

Factors Affecting Productivity and Challenges Encountered to Rice Competitiveness Enhancement Fund (RCEF) Mechanization Program among Farmers' Cooperative and Associations (FCAs) of Guimba

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Abstract— *The study investigates the factors influencing productivity and the challenges faced by Farmers' Cooperative and Associations (FCAs) participating in the Rice Competitiveness Enhancement Fund (RCEF) Mechanization Program in Guimba, Nueva Ecija, Philippines. This program aims to enhance the competitiveness of rice farming by providing modern mechanization equipment and support to smallholder farmers. The research employs a quantitative type of research through survey questionnaires to gather data. Findings reveal several key factors affecting productivity, including access to and utilization of mechanization equipment, training and technical support, and the availability of credit facilities. Additionally, the study identifies a range of challenges faced by FCAs in implementing the RCEF Mechanization Program, including issues related to the maintenance and repair of equipment, coordination among members, and the need for improved access to information and resources. The study underscores the importance of addressing these factors and challenges to maximize the impact of the RCEF Mechanization Program on rice farming productivity and the overall competitiveness of the sector. The findings offer valuable insights for policymakers, agricultural extension services, and farmer cooperatives in designing and implementing effective interventions to support smallholder rice farmers in Guimba, Nueva Ecija, and similar agricultural communities across the Philippines.*

Keywords— *Farmers' Cooperatives and Associations, Income, Mechanization, Productivity, RCEF*

I. INTRODUCTION

Developing agricultural mechanization is an important stage in the modernization of farmers. Introducing proper machinery to farmers will ensure their agricultural production is not only more environmentally sustainable but is more efficient in growing crops. It is an advanced representative of modern agricultural productivity that plays a vital role in enhancing agricultural labor conditions, promoting agricultural economic output and adjusting agricultural industrial structure (Qiao, 2017).

In the Philippines, agriculture is an important part of the economy and it employs a large percentage of the country's workforce. Unfortunately, the country is still classified as low mechanization level because of the low buying capability of farmers, abundance of rural labor, very small landholdings of every farmer, high cost of machines, and some government policies not favorable to mechanization agriculture. In line with this, the Philippine Center for Postharvest Development and Mechanization (PHilMech) implements a program that is suited to the farmer's needs in

terms of machinery. Rice Competitiveness Enhancement Fund (RCEF) Mechanization Program aims to raise farmers' productivity, profitability and global competitiveness through strengthened access and use of appropriate production mechanization technologies.

The RCEF Mechanization Program is devised to give support to the Farmers' Cooperative and Associations (FCAs) for the utilization of equipment in farming. The goal of mechanization is to lead sustainable agricultural development and to have an appropriate technology for greater production. According to Wilfrido Enverga, a chairman of the House of Committee on Agriculture and Food, RCEF is a game changer which helps agricultural challenges.

II. METHODOLOGY

This study is a quantitative type of research that aims to determine the factors affecting the productivity of the RCEF Mechanization Program among FCAs. It used descriptive statistics to describe the profile (Subia, Mangiduyos & Turgano, 2020), productivity, factors affecting productivity and the challenges encountered by respondents.

The farmer-respondents in this study were described according to their profile; number of laborers, land holding, and number of members in the association, and according to their productivity; Technical progress, productivity growth, capital, and labor. Followed by the survey questionnaire related to factors affecting productivity and challenges encountered by the RCEF mechanization program.

III. RESULTS AND DISCUSSION

In terms of demographic profile, those aged 41-50 have the highest frequency of 13 with 43.33%, while those aged 61 and above have the lowest frequency of 1 with only 3.33%, the remaining groups aged 31-40 have 23.33% and 51-60 has 30%. The respondents consisted of 24 males with 80% of the total number and the rest females with a frequency of 6 or 20%. Land ownership was clustered to less than 1 hectare (10%), 1 hectare – 2 hectares (23.33%), 2 hectares – 3 hectares (40%), and more than 3 hectares (26.67%). Regarding members of the FCA, 12 (40%) of the respondents belongs to an association with 41-50 members which is the most frequent while respondents that belong to an association with 51-60 member only have a frequency of 1 (3.333%) and other ranges of less than 30 has 2 (6.667%), 31-40 has 6 (20%), and 61 and above with a frequency of 9 (30%).

According to the result of the descriptive statistics on productivity in terms of productivity growth, there are ten indicators rated by the respondents and a weighted mean of

3.507. The fourth and last statement, indicating that the mechanization program has significantly increased rice yield and contributed to a reduction in post-harvest losses and waste, has the highest mean of 3.6, while the ninth statement has the lowest mean of 3.4, indicating mechanization helped in better crop management. In terms of the indicators of income, the gathered data has a weighted mean of 3.273, where the statement saying that the income of the farmers increased since their involvement in the RCEF mechanization program has the highest mean of 3.6, whereas the statement saying that income gained during the program is sufficient to cover farming expenses has the lowest mean of 3. With regard to labor, the respondent's rating has a weighted mean of 3.477. The statement that the use of modern farming equipment through the RCEF Mechanization Program has reduced the labor required for rice farming has a mean of 3.667, while the statement that laborers are effectively trained to operate and maintain mechanized equipment provided by RCEF has the lowest mean with only 3.367.

The descriptive statistics on factors affecting productivity in terms of the availability of equipment have a weighted mean of 3.319. Statements saying that the equipment is technologically up-to-date and capable of handling modern farming needs and that the equipment's performance significantly contributes to increased farm productivity have the highest mean of 3.633, while 3.033 is the lowest mean for the statements that farmers have easy access to information about the availability and usage of mechanized equipment and machines provided by the RCEF Mechanization Program and are readily available when needed. On the factors affecting productivity in terms of awareness, the weighted mean is 3.28, where two of the statements mark the highest, with a mean of 3.5 stating that the farmers are aware of the existence of the RCEF Mechanization Program. While 3.1 is the markedly lowest, stating that farmers rely on credible sources for information about the RCEF Mechanization Program.

The descriptive statistics on challenges encountered in terms of literacy on machinery have a weighted mean of 3.223. Statements saying that limited awareness or information about the RCEF Mechanization Program has hindered our farmer's cooperative or association's participation have the highest mean of 3.333, while three of the indicators have the lowest mean of only 3.167. The statements are that seasonal factors, such as weather conditions, significantly impact my income despite mechanization, the availability of qualified trainers or instructors is insufficient for teaching machinery operation, and challenges in machinery literacy hinder my full participation in the RCEF mechanization program. In terms of the distribution of machinery, the data gathered has a weighted mean of 3.013, where the statement that

additional training and technical support should be made available to improve access to mechanization was marked highest with a mean of 3.267, while the statement that the distribution process for machinery in the RCEF program is inefficient and time-consuming and there is a lack of transparency in the machinery distribution process was marked lowest with a mean of 2.767.

On the test correlation between productivity and factors affecting productivity, productivity growth and availability of equipment was identified with no correlation with a correlation coefficient of 0.127. Four pairs were determined with weak correlation coefficients: income and availability of equipment (0.309), labor and availability of equipment (0.476), productivity growth and awareness (0.331), labor and awareness (0.314). In addition, one has a moderate correlation with a coefficient of 0.753, income and awareness.

On the test correlation between productivity and challenges encountered, the three variables under productivity; productivity growth, income, and labor have no correlation to the distribution of machinery with correlation coefficients of 0.039, 0.197 and -0.055. Productivity growth and labor have a weak correlation to literacy in machinery with both coefficients of 0.413 while income and literacy in machinery were identified with a strong correlation with a coefficient of 0.967.

The demographic information is significant as it provides insights into the age distribution of the surveyed population. It suggests that a significant portion of the respondents falls within the 41-50 age bracket, which may have implications for understanding their perspectives and needs. Gender breakdown can be vital in understanding potential gender-specific factors or preferences related to the study's subject matter. Distribution on land ownership provides valuable information about the distribution of land resources among the surveyed population, which can have implications for agricultural practices, income, and livelihoods. The analysis of FCA's number of members sheds light on the distribution of respondents among different cooperative association sizes, which can influence factors like collective decision-making, resource pooling, and the overall functioning of these associations.

The analysis of productivity-related indicators indicates an overall positive perception among respondents. The weighted mean of 3.507 suggests a moderately favorable view of the program's impact on productivity. The fourth statement, which highlights the significant increase in rice yield and the reduction in post-harvest losses and waste due to the mechanization program, received the highest mean of 3.6. This indicates that a majority of respondents believe that the program has been successful in enhancing rice

production and minimizing losses, which is a crucial aspect of agricultural sustainability. In terms of income-related indicators, the weighted mean of 3.273 indicates a generally positive sentiment among respondents, slightly lower than the productivity aspect. The statement indicating an increase in farmers' income due to their involvement in the RCEF mechanization program received the highest mean of 3.6. This suggests that a significant proportion of respondents believe that the program has been successful in boosting their income, which is a crucial goal of agricultural development initiatives. Regarding labor-related indicators, the weighted mean of 3.477 indicates that respondents generally view the program positively in terms of labor impact. The statement suggesting that the use of modern farming equipment through the RCEF Mechanization Program has reduced the labor required for rice farming received the highest mean of 3.667. This signifies that most respondents believe that the program has been successful in decreasing the labor-intensive nature of rice farming, which can lead to increased efficiency and reduced physical strain on farmers. This supports the study of Chavas (2008) that mechanization is one of the factors contributing to rapid productivity growth in agriculture. Alternatively, the study of Thomas Daum and Regina Birner (2020) found mixed evidence that mechanization can have a positive effect on yields. The result states that there is a consensus that mechanization increases labor-productivity and several causal mechanisms by which mechanization makes it possible to increase land productivity.

Statements indicating that the equipment is technologically up-to-date and capable of handling modern farming needs and that the equipment's performance significantly contributes to increased farm productivity received the highest mean of 3.633. This suggests that respondents largely believe that the mechanized equipment provided by the RCEF Mechanization Program is technologically advanced and effective in enhancing farm productivity. This is a positive finding as modern equipment can significantly impact agricultural efficiency. Statements indicating that farmers are aware of the existence of the program received the highest mean of 3.5. This indicates that a significant portion of respondents is aware of the program's existence. High awareness is essential for the program's success as it ensures that farmers have the opportunity to access its benefits. In conclusion, the analysis reveals a generally positive perception among respondents regarding equipment availability and awareness about the RCEF Mechanization Program. However, there are variations in the level of positivity across different aspects within these categories.

The analysis of challenges related to machinery literacy reveals a moderately positive perception among respondents, with a weighted mean of 3.223. The statement indicating that

limited awareness or information about the RCEF Mechanization Program has hindered the farmer's cooperative or association's participation received the highest mean of 3.333. This suggests that respondents believe that a lack of awareness or information about the program has been a significant hindrance to cooperative or association participation. Addressing this issue by improving information dissemination could potentially enhance participation rates. In terms of the distribution of machinery, the data reveals a moderately positive perception among respondents, with a weighted mean of 3.013. The statement indicating that additional training and technical support should be made available to improve access to mechanization received the highest mean of 3.267. This suggests that respondents believe that offering additional training and technical support can enhance access to mechanization, which is a valuable insight for program planners. Adequate training can improve the effectiveness of mechanized farming. Addressing challenges related to machinery literacy, such as awareness, training, and seasonal factors, is crucial to maximize the program's impact. Ensuring that farmers have access to information and training resources can help them overcome literacy barriers.

The data analysis shows that there is no significant correlation between productivity growth and the availability of equipment. This means that changes in the availability of equipment do not appear to have a strong impact on the overall productivity growth of the respondents. A weak positive correlation is observed between income and the availability of equipment. While there is a connection between income levels and equipment availability, it's not a very strong one. There is a weak positive correlation between labor and the availability of equipment. This suggests that as the availability of equipment increases, the reliance on manual labor tends to decrease slightly. A weak positive correlation between productivity growth and awareness about the RCEF Mechanization Program implies that being more aware of the program might contribute to a slight increase in productivity growth. Similar to productivity growth, there is a weak positive correlation between labor and awareness. This suggests that having a higher awareness of the program may lead to a slight reduction in the reliance on manual labor. However, the correlation is not strong, indicating that labor is influenced by other factors as well. The strongest correlation observed in the analysis is between income and awareness about the RCEF Mechanization Program. A moderate positive correlation of 0.753 suggests that being more aware of the program is significantly associated with higher income levels among respondents. This indicates that awareness plays a more substantial role in influencing income compared to the other factors studied. In summary, the correlation analysis provides valuable insights

into the relationships between various factors and productivity, income, and labor within the context of the RCEF Mechanization Program. While some weak correlations were identified, the most notable finding is the moderate correlation between income and awareness, indicating that raising awareness about the program may have a substantial impact on farmers' income levels.

The data analysis indicates no significant correlation between productivity growth and the distribution of machinery. This suggests that changes in the distribution of machinery do not appear to have a substantial impact on productivity growth among the respondents. Similarly, there is a weak positive correlation between income and the distribution of machinery. While there is some connection between income levels and the distribution of machinery, it is not a strong relationship. This implies that income levels are influenced by various factors beyond the distribution of machinery. There is no significant correlation between labor and the distribution of machinery. This means that changes in the distribution of machinery do not seem to be related to changes in labor utilization among the respondents. A weak positive correlation is observed between productivity growth and literacy in machinery. This suggests that respondents with higher levels of machinery literacy tend to experience slightly higher productivity growth. However, the correlation is not strong, indicating that other factors likely play a more significant role in influencing productivity growth. Similarly, there is a weak positive correlation between labor and literacy in machinery. This implies that respondents with higher levels of machinery literacy tend to rely slightly less on manual labor. However, the correlation is not strong, indicating that labor decisions are influenced by multiple factors. The most notable finding is the strong positive correlation between income and literacy in machinery. This indicates that respondents with higher levels of machinery literacy tend to have significantly higher income levels. Machinery literacy appears to be a critical factor influencing income among the respondents.

IV. CONCLUSIONS AND RECOMMENDATIONS

Understanding the conclusions can guide program planners and policymakers in addressing specific challenges and promoting factors that contribute to increased productivity and income in the context of the study. Program planners and policymakers should closely examine the study's conclusions and use them as a roadmap for targeted interventions and policy adjustments to enhance agricultural productivity and income.

1. Improving the distribution process for machinery is essential to enhance program effectiveness. Implement a

comprehensive overhaul of the machinery distribution process, focusing on efficiency and transparency, to ensure that farmers receive the equipment they need promptly and without unnecessary obstacles.

2. Addressing challenges related to machinery literacy, such as awareness, training, and seasonal factors, is crucial to maximize the program's impact. Develop and implement tailored training programs that address the specific machinery literacy challenges faced by farmers, with a focus on increasing awareness, providing year-round training opportunities, and adapting to seasonal demands.

3. Ensuring that farmers have access to information and training resources can help them overcome literacy barriers. Establish easily accessible information centers and online platforms that provide farmers with up-to-date information on machinery availability, training schedules, and best practices, ensuring information is readily available and user-friendly.

4. To improve the program's effectiveness, it is important to address the areas where perceptions are less favorable. Conduct targeted outreach and communication efforts to improve the program's image and perception among farmers. This includes enhancing communication channels, promoting transparency, and addressing misconceptions or negative perceptions.

5. Efforts should be made to provide farmers with reliable sources of information about the program to build trust and credibility. Collaborate with local agricultural extension services, community leaders, and trusted intermediaries to disseminate accurate information about the program. Establish mechanisms for feedback and continuous improvement to build trust over time and ensure long-term program sustainability.

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