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Abstract

The study aimed to assess the adoption of the PalayCheck System among registered rice farmers in Bulacan. In terms of socio-demographic and farming characteristic of the rice farmer, benefits derived from FFS participation and adoption, and the evaluation of the level of adoption of rice farmers in the PalayCheck System were examined. A descriptive research design method was used in the study. The respondents were drawn from the 2019–2020 TESDA RCEF-RESP graduates in Bulacan, with a total of 82 registered rice farmers were purposively selected to act as respondents of the study. Based on the results of this study, rice farmers were married males and older-aged adults, tilling 1.0 to 2.0 hectares of land, with more than 31 years of experience in rice farming. Rice farmers' level of adoption of the PalayCheck System Key Checks showed a very high adoption rate, except in Key Check 3, "Practiced synchronous planting after a rest period" and Key Check 7 "No significant yield loss due to pests" both gained high adoption. In addition, rice farmers experienced significant benefits by strengthening their decision-making abilities and gaining confidence in managing and improving their farming activities. The study recommends enhancing farmer education through a farmer-centered approach, strengthening stakeholder collaboration with rice farmers in Bulacan, and encouraging further research on the adoption of the PalayCheck System.

Keywords: *agriculture extension, PalayCheck system, rice productivity, technology adoption*

Introduction

Rice is the staple food crop of the Philippines and is central to the well- being of the nation. With an average annual per capita consumption of 136 kg by a population of 111.57 million (PSA, 2022), the annual production from 4.65 million hectares of rice land regularly requires imports of up to 1.70 million tons annually. However, the growth in production of 19% has is failed to keep up with the increasing rice demand from a population growth of 1.1% per annum (PSA, 2022).

Republic Act 11203 established the Rice Competitiveness Enhancement Fund (RCEF), also known as the Rice Fund, to help boost the productivity and income of rice farmers. This was introduced in response to the liberalization of the country's rice trade policy, which removed quantitative restrictions on rice imports and replaced them with tariffs, among other measures. RCEF has four major components: rice farm machinery and equipment; rice seed development, propagation, and promotion; expanded rice credit assistance; and rice extension services, which should be implemented in an integrated manner (DA-

ATI, 2020).

The main implementor of the Rice Extension Service Program was the Technical Education and Skills Development Authority (TESDA) in partnership with the different Learning Site in Agriculture (LSA). It aims to capacitate the knowledge and skills of farmers through the conduct of Farmers Field School (FFS). Extension services are one of the development strategies to transfer technologies that can address these issues. According to Ison, Roling and Watson (2007), instead of technology transfer being carried out by extension workers talking to farmers, the FFS emphasized discovery learning by groups of farmers with the facilitation of the whole process by skilled trainers.

The PalayCheck System is an interactive rice crop management approach that highlights essential technologies and practices called Key Checks. It allows farmers to compare their current methods with recommended best practices and promotes continuous learning through farmers' discussion groups to enhance productivity, profitability, and environmental sustainability. PalayCheck is simply "learning, checking, and sharing for best farming practices". PalayCheck covers the principal areas of crop management such as seed quality, land preparation, crop establishment, and the respective management of nutrients, water, pests, harvest, and postharvest (PhilRiceshop, 2022).

FFS is an extension strategy that helps farmers solve local issues by allowing them to learn from each other's farming experience. It is conducted on a weekly basis with a curriculum on the how and why of farming and is overseen by a facilitator. Through FFS, farmers also gain knowledge and skills in crop management decisions and strengthen their interpersonal relationships with fellow farmers by participating in a variety of group activities (FAO, 2016).

The RCEF-RESP (Rice Extension Services Program) aims to improve rice productivity through the training the training and capacity-building of rice farmers on modern, science-based farming technologies and practices. Despite these significant efforts, extension services like the Farmers Field School (FFS) on PalayCheck System make it is crucial to systematically assess the outcomes and impacts of these programs on the ground. Assessment allows stakeholders to determine whether these interventions are genuinely leading to improvements in rice productivity, farmer income, technological adoption, and sustainable farming practices. The study was assessed the adoption of the PalayCheck System among registered rice farmers in Bulacan. It focused on farmers' socio-demographic and farming characteristics, years and level of adoption after FFS, and the benefits gained from participation.

Materials and Methods

For this study, the researcher used a descriptive research design. The data collected included the socio-demographic and farming characteristics of rice farmers, the perception of rice farmers in terms of the benefits derived from participation in FFS, and the rice farmers' problems encountered in adopting the PalayCheck System, focusing on the level and years of adoption of rice farmers in the PalayCheck System after FFS. A total of 175 individuals graduated from the TESDA Farmer Field School (FFS) in Bulacan during 2019–2020. For the purpose of the research evaluation, only 82 participants who were confirmed as registered rice farmers were intentionally selected as respondents, while non-rice farmers were not included in the study. The researcher asked permission from the TESDA Bulacan Office, Provincial Agriculture Office, and City/Municipal Agriculture Offices to seek their help in accessing vital documents for the conduct of this study, such as the list of TESDA FFS graduates and the general master list of farmers who planted rice.

A researcher-made questionnaire was used in the survey to gather data. The survey questionnaire's content was subjected to reliability and validity tests using Cronbach's alpha and was pre-tested with 30 farmer respondents who shared the same characteristics but were not included as respondents of the study. The Likert-type scale used for this study satisfied the conditions for using Cronbach's alpha. The Cronbach's alpha result on reliability and validity of the questionnaire resulted in 0.79 marked as acceptable, which is in the range of its acceptable value of 0.70–0.95. Utilizing the Percentages and frequencies were used to determine the socio-demographic and farming characteristics of rice farmers such as age, sex, civil status, educational attainment, tenurial status, years of experience in rice farming, total farm size, area dedicated to rice farming, farm location, and the years of adoption of PalayCheck System Key Checks. Furthermore, for household size and annual farm income the data gathered was averaged and reported appropriately. Mean and standard deviation were used to determine the level of adoption of rice farmers in the PalayCheck System after FFS; and the benefits derived from participation in FFS.

Results and Discussion

Socio-demographic Profile of Rice Farmers

The results of the study indicate that the majority of rice farmers are aged 50 years and above, with a mean age of 59.78 years, highlighting an aging farming population, as shown in Table 1. This is because, rather than farming, young people are encouraged to attend school in order to earn a degree and land a respectable, well-paying job. This is also relevant to the adoption of extension services, as older farmers may be less inclined to adopt new technologies or farming practices due to established routines and limited familiarity with modern methods. This can be attributed to the study conducted by Palis (2020) regarding the aspirations of rice farmers for their children, result of the study shows that Filipino rice farmers nowadays are indeed aging.

Table 1

Socio-Demographic Profile of Rice Farmers

Socio-Demographic Profile	Frequency	Percentage (%)
Age		
Younger age group (15-29 years)	1	1.22
Middle age group (30- 49 years)	9	10.98
Older age group (50 and above)	72	87.80
Sex		
Male	62	75.6
Female	20	24.4
Civil Status		
Single	5	6.0
Married	65	78.3
Separated	2	2.4
Widow	10	12.0
Educational Attainment		
Elementary Undergraduate	7	8.5
Elementary Graduate	20	24.4
High School Undergraduate	5	6.1
High School Graduate	21	25.6
College Undergraduate	11	13.4
College Graduate	14	17.1
Vocational	4	4.9

Socio-Demographic Profile	Average
Household Size	4.13
Annual Farm Income (Php)	46, 246.00

Table 1 also shows that 75.60% of the rice farmers are male and only 24.40% are female. The population of the study was dominated by male rice farmers. Majority of the rice farmers are married, with 78.3%, followed by widow/widower respondents (12%) and separated respondents (2.4%) while 6% are single farmers. It was also shown that 25.6% of the rice farmers were high school graduates and 24.4% were elementary graduates. Table 1 also indicates that vocational graduates were 4.9% of the total population. Cuevas et al. (2021), in their research study, also found that most of the farmers attained the high school level. It further shows that the average household size of the rice farmers was 4.13. This finding was supported by the study of Delco (2020), where farm households were categorized as small family. It also revealed that ₱46,246.00 was the average annual farm income of the rice farmers.

Farming Characteristics of Rice Farmers

Table 2 shows that most of the rice farmers are tenants (50.0%), while 46.3% are farm owners, and 3.7% are renters. This distribution has important effects on how farmers adopt extension services. Tenant farmers may hesitate to follow new or costly farming practices because they do not own the land, while farm owners are more likely to invest in long-term improvements. Renters, though fewer, may also lack motivation to adopt new methods due to short-term land use. Because of this, extension services should offer practical and low-cost solutions for tenants and promote policies that support land security. In the study of Chavula and Turyasingura (2022), it was mentioned that by having land ownership, the smallholder farmer can make long-term plans and strategies to improve their farms.

Table 2

Farming Characteristics of Rice Farmers

Farming Character	Frequency	Percentage (%)
Tenurial Status		
Farmer-owner	38	46.3
Tenant	41	50.0
Renter	3	3.7
Years of Experience in Rice Farming		
Less than 15 years	19	23.1
16-30 years	27	32.9
More than 31 years	36	43.6
Total Farm Size		
Less than 1 hectare	21	25.4
1.0-2.0 hectare	49	59.6
2.1-3.0 hectares	7	8.5
More than 3.1 hectares	5	6
Area Dedicated to Rice		
Less than 1 hectare	21	25.4
1.0-2.0 hectare	49	59.6
2.1-3.0 hectares	8	9.7
More than 3.1 hectares	4	4.8
Farm Ecosystem		
Irrigated	68	82.9
Rainfed	14	17.1
Source of Water		
Deep well	39	47.0
NIA	20	24.4
Rainwater	13	15.8
River	3	3.6
Tabon	7	8.5

Table 2 also presents data indicating that 43.6% of the total rice farming population had over 31 years of experience, while 32.9% had between 16 and 30 years of experience, and 23.1% had been engaged in rice farming for less than 15 years. This distribution suggests that the majority of rice farmers possess substantial farming experience, which is a critical factor influencing agricultural productivity and decision-making. According to Adesope et al. (2012), farming experience significantly contributes to the adoption of improved agricultural technologies and practices, as experienced farmers are more knowledgeable about farming techniques, risk management, and resource optimization.

In terms of total farm size, the majority of respondents (59.6%) cultivated between 1.0 and 2.0 hectares of land. Additionally, 25.4% of farmers managed farms smaller than one hectare. A smaller proportion tilled larger areas, with 8.5% cultivating between 2.1 and 3.0 hectares, and 6.0% farming more than 3.1 hectares. The data reveal that more than half of the farmer respondents had land areas tilled with rice between 1.0 and 2.0 hectares and still considered smallholder farmers. On average, respondents have a total farm size of 1.5 hectares. According to Republic Act No. 11511, the updated definition of small farmer/fisher folk is those farmers who utilize not more than five (5) hectares of land for a single purpose or a combination of different farming systems. From the total farm size, only one rice farmer who have more than 3.1 hectares dedicated about 2.1 to 3.0 hectares to rice farming. Furthermore, the majority of farmers (82.9%) farm in irrigated ecosystems, while a smaller proportion (16.9%) rely on rained ecosystems. In terms of water sources, 47.0% of farmers use deep wells, followed by 24.4% who source water from the National Irrigation Administration (NIA). Additionally, 15.8% depend on rainwater, 8.5% use tabon water sources, and 3.6% rely on river sources.

Level of Adoption of Rice Farmers in the PalayCheck System After FFS

The level of adoption of rice farmers using the PalayCheck System is shown in Table 3. In terms of Key Check 1 also known as the “Use of Quality Seed of a Recommended Variety,” the rice farmers rated the level of adoption as very high with a weighted mean of 4.29 (*SD* = 0.69). The very high adoption rate of Key Check 1 may be attributed to the government’s seed subsidy program and the promotion of recommended varieties, as a portion of the seeds used by farmers was supplied by the Department of Agriculture (DA) and Local Government Units (LGUs). According to the *PalayCheck System Manual*, experts believe that the provision of high-quality rice seeds can give at least a 10% increase in the yield of rice farmers’ produce. In relation to this, Diaz et al. (2015) cited that a large part of the increase in yield was achieved through the use of high-quality seeds.

For the Key Check 2, or “Well-leveled Field”, the rice farmers level of adoption had a weighted mean of 4.56 (SD = 0.61) indicating very high adoption. The result indicates that most of the rice farmers know the importance of a well-leveled field which is to ensure that irrigation water is uniformly distributed to rice fields. It can be noted that rice farmers have access to farm machinery for land preparation like four-wheel-drive tractors and hand tractors. Samoy-Pascual et al. (2022) cited that well-leveled soil may have enhanced the uniform distribution of water and fertilizer to the crops. Bouman et al. (2007) reported that when fields are unleveled, water might stagnate in depressions, whereas higher parts may become dry which could result in uneven crop emergence as well as uneven fertilizer distribution, and weed problems.

As presented in the table was Key Check 3, which pertains to the practice of "Synchronous Planting Following a Rest Period". The rice farmers’ high level of adoption obtained the lowest value among the Key Checks with a mean of 4.07 (*SD* = 0.84). It was observed that this technology is one of the Key Checks that is difficult to adopt. Some rice farmers adopt the technology to enable efficient use of irrigation and minimize the spread of pests and diseases in a farm area. However, some of them did not practice this technology because of the late delivery of irrigation for land preparation. According to Patindol et al.

(2016), one of the factors that explain why farmers do not follow synchronous planting is the availability of irrigation water.

It was also shown in the table that rice farmers in the PalayCheck System demonstrated a very high level of adoption for Key Check 4, "Sufficient numbers of healthy seedlings," with a weighted mean score of 4.54 (*SD* = 0.67). Based on the field survey and assessment, respondents reported adhering to the recommended seedling rate and ensuring that each hill had one healthy seedling. Some of them said that they did not fully adopt this practice because pest occurred during the seedling stage. The findings on the number of healthy seedlings are consistent with the previous study results indicating that high-quality seeds reduce the required seeding rate and produce strong and healthy seedlings resulting in a more uniform crop with higher yields (Rice Knowledge Bank, 2016).

Adoption of Key Check 5, "Sufficient Nutrients from Tillering to Early Panicle Initiation and Flowering" was rated "very high", with a weighted mean of 4.43 (*SD* = 0.70). Farmers attested that they properly adopted the recommendation in achieving Key Check 5 by knowing the right element the right amount, and the right timing for the fertilizer application. Acierto et al. (2021) needed noted that Key Check 5 is not easy to adopt because it involves significant monetary costs. As observed in the present times fertilizers and other farm inputs are often costly, which may lead farmers to inconsistency follow or adopt the technology.

For Key Check 6, "Avoided Stress Caused by Drought or Excessive Water that Could Affect the Growth and Yield of the Crop," rice farmers had a very high level of adoption with a weighted mean of 4.24 (*SD* = 0.97). This indicates that farmers ensured enough irrigation water supply. Rice Farmers adopted this Key Check for the easy management of land preparation, pest and weed control, and fertilizer application. This finding aligns with a study by PhilRice (2015), which revealed that sufficient water supply supports proper crop establishment, enhances seedling vigor, and promotes normal crop growth and yield. Moreover, providing the right amount of water allows crops to reach their optimal growth and productivity.

Key Check 7, "No Significant Yield Loss Due to Pest" the study revealed high level of adoption with a weighted mean of 4.19 (*SD* = 0.88) among rice farmers. This Key Check remarked as 2nd to the last with lowest mean among nine Key Checks in PalayCheck System. Some of the farmers applied chemical control to control the pest in farm whether it was insect pests, diseases, weeds, rats, snails, and birds instead of use Integrated Pest Management (IPM) approach. Rice Farmers adoption of the Key Check could be due to the fact that IPM focuses on pest prevention and uses pesticides only as needed Patindol et al. (2016)

Key Check 8, "Harvested the Crop at the Right Time," obtained the highest adoption level with a weighted mean of 4.59 (SD=0.58), which is categorized as very high. This result indicates that most farmers readily adopt this practice because it is easier to manage and does not require much time, skill, or financial resources. This finding aligns with Mataia et al. (2015), who reported that farmers are already familiar with and knowledgeable about Key Check 8 since it is generally practiced.

Lastly, Key Check 9, the newly added parameter, "Dried, Cleaned, and Stored Grains Properly" received a very high adoption level with a weighted mean of 4.49 (*SD* = 0.74). This result indicates that, although the PalayCheck System is relatively new, it was readily adopted by the farmers. It was also observed that farmers typically dry, clean, and store palay only for their own consumption, while the majority of their harvested palay is sold immediately in its fresh, undried form.

To summarize the result, among nine Key Checks in the PalayCheck System, Key Check 8, "Harvested the Crop at the Right Time," had the highest adoption level because of the practice easy to implement, as it requires less time, skill, and financial resources. On the other hand, Key Check 3, "Synchronous Planting After a Rest Period," recorded the lowest adoption level, among the Key Checks, this lower adoption may be due to challenges such as the late delivery of irrigation water and coordination among farmers, making it difficult to practice synchronized planting across fields.

Table 3

Level of Adoption of Rice Farmers in the PalayCheck System After FFS

Items	Mean	SD	Verbal Interpretation
Key Check 1. Variety and seed selection "Use-high quality seeds of are recommended variety"	4.29	0.69	Very High Adoption
Key Check 2. Land Preparation "Well-leveled field"	4.56	0.61	Very High Adoption
Key Check 3. Crop Establishment "Practiced synchronous planting after a rest period"	4.07	0.84	High Adoption
Key Check 4. Crop Establishment "Sufficient number of healthy seedlings"	4.54	0.67	Very High Adoption
Key Check 5. Nutrient Management "Sufficient nutrients from tillering to early panicle initiation (EPI) and flowering"	4.43	0.70	Very High Adoption
Key Check 6. Water Management "Avoided stress caused by drought or excessive water that could affect the growth and yield of the crop"	4.24	0.97	Very High Adoption
Key Check 7. Pest Management "No significant yield loss due to pests"	4.19	0.88	High Adoption
Key Check 8. Harvest Management "Harvested the crop at the right time"	4.59	0.58	Very High Adoption
Key Check 9. Postharvest Management "Dried, cleaned, and stored grains properly"	4.49	0.74	Very High Adoption

Legend: 4.21–5.00 = Very High Adoption; 3.32–4.20 = High Adoption; 2.61–3.40 = Moderate Adoption; 1.81–2.60 = Low Adoption; 1.00–1.80 = Very Low Adoption.

Benefits Obtained of Rice Farmers in the PalayCheck System After FFS

The benefits obtained by rice farmers in the adoption of PalayCheck System after FFS are shown in Table 4. Overall, the benefits obtained from participating in the FFS were rated very high by the rice farmers. Among the benefits obtained, the highest mean value was that the decision-making ability of farmers had been strengthened/improved, with a mean of 4.72 (Table 4). It can be noted that attending FFS can influence the decision-making ability of farmers. This was followed by "confidence to manage and improve my rice farming activities through the adoption of some appropriate technologies learned in FFS," with a mean of 4.71. It also highlighted that attending and participating in the FFS can boost farmers' confidence in managing their farms. Related to this, in the study of Casinillo (2023), it was observed that the FFS training program improved the productivity of rice farmers and positively influenced their economic income and decision-making process in the farming system.

However, the lowest weighted mean value was obtained for the statement*, "I obtained higher yield through my participation in FFS activities"* (*M* = 4.48), which is still marked as indicating very high benefits. This implies that farmers recognize yield improvement as a benefit, but may not see it as the most significant outcome of FFS participation. This is supported by related studies such as Van den Berg and Jiggins (2007), who found that FFS programs often lead to stronger impacts on farmers' knowledge and practices rather than immediate increases in yield.

Table 4

Benefits Obtained of Rice Farmers in the PalayCheck System After FFS

Items	Mean	SD	Verbal Interpretation
1. The FFS enhance my skills and knowledge.	4.67	0.49	Very High
2. Had a new farmer acquaintance that I could share farming skills with.	4.55	0.57	Very High
3. My decision-making ability has been strengthen/ improved.	4.72	0.48	Very High
4. I am now confident to manage and improve my rice farming activities though adoption of some appropriate technologies learned in FFS.	4.71	0.46	Very High
5. Obtain higher yield through my participation in FFS activities.	4.48	0.74	Very High
Mean	**4.63**	**0.56**	**Very High**

Legend: 4.21–5.00 = Very High; 3.41–4.20 = High; 2.61–3.40 = Moderate; 1.81–2.60 = Low; 1.00–1.80 = Very Low

Conclusions

In conclusion, the study found that rice farming in Bulacan is predominantly undertaken by older adults aged 50 years and above, primarily consisting of married male high school graduates. The majority of rice farms are managed by small family units of one to four members, with annual farm incomes ranging from ₱0 to ₱40,000. Most farmers are long-term tenants, having been engaged in rice cultivation for over 31 years on farm sizes ranging from 1.0 to 2.0 hectares, devoted exclusively to rice production and typically irrigated through deep wells.

The findings also underscore the strong adoption of the PalayCheck System among registered rice farmers, with generally very high levels of adoption across most Key Checks. However, Key Check 3 (Practiced synchronous planting after a rest period) and Key Check 7 (No significant yield loss due to pests) reflected slightly lower, yet still high, adoption rates.

Furthermore, the study highlights that participation in Farmer Field School (FFS) programs significantly enhanced farmers' decision-making capabilities and confidence in managing and improving their rice farming practices. This empowerment, driven by the application of appropriate technologies introduced through FFS, contributed to increased productivity and improved farm outcomes.

Recommendations

Based on the results of the study, several recommendations are proposed to benefit rice farmers. First, implementers are encouraged to strengthen the conduct of the Farmer Field School by adopting a farmer-centered learning approach. This includes promoting participatory and experiential learning methods, setting up demonstration farms where farmers can observe and apply the PalayCheck principles, and encouraging farmer-to-farmer learning by involving successful adopters as resource persons. Second, stakeholders are advised to conduct regular consultation meetings with rice farmers in Bulacan to identify their needs and deliver appropriate interventions, such as extension services and necessary farm inputs. These efforts aim to ensure that support provided is timely, relevant, and aligned with the farmers' actual concerns.

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