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Financial viability of paddy harvester CLAAS30

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ABSTRACT : The present study assesses the potential of using paddy harvesters and its impact on timeliness, harvesting cost, crop yield, farm income and employment. The results indicated that CLAAS30 ensures rapid harvesting, reduces harvesting costs, minimises post harvest losses, raises income of farmers and assists farmers in overcoming labour shortages during peak harvesting period. The machine replaces labour by about 90 per cent, reduces the harvesting costs by Rs. 5500 per hectare and increases net return by around Rs. 35000/ha. Field conditions such as crop density, crop maturity, soil moisture condition, weed population, plot size, lodging and operators skills determine the efficiency of harvesting. The crop tiger 30 harvests 10 acres per day. The CLAAS30 is an impressive equipment, which reduces the cost of paddy production by about 25-30 per cent and reduces post harvest losses to a considerable extent. The present study implies a positive financial viability. Negative effects are noticed on employment opportunities and also on the income of harvesting labourers. Although the CLAAS30 has gained greater acceptance among farmers, the price of the machine is around 23 lakhs, which tends to discourage them to invest on this technology. However, it is possible to popularize this machine in major rice producing areas by providing subsidy to farmers and companies and by way of conducting appropriate training programmes.

KEY WORDS : CLAAS30, Incentive, Employment

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Harvesting, threshing and winnowing represent the final field operations in the paddy production process. It is at this particular point that the farmers and labourers receive their pay off through cultivation. The harvesting and threshing operations consume as much as 50 per cent of the total farm power requirement for paddy cultivation in Karnataka Wickramanayaka, 1978). Harvesting, threshing and winnowing are done separately and require a great deal of labour application, usually in the range of 10-15 labour days per ha depending on the condition of the crop and variety. Both men and women participate in these operations and the wage rate in cash or kind is substantially high as Rs. 200-250/day. Owing to the high level of labour requirements and the concurrent maturity of crop in many cultivators fields, more often difficulties are encountered in mobilizing sufficient labour and harvesting is delayed beyond the optimum crop maturity conditions. The delay in harvesting results, in reduction of the quality and quantity of paddy (Toquero *et al*., 1977). This can be a costly practice if the harvesting takes place during the rainy season. The post-harvest losses in paddy production of Sri Lanka have been estimated to be high as 25 to 30 per cent in year 1974 (Wickramanayaka and Wimberly, 1975). Labour scarcity during the peak labour demanding period and the high wage rate involved are becoming a challenge for rice cultivation. The cost of labour is about 40-45 per cent of the total cost of production of paddy, out of which 50 per cent is used for harvesting, threshing and winnowing operations. These constraints could be overcome through the introduction of mechanical paddy harvesters. It will provide solutions scarcity of labour during peak harvesting season and also assist in achieving timeliness, minimizing drudgery, reducing crop losses and improving the quality of paddy. It has been reported that grain losses were below 3 per cent and grain damage was about 0.5 per cent when harvesting was done with paddy harvester in Japan. In this context, an attempt has been made through this paper to evaluate the impact of using the crop tiger 30 on timeliness, harvesting costs, crop yield, farm income and labour use and to estimate the cash inflow, cash outflow, NPW & IRR.

METHODOLOGY

Primary data about the use of harvester were collected through personal interview with the farmers. Data pertaining

to summer 2012-13 were used for the analysis. Ninety farmers were interviewed at Jigali, Kumbaluru, Kathalagere and Holesirigere regarding the use of paddy harvester. This survey was designed to identify the timeliness, harvesting cost, crop yield, farm income and labour use for different harvesting methods. This study attempted to investigate the performance of the following harvesting and threshing methods.

- Manual harvesting and threshing with four wheel tractors.
- Manual harvesting and threshing with low capacity thresher.
- CLAAS30.

Data analysis and methods :

Data pertaining to three different harvesting and threshing methods were analysed. The following estimates were considered to evaluate the efficiency of these methods :

- Timeliness and labour requirements of three methods were compared by estimating average labour hours taken for harvesting one ha. paddy.
- Cost of harvesting of different methods was estimated by averaging all the costs involved in harvesting to drying one ha. paddy.
- Yield and income obtained from different methods were compared through analysing average yield and prices.

Financial viability :

Financial viability of the CLAAS30 was quantified by estimating net present value and internal rate of return.

Net present worth :

This is simply the present worth of the cash flow stream. The selection criterion of the project depends upon the positive value of the NPW when discounted at the opportunity cost of the capital. NPW is an absolute measure not relative. It is helpful in working out B-C ratio of the project. It can be computed by discounting the cash flow with following formula:

$$NPV = P_1/(1+i)^{t1} + P_2/(1+i)^{t2} + \ldots + P_n/1+i)^{tn}$$

where,

P_1 = cash flow at the first year

i = discount rate

t = time period,

C = initial cost of the machine, NPV>0 indicates financial viability.

Internal rate of return :

The method of working IRR provides the knowledge of actual rate of return from different projects. Thus, IRR is known as marginal efficiency of the capital or yield on the investment. In computation of IRR, the time value of money is accounted. It is the discount rate at which NPV=0. Internal Rate of Return is found out using the following formula :

IRR = Lower discount rate + Difference b/w two discount rate × NPW at lower discount rate / Absolute difference b/w NPW at two discount rates

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Timeliness of harvesting operations :

Paddy harvesting in major growing areas of most of the state is delayed during summer season as a result of manual harvesting. Farmers have experienced further delay of harvesting during rainy season. Farmers gained improvement in the timeliness by using CLAAS30 for harvesting their crop at optimum conditions. While manual harvesting and threshing with four-wheel tractor consume about 15 labour days/ha, use of manual harvesting and low capacity thresher took about 10 labour days/ha.

The average labour requirement was reduced to about 2 hours per ha by using CLAAS30 (Table 1). All the crop tiger30 users expressed that it permitted faster, easier and timely operations in harvesting. However, the labour days requirement for crop tiger 30 was relatively low in Bhadra Command area due to large plot size, low density planting soil conditions and less lodging nature of the paddy variety cultivation by the farmers.

Cost of harvesting, threshing and winnowing :

The estimated cost of manual harvesting and threshing

Table 1 : Average labour hours requirement for harvesting, threshing and winnowing one ha of paddy (hrs/ha)

Operations	Manual harvesting and threshing with four-wheel tractor	Manual harvesting and threshing with low capacity thresher	Crop tiger30
Cutting with sickle, binding, gathering and heaping	20	25	
Threshing with 4 WT	04	06	02 hrs
Threshing with low capacity thresher	–	10	
Winnowing and bagging	10	10	
Total	34	51	02 hrs

by four-wheel tractor was about Rs. 7100/ha and for the low capacity thresher it was Rs. 6600/ha (Table 2). In contrast, the cost of CLAAS30 operations was around Rs. 4050/ha in case of crop tiger30. The detailed breakdown of cost is given in Table 3. Paddy harvested using CLAAS30 requires drying before storage and costs about Rs. 850/ha. Although cost of harvesting by CLAAS30 is estimated to be around Rs. 4050/ha (Table 2).

Changes in crop yield, farm income and unit cost of production:

It reveals that average crop output obtained from the adoption of CLAAS30 was around 5820 kg/ha, whereas, average yield from manual harvesting-threshing with four-wheel tractor and manual harvesting with low capacity thresher was 5240 kg/ha and 5470, respectively (Table 4). Hence, CLAAS30 gave additional yield advantage of 350-600 kg/ha. Farmers indicated that increase in average paddy yield was due to reduced post harvest losses, which is about 5 per cent of total crop output. Reasons cited for reduced losses were timely harvesting, area coverage and cutting, manual post harvest losses during gathering, threshing and winnowing (Table 4).

High field losses were reported in manual harvesting and threshing especially when harvesting delayed due to rains and the engagement of inefficient and dishonest labourers. Farmers were able to obtain an additional income of Rs. 4,500-7,500 (price of paddy=13.00/kg) as a result of reduced crop losses.

A decrease in unit cost of production of paddy was

Table 2: Average cost of harvesting, threshing and winnowing **(Rs./ha)**

Operations	Manual harvesting and threshing with 4-WT	Manual harvest and threshing with low capacity thresher	Crop tiger 30
Harvesting, gathering and heaping	2600	2600	3200
Threshing	1500	1400	
Transport, winnowing and drying	3000	2600	850
Total	7100	6600	4050

Table 3 : Average cost of crop tiger 30 operations **(Rs./ha)**

Item	Average cost
Operators wage	350
Labour	355
Transport of machine	500
Diesel and lubricants	1000
Depreciation cost	250
Interest	250
Maintenance cost and operation	200
Miscellaneous cost	300

Table 4 : Average output of different harvesting and threshing methods

Sr. No.	Methods	Average output (kg/ha)
1.	Manual harvesting and threshing with 4 wheel tractor	5240
2.	Manual harvesting and threshing with low capacity thresher	5470
3.	CLAAS30	5820

Table 5 : Post-harvester losses in different methods of harvesting and threshing

Sr. No.	Methods	% Losses	Average losses (kg/ha)
1.	Manual harvesting and threshing with 4-wheel tractor	5	25
	Transport and handling	2	02
	Threshing and winnowing	2	05
	Total	9	32
2.	CLAAS30	2	5

Table 6 : Financial viability of CLAAS30 (Rs. lakhs)

Cash outflow	Years									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Operation and maintenance cost										
Diesel cost	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Oils and filter	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
Operator wage	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Transport charges	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Engine maintenance	0.00	0.00	0.05	0.05	0.00	0.00	0.05	0.05	0.00	0.05
Plumb maintenance	0.00	0.00	0.04	0.04	0.00	0.04	0.00	0.04	0.00	0.04
Miscellaneous	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Machine cost	23.00	-	-	-	-	-	-	-	-	-
Total cash outflow	24.43	1.43	1.52	1.52	1.43	1.47	1.48	1.52	1.43	1.52
Cash inflow:										
Income generated annually 500 acre @ Rs. 2000	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Incremental cash flow	14.43	8.57	8.48	8.48	8.57	8.53	8.52	8.48	8.57	8.48
NPW @ 10%					34.0					
Financial IRR					28%					

observed with the use of CLAAS30 as a result of reduced harvesting costs and improved crop output (Table 5). It was estimated that unit cost of production dropped from Rs. 13.00/ kg to Rs. 9.00/kg due to CLAAS30.

Labour use :

CLAAS30 operation and manual cutting of farmers requires about two average labour days/ha. In contrast, manual harvesting and threshing and winnowing with 4-WT need about 10-0 average labour days per ha. This indicated a gross labour displacement of 8 average labour days/ha due to use of CLAAS30. It represents a straight forward substitution of capital for labour and that under the labour supply circumstances existent in most sub-continent countries. The entire respondents expressed that manual harvesting and threshing methods are laborious and becoming un-attractive for the present generation particularly youths. Youths are moving away from farming as educated youths are looking for more productive and less laborious employment. CLAAS30 is capable of providing such opportunities to meet the present demand of younger generation.

Financial viability of CLAAS30 :

The profitability of the harvester depends on its price, interest rate, rental rate, durability and utilization. The initial cost of this machine is Rs. 23 lacs. Life span of the machine was assumed as 10 years and the operational cost, operators wage rate and cost of maintenance were included in estimating the expenditure components (cash outflow). Annual income generated by CLAAS30 was estimated to be Rs. 10 lakhs where, 500 acre per season is harvested at the rate of Rs. 2000 rent per hour. A cash flow analysis was carried out on these variables to assess the financial viability of the machine. The details of the same are given in Table 6. Results indicate that NPW is 34.00 lakhs at the discount rate of 10 per cent. Return to capital was around 28 per cent IRR and seems to be quite impressive. The findings show that financial viability is very sound and even banks can provide loans for this kind of investment.

Conclusion :

The CLAAS30 that has gained rapid acceptance from the farmers when first introduced. It has both advantages and the disadvantages compared to manual reaping. Advantages include faster harvesting, less labour requirement, reduced cost, minimized grain loss, quicker handling, faster and easier threshing and increased income to farmers. Disadvantages of the CLAAS30 include labour displacement and reduction of income of labours with limited alternative income opportunities. The present analysis implies a positive impact through the use of CLAAS30.

Although the machine had an adverse impact on employment opportunities and the income of harvesting labourers, it was found to be an attractive investment for owners and did certainly reduce production costs. Mechanization of paddy harvesting could be a key to overcome labour shortage and timely availability that presently hinders the increased

cropping intensity, which in turn will permit labour to be absorbed at other related operations during the production cycle. Adoption of this technology in paddy sector provides a powerful incentive to famers. This form of mechanization acts as a shifter variable in the factor market (labour) and in the supply response (yield gain) as well.

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