

Status of Mechanization in Kadapa District of Andhra Pradesh

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ABSTRACT

Indian Agriculture is undergoing a gradual shift from dependence on human power and animal power to mechanical power. Mechanical power is largely consumed in big land holdings as under their economic condition, the small and marginal farmers are unable to own farm machinery on their own. Andhra Pradesh State is typically an agrarian State with 80.96 lakh ha of the net sown area and has about 65.39 lakh ha operational holdings and 34.35 lakh ha are small and marginal holdings. Some of the initial problems in farm mechanization had been the small and scattered size of farm holdings, financially challenged farmers, lack of awareness among the marginal farmers, and the issue of dry land agriculture. In Andhra Pradesh at present, the Farm power availability is below 2.00Kw/ha. Which is low and there is a lot of scope for improvement. The mechanization index very low SC and ST category because of that is staying away from the municipal areas, small land holding, less annual income, and repair and Maintenance Lake of non-availability of workshops in rural areas. The economic status of the farmers is greatly affected by the farm mechanization index less mechanization formed in less than 25,000 Rs of the annual income of the farmers.

Keywords: Andhra Pradesh, Kadapa, Farm mechanization, Survey, mechanization index

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INTRODUCTION

Mechanical power is largely consumed in big land holdings as under their economic condition, the small and marginal farmers are unable to get own farm machinery because of various reasons. Therefore, to bring farm machinery available within the reach of small and marginal farmers.

The Department of Agriculture through its Mechanical Wing has been popularizing the use of Agricultural Machineries to the small and marginal farmers of the nation. Farm mechanization refers to the development and use of machines that can take the place of human and animal power in agricultural processes. Farm Mechanization removes the drudgery associated with agricultural labour, overcomes time to perform tasks within the optimum time. It implies the use of various power sources and improved farm tools and equipment, intending to reduce the drudgery of the human beings and draught animals, enhance the cropping intensity, precision in metering and placement of inputs, and timelines of efficiency of utilization of various crop inputs (land preparation, sowing of seeds, spraying, fertilizer, irrigation, water, etc.) and reduce the losses at different stages of crop production.

The end objective of farm mechanization is to enhance the overall productivity and production with the lowest cost of production. It is one of the important inputs to the user in all-around development in rural India. Andhra Pradesh State is typically an agrarian State with 80.96 lakh ha of the net sown area and 34.35 lakh has been small and marginal holdings. In Andhra Pradesh the progress of mechanization in agriculture

has uneven. Some of the initial problems in farm mechanization had been the small and scattered size of farm holdings, financially challenged farmers, and the issue of dry land agriculture. The Farm power availability is below 2.00Kw/hathis can be improved by providing adequate subsidies to procure high-cost machinery and by concentrating more on the financially challenged regions. The Kadapa district is located in Andhra Pradesh state. In the Kadapa region, the status of mechanization is not known. So, any planning related to farm mechanization in this area will be difficult due to the lack of enough information. Therefore, it is essential to have a comprehensive analysis study in this field. This study evaluates the status of agricultural mechanization and its impacts on sustainable development.

MATERIALS AND METHODS

The government of India has established research centers to compile data related to the cost of use of agricultural inputs including agricultural engineering inputs like (human power, mechanical power) from seedbed preparation to threshing. The data collected different groups of farmers (marginal, small, and large).

The number of available traditional and improved implements was surveyed for their annual use. Annual usage of the man, animal, and mechanical power was investigated through the operations performed by the farmer in the current cultivation practices.

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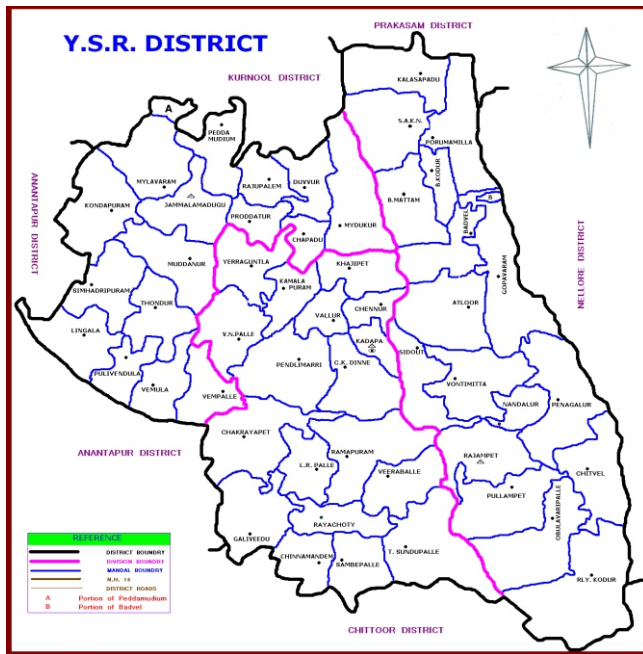


Fig .1. Map showing Kadapa district profile

Profile of Kadapa

Kadapa is located at Latitude : 13043’ and 15014’N
 Longitude 77055’ and 79029’E
 Kadapa is divided into : 51 Mandals and has 972 Villages
 The district is surrounded by : North by Kurnool District, South by Chittoor District West by Anantapur District, and east by Nellore District.
 Population : 28,82,469
 Male and Female : 145200 and 143000
 Area : 15,379 Square kilometers
 Density : 188 /sq.km
 Average Annual Rainfall : 700 mm
 Average Elevation : 442 m (1450 ft)
 Soil Types : Red Soils (57 %) and Black Soil (47 %)
 Major crops : Paddy, groundnut, sunflower, cotton, betel leaves, and horticultural crops like mango, sweet orange, banana, lemon, papaya, and lemon

Randomly selected list of 700 farmers from 7 villages for the survey. The following data were collected from the farmer’s investigation. Categories of farmers (Small, Marginal, and Big Farmers).

- Social status of the farmers
- Economics status of the farmers
- The annual income of the farmers
- Farm tools and machinery used by the farmers

The data questionnaire was prepared to cover all aspects of the process like general information of the farmer, landholding, status, and type of agricultural machinery and implements are used by the farmer. The Data questionnaire used for verification is annexed.

Mechanization Index (MI)

The mechanization index (MI) was calculated based on the total cost of farm operations performed by a different mode of operations and the cost of the operations performed by the

machinery (Tractor, diesel engine, or electric motor). The mechanization index was calculated the formula derived

$$MTL = \frac{N_{mc}}{(N_{mc} + N_{ht})}$$

- C_M = Cost of use of the machinery
- C_H = Cost of human labor
- C_A = Cost of use of animals

Mechanization Tool Level (MTL)

The mechanization tool level is the indicator of the percentage of mechanized being used for a particular operation (Jonathan et al. 2011). This is computed based on the total machinery being used and the mechanized machine for the same operation. The Mechanization tool level (MTL) was calculated from the relationship.

$$MI = \frac{C_M}{C_H + C_A + C_M}$$

N_{mc} = number of machines used for a particular farm operation
 N_{ht} = number of hand tools used for the same

Social status of Farmers

The analysis was carried out to find the farmer distribution according to the social status of the farmers. The social status of rural society is a measure of an individual’s according to the revenue division rule of India the social status of the farmers are divided into four categories i.e. (SC, ST, BC, and OC). The number of farmers in each category is listed below the table 1.

Table 1: Social status of the Farmers

S. No	Category	No of Farmers
1	SC	114
2	ST	170
3	BC	245
4	OC	174
Total		700

Category of the farmers

The category of the farmers is classified into three divisions based on the size of landholding (Table 2).

Table 2: The category of the farmer as per the size of landholding

S.No.	Category	Landholding
1	Marginal Farmers	up to 2.5acres of dry land or 1.5acres of wetland
2	Small Farmers	up to 5 acres of dry land or 2.5 to 5acres of wetland
3	Big farmers	More than 5 acres of dry land or more than 2.5 acres of wetland

By considering the above classification and by observing the data at the time of data collection of the farmers belonging to different categories have been assessed and presented table 3.

Table 3: Category of the farmers

S. No	Category of farmer	No of Farmers
1	MF	189
2	SF	359
3	BF	152
	Total	700

The study indicates that 51 percent of the farmers were owned by small farmers, 27 percent by marginal farmers, and the remaining 22 percent by big farmers.

The economic status of the farmers

The socioeconomic status of rural society is a measure of an individual's or family's economic and social position based on education, income, and occupation. It is such a strong predictor of health that an assessment of the health of the Indian rural environment would be incomplete without consideration of the socioeconomic status of its residents. It includes measures of income (median family and median household income, and poverty levels), and measures associated with income status (educational level and employment levels). A farmer's household its income from various sources like income from cultivation, income from wages, salary income from non from business, and income livestock. All these incomes are added to obtain the total annual household income of a farm household. The estimates of all India data are obtained by using appropriate weights presented in the NSS survey. All the summary statistics provided henceforth are obtained using the weights and hence represent population statistics. The report is further structured as follows in the below [table 5](#).

Table 5: Category of economic value

S No	Economic value	No of Farmers
1	Less than 10000	95
2	10000-25000	85
3	25000-50000	213
4	50000-100000	157
5	More than 100000	150
Total		700

Use pattern of farm tools and implements among farmers

Inventory of available improved tools and implements revealed that most of the farmers have improved animal-drawn tools viz iron plow (94%), blade harrow (83%), Knapsack sprayer (51%), etc. The tractor was owned by only 8 % of farmers. Similarly, cultivator, leveler, rotavator, and threshers were owned by 10, 6, 7, and 7 percent farmers ([Table 6](#)). The fewer adoption of the tractor and tractor-drawn implement was due to higher initial costs and unaffordable to the small and marginal farmers. The diesel engine or motor for water lifting was owned by 50 % of farmers.



Tillage operation



Planting operation with seeds



Planting operation with seedlings



Fertilizing operation



Spraying operation using knapsack



Spraying operation using blower



Harvesting operation with bags



Harvesting operation with wheelbarrow



Cutting plants operation

Table 6: Inventory of different tools among farmers

Implements and tools	No of tools	Percentage
Sickles	500	19.2
Tractors	200	7.98
Power tillers	350	13.9
tillage implements	200	7.98
Rotavators	200	7.98
sowing	250	9.98
Transplanters	10	0.39
Weeders	300	11.9
Sprayer	500	19.9
Harvesting machinery	12	0.47

RESULTS AND DISCUSSION

The operations performed by farmers in traditional cultivation practices for different crops were surveyed, noted down in the questionnaire prepared in format and it included socio-economic details as well as technical details. The socioeconomic details included education level, landholding, annual income, number of family members, subsidiary business. The technical details included an inventory of livestock, source of irrigation, plant protection equipment, power sources, operations performed in current cultivation practices for different crops in terms of hours of application of different power sources, technical knowhow of farmer about improved implements and government schemes about the farm implements and farmers, view for boosting mechanization in their area, etc. Mechanization of farm activities is the need of our to increase production and productivity. Though subsidy is being provided for farm machinery, due to the prohibitive cost of farm machinery all farmers may not come forward to own them. Hence, the establishment of the Custom Hiring Service Centre (CHSC) is a boon for farmers, especially for the small and marginal farmers.

Social status affected the mechanization index

The social status of the farmers is mainly divided into four categories (SC, ST, BC, and OC) in the Andhra Pradesh state. The social status of the farmers is greatly affected by the farm mechanization index less mechanization formed in the SC category more mechanization involved in the OC farmers and moderate mechanization in BC Category. The mechanization index of the category of the farmers is 50%, 55%, 70%, and 80% followed by SC, ST, BC, and OC categories (Fig. 1). The mechanization index is very SC and ST category because of that is staying away from the municipal areas, small land holding, less annual income of the framers another major reason less knowledge on the operation of the machinery and repair and maintenance lake of non-availability of workshops in rural areas.

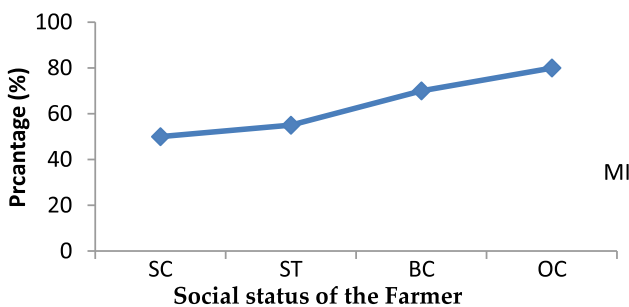


Fig.1: Social status affected on the mechanization index

Category of a farmer affected on the mechanization index

The category of the farmers is mainly divided into three groups (i.e., marginal farmers, small farmers, and big farmers) in the Andhra Pradesh state. The category of the farmers is greatly affected on the farm mechanization index less mechanization formed in the marginal farmers more mechanization involved in the big farmers and moderate mechanization small farmers. The mechanization index of the category of the farmers is which is 60%, 73%, and 85% followed by marginal, small, and big farmers (Fig. 2). Most of the SC and St farmers are the less land holding i.e., small and marginal farmers so the mechanization index is very low for SC and ST category.

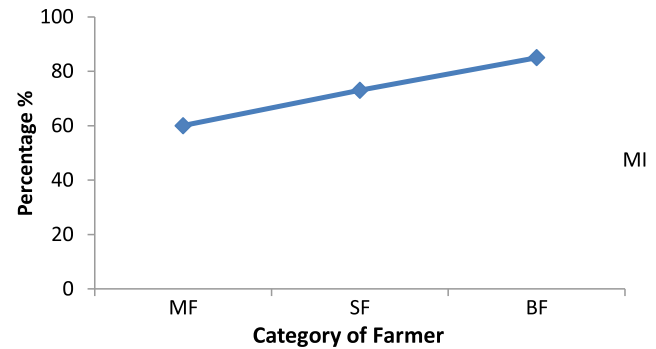


Fig. 2: Category of a farmer affected on the mechanization index

The economic status of the farmer affected on the mechanization index

The economic status of the farmers is mainly divided into five groups. The economic status of the farmers is greatly affected on the farm mechanization index less mechanization formed in the less than 25,000 Rs annual income more mechanization involved in the more than 1,00,000 Rs annual income and moderate mechanization index is remaining groups shown in below Fig. The mechanization index of the category of the farmers is which is 20%, 25%, 45%, 53%, and 78% mechanization index followed less than 10,000 to the more than 1,00,000 Rs annual income different farmers groups (Fig. 3). Most of the SC and ST farmers are less land holding so the economic status of those farmers very less. So that an initiative to provide all machines on a custom hiring basis for timely operations during a labor shortage, high labour cost situations, and for timely sowing of crops before soil moisture depletes.

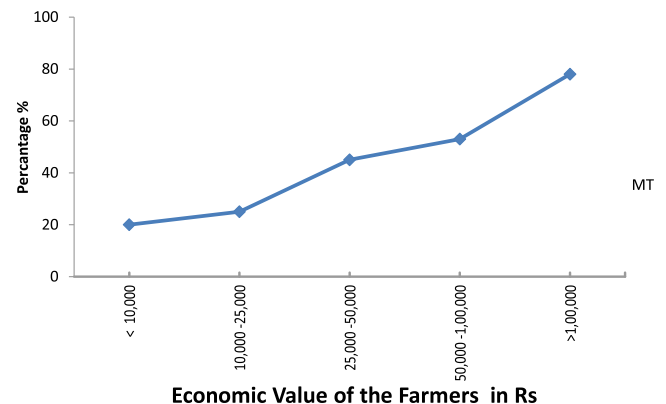


Fig. 3: Economic Status of the Farmer Affected on the Mechanization Index

Mechanization tool level for different farm operations

The mechanization tool level is the indicator of the percentage of machines being used for a particular operation. This is computed based on total machinery being used and the mechanized machine for the same operation and given in. The maximum value of the MTL was found as 40 percent for tillage operation, whereas, minimum for the transplanting was 0 percent. The higher MTL for tillage was found due to the custom hiring of the tractor-operated plough, rotavator, and energy-consuming nature of tillage operation (Fig. 4). The lowest MTL for transplanting due to the not popularization of transplanting equipment, high cost, and less suitable for soil condition. Low level of MTL in sowing found due to fewer number animals and tractor operated seed drills.

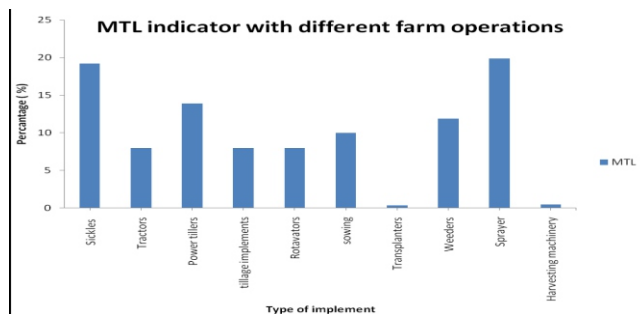


Fig. 4: MTL indicator with different farm operations

How to develop the mechanization index in rural villages

The wide fragmented and scattered landholding in the region to be consolidated (Virtual or real) to give access for their owner to benefit from agricultural mechanization. There is a need to innovate custom services by institutions or

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Government authority. Need to design and develop ergonomically suitable implements for sowing, transplanting, and harvesting operation. The Government has emphasized providing financial assistance to the farmers and other target groups for the purchase of different kinds of farm equipment, demonstration of new equipment among farmers for the spread of new technology, human resource development in operation, maintenance or repairs, and management of agricultural machinery. Agricultural universities representative and DM, APAGROS as members take the major role for the improve the farm mechanization level of the farmers. Where in hiring charges for Small and Marginal category farmers will be lower than the other category farmers. Rates should be reasonable and realistic and should be about market rates as obtaining from time to time.

CONCLUSION

The mechanization index very low SC and ST category because of that is staying away from the municipal areas, small land holding, less annual and repair and Maintenance, lack of non-availability of workshops in rural areas. The economic status of the farmers is greatly affected by the farm mechanization index less mechanization formed in less than 25,000 Rs of the annual income of the farmers. Mechanization tool level (MTL), more in sickles and sprayers therefore design, development, and popularization of small hand tools and equipment suitable for sowing, transplanting, and harvesting operations in the Kadapa region needs to be done on a priority basis to enhance mechanization index in selected operations and also to increase the income of farmers. Government should encourage more custom hiring centers at the block/district level to increase the availability of costly/heavy machinery to enhance mechanization.

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