Socio-Economic Impact of Farm Mechanization on the Regional Economy of South India: Case of Paddy Farmers of Trichy, Tamil Nadu

ABSTRACT

Farm mechanisation has a potential to improve the efficiency, productivity and cost-effective paddy cultivation while reducing the labour-intensive traditional methods which hinders timely farm operations. This study aims to analyse effect of farm mechanization on socio-economic condition of the farmers of Cauvery Delta Zone in Trichy district of Tamil Nadu. Based on the access to canal water, urbanisation and availability of non-farm opportunity, four blocks in Trichy district were selected. Two villages from each block were randomly selected. Fifty respondents from two villages and fifty-five respondents from two villages (total 210) randomly selected and data collected through personal interviews. Results revealed that majority of the paddy farmers (67%) with medium usage of machinery followed by (18%) of high level of utilization and (15%) with low level of utilization of machineries. In addition, the impact of mechanization studied under four components namely, crop specific, labour, social and economic impact and the results have clearly exhibited significant positive impact on paddy cultivators.

Keywords: Mechanization, Paddy cultivation, crop specific impact, labour impact, social impact, economic impact.

1.INTRODUCTION

Paddy is the main food crop to meet food demand of more than half of the world population. Paddy is labour-intensive, it needs lots of labour for the optimal production. Demand for mechanization in the agriculture in general and paddy cultivation in particular is drastically increased. Drivers of increasing farm mechanization in India are a lack of agricultural labour and the necessity to increase farm production and productivity at unit level. Since time immemorial, Tamil Nadu has been a prominent rice-producing state in India. In Tamil Nadu, paddy cultivation accounts for close to 33.08% of all cultivated land, or around 20 lakh hectares (2020–21). Over the period Tamil Nadu state is a state most urbanised state in India after Maharashtra. Thus, movement of labour from rural to urban reduces the availability of labour for agriculture. This leads to continuous increasing in the wage rate in agriculture. Hence, farmers were prepared to use machineries for their cultivation needs.

In addition, mechanization aims to minimize losses at all stages of crop production and reduce the need of draught animals and human labour while simultaneously enhancing crop intensity, accuracy, and timeliness for the efficient use of farm inputs. Although mechanization can be used at every stage of paddy cultivation, from field preparation to harvesting, such as tractors for land preparation, paddy transplanters in place of manual labour, mechanical weeders and mechanized sprayers and harvesters that can cut, thresh, and collect rice grains to reduce labor involvement and post-harvest losses. Labour shortages during the peak cropping season led the farmer to opt for mechanization. Though the Farm mechanization has enhanced the agricultural productivity farmers found difficult in timely availability and affordability of machineries to reduce production costs. The necessity of operating in time has grown dramatically due to climate induced uncertainties in crop production, which can only be achieved

by mechanization. But at the same time, the rural community have started to move to urban region in pursuit of non-farm work alternatives due to the expansion of automation, which also employee-less farm labour.

In this context, this research aims to study on "Analysing the socio-economic impact of mechanization among paddy farmers in Trichy district, Tamil Nadu" to study the positive and negative faces due to mechanization and worked in the topic with specific objective of to investigate socio economic impact of mechanization on regional economy and its effects on farming community.

2.METHODOLOGY

The study was conducted in Tiruchirappalli district of Tamil Nadu state, because it has both Cauvery canal irrigated and non-canal irrigated paddy area in Tamil Nadu. Tiruchirappalli district consists of 14 blocks. Among 14 blocks Mannachanallur and Thiruverambur block were selected for the study based on area under paddy cultivation is higher in theses blocks in canal irrigated and non-canal area. Manickapuram and Thiruvasi from Mannachanallur block and Pappakurichy and Vengur from Thiruverambur block were chosen randomly as study area. In this study, Ex-post facto research design was used to meet the objectives and types of information required by the study. Further with the guidance of agriculture officers and agricultural assistants the list of paddy farmers of the respected villages was collected. From the list of farmers 10 percent of total farmers from each village has been selected as respondents. A pre-tested interview schedule was used to gather the information from the paddy farmers. The

impact of mechanization on paddy farming was investigated under four subheadings: crop specific impact, labour impact, social and economic impact using Z-test for analysis.

3. RESULT AND DISCUSSION

The responses from the paddy farmers were gathered in the form of before and after machine usage in paddy cultivation in order to examine the impact of farm mechanization on paddy cultivation under four sub-divisions like crop specific impact, labour impact, social impact and economic impact. Z-test was used because of large sample size and also the sample compares two sample mean. Here when the calculated Z (two-tailed) value is greater than the critical value it denotes the significant differences due to mechanization. The attained result is shown in Table 1.

S.NO	COMPONENTS	Mean (Before)	Mean (After)	Z- Value	P-Value
	Crop specific impact				
1.	Field preparation (Nursery and Main Field)	1.976	1.976	0.00(NS)	1.000
2.	Effective Transplantation	1.561	1.980	**11.77****	0.000

3.	Maintenance of equal spacing	1.485	1.980	**13.81****	0.000
4.	Effective utilization of inputs (Weeding and Spraying)	1.309	1.995	**21.20****	0.000
5.	Wastage minimization	1.538	1.428	**2.25***	0.024
6.	Saves water	1.480	1.504	0.48(NS)	0.626
7.	Timely harvesting	1.085	1.990	**44.14****	0.000
8.	Improved yield	1.252	1.976	**22.73****	0.000
9.	Post Harvest handling	1.052	1.995	**58.45****	0.000
	Labour specific impact				
1.	Meet out labour scarcity	1.423	1.990	**16.26****	0.000
2.	Reduce women activity in farming	1.038	1.995	**68.02****	0.000
3.	Create employment opportunity	1.966	1.238	**22.78****	0.000
	Social impact				
1.	Social participation	1.842	1.871	0.83(NS)	0.403
2.	Involved in Decision making process	1.747	1.880	**3.55****	0.000
3.	Promotes entrepreneurship behaviour	1.176	1.514	**7.77****	0.000
4.	Improves standard of living	1.528	1.904	**9.39****	0.000
5.	Drudgery reduced	1.757	1.890	**3.63****	0.000
	Economic impact				
1.	Increased the productivity	1.742	1.900	**4.28****	0.000
2.	Increased the income	1.509	1.933	**10.96****	0.000
3.	Cost of cultivation reduced	1.142	1.952	**28.56****	0.000
4.	Accessibility of loan is easy	1.380	1.742	**8.00****	0.000
5.	Increased purchasing power	1.142	1.585	**10.59****	0.000
6.	Increased investment	1.104	1.366	**6.63****	0.000

Table: 1 Impact of farm mechanization in Paddy cultivation

***** - Significant at 1% level; *- Significant at 5% level; NS - Non-Significant***

As mentioned previously, four sub-divisions were employed to study the impact, and each division had a series of questions with a minimum of three and a

maximum of nine. From the table, it can be inferred that before and after the use of machinery in paddy cultivation, all the four categories exhibit mechanization-related variations at a 1% level of significance.

Crop specific impact

Although the paddy farmers used tractors for preparatory cultivation for more than ten years and that the water requirement for paddy cultivation has not changed as a result of mechanization, the field preparation and water usage do not indicate any differences (non-significant) according to crop specific impact. However, in the case of use of transplanter and combined harvester has a significant impact on paddy cultivation. The comparative economics of conventional and machine planting revealed that yield increased by nearly 40.00 per cent and Farmers' feedback on machine planting was as they had opted for machine planting to overcome labour scarcity and to increase yields. (Theodore 2017). Maintaining uniform spacing, using inputs effectively, harvesting on time, enhancing yield, and post-harvest care appear different with 1% of significance and wastage minimization are significant at 5% level of significance.

Labour impact

In the case of labour-specific impact, it clearly denotes that farm mechanization has reduced the labour shortage while simultaneously creating new job possibilities with 1% level of significance. In a unintended consequence

mechanization has decreased women's involvement in farming. The mechanization led to significantly greater decline in women's than men's labour on Indian farms (Afridi 2023)

Social impact

Considering the changes in social effect, social involvement is non-significant since it is based on everyone's mindset, while decision making, fostering entrepreneurship, improving living standards, and reducing drudgery are identified with greater significance with a 1% level of relevance.

Economic impact

Finally, in the case of economic impact, it is evident that mechanization has had a significant economic impact on regional economy and among the farming community. All the inquiries such as increase in production, increase in income, reduction in cultivation costs, loan accessibility, increase in purchasing power, and increased investment have set down to be significant at 1% level of significance clearly exhibited the effect of farm machineries in the paddy cultivation and economical benefit to the farmers.

Table:2 Distribution pattern of Paddy farmers according to overall impact

(n=210)

S.No.	Category	Number	Percentage

1.	Low	31	14.7
2.	Medium	140	66.6
3.	High	39	18.5

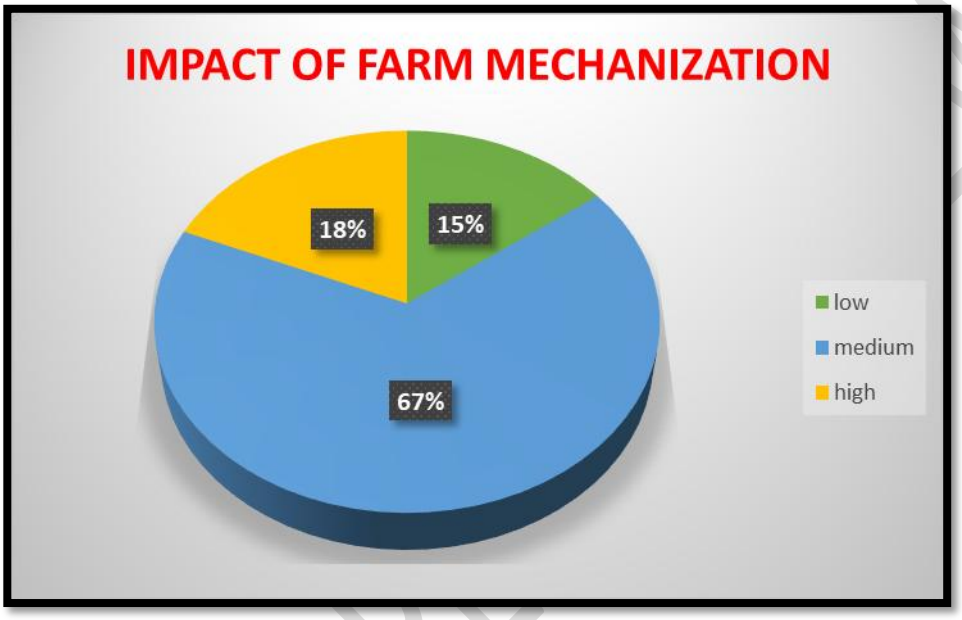

Fig. 1. Distribution of respondents based on the extent of impact

From the table 2, it can be inferred that 67% percentage of paddy farmers are incorporated with medium level of usage of machineries, which indicates that they have not fully stepped into mechanized farming but till then they are using farm machineries significantly. It was followed by 18% percent of farmers who have identified themselves as high level of user of farm machineries in the paddy cultivation, and only 15% of farmers who are still in low level of machineries due to various reasons.

4.CONCLUSION

This study on effect of farm mechanization among the paddy farmers in the Trichy district clearly indicated that farm mechanization has a positive impact on paddy cultivation. Z ration clearly states that the impact of farm mechanization on paddy cultivation have been multi-dimensional, including the effects on labour and the effects on crop production and in social and economic aspects. In case of crop, timely operations, overcoming labour shortages, increased yield, etc. have positive effects. However, when it comes to labour, there are both positive and negative effects, including labour displacement, a decline in women's participation in agriculture, and the creation of new employment opportunities. The fact that the social and economic effects were demonstrates that the mechanization created a positive impact for the farmers. But the same time cautious need to be taken to make an alternative arrangement for the displaced agricultural labour due farm mechanization.

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