Total Productive Maintenance in the Philippine Rice Production Sector

Charmine Sheena R. Saflor and Marvin I. Noroña
School of Industrial Engineering and Engineering Management
Mapúa University, Manila, Philippines
saflorcharminesheena@gmail.com, minorona@mapua.edu.ph

Abstract

Rice production is an important aspect of the Philippine food supply and economy. Mechanized farming has received extensive government support with farm equipment and training on the basics of operations, repairs and maintenance through local cooperatives tasked with its future replacement. Thus, it would be imperative to systematize maintenance practices to ensure proper upkeep and operations. Extant literature highlighted benefits of total productive maintenance (TPM) in manufacturing environments but not in the agricultural sector, particularly in rice production. This research was aimed to institutionalize TPM practices at the local level by showing its benefits in terms of the better equipment utilization, and improvement in yield. The study chose for its research locale the province of Occidental Mindoro, an agricultural area devoted for rice production, which is a source of employment of almost 80% of its population. After an assessment of maintenance practices, areas of improvement were incorporated in a TPM strategy model grounded at the local level, not as complex as in a manufacturing setup, but a straightforward approach of equipping the farm cooperative personnel with a TPM mind set in view of the benefits of longer equipment lives and improved reliability that will consequently maximize crop yield and profitability.

Keywords
Rice Production, Total Productive Maintenance (TPM), Farm Cooperative, TPM Strategy Model

1. Introduction

In the passage towards a world's class food provider, several sectors realize the necessity to maintain equipment and machines. Because of the high market demand, these sectors were pressed to adopt new technologies with no options for failures and wastes (Mwanza et al., 2015). These drastic changes in technology worldwide have carried many modifications in machine and equipment applicable in different sectors. The agricultural sector, for example, is becoming more technologically advanced too. Because of these changes, machine and equipment maintenance necessities have also altered and became more advanced.

Agriculture plays a vital role in the economy of the Philippines. The Philippine economy posted a 6.0% growth in 2018, with Agriculture, Hunting, Forestry, and Fishing (AHFF) contributing 7.4%. Although the Philippines is a minor exporter of different agriculture products, it remains significant since it is the country's 37% workforce. The government is also focused on attaining long-term food production, and supply sustainability with its fast-growing population has increased to approximately 100.98 million in 2016 (PSA, 2016).

The Philippine agricultural sector has four sectors, namely: livestock, forestry fisheries, and farming. In the farming industry, the country's main crops are sugarcane, coconut, coffee, mangoes, rice, corn, bananas, pineapple, mangoes, tobacco, and abaca. Rice is the major crop in the Philippines and is planted in about 30% of the country's total area harvest (David Dawe, 2005). Mendoza (2008) stated that rice farming practices in the Philippines involve the following: seedling preparation, spacing, and row, weed and irrigation management, harvesting, spreading and incorporating straw manually, but this has changed. In the Philippines, rice production has been continually shifting because of technological development, and the government proposed agendas with the people's active trials and need. A tremendous demand of these requirements is the unceasing growing population that has to be served and the cost decline to make rice farming gainful to the farmers (Bautista & Javier, 2005). Mechanizing the rice production is the result of labor when a job is done physically; the exhaustive power was necessary for operations like the growing cost of manual work and preparation and the substantial number of time devoted to having a good quality of rice. Simultaneously, mechanization in rice production is more linked with engine or motor functioned equipment (Bautista & Javier, 2005).

In the Philippines, the maintenance cost of the machineries in the agricultural sector is becoming a huge problem (Onate, 2018). Since most of the farmers do not have enough capitalization, most of the farmers are taking credit loans to be able to afford the machineries for their farm in order to cope up with the competition. But due to unexpected breakdown of the machineries and equipment, their profit is becoming less. Farmers in the Philippines are not very much aware of best practices in the maintenance of agriculture machineries and equipment. They tend to buy, use and dispose machines and equipment, since maintenance in the agricultural sector is practiced on a reactive mode on a need basis. Most of the time, farmers are using the machines until it wear out without the proper maintenance making the life cycle of the machines less than it tends to be (Onate, 2018).

However, there is a dearth of literature on maintenance strategies and total productive maintenance for agricultural machines and equipment, particularly in rice production. The results of the maintenance studies conducted in manufacturing showed that cost-effectiveness and productivity significantly improved. It would be interesting to research whether total productive maintenance can be adopted in Philippine rice production to address local issues of high operations and maintenance costs, given its thrust for food sustainability and affordability. Hence, this research study is aimed at three things:

1. Assess and evaluate the maintenance practices in mechanized rice production areas in the Philippines.
2. Determine the significant factors affecting the decisions related to rice production players' mechanization and maintenance practices in the Philippines.
3. Formulate a TPM-based strategy and model in employing best practices in the maintenance of machines and equipment in the rice production sector towards better productivity and cost-efficiency.

This research undertaking will benefit the rice-producing sector in terms of the minimalization of cost production, efficient capital utilization, and improved productivity. This study is expected to redound the reduction of production cost, perceived results of maximization of capital utilization. The farming community will also benefit from this study since minimizing the total overall cost will be the thematic approach and not just the cost of acquiring, operating, and maintaining machines & equipment in the rice production sector with the perspective of making this staple food available and affordable for the Filipinos.

The scope of the study covered Philippine rice-producing areas with predominantly mechanization methods such as Nueva Ecija in North Luzon, the top rice producer in the entire Philippines; Mindoro, the top producing province in Region 4 (MIMAROPA and CALABARZON) in South Luzon, and Lanao del Norte and the Davao Province in Mindanao. Actual observations and available data from the Department of Agriculture in research will be the primary source of information, subject to accessibility and sensitivity to confidentiality. It will only focus on mechanizing the significant activities of planting, harvesting, and post-production engaged in by the various stakeholders and players in the rice production sector, including individual rice farmers, millers, traders, resellers, and government agencies like the Department of Agriculture and LGUs.

2. Methodology

2.1 Conceptual Framework

It was widely recognized that Total Productive Maintenance in the manufacturing sector is effectively improving productivity and efficiency of industrial machines and equipment. It is in this light that this research sought to find out if TPM can be adopted in the Philippine rice production sector which is mainly characterized by the following: (a) susceptibility to climate changes and natural disasters; (b) availability of farm equipment mainly comes from imports; and (c) farm gate prices governed the individual rice farmers, millers, traders and resellers in their operations and cost performance. These all led to risk averseness of rice production players to capital investment in machines &

equipment, not to mention that traditional farm practices have been sustainable and profitable. The conduct of the research will be guided by the following conceptual framework shown in figure 1.

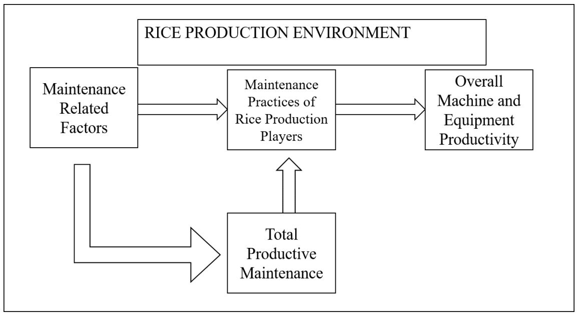

Figure 2. Conceptual Framework

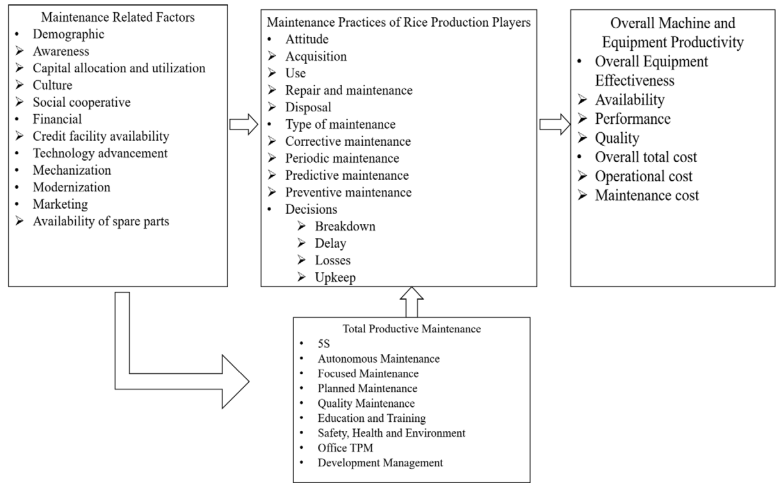

Figure 2. Operational Framework

Maintenance related factors drive the maintenance practices of players in the rice production. These maintenance practices consequently have an effect on the availability, quality and performance of machine and equipment. It is posited in this research study that TPM will greatly influence the maintenance practices of rice production sector players and will ultimately result in better machine and equipment productivity. The study will attempt to prove that the adaptation of TPM will significantly impact the overall equipment effectiveness of machine and equipment in the rice production sector in the Philippines. For the objectives to be attained, the following hypotheses were developed accordingly:

$H1_0$: The maintenance related factors do not drive (no significant relationship) the maintenance practices of rice production players.
$H1_a$: The maintenance related factors drive (significant relationship) the maintenance practices of rice production players.
$H2_0$: There is no significant relationship between the maintenance practices of rice production players and the productivity of machine and equipment.
$H2_a$: There is a significant relationship between the maintenance practices or rice production players and the productivity of machine and equipment.
$H3_0$: Total Productive Maintenance does not drive (no significantly) affect the maintenance practices of the rice production players.
$H3_a$: Total Productive Maintenance drive (significantly) affects the maintenance practices of the rice production players.
$H4_0$: Total Productive Maintenance does not significantly affect the overall machine and equipment productivity.
$H4_{a:}$ Total Productive Maintenance significantly affects the overall machine and equipment productivity.

To be able to test the above hypotheses, the following operational framework in figure 2 were used in designing the step by step procedures of this research paper. It served as the guide in conducting the research and identify the variables that focused on the research decision. Following, therefore are the definition of these variables.

2.5 Data Gathering

Based on the needed variables for the operational framework, data will be gathered using primary information and secondary records. The main records will be the documents that will be requested and gathered in the Department of Agriculture's office. Specifically, the primary data needed were the following: number of farmers, land area of farmers, financial assistance or credit facility, and technology advancement plans.

Secondary data came from the survey and interviews that were conducted to the rice production sector players such as the farmers, millers, traders and operators. The researcher focused in the following: awareness of the maintenance practices, type of maintenance, type of damages experienced, causes of the maintenance problems, the overall equipment effectiveness rating of the farms, operational costs, maintenance costs, capital allocation, social cooperative, credit facility, and attitude in buying and using machines and equipment

Since the study addressed the whole rice production sector, the sample came from the Department of Agriculture's office. The study used purposive sampling as the population involved was constrained with the accessibility and availability. This sampling was chosen by the researcher since not all the farms are already mechanized. This method also defined the sample size at the end of data gathering. According to Lewis & Sheppard (2006), purposive sampling is an informant selection technique that does not need causal philosophies or model that set off number of informers. It is finding the individuals and people who can and are eager to provide data by quality of knowledge and understanding.

Research questionnaires were distributed in the rice production players in Occidental Mindoro. As stated by Asejo (2019), Occidental Mindoro, Nueva Ecija and Lanao del Norte have the same practices in terms of rice production. Respondents were farmers, millers, traders and operators in the said sector that are highly knowledgeable in the rice production.

3. Results and Discussion

In order to assess and evaluate the maintenance practices of the rice production players, descriptive statistics was used. Based on frequency count and percentage analyses, the enabling factors of maintenance related factors of agricultural players are characterized by farmers and owners (46%), involved in rice production for 2-5 years (36%), having less than 5 hectares farmland (51%), not allocating funds for maintenance of machine (46%), member of a cooperative for financial support (66%), willingness to buy new machines for the farm (99%), having less than 5 machines and equipment in the farm (41%), used of machines in different farm operations such as soil preparation, planting, harvest, and post-harvest (42%), used of different types of equipment except miller and dryer (43%), having no knowledge about the ATI training for maintenance (71%), not attended the ATI training for maintenance practices (19%), having assigned employee for the maintenance of machines (52%), not satisfied with maintenance worker performance (28%), being 31-40 years old (37%), not renting machines and equipment (81%), and sometimes having available spare parts for the machines (52%).

3.1 VARIMAX R-Type Factor

The VARIMAX R-type factor which is type of the Factor Analysis and Multi-Variate was conducted. Using this statistical tool, the original structure of 56 variables was lessen. Based on table 1, four factors best characterized the statistics in terms of variance explained (70.11%). These factors named (1) Overall Machine and Equipment Productivity, (2) Maintenance Related Factors, (3) Maintenance Practices, and (4) Total Productive Maintenance. Table 9 details the Eigenvalues, explained variance, factor loadings, , communalities and Cronbach's alpha for the four-factor solution. As a regulation, factor loadings which are greater than ± 0.5 are mostly measured essential for real-world significance. All loadings which provided the connections between the variables and the factors exceeded the 0.5 verge level with loading ranging from 0.647-0.819. Also, Cronbach's alpha results exceeded the recommended value of 0.7 and ranged from 0.708-0.899 indicating that the measure used was reliable. The communalities results ranged from 0.507-0.894 characterize the relative between the variable and all other factors.

The said multi-variate statistical tool retained 21 variable solutions, removing 35 variables. Two variables cold maintenance cost/breakdown cost (.716) and operational cost (.480) are grouped together under outcome called overall machine and equipment productivity. Five variables called involvement in agriculture, years in the field of rice production, land area of farm, willingness to buy new machine and equipment and number of machines and equipment composed the enabling factors called maintenance related factors. This enabling factor is best manifested in land area of farm (.821) and willingness to buy new machine and equipment (.944).

The remaining ten variables called has experience machine and equipment breakdown, use of machine and equipment in different operations, type of equipment used, amount for maintenance, allocating fund for maintenance, knowledge in ATI training for maintenance practices, assigned employee responsible for the maintenance of machine and equipment, satisfied with the maintenance worker performance, attendance to ATI training for maintenance practices and times attended ATI training for maintenance practices composed another enabling factors called maintenance practices. This factor is best manifested by the has experience machine and equipment breakdown (.944), times attended ATI training for maintenance practices (.943), assigned employee responsible for the maintenance of machine and equipment (.848) and satisfied with the maintenance worker performance (.828).

Four variables called system for maintenance planning for the fault detection, When procuring new machine, care given to easy maintenance and repair potentials, Workers included in the planning of new machine and equipment, Attendance to other trainings seminars about maintenance and New workers trained on the currently existing maintenance program composed the enabling factor Total Productive Maintenance. It is best manifested by new workers trained on the currently existing maintenance program (.897).

Table 1. VARIMAX Rotated Factor Loading and Communalities for the Four-Factor Solution

No	Factor	Description	Factor Loading	Communalities
1	Overall Machine and Equipment Productivity Variance=29.928 Eigenvalue=6.584 Cronbach Alpha=.899	Maintenance cost/breakdown cost per month	.716	.684
		Operational cost per cropping	.480	.507
2	Maintenance Related Factors Variance=17.706 Eigenvalue=3.895 Cronbach Alpha=.715	Involvement in Agriculture	.664	.556
		Years in the field of rice production	.541	.528
		Land area of farm in hectares	.821	.852
		Willingness to buy new machines and equipment for the farm	.944	.892
		Number of machines and equipment in the farm	.678	.796
3	Maintenance Practices Variance=13.203 Eigenvalue=2.905 Cronbach Alpha=.708	Has experienced machine and equipment breakdown	.944	.892
		Use of machines and equipment in different operations	.717	.698
		Types of equipment used	.529	.506
		Amount for maintenance	.761	.749
		Allocating funds for maintenance	.410	.526
		Knowledge about the ATI training for maintenance practices	.613	.650
		Assigned employee responsible for the maintenance of machines and equipment	.848	.760
		Satisfied with maintenance worker performance	.829	.689
		Attendance to ATI training for maintenance practices	.716	.724
		Times attended ATI training for maintenance practices	.943	.894
4	Total Productive Maintenance Variance=9.271 Eigenvalue=2.040 Cronbach Alpha=.709	Maintenance and repair preparation and regulator system is use in order to detect conditions and to plan maintenance and preservations	.656	.524
		When procuring new machine, care given to easy maintenance and repair potentials	.759	.637
		Workers included in the planning of new machine and equipment	.672	.655

	New workers trained on the currently existing maintenance program	.897	.810

3.2 Regression Analysis

The Regression analysis clarified the result of the factor analysis which is shown in Table 2. The analysis indicates that Maintenance Related Factors significantly affect the Maintenance Practices (β=.816, p=.000). The first null hypothesis stating that maintenance related factors do not drive (no significant relationship) the maintenance practices of rice production players is rejected. Thus, the first alternate hypothesis that maintenance related factors drive (significant relationship) the maintenance practices of rice production players is accepted.

Likewise, Maintenance Practices significantly affect Overall Machine and Equipment Productivity (β=.727, p=.000). The second null hypothesis stating that there is no significant relationship between the maintenance practices of rice production players and the productivity of machine and equipment is rejected. Thus, the alternate hypothesis that there is a significant relationship between the maintenance practices or rice production players and the productivity of machine and equipment is accepted.

Also, Total Productive Maintenance significantly affect the overall machine and equipment productivity (β=.431, p=.000). The third null hypothesis stating that Total Productive Maintenance does not significantly affect the overall machine and equipment productivity is rejected. Thus, the alternate hypothesis that Total Productive Maintenance significantly affect the overall machine and equipment productivity is accepted.
Also, Total Productive Maintenance significantly affect Maintenance Practices (β=.384, p=.000). Meanwhile, the fourth null hypothesis stating that Total Productive Maintenance does not significantly affect the maintenance practices of the rice production players is rejected. The alternate hypothesis that Total Productive Maintenance significantly affect the maintenance practices is accepted.

In addition to four hypotheses, the result also indicates that the maintenance related factors significantly affect the overall machine and equipment productivity. Lastly, the Total Productive Maintenance significantly affects the Overall machine and equipment productivity. These two factors has been added to the proposed framework.

Table 2. Regression analysis of the enabling and outcome factors

Independent Variable	Dependent Variable	Beta	Significance	Interpretation
Maintenance Practices	Maintenance Related Factors	.816	.000	Significant
Overall Machine and Equipment Productivity	Maintenance Related Factors	.727	.000	Significant
Total Productive Maintenance	Maintenance Related Factors	.384	.000	Significant
Overall Machine and Equipment Productivity	Maintenance Practices	.697	.000	Significant
Total Productive Maintenance	Maintenance Practices	.397	.000	Significant
Total Productive Maintenance	Overall Machine and Equipment Productivity	.431	.000	Significant

For the identification of the significant factors of the four main factors, multiple regression has been used. The regression result in Table 3 shows that Involvement in Agriculture (β=.178, p=.003), Land area (β=.336, p=.000), and

Number of machine and equipment (β=.460, p=.000) significantly affect Maintenance Practices. The positive regression weights indicate that the increase in these variables will drive the increase of Maintenance Practices.

Table 3. Regression result of maintenance related factors to maintenance practices

Maintenance Related Factors	Beta Coefficient	Significance	Interpretation
Involvement in Agriculture	.178	.003	Significant
Years in the rice production	.025	.683	Not Significant
Land area	.336	.000	Significant
Number of machines and equipment	.460	.000	Significant

The result in Table 4 shows that years in production (β=.148, p=.044) and the land area (β=.511, p=.000) significantly drive the overall machine and equipment productivity. The positive regression weights point to that the increase in these variables will drive the increase of overall machine and equipment.

Table 4. Regression result of maintenance related factors to overall machine and equipment productivity

Maintenance Related Factors	Beta Coefficient	Significance	Interpretation
Involvement in Agriculture	.066	.338	Not Significant
Years in the rice production	.148	.044	Significant
Land area	.511	.000	Significant
Number of machines and equipment	.202	.064	Not Significant

Table 6 shows the result of the regression analysis of maintenance related factors to Total Productive Maintenance. This result indicates that land area (β=.393, p=.016) significantly affects the Total Productive Maintenance The positive regression point that the increase in this variable will increase the Total Productive Maintenance.

Table 5. Regression result of maintenance related factors to Total Productive Maintenance

Maintenance Related Factors	Beta Coefficient	Significance	Interpretation
Involvement in Agriculture	.079	.445	Not Significant
Years in the rice production	-.151	.168	Not Significant
Land area	.393	.016	Significant
Number of machines and equipment	.108	.505	Not Significant

The multiple regression result in Table 6 demonstrates that the amount for maintenance (β=.494, p=.000) significantly affects the overall machine and equipment productivity. The positive regression weights specify that the increase in this variable will drive the increase of overall machine and equipment productivity.

Table 6. Regression result of maintenance practices to overall machine and equipment productivity

Maintenance Practices	Beta Coefficient	Significance	Interpretation
Allocating fund for maintenance	-.106	.181	Not Significant
Amount for maintenance	.494	.000	Significant
Use of machine and equipment in different operations	.020	.862	Not Significant
Type of equipment used	-.038	.702	Not Significant
Knowledge about ATI seminar	.255	.035	Not Significant
Attendance in the ATI seminar	-.020	.872	Not Significant
Times attended the ATI seminar	.130	.204	Not Significant
Assigned employee responsible for maintenance	.186	.243	Not Significant
Satisfaction in the employee's performance	-.066	.630	Not Significant
Experience machine breakdown	.139	.078	Not Significant

Table 7 demonstrates the result of regression of maintenance practices to Total Productive Maintenance. It shows that the allocation of fund for maintenance (β=.308, p=.004), knowledge about Agriculture Training Institute seminar (β=.406, p=.013), attendance in the Agriculture Training Institute seminar (β=-.358, p=.032) and the frequent time of attending Agriculture Training Institute seminar (β=-.488, p=.001) significantly affect Total Productive Maintenance. The positive regression weights specifies that the increase in these variables will drive the increase of Total Productive Maintenance.

Table 7. Regression result of maintenance practices to Total Productive Maintenance

Maintenance Practices	Beta Coefficient	Significance	Interpretation
Allocating fund for maintenance	.308	.004	Significant
Amount for maintenance	-.011	.939	Not Significant
Use of machine and equipment in different operations	-.149	.341	Not Significant
Type of equipment used	.093	.485	Not Significant
Knowledge about Agriculture Training Institute seminar	.406	.013	Significant
Attendance in the Agriculture Training Institute seminar	-.358	.032	Significant
Times attended the Agriculture Training Institute seminar	.488	.001	Significant

Assigned employee responsible for maintenance	-.085	.691	Not Significant
Satisfaction in the employee's performance	.049	.788	Not Significant
Experience machine breakdown	-.026	.802	Not Significant

The regression result in Table 8 shows that maintenance cost/breakdown cost (β=.509, p=.000) significantly affects the Total Productive Maintenance. The positive regression weights indicate that the increase in the maintenance cost/breakdown cost will drive the increase of Maintenance Practices.

Table 8. Regression result of overall machine and equipment productivity to Total Productive Maintenance

Overall Machine and Equipment Productivity	**Beta Coefficient**	**Significance**	**Interpretation**
Maintenance cost/breakdown cost	.509	.000	Significant
Operational cost	-0.037	.746	Not Significant

In addition, the regression result in Table 9 shows that maintenance cost/breakdown cost (β=.518, p=.000) and the operational cost (β=.251, p=.008) significantly affect maintenance practices. The positive regression weights indicate that the increase in the maintenance cost/breakdown cost will drive the increase of Maintenance Practices.

Table 9. Regression result of overall machine and equipment productivity to maintenance practices

Overall Machine and Equipment Productivity	**Beta Coefficient**	**Significance**	**Interpretation**
Maintenance cost/breakdown cost	.518	.000	Significant
Operational cost	.251	.008	Significant

The regression result in Table 10 shows that workers trained on the maintenance program (β=.492, p=.000) significantly affects the maintenance related factors. The positive regression weights indicate that the increase in training shows that workers trained on the maintenance program cost will drive the increase of maintenance related factors.

Table 10. Regression result of Total Productive Maintenance to maintenance related factors

Total Productive Maintenance	**Beta Coefficient**	**Significance**	**Interpretation**
Maintenance repair works that have to be carried out in cases of machine downtime conducted according to designated time intervals	.007	.933	Not Significant
When procuring new machine and equipment,	.001	.991	Not Significant

attention given to easy maintenance and repair possibilities			
Workers are included in the planning of new machine and equipment	.199	.053	Not Significant
New workers trained on the currently existing maintenance program	.492	.000	Significant

4. Conclusion

The first objective of the paper was to evaluate the maintenance practices of the mechanized rice production and it was obtained through interview, observation and conducted survey. The researcher concluded that the performance of the machine and equipment in terms of availability, durability, functionality, quality, reliability and safety are below the overall equipment effectiveness percentage which is 80%, the rice production players were all dissatisfied in the performance and gave a rating of below 40%. Also, the results manifested that the maintenance cost per month which consisted mainly of replacement of parts, change oil and breakdown repair costs roughly 1001-3000 pesos per month which contributed with the total operational cost of 20,001-30,000 pesos per cropping which is very high as compared to the average operating cost of 19,000 pesos per cropping as per Department of Agriculture (2019). This high cost was resulted because of no maintenance and that the agricultural players experienced frequent breakdown of 11-20 hours machine per month.

The research's objective number 2 of this research was to determine the significant factors affecting the decisions related to the mechanization and maintenance practices of rice production players in the Philippines. This objective was achieved through conducting survey to rice production players and statistical analyses. Significant factors were identified by using Factor Analysis and Regression Analysis. Based on the results, the significant factors are: land areas of farm, number of machineries and equipment, involvement in rice production players and the years in the field of rice production.

The last objective was to formulate a TPM-based strategy and model in employing best practices in the maintenance of machines & equipment in the rice production sector towards better productivity and cost efficiency. It was attained by using statistical analysis such as the test of normality, factor analysis, linear regression and multiple regression. The framework developed on this research paper was suited to the needs of the rice production players in a TPM based framework.

The research question for this research is if Total Productive Maintenance can be adopted in Philippine rice production to address local issues of high operations and maintenance costs in view of the country's thrust for food sustainability and affordability was answered by obtaining the three objectives of this research. Based on the results and discussions, this TPM based framework will work effectively in rice production sector.

5. Recommendation

This research study recommends the adoption of the TPM based framework to the rice production sector in the Philippines in order to address the local issues of high operations and maintenance costs in view of the country's thrust for food sustainability and affordability. Significant effects will be the reduced breakdown cost, maintenance cost and operational cost. With lower operational cost, there will also be a reduction in the price of rice, thus the rice will become affordable to all the Filipinos. Future studies may look into other sector of agriculture with different machines and equipment if the developed framework will work. Table 11 shows the recommended implementation of the TPM based framework in different levels:

Table 11. Recommended implementation of TPM based framework per level

Level	Recommended Action/s
Rice production players	Involvement in maintenance seminar, Assigning employee for the maintenance of machine and equipment
Cooperative	Encouraging the farmers to attend the maintenance seminar, Close coordination to the agriculture office for the programs and seminars for rice production.
Municipal Agriculture Office	Consolidation of list of farmers who is/are qualified to attend maintenance seminar, Proposing maintenance seminar and allotting budget to the said seminar.
Provincial and Regional Agriculture Office	Tapping the Agriculture Training Institute for conducting maintenance seminar, Emphasized the need of the maintenance practices seminar to the national level.
Department of Agriculture (National)	Continuous support for the mechanization of the rice production sector in land preparation, transplanting, crop care, harvesting and post-harvest, Allotting more fund in the maintenance practices seminar for the rice production players.
Agriculture Training Institute	Awareness for maintenance practices for the rice production players must be one of the priority, Emphasized the importance of maintenance practices to the rice production players in terms of the operational cost and food affordability, Information dissemination about the maintenance practices seminar must be until the individual farmers, Encouraging more rice production players to attend maintenance practices seminar.

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Biographies

Charmine Sheena R. Saflor is an industrial engineering faculty at the Occidental Mindoro State University in the Philippines. She earned her MS Industrial Engineering degree from the Mapúa University and her research interests include operations research, ergonomics, quality assurance, lean manufacturing and TPM.

Marvin I. Noroña is an industrial engineering professor at the Mapua University. He earned his BSIE and MBA degrees from University of the Philippines and is completing a Doctor in Business Administration degree at the De La Salle University. Apart from research and teaching, he is into management consulting and training in the areas of sustainability, supply & operations management, production & service systems improvement, strategic planning, lean six sigma, and design thinking.