



## Impact of Mechanization on Employment of Agricultural Labour in Rice Operations in East Godavari District of Andhra Pradesh

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### ABSTRACT

The present study is intended to analyse the impact of mechanization on employment of agricultural labour in rice operations in East Godavari district of Andhra Pradesh. The total sample was categorized into two groups viz., category I (mechanized farms) and category II (partially mechanized farms). Results of regression analysis revealed that tractor used time, cost of cultivation, animal used time and dummy variable were statistically significant indicating that they were important variables in determining the labour used time. The fit of the model was judged by  $R^2$  and the selected variables contributed 68 per cent variation in labour used time.

**Key words :** Animal used time, Labour used time, Mechanization, Tractor used time.

Rice (*Oryza sativa*.L.) is the most important and extensively grown food crop of India. It is the staple food for more than half of the world population and is of paramount importance to Indian economy. It is grown in an area of 36.95 mha with a production of 80.41 mt. In Andhra Pradesh, rice is grown in an area of 45.63 lakh ha with a production of 75.10 lakh tonnes (Ministry of Agriculture, 2011-12).

The possibility of mechanization is strongly influenced by the farm size, cost of farm labour, machines and energy. The farming system continued to utilize manual power, animal power and tractor power. In order to bring more land under cultivation and to improve productivity per unit area, it is necessary to use all sources of power like tractors, power tillers, oil engines, electric motors and renewable energy.

Due to rapid industrialization and large scale migration to urban areas labour is becoming increasingly scarce and also proving costly. This labour shortage during harvesting resulted in delayed harvest and consequent field grain losses. Mechanization of harvesting was the alternative solution (Manjunatha *et.al*, 2009). With this background, the impact of mechanization on employment of agriculture labour was analysed in this article.

### MATERIAL AND METHODS

The study was conducted in East Godavari district of Andhra Pradesh. Multi-stage purposive

and random sampling was followed for the study. East Godavari district was selected purposively as it is highest paddy producing district and leading district in farm mechanization. In East Godavari district all the mandals with paddy cultivation were arranged and top three mandals which are adopting mechanization under paddy were selected purposively for the study. Among 60 mandals, Ramachandrapuram stood first in practicing mechanization in rice cultivation, Peddapuram and U.Kothapalli were the other two top mandals of the district. From each mandal four paddy growing villages were randomly selected, to make total twelve villages for the study of mechanization in rice cultivation.

The farmers, who mechanized their farms fully using tractor, tractor drawn implements, transplanters, harvesters, combined harvesters and threshers for field operations and water lift (either oil engine run or electrically operated) for irrigation were categorised under mechanized farmers (Krishna, 1982).

The farmers, who adopted partial mechanization and are still using bullock power and manual power along with machine power were categorised under partially mechanized farmers.

Accordingly, farmers in sample villages, were listed based on category. Under mechanized category seventy farmers and under partially mechanized category fifty farmers were chosen at random. However, to arrive accuracy in the

Table 1. Estimated regression coefficients for the determinants of labour employment.

S. No	Notation	Variables	Co-efficient	Standard error	t-value	R <sup>2</sup> Value
1	Y	Labour used time	389.76	87.54	6.87**	
2	X <sub>1</sub>	Tractor used time	-3.19	0.19	2.57**	
3	X <sub>2</sub>	Gross returns	0.01	0.006	0.96NS	0.68
4	X <sub>3</sub>	Cost of cultivation	-0.05	0.001	3.01**	
5	X <sub>4</sub>	Animal used time	1.61	0.68	2.75*	
6	X <sub>5</sub>	Dummy variable	-460.37	65.48	3.53**	

Number of observations = 120

\*\* Significant at one percent level

\* Significant at five per cent level

NS non-significant

Model =  $Y = 389.76^{**} - 3.19X_1^{**} + 0.01X_2 - 0.05X_3^{**} + 1.61X_4^* - 460.37X_5^{**}$

collection of data, those farmers who own the concerned machinery were given priority in the selection. Thus in each village ten farmers were selected making the total sample one hundred and twenty. The each category has half of total respondents.

### Regression Analysis

In multivariate regression analysis, an attempt is made to account for the account for the variation of the independent variables in the dependent variable synchronically (Tabachnik *et al.*, 1996).

A Multiple Linear Regression model was employed to determine the impact of farm mechanization on labour use (Rahman *et al.*, 2011). The following multiple regression model is used to identify the factors effecting the labour requirement for rice cultivation.

The empirical model was:

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + U_1$$

Where,

Y = Labour used time (hrs/ha)

X<sub>1</sub> = Tractor used time (hrs/ha)

X<sub>2</sub> = Out put (Gross returns in Rs/ha)

X<sub>3</sub> = Input (Cost of cultivation in Rs/ha)

X<sub>4</sub> = Animal used time (hrs/ha)

X<sub>5</sub> = Dummy (1 for mechanized, 0 for others)

### RESULTS AND DISCUSSION

According to the regression analysis the value of adjusted R<sup>2</sup> was found 0.68 which indicate

that 68% of the variation in labour requirement was explained by the independent variables included in the model.

The table 1 reveals that the coefficient of animal power is positive and significant. It indicates that holding all other factors as constant, animal power encourages the labour requirement. Because application of animal power needs labour and so it increases labour requirement. The coefficient of output is also positive and encourages the labour requirement.

It is also observed that the coefficients of input costs and tractor used times have negative sign which indicates adverse effect on labour requirements. The negative coefficient of input costs indicate that 1 unit increase in the cost of inputs, keeping other factor constant, will decrease the labour requirement by 0.05 units. It is understood that with the increase in the cost of inputs their consumption quantity will be reduced resulting a decrease in labour requirement. Similarly for tractor time, a unit use of tractor, keeping other factor constant, will reduce the labour requirement by over 3.19 units which is similar to the findings of Rahman *et al.*, (2011) and Aurangzeb (2007). The negative coefficient of dummy variable indicate that with the increase of mechanization the total labour used time will be decreased.

### Conclusion:

The mechanization has negative impact on the agricultural labour. With the increase of one unit tractor used time the labour used time is reduced

by 3.19 units. It indicates that the mechanization reduces the total cost of cultivation by replacing labour and increases the agricultural production and profitability on account of timeliness of operation, better quality of work done and more efficient utilization of inputs.

#### LITERATURE CITED

- Aurangzeb M, S Nigar and M Khan 2007** Labour requirement model for the wheat crop under mechanized and traditional farming systems in the NWFP: A case study of Peshwar districts. *Sarhad Journal of Agriculture*, 23(1): 177-186.
- Krishna K 1982** Impact of farm mechanization on income and labour employment in Guntur district of Andhra Pradesh. *M.sc.(Agri.) Thesis*. Acharya N. G. Ranga University, Hyderabad.
- Manjunatha M V, Reddy M B G, Shashidhar S D and Joshi V R 2009** Field performance evaluation of vertical conveyor paddy reaper. *Karnataka Journal of Agricultural Sciences*, 22(1): 140-142.
- Rahman M S, Miah M A M, Moniruzzaman and Hossain S 2011** Impact of farm mechanization on labour use for Wheat cultivation in Northern Bangladesh. *The Journal of Animal and Plant Sciences*, 21(3): 589-594.
- Tabachnik B G and Fidell S L 1996** Using Multivariate statistics (3<sup>rd</sup> edition). Harper Collins College Publishers, New York.

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