

FARMERS' ACCEPTABILITY ON USING COMBINE HARVESTER IN SAN MIGUEL, BULACAN, PHILIPPINES

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ABSTRACT

The study focused on the acceptability of farmers on using combine harvester in San Miguel, Bulacan, Philippines with emphasis on the efficiency of Combine Harvester; the advantages and disadvantages; and the problems encountered of using the machine. The respondent of the study consists of farmers, seasonal laborers and owners of combine harvester in San Miguel, Bulacan, Philippines. The group of farmers surveyed and interviewed were those who had a direct and indirect involvement in the operation of the combine harvester in San Miguel, Bulacan, Philippines. Farming was the main source of income of all of the respondents, except the owners of combine harvester who were having their other businesses means of livelihood and enterprises. Combine harvester was a newly introduced technology in San Miguel, Bulacan. Most of the owners own at least a unit of combine harvester in the area. Though it was newly introduced to the community, many farmers accepted it and patronized this product of modern technology because they proved that combine harvester was a more effective way of harvesting rice compared to manual labor. Consequently, it minimizes cost and expenses compared to labor/manual harvesting, endorsed by the government as an alternative way of harvesting rice, makes work easier, promised more income/return to the farmers, it saves time and therefore increases productivity, and were accepted by many farmers in the municipality of San Miguel, Bulacan, Philippines.

KEYWORDS: Combine Harvester, farmers, seasonal laborers, productivity, efficiency



Introduction

Rice is the most extensively grown crop in the country, planted about 30% of the total to agricultural area harvested. For ninety-seven million families, rice farming is the source of over half of the household income. In addition, millions of landless farm workers, and tens of thousands of merchants indirectly depend on rice for a living. (Dawe: 2003). In this study, the researchers want to know the problems encountered by landless farm workers if they were replaced by combine harvester on rice harvesting in the Philippines. The combine harvester was invented in the United States by *Hiram Moore* in 1834, and early versions were pulled by horse or mule teams. In 1835, Moore built a full-scale version and by 1839, over 50 acres of crops were harvested. By 1860, combine harvesters with a cutting width of several meters were used on American farms. In 1882, the Australian *Hugh Victor McKay* had a similar idea and developed the first commercial combine harvester in 1885, the Sunshine Harvester. (Dawe: 2003) The Philippine Rice Research Institute (PhilRice) research team in cooperation with the Briggs and Stratton (B&S), a private company supplying farm engines in the Philippines, modified the original design of rice combine harvester from China to fit local farm conditions. China's design has reaping, crop conveying, and threshing components only. According to a report submitted to PCARRD, PhilRice and B&S improved the machine's efficiency by incorporating cleaning, bagging, and recycling components. Technical evaluation on its performance, which was conducted by the Agricultural Machinery Testing and Evaluation Center of the University of the Philippines Los Banos (AMTEC-UPLB), indicates that the machine performed well with 0.194 hectare per hour field capacity, 86.6 percent field efficiency, 90.3 percent purity of threshed grains, total grain loss of only 1.68 percent, and fuel consumption of 3.68 liters per hour. AMTEC-UPLB test results are comparable with the data gathered from the endurance tests conducted in Nueva Ecija, Bataan, Tarlac, Pangasinan, and Cagayan, involving farmer-cooperators. (AMTEC-UPLB: 2011) Economic analysis on the use of machine for custom hiring to service farms of organized farmer groups shows that at harvesting cost of P5,442 per hectare, the capital investment of P350,000 can be recovered in 1.7 years or from a harvesting area of 87.3 hectares to break-even. For individual farmer's use and ownership, economic viability is high at benefit-cost ratio of 1.36 with a break-even land area of 48 hectares and a payback period of less than one year. Additional income can be realized from the recovered harvesting losses of 5 percent, which is better compared with unrecovered manual harvesting losses of more than 6 percent. (<http://www.pcaarrd.dost.gov.ph>) The researchers want to find out the benefits of using combine harvester among the selected farmers and stakeholders in San Miguel, Bulacan, hence, this study. This study determined the acceptability of combine harvester by a group of farmer respondents' in the Municipality of San Miguel, Bulacan.

Specifically, the researchers sought to answer the following questions:

1. What is the extent of acceptability of farmers on using Combine Harvester?
2. How efficient is the Combine Harvester compare to manual harvesting?
3. What are the advantages and disadvantages using combine harvester?
4. What are the problems encountered in using combine harvester?

Method

Research Design

This study assessed the acceptability of Combine Harvester machine in the Municipality of San Miguel, Bulacan. Descriptive method was use through survey questionnaire and personal interviews. The data gathered from the respondents were used as basis to determine the acceptability and viability of the Combine Harvester Machine.

Sampling Procedure and Selection of the Respondents

A complete enumeration of 10 owners of combine harvester machine; 25 farmers who availed the machine; and 25 seasonal laborers who were displaced and affected by the work of technology was used as sample population. The list of 10 owner of combine harvester was given by Municipal Agricultural Office (MAO) in San Miguel, Bulacan. The lists of 25 farmers were obtained from the owner of combine harvester who actually used or availed their machine. The list of 25 seasonal laborers was obtained in areas in San Miguel, Bulacan where the combine harvesters was used, hired and operated during the last first-crop harvesting season of 2021.

Research Instrument

The study utilized a survey questionnaire. A Likert type of instrument was developed and solely used in gathering the respondents' perception in this study. The bases for developing the instrument were the objectives and problems mentioned in this study. The instrument which was submitted to the adviser and critic for comments, and suggestions was validated to test the statistical conformity. The instrument was immediately floated to the respondents. The research instrument was prepared accordingly with clear instruction and direction. Data gathered was used to determine the acceptability of farmers on using combine harvester in San Miguel, Bulacan. Consequently, the primary data was used to compute Average Percentage Distribution of Acceptability of Using Combine Harvester.

Data Processing and Statistical Treatment

Data gathered were classified and tabulated accordingly. Descriptive procedure was used for analysis and interpretation.

1. Simple mean and percentage ranking was used to quantify the response of each respondents. For verbal interpretation of the responses of respondents', the following verbal description was used in this study:

Weighted Mean	Verbal Description
4.21 – 5.00	Very much accepted (VMA)
3.41 – 4.20	Accepted (A)
2.61 – 3.40	Moderately accepted (MA)
1.81 – 2.60	Slightly accepted (SA)
1.00 – 1.80	Not accepted (NA)

2. F-test was used to determine the differences on three groups of farmers' respondents in San Miguel, Bulacan;
3. Simple frequency and ranking was used to analyze the acceptability of farmers' respondents in San Miguel, Bulacan. ;
4. Percentage distribution- was used to determine the presence of each different number to express as percent.

Result

This chapter of the study presented the analysis and interpretation of gathered data from the response of the respondents of the municipality of San Miguel, Bulacan.

Table 1. Farmers Acceptability of Using Combine Harvester

Respondents	Average	Rank	Equivalent Rating
Farmer	4.5	1	VMA
C.H. Owner	4.48	2	VMA
Seasonal Laborer	4.0	3	A

The farmers acceptability of using Combine Harvester revealed that farmers got the highest rank with a mean of 4.5 which means very much accepted (VMA). It reflects that farmers indeed accepted the technology of using combine harvester. It was followed by the combine harvester owner with a mean of 4.48 which means very much accepted (VMA) and last was the response of seasonal laborer with a mean of 4.0 which also means accepted (A). Table 3. shows the level of acceptability on using combine harvester.

It was highlighted by ten benchmark statement. In benchmark statement no.1 farmer-respondents' obtained a mean of 4.88 which suggests that they very much accepted (VMA) and using combine harvester is more effective way of harvesting rice compared to labor. On the other hand, seasonal laborer respondents obtained a mean of 3.96 which means accepted (A). And also, C.H. owner respondents obtained a mean of 5.00 which means very much accepted (VMA).

Table.3 Level of Acceptability of Farmers on Using Combine Harvester

Benchmark Statement on using combine harvester	Farmers		Seasonal laborer		C.H. Owner	
	Mean	VD	Mean	VD	Mean	VD
Combine harvester is more effective way of harvesting rice compare to laborer.	4.88	VMA	3.96	A	5.00	VMA
Combine harvester minimizes cost and expenses compared to labor/manual harvesting.	4.6	VMA	4.00	A	4.60	MA
Combine harvester was endorsed by the government as an alternative way of farming.	4.36	VMA	3.92	A	4.10	A
The work can easily done by using combine harvester.	4.72	VMA	4.28	VMA	4.80	VMA
The use of combine harvester promise more income/return to the farmers.	4.76	VMA	4.00	A	4.80	VMA
The combine harvester eliminates seasonal laborers/manual laborers.	4.76	VMA	4.64	VMA	4.80	VMA
The combine harvester saves time and therefore increases productivity.	4.76	VMA	4.44	VMA	4.80	VMA
The combine harvester damaged the field heavily.	3.40	MA	3.76	A	2.80	MA
The combine harvester is accepted by many farmers.	4.44	VMA	3.60	A	4.30	VMA
Will you recommend the use of combine harvester to other farmers?	4.28	VMA	3.24	MA	4.80	VMA
MEAN	4.50	VMA	4.00	A	4.48	VMA

In benchmark statement no.2 farmer-respondents' obtained a mean of 4.60 which suggests that they very much accepted (VMA) which means that Combine harvester minimizes cost and expenses compared to labor/manual harvesting. On the other hand laborer respondent obtained a mean of 4.00 which means accepted (A). Meanwhile, owner respondent obtained a mean of 4.60 which means very much accepted (VMA). In benchmark statement no.3 farmer-respondents' obtained a mean of 4.36 which suggests that they very much accepted (VMA) the use of Combine harvester. It endorsed by the government as an alternative way of farming. On the other hand laborer respondent obtained a mean of 3.92 which means accepted (A). The owner respondent obtained a mean of 4.10 which means accepted (A). In benchmark statement no.4 farmer-respondents' obtained a mean of 4.72 which suggests that they very much accepted (VMA). The work can easily done by using combine harvester. On the other hand laborer respondent obtained a mean of 4.28 which means very much accepted (VMA). The owner respondent obtained a mean of 4.80 which means very much accepted (VMA). In benchmark statement no.5 farmer-respondents' obtained a mean of 4.76 which suggests that they very much accepted (VMA). The use of combine harvester promise more

income/return to the farmers. On the other hand laborer respondent obtained a mean of 4.00 which means accepted (A). Meanwhile, owner respondent obtained a mean of 4.80 which means very much accepted (VMA). In benchmark statement no.6 farmer-respondents' obtained a mean of 4.76 which suggests that they very much accepted (VMA). The combine harvester eliminates seasonal laborers/manual laborers. On the other hand laborer respondent obtained a mean of 4.64 which means very much accepted (VMA). The owner respondent obtained a mean of 4.80 which means very much accepted (VMA). In benchmark statement no.7 farmer-respondents' obtained a mean of 4.76 which suggests that they very much accepted (VMA). The combine harvester saves time and therefore increases productivity. On the other hand laborer respondent obtained a mean of 4.44 which means very much accepted (VMA). And also owner respondent obtained a mean of 4.80 which means very much accepted (VMA). In benchmark statement no.8 farmer-respondents' obtained a mean of 3.40 which suggests that they moderately accepted (MA). The combine harvester damaged the field heavily. On the other hand laborer respondent obtained a mean of 3.76 which means accepted (A). The owner respondent obtained a mean of 2.80 which means moderately accepted (MA). In benchmark statement no.9 farmer-respondents' obtained a mean of 4.44 which suggests that they very much accepted (VMA). The combine harvester is accepted by many farmers. On the other hand laborer respondent obtained a mean of 3.60 which means accepted (A). Meanwhile, the owner respondent obtained a mean of 4.30 which means very much accepted (VMA). In benchmark statement no.10 farmer-respondents' obtained a mean of 4.28 which suggests that they very much accepted (VMA). They recommended the use of combine harvester to other farmers. On the other hand laborer respondent obtained a mean of 3.24 which means moderately accepted (MA). The owner respondent obtained a mean of 4.80 which means very much accepted (VMA).

Table 4. The Average Numerical Ratings of the Three Groups of Respondents Using Combine Harvester

Questions No.	Farmers	X ²	Seasonal Laborer	X ²	C.H. Owner	X ²
1	4.88	23.81	3.96	15.68	5.00	25.00
2	4.60	21.16	4.00	16.00	4.60	21.16
3	4.36	19.01	3.92	15.37	4.10	16.81
4	4.72	22.28	4.28	18.32	4.80	23.04
5	4.76	22.66	4.00	16.00	4.80	23.04
6	4.76	22.66	4.64	21.53	4.80	23.04
7	4.80	23.04	4.44	19.71	4.80	23.04
8	3.24	10.50	3.76	14.14	2.80	7.84
9	4.44	19.71	3.60	12.96	4.30	18.49
10	4.40	19.36	3.24	10.50	4.80	23.04
Total	44.96	204.19	39.84	160.20	44.80	204.50
Grand total						129.60

Table 5. Analysis of Variance as the Source of Variation.

Source of variation	Sum of Square	Degree of Freedom	Mean Square	Computed F	Tabular F 0.05	0.01
Between groups(<i>b</i>)	1.69	2	0.85	3.12 ^{ns}	3.35	5.49
Within groups (<i>w</i>)	7.33	27	0.27			

Ns = not significant

Analysis of variance revealed that there was no significant difference between the three groups of respondents using combine harvester. The computed F value of 3.12 was less than the tabular F value of 3.35 (0.05 level of significant) and 5.49 (0.01) and therefore not significant.

Discussion

Efficiency of the Combine Harvester compared to manual harvesting

Manual harvesting usually utilized 10 laborers/persons per hectare per day, while combine harvester has a maximum capacity of 5ha a day and perform not only harvest or cut; it threshed at the same time. Unlike in manual harvesting they will spend half of a day to collect their harvested crops, at threshing using a thresher for at least another half day, then in every post-harvest operation there were always losses and also high labor cost and susceptible to grain damage.

The advantages and disadvantages of combine harvester

The following are the advantages of the combine harvester based on the level of acceptability of the farmers.

1. It minimizes expenses compared to manual harvesting.
2. It eliminates the drudgery of manual harvesting.
3. It gives more income on the part of the farmers.
4. It saves harvesting time and increases farm productivity.

The following are the disadvantages of the combine harvester based on the level of acceptability of the farmers.

1. It displaces human labor that may cause social problem.
2. It partly damages the field dikes

Problem encountered

These are the problems encountered in using combine harvester including:

1. Being injured by the drive mechanisms or trapped when automatic sensors operate.
2. Contacting the knife, reel or stripper rotor
3. Becoming entangled with the leveling or discharge augers in the grain tank.

Conclusion

The study showed that most of the respondents accepted the combine harvester. Farmers, respondent's obtained a mean of 4.5 which suggests that they very much accepted (VMA) the combine harvester as an alternative to manual reaping; that using combine harvester is a more effective way of harvesting rice compared to labor. On the other hand seasonal laborer respondents obtained a mean of 4.00 which means accepted (A). And also combine harvester owner respondents obtained a mean of 4.48 which means very much accepted (VMA). There is no significant difference in the response of the group of respondents on the acceptability of using combine harvester.

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