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Welfare impact analysis of paddy harvester CLAAS30

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■ **ABSTRACT :** The present study assessed the potential of using paddy harvesters and its impact on timeliness, harvesting cost, crop yield, farm income and employment. The results indicated that CLAAS30 ensured rapid harvesting, reduced harvesting costs, minimised post harvest losses, raised income of farmers and assisted farmers in overcoming labour shortages during the peak harvesting period. The machine replaced labour by about 90 per cent, reduced the harvesting costs by Rs. 5500 per hectare and increased 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 determined the efficiency of harvesting. The CLAAS30 harvested 10 acres per day. The CLAAS30 is impressive equipment, which reduced the cost of paddy production by about 25-30 per cent and reduced post harvest losses to a considerable extent. The present study implies a positive welfare impact. 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 tend to discourage them to invest on this technology.

■ **KEY WORDS :** Peddy harvester, CLAAS 30, Welfare impact analysis

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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. Harvesting is traditionally carried out in Karnataka by using sickles. Four wheel tractors are low capacity mechanical threshers are generally used for threshing. Winnowing is carried out by fan attached to tractor or through manual winnowing. The harvesting and threshing operations consume as much as 50 per cent of the total farm power requirement for paddy cultivation in Karnataka. 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 cash or kind is substantially high as Rs. 200-250/day. Owing to the high level of labour requirements and the concurrent maturity of crops in many farmers fields, more often difficulties are encountered in mobilizing sufficient labour and harvesting is delayed beyond the optimum crop maturity conditions (Andrew and David, 1970 and Culpin, 1984). The delay in harvesting results, reduction of the quality and quantity of paddy (Toquero *et al.,* 1977). This can be a costly practice if the harvesting takes place during rainy season. Labour scarcity during the peak labour demanding periods 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 (Socio Economics and Planning Centre of DOA, 2012). These constraints could be overcome through the introduction of mechanical paddy harvesters. It will provide solutions for scarcity of labour during peak harvesting season and also assist in achieving timeliness, minimizing drudgery, reducing crop losses and improving the quality of paddy (Duff and Toquero, 1957). It has been reported by (Shin-Norinsha, 1971) that grain losses were below 3 per cent and grain damage was about 0.5 per cent when harvesting is done with paddy harvester in Japan. In this context, an effort has been made through this paper to assess the welfare impact of the CLAAS 30.

METHODOLOGY

Field level data on use of harvester were collected through personal interviews with farmers (and also on perusal of records) and data pertaining to summer 2012-13 were used for the analysis. 90 farmers were interviewed at Kumbaluru, Jigali, Kathalagere and Holesirigere regarding 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 welfare impact performance of manual harvesting and threshing with four wheel tractors manual harvesting and threshing with low capacity thresher and CLAAS 30.

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 :

- Cost of harvesting of different methods was estimated by averaging all the costs involved in harvesting to drying 1ha paddy.
- Yield and income obtained from different methods were compared through analysing average yield and prices.
- Welfare impact analysis was made to evaluate the net economic return.

Welfare impact analysis :

Gross economic return and Net economic return were estimated for the utilization of CLAAS 30. Gross economic return is the value of the reduced cost of paddy harvesting by CLAAS 30. In Fig. A supply is positively sloping with the own price elasticity (Niranjan *et al.*, 2000 and Pudasami, 1979) and the original supply curve is SoSo. The new supply curve is S1S1, after the introduction of CLAAS 30. The net benefit to society is b+c+f+e, that is the area between two supply curves and the demand curve, as shown in Fig. A. This is so since the net gain in consumer and producer surplus is a+b+c (-a+e+f). The GER is calculated from the area remaining after accounting for the changes in surpluses. In computing the gross social returns from the CLAAS 30, the total production was considered after the new equilibrium is achieved and multiplied by the ensuing cost savings per kilogram of paddy harvested.

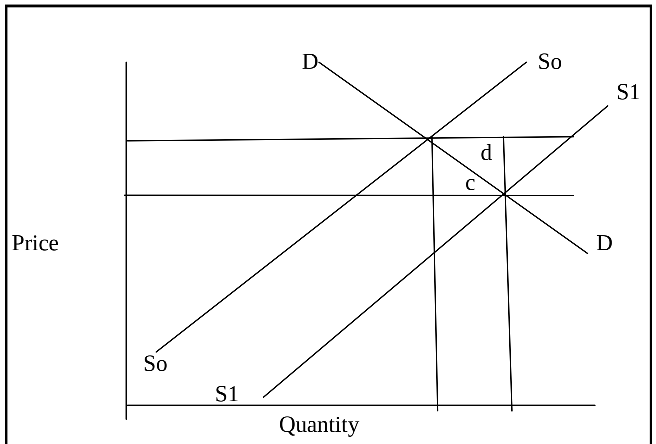

Fig. A : Supply shift of rice after using the CLAAS 30

Net economic return indicates the value of expenditure incurred by displaced labours. The effect of CLAAS 30 on labour is explicitly taken into account when computing the Net economic return as shown in Fig. B. Prior to introducing CLAAS 30, the demand for labour is DoDo and the supply is SoSo. However, the demand declines to D1D1 with the introduction of harvesters.

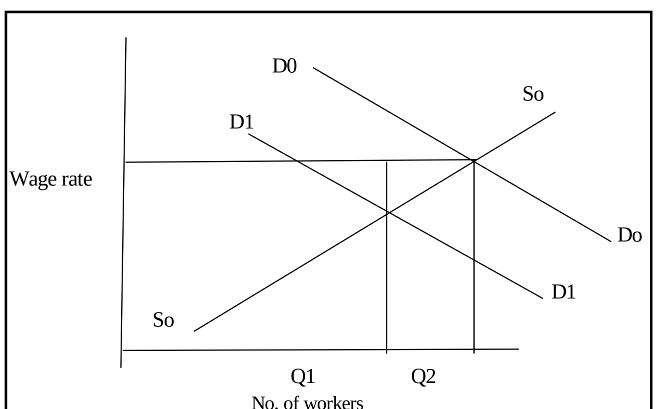

Fig. B : Demand shift of rice after using the CLAAS 30

As a result the displaced labour caused by the harvester is WO (Q2-Q1).

RESULTS AND DISCUSSION

The findings of the present study as well as relevant discussion have been presented under following heads :

Cost of harvesting, threshing and winnowing :

The estimated cost of manual harvesting and threshing by four-wheel tractor was about Rs. 7100/ha and with the low capacity thresher it was Rs. 6,600/ha (Table 1). In contrast, the cost of CLAAS 30 operations was around Rs. 4050/ha. The detailed breakdown of cost is given in Table 2. Paddy harvested using CLAAS 30 requires drying before storage and this costs about Rs. 850/ha. Although cost of harvesting by CLAAS 30 was estimated to be around Rs. 4050/ha (Table 1).

Table 1: 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	CLAAS30
Harvesting, gathering and heaping	2600	2600	3200
Threshing	1500	1400	
Transports, winnowing and drying	3000	2600	850
Total	7100	6600	4050

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

It reveals that average crop output obtained from the adoption of CLAAS 30 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 3). Hence, CLAAS 30 gave additional yield advantage of 200-250 kg/ha. Farmers indicated that increase in average paddy yield was due to reduced post harvest losses, which was about 5 per cent of total crop output. Reasons cited for reduced losses were timely harvesting, complete 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. 4,350-5,050 (price of paddy=30.50)/ha as a result of reduced crop losses.

Table 2 : Average cost of CLAAS30 operations

Items	Average cost (Rs./ha)
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 3 : 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.	CLAAS 30	5820

Table 4 : 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.	CLAAS 30	2	5

A decrease in unit cost of production of paddy was observed with the use of CLAAS 30 as a result of reduced harvesting costs and improved crop output. It was estimated that unit cost production dropped from 30.00 Rs./kg to 15.00 Rs./kg due to CLAAS 30.

Partial budgeting was carried out to examine the outcome of CLAAS 30 by computing additional costs incurred and additional returns obtained (Table 5). The analysis has shown that farmers can get benefit with additional food grains of 5.8 qtls. worth Rs. 7540 which farmers would have foregone with traditional method of harvesting paddy. Besides, the farmers could save Rs. 2250 on account of savings in labour use for harvesting. The net gain due to adoption of this technology is economically viable. This is an important message to be disseminated to farming community by extension agencies for harnessing the potential benefits of this technology.

Table 5 : Partial budgeting (Rs. /ha)

Sr. No.	Added returns and reduced costs	Value
1.	Increase in returns	7540
2.	Increase in yield	7450
3.	Labour cost saving 15 labours at Rs. 150 /day	2250
4.	Decrease in fuel and repair cost	2000
5.	Other inputs saved	2500

Welfare analysis of CLAAS 30 :

Gross social returns indicate the aggregate volume of the reduced cost of harvesting paddy by the CLAAS 30. These returns differ from net social returns by the value of the costs in carried by workers displaced by the harvester. CLAAS 30 reduces costs from Rs. 30.00 to 25.00/kg of paddy. Assuming that one CLAAS 30 harvests about 50 ha during *Kharif* season and with an estimated yield of 5820 kg of paddy per hectare, the Gross Social Returns (GSR) was computed as Rs. 72750. This is the gain to the producer and the consumer in monetary terms. The CLAAS 30 displaced about 15 man-days per hectare compared to manual harvesting. Assuming 50 ha of paddy harvested and the average wage rate of Rs. 200 per man-day during *Kharif* 2011-12, the computed Net Social Returns (NSR) for CLAAS 30 was Rs. 35000. The estimates indicate that GSR is higher than NSR. According to the estimates the benefits to the society from the introduction of CLAAS 30 is higher than the wage loss of displaced workers. Therefore, the CLAAS 30 usage can be recommended for paddy harvesting.

Conclusion :

The CLAAS 30 which has gained rapid acceptance from the farmers when first introduced has both advantages and the disadvantages compared to manual reaping. Advantages included faster harvesting, less labour requirement, reduced cost, minimized grain loss, quicker handling, faster and easier threshing and increased income to farmers. Disadvantages of the CLAAS 30 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 CLAAS 30. 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 hinder 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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