modern rice farming technologies are good; however, farmers find it financially challenging to maintain them. For rice to grow properly, it requires a lot of fertilizers and pesticides. With this kind of problem, farmers do not like new technologies.

"In terms of rice variety, the thing is, it requires many fertilizers." P2

"In crop growing, it depends, for instance, that there is an infestation of pests. It is difficult, and that is the problem because you will buy pesticides for maintenance." P10

Some farmers also find it financially challenging to purchase modern machinery. These machines are subjected to technological malfunctions due to overuse. Mechanics sometimes suggest replacement due to unfixable conditions, which adds to their expenses.

"Just like the pump belt, you must buy a replacement if it is just the problem. In terms of machines, you get them from the field and get them fixed." P7

"The biggest problem is when the inside parts of the machine need to be fixed, you will have to spend more money." P15

With the financial challenge brought by modern rice farming technologies, some farmers have found a solution: borrowing money. However, this solution is not good for the farmers; it is a gamble because what they harvest is almost equivalent to what they have borrowed and is sometimes insufficient. According to Palis (2015), insufficient financial capital is the most common need in rice farming in the Philippines; farmers can manage and cope with this problem by borrowing money from informal lenders. However, they are being charged with high interest rates.

"Money is the partner; if you do not have money for the investment, you are definitely going to borrow money, and you will buy fertilizers and pesticides; it is necessary because if you do not, then how will you make a profit." P15

"When it is out of the field (machinery), you are going to send it to a fixing shop; if there is no money, you'll have to borrow and pay it after harvest season." P15

"You are going to look for investment for your farm; if you do not have money to spend, you are looking for money. Money is the partner." P8

Inefficiency of Agri-systems and Programs

Under "Inefficiency of Agri-systems and programs," two sub-themes were identified: (a) unsubstantial implementation of farm-to-market options and (b) insufficient government support. Road transportation is crucial to the development of agriculture. This is because it is the primary method of moving agricultural products from farms to markets and different urban areas where they can be bought and consumed (Tunde & Adeniyi, 2012). These roads assist farmers and fishermen in obtaining higher prices and a wider market for their goods, hence, higher income and lesser expenses. There are some interviewed farmers in the study who find the farm-to-market roads beneficial at some point in their lives yet still be a problem. Participants 3 and 11 said,

"…we lack with those farm-to-market." P3

"Transportation is the number one problem for farmers." P11

"Firstly, the problem of farmers is the transport expenses, from farms to possible roads." P11

Government support has one of the greatest influences on rice production in such countries. In Southeast Asia, the role of government in the rice industry is crucial. It interferes with rice production to boost output and achieve self-sufficiency in the sector (Laiprakobsup, 2019). Under Duterte's administration, the DA implemented the "Plant, Plant, Plant Program" or "Ahon Lahat, Pagkaing Sapat (ALPAS) laban sa Covid-19," which seeks to

increase national agri-fishery output through increased use of high-quality seeds, suitable inputs, and modern technologies to boost productivity levels across all commodities and ensures food productivity. This program was nationwide; however, it is still insufficient, and only a handful of farmers are benefiting from this according to the interviewed farmers.

"We hope for a solution. The government should increase the number of seeds because what they give nowadays is lacking, so inbred and hybrid are somewhat combined. Then the fertilizers, there should always be a fertilizer." P2

"All farmers should be given rice variety, not selected ones only. Like financial assistance, like fertilizers, and if the Department of Agriculture gives assistance, everyone should be given it." P5

"If the DA will support us, farming will be better for me. To avail ourselves of seeds, there is also fertilizer to minimize expenses." P8

Modern Rice farming technologies have improved many of the farmers' lives and their farming practices. New rice farming technologies are useful, fast, and convenient during farming processes (i.e., land preparation, crop growing, and harvesting), and they boost production, making farmers more productive than ever. Based on the findings, farmers produce high yields because of modern technologies. However, the Philippines still imports rice from neighboring countries. According to Cardona and Garcia (2016), the Philippines' initial goal of rice self-sufficiency in 2013 was moved, and the country is likely to import rice from the neighboring countries. This is mainly because of high rice consumption, increased population growth, challenges in rice production, and an increasing amount of imported rice.

On the other hand, according to Villano (2014), the increase in production implies an increase in income, thus making rice farming a profitable livelihood for rice farmers. Based on the findings, unlike traditional rice farming practices, the farmers are experiencing an increase in income. Adapting to modern technologies in agricultural practices can increase income due to a significant increase in production (Ojo et al., 2018). However, in the Philippines, farmers remain the poorest in the country (Ocampo & Pobre, 2021). According to the Philippine Statistics Authority (PSA), it was reported in 2020 that farmers had a high poverty incidence among other basic sectors in 2018.

Furthermore, the findings of this study also revealed that the farmers preferred modern rice farming technologies due to their convenience and fast work (e.g., harvesting). According to the Philippine Rice Research Institute (PhilRice), traditional harvesting would take at least a week per hectare, whereas new farming technologies would take 4-5 hectares daily. Jones et al. (2019) also claimed that technology can increase task efficiency, improve food quality and quantity, and reduce labor-intensive tasks. Hence, with the use of modern technologies, farmers became more productive.

However, farmers are aware of the disadvantages brought by these modern technologies and cannot be helped; thus, they have embraced the negative effects of these new technologies. As farmers have observed, during farming procedures, the soil being highly saturated results in work difficulties, and modern rice farming technologies are becoming useless in this scenario. Fertilizers are being washed out, too much water slows down the growth rate of rice, and machinery perforates the paddy field, resulting in deeper soil. However, Kirchhof et al. (2011) stated that through effective weed control and soil softening, puddling reduces water use by reducing percolation losses and is useful in assisting the manual transplantation of rice seedlings. Puddling the soil over time results in a compacted layer beneath the puddled area, further reducing percolation losses.

Another negative impact of modern technology is the observed unclean harvests by the farmers, like participants 2, 5, and 12. They have observed many rice chaffs mixed in grained rice by this new technology (i.e., harvester). This may add to the observed unpleasant rice quality, such as discoloration. The discoloration of rice grain indicates poor yield and quality of rice, which causes it to lose its market value (Raghu et al., 2020). Shafiekhani et al. (2018) also noted that rice discoloration significantly loses farmers and processors. Furthermore, even though the utilization of new technologies has seemed positive about their effectiveness, the availability of farm laborers decreased. Most agricultural research discovered a negative relationship between labor input and machinery,

indicating that using machinery could eliminate the need for unskilled laborers to increase output and lower labor costs (Kea, 2016).

As farmers experience the negative impacts of modern rice farming technologies, they also carry the burden of these new technologies. Based on the result of the analysis from the interviews and observations, rice farmers are struggling financially. Most of the farmers in the study admitted that finances come first to have a good and better outcome in modern farming (i.e., positive impacts). Farmers in the study also find it financially challenging in terms of maintenance; to gain more harvest, farmers provide a sustainable number of fertilizers and pesticides to ensure a good result. Machines are being sent to workshops to avoid delays to fix such damages or malfunctions. Hence, these maintenances add up to their expenses.

Furthermore, it was revealed that the solution of rice farmers to financial challenges is mainly to borrow money. However, what they have harvested is almost equivalent to their borrowed capital and sometimes less. Insufficient financial capital is the most common need in rice farming in the Philippines, and farmers are found to manage and cope with this problem by borrowing money from informal lenders. However, they are charged high interest rates (Palis, 2015). According to Teye (2021), the reason behind the high charges is that farmers are mistreated by financial institutions, which acts as a barrier to facilitating their access to loans. Moreover, government support plays a big role in the country's rice production. It interferes with rice production to boost output and achieve self-sufficiency in the sector (Laiprakobsup, 2019).

The DA under Duterte's administration implemented the "Plant, Plant, Plant Program" or "Ahon Lahat, Pagkaing Sapat (ALPAS) laban sa Covid-19." it seeks an increase in agri-fishery production through an increase in financial inputs, high-quality seeds (e.g., hybrid) and modern technologies (i.e. machinery) that will boost productivity levels across all commodities and ensures food security nationwide. However, it is still insufficient, and only a handful of farmers benefit from the said program according to the interviewed farmers. Traditionally, local politicians and representatives from national government agencies in the Philippines, as well as the Japan International Cooperation Agency (JICA), Nippon Koei, and other aid organizations, hold power making Agrarian Reform Beneficiaries (ARBs), who are much fewer powerful than other supporting actors like landowners and traders, receive disproportionately fewer benefits (Teves, 2022a).

Furthermore, the DA also provided farmers with a Farm-to-Market Road Development Program because transportation is crucial in developing the agricultural sector. It is the initial procedure of moving agricultural products from farms to markets and different urban areas where they can be bought and consumed (Tunde & Adeniyi, 2012). However, for the same reason as the "Plant, Plant, Plant Program," it is argued that even though the FMR encouraged cooperation and advantageous relationships among aid authorities, the non-poor sector benefited more significantly. In order to maximize the benefits of FMR, Agrarian Reform Beneficiaries (ARBs) demand additional support (Teves, 2022b).

This study may have several limitations. For several reasons, the findings cannot be applied to the general population or all rice farmers. This is partly because of the narrow scope of the inquiry; these new experiences varied, and the qualitative findings cannot be generalized (Brodsky, 2016). Because the study is geographically constrained, it is impossible to extrapolate participant experiences to its context. For future works, other researchers may focus on coped solutions to the problems experienced by rice farmers regarding new rice farming technologies and also the experiences of rice farmers who are still utilizing traditional practices. Additionally, considering that the current study focuses on the impacts of modern rice farming technologies among rice farmers in Tanauan, Leyte, further study may be conducted in other locales. Moreover, a qualitative study may also be conducted to provide generalized results.

4.0 Conclusion

Based on the study's findings, the farmers experienced various positive impacts, such as producing high yields, and an increase in yield implies an increase in income. Also, farmers find it convenient and fast, but they also experience the negative side of it; according to them, it destroys paddy fields, produces unclean harvests, and has observed that farm laborers are disadvantaged. Moreover, farmers also have experienced problems with new technologies. They find it financially challenging because new farming technologies are costly and require high

maintenance. Farmers' solution to these problems was to borrow money; however, due to high interest rates imposed by some financial institutions, their harvests became payment, almost equivalent to what they borrowed and sometimes less. Thus, borrowing money also became a financial challenge to the rice farmers. Furthermore, farmers also experienced the inefficiency of agri-systems and programs, such as the unsubstantial implementation of farm-to-market options and insufficient government support, which the farmers are looking into in order for them to achieve sustainability.

Given the findings of this study, the researcher recommends the collaboration of Civil Organizations (i.e. farmers' associations) in order to reinforce farm laborers to one another, the encouragement of Barangay through ordinances for farmers to continue farming, the partnership between private sectors and Local Government Unit (LGU) to provide modern rice farming technologies (i.e. machinery) for the farmers, and LGU may ensure to look into the implementation of transportation (i.e. farm-to-market roads) so that delays will be avoided and fewer expenses for rice farmers.

A continuous training session will be held covering topics involving new methods from the Department of Agriculture (DA) and encouraging all farmers to attend. The National Government may ensure the proper implementation of "The Agriculture, Fisheries, and Rural Development Financing Enhancement Act of 2022," which also states that lending cooperatives, microfinance institutions, retail banks, and rural and thrift banks shall apply minimum interest rates for wholesale loans obtained from government banks. The researchers recommend increasing a sustainable supply of hybrid seed varieties, fertilizers, and pesticides for the rice farmers to have a sustainable livelihood.

5.0 Contributions of Authors

JBV, GPG –writing, editing, encoding, fieldwork, ART, JPV – data analysis, supervising.

6.0 Funding

This study did not receive any funding.

7.0 Conflict of Interests

The authors declare that there are no conflicts of interest regarding the publication of this paper. No financial, personal, or professional interests have influenced the research or its outcomes, and all work has been conducted with transparency and integrity.

8.0 Acknowledgment

We would like to sincerely thank Eastern Visayas State University – Tanauan Campus Research and Development Office for providing the necessary resources and a conducive environment for conducting this research. We are particularly grateful to the Sta. Elena Farmer's Association for their assistance and technical support during the data collection and analysis stages. To our fellow researchers, thank you for your collaboration and interactive discussions, which have enriched the research process. Your suggestions and feedback were critical in refining the direction of this work. Thank you all for your contribution to this work.

9.0 References

Addison, M., Ohene-Yankyera, K., Acheampong, P. P., & Wongnaa, C. A. (2022). The impact of uptake of selected agricultural technologies on rice farmers' income distribution in Ghana. Agriculture & Food Security, 11(1), 2. https://doi.org/10.1186/s40066-021-00339-0

Askarany, D. B. (2012). The Effect of Innovation Characteristics on Activity-Based Costing Adoption. Int. J. Managerial and financial Accounting, 4(3), 291–313. https://tinyurl.com/bddd5fyb

Berto, W. (2022). Top 4 most popular rice varieties. Retrieved from https://www.philrice.gov.ph/top-5-popular-rice-varieties/

Bhattacharya, K.R., & Ali, S. Z. (2015). An introduction to rice-grain technology. WPI Publishing

Bingham, A.J., & Witkowsky, P. (2022). Deductive and inductive approaches to qualitative data analysis. In C. Vanover, P. Mihas, & J. Saldaña (Eds.), Analyzing and interpreting qualitative data: After the interview (pp. 133-146). SAGE Publications.

Boledo, L.B. (2021). Agri sector slow to adopt new technology. Retrieved from https://tinyurl.com/4keh6c67

Casinillo, L., & Seriño, M. (2022). Econometric evidence on happiness and its determinants among rice farmers in Leyte, Philippines. Independent Journal of Management & Production, 13, 1026-1044. http://dx.doi.org/10.14807/ijmp.v13i5.1597

Chukwuemeka, E. (2022). Advantage and disadvantage technology in agriculture. Retrieved from https://tinyurl.com/yjf6xccr

Clarke, V., & Braun, V. (2013). Teaching thematic analysis: Overcoming challenges and developing strategies for effective learning. Retrieved from https://tinyurl.com/433j7p6j

Cridland, E.K., Jones, S.C., Caputi, P., & Magee, C.A. (2014). Qualitative research with families living with autism spectrum disorder: Recommendations for conducting semi-structured interviews. Journal of Intellectual and Developmental Disability, 40, 78-91. https://doi.org/10.1177/1088357615583466

Cunguara, B., & Darnhofer, I. (2011). Assessing the impact of improved agricultural technologies on household income in rural Mozambique. Food Policy, 36(3), 378–390. https://doi.org/10.1016/j.foodpol.2011.03.002

De Asis, L. A., & Morales, R. A. (2018). Individual and Societal Factors Influencing Technology Adaptation of Rice Farmers in Northern Samar. KnE Social Sciences, 3(6), 789–798. https://doi.org/10.18502/kss.v3i6.2420

De Souza Filho, H.M. (2018). The Adoption of Sustainable Agricultural Technologies. Routledge.

Dumlao, T. (2017, November 20). 'rice revolution' sparked in Leyte. Inquirer.net. Retrieved from https://tinyurl.com/4m4zs4ff

Chand, G. G., Gupta, R. R., Samimuddin, K., Onohal, D., Parmar, N., Rane, G. V., Joseph, & Pathak, V. K. (2020). Paddy cultivation guide: Different methods of rice cultivation in India. Retrieved from https://tinyurl.com/4u3zdwvp

Ferrer, P. (2016). Growing hope with green super rice. Retrieved from https://tinyurl.com/2ymsb9sz

Gallibu, T., & Tindowen, D.J. (2015). Rice Farming Methods, Tools, and Indigenous Practices and Beliefs of Itawes Farmers Of Tuguegarao City. 2. Bannag: Journal of Local Knowledge, 2(1). https://tinyurl.com/m6527pmb

García-Llorente, M., Rubio-Olivar, R., & Gutierrez-Briceño, I. (2018). Farming for Life Quality and Sustainability: A Literature Review of Green Care Research Trends in Europe. Int J Environ Res Public Health, 15(6), 1282. https://doi.org/10.3390/ijerph15061282

Hasan, K., S. T. Tanaka, T., Alam, M., Ali, R., & Kumer Saha, C. (2020). Impact of modern rice harvesting practices over traditional ones. Reviews in Agricultural Science, 8(0), 89–108. https://doi.org/10.7831/ras.8.0_89

Hennink, M., & Kaiser, B. N. (2022). Sample sizes for saturation in qualitative research: A systematic review of empirical tests. Social Science & Medicine, 292, 114523. https://doi.org/10.1016/j.socscimed.2021.114523

Hou, B., Mutuc, E. B., Wu, L., Lee, H.-Y., & Lu, K.-H. (2020). Sustainable rice farming systems: Farmer attribute and land ecosystem perspectives. International Food and Agribusiness Management Review, 23(1), 121–141. https://doi.org/10.22434/ifamr2018.0220
Jones, M., Alam, M., Rahman, M., Hammadur; Ali, Md. Rostom; Hasan, Md. Kamrul; and Ali Pathan, Md. Shadhin ibn. (2019). Gender Technology Assessment Bangladesh: Harvesting Technology. Retrieved from https://tinyurl.com/xxupnv5u
Kea, S., Li, H., & Pich, L. (2016). Technical Efficiency and Its Determinants of Rice Production in Cambodia. Economies, 4(4), 22. https://tinyurl.com/2wjktzvz
Kirchhof, G., Tuong, T.P., So, H.B. (2011). Puddling: Effect on Soil Physical Properties and Crops. In: Gliński, J., Horabik, J., Lipiec, J. (eds) Encyclopedia of Agrophysics. Encyclopedia of Earth Sciences Series. Springer, Dordrecht.
Laborte, A. G., Paguirigan, N. C., Moya, P. F., Nelson, A., Sparks, A. H., & Gregorio, G. B. (2015). Farmers' preference for rice traits: Insights from farm surveys in Central Luzon, Philippines, 1966-2012. Retrieved from https://tinyurl.com/3shs53hn
Laiprakobsupp, T. (2019). The policy effect of government assistance on the rice production in Southeast Asia: Comparative case studies of Thailand, Vietnam, and the Philippines. Development Studies Research, 6(1), 1-12. https://tinyurl.com/mv6fepya
Mariano, M., Villano, R. and Fleming, E. (2011). Technical efficiency of rice farms in different agroclimatic zones in the Philippines: An application of a Stochastic Metafrontier model. Asian Eco-nomic Journal, 25, 245–269. https://doi.org/10.1111/j.1467-8381.2011.02060.x
Meena, B. P., & Meena, V. (2014). Modern techniques of rice production: A key for ecosystem. Indian Farming, 64(3), 11-14. https://tinyurl.com/yyfs6x6k
Muchena, F. N. (2005). Turning the tides of soil degradation in Africa: capturing the reality and exploring opportunities. Land Use Policy, 22(1), 23–31. https://doi.org/10.1016/j.landusepol.2003.07.001
Nguezet, P., Diagne, A., Okoruwa, V.O, Ojehomon, V. (2011). Impact of Improved Rice Technology (NERICA varieties) on Income and Poverty among Rice Farming Households in Nigeria: A Local Average Treatment Effect (LATE) Approach. Quarterly Journal of International Agriculture, 50(3), 1-25. https://tinyurl.com/38pnybmh
Ojo, T. O., Ogundeji, A. A., Babu, S. C., & Alimi, T. (2020). Estimating financing gaps in rice production in Southwestern Nigeria. Journal of Economic Structures, 9(1), 12. https://doi.org/10.1186/s40008-020-0190-y
Palis, F., Diaz, C., Todcor, G., Flor, R.J., Tanzo, I., Datoon, R. (2015). Voices From the Field: Needs of Small-Scale Filipino Rice Farmers. Crop protection newsletter. Philippines Joumal of Crop Science, 40. 64-75. https://tinyurl.com/hw975kbr
Ravanara, R. (2022). MegaBites. Retrieved from https://tinyurl.com/bdhdvwvy
Saj, S. (2019). Best rice farming, cultivation, production and seeds complete guide. Retrieved from https://tinyurl.com/47xw4uzc
Segal, R., & Minh, L. N. (2019). Unfair harvest: The State of Rice in Asia - DSPACE. Retrieved from https://tinyurl.com/5awkfa6r
Taherdoost, H. (2018). A review of technology acceptance and adoption models and theories. Retrieved from https://doi.org/10.1016/j.promfg.2018.03.137
Taiwo, A. A., & Downe, A. G. (2013). The Theory of User Acceptance and Use of Technology (UTAUT): A meta-analytic review of empirical findings. Joumal of Theoretical and Applied Information Technology, 49(1), 48-58. https://tinyurl.com/2mz95yx4
Teves, M. (2022). Governmentality in the Context of a Japanese-funded Farm-to- Market Road (FMR) in Agdangan, Quezon Province, Philippines. Studies of Transition States and Societies, 0. https://doi.org/10.58036/stss.v0i0.1023
Teves, Ma. J. T. E. G. (2022). Sociological analysis of subproject actors' relations in a farm-to-market road in the agdangan, quezon province, philippines. SSRN Electronic Journal. https://doi.org/10.2139/ssm.4070681
Teye, E. S., & Quarshie, P. T. (2022). Impact of agricultural finance on technology adoption, agricultural productivity and rural household economic wellbeing in Ghana: A case study of rice farmers in Shai-Osudoku District. South African Geographical Journal, 104(2), 231–250. https://doi.org/10.1080/03736245.2021.1962395
Tiongco, M., Dawe, D. (2002). 'Long-term evolution of productivity in a sample of Philippine rice farms: Implications for sustainability and future research. World Development, 30, 891–898. https://doi.org/10.1016/S0305-750X(02)00011-6
Tunde, A.M, & Adeniyi, EE. (2012). Impact of Road Transport on Agricultural Development: A Nigerian Example. Ethiopian Joumal of Environmental Studies and Management, 5(3). https://doi.org/10.4314/EJESM.V5I3.3
Vagle, M. D. (2014). Crafting phenomenological research. Walnut Creek, CA: Left Coast Press.
Venkatesh, V., Morris, M.G., Davis, G.B., & Davis, F.D. (2003). User Acceptance of Information Technology: Toward a Unified View. MISQuarterly, 23(7), 425. https://doi.org/10.2307/30036540
Villano, R., Bravo-Ureta, B., Solis, D., & Fleming, E. (2014). Modern Rice Technologies and Productivity in the Philippines: Disentangling Technology from Managerial Gaps. Journal of Agricultural Economics, 66(1). http://dx.doi.org/10.1111/1477-9552.12081
Wordofa, M.G., Hassen, J.Y., Endris, G.S., Aweke, C.S., Moges, D.K., & Rorisa, D.T. (2021). Adoption of improved agricultural technology and its impact on household income: a propensity score matching estimation in Eastern Ethiopia. Agric Food Security, 10(5), 1–12. https://doi.org/10.1186/s40066-020-00278-2
Xu, L., Yuan, S., Wang, X., Yu, X. and Peng, S. (2021). High yields of hybrid rice do not require more nitrogen fertilizer than inbred rice: A meta-analysis. Food Energy Secur, 10, 341-350. https://doi.org/10.1002/fes3.276

.