

Mechanisation in Paddy Farming – Paradigm shift in the Farmers Perception: An Empirical Analysis

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Abstract— *Mechanisation practices have been growing in rapid phase in the Indian paddy farming. The researcher emphasised over the different paddy farming practices such as, primary tillage, secondary tillage, plantation, intercultural operations and harvesting and threshing. The researcher tested the impact of mechanisation in the various paddy farming practices. Researcher deployed the paired t-test and the results are presented. The study has been carried in Tenali revenue mandal located in Guntur district of Andhra Pradesh state in India.*

Index Words: *Mechanisation, paddy farming, primary tillage, secondary tillage, plantation, intercultural operations, harvesting and threshing*

I. INTRODUCTION

Mechanization in agriculture has paralleled many other changes in India, which has transformed itself from a machinery importer to the world's leading tractor manufacturer. Most of the earlier innovations in the rice mechanization sector in India were on tractors, drillers, and mechanical trans planters, different types of irrigation machinery, and mechanical weed control as preharvest machines. For postharvest operations, automation is used for harvesting, proper threshing; post thresh cleaning, rolling, milling, drying, and safe storage (Manchikanti and Sengupta 2011). The adoption of agricultural mechanization in India is continuously increasing. In 2007, India had 3.2 million agricultural tractors and 0.48 million combine harvesters and threshers. The density of tractors per 1,000 ha of cropped area was about 16 compared with the world average of 19, and 27 in the US (Directorate of Economics and Statistics 2013).

II. MECHANIZATION GROWTH IN INDIA

The general pattern for the growth of mechanization in India was found to be broadly similar to a more worldwide pattern but with two clear mechanization stages: (a) the first stage starting from the 1950s to the 1970s, and (b) the second stage from 1970 to the present (Gajendra Singh 2013). The first stage included education related to agricultural engineering programs, indicating its importance alongside other engineering disciplines; importing of tractors; and farm operations and transport work using draught animals. This

period ended with tractor production, which started under license in 1961, having an annual output of 880 tractors by Eicher Tractor Ltd. Five manufacturers were licensed to make tractors, while production of power tillers started in 1965. More concentrated support for the field of agricultural engineering education was provided with establishment of the first college of agricultural engineering, based on the US Land Grant pattern, in 1962 at Pantnagar with the help of the University of Illinois. This was followed by the establishment of six more colleges and two degree-granting departments at institutes under the Table 6 presents key mechanization indicators and information from India. Indian Council for Agricultural Research (ICAR). During this time, 96% of the tractors were owned by larger farmers with landholdings of more than 10 ha. Another major development was the creation of credit facilities to purchase farm equipment. In the late 1960s, the Green Revolution began, marking the beginning of the second stage.

III. RESEARCH PROBLEM

There are many studies which reveals about the mechanization's role in the paddy farming. Some specific studies focused and revealed the utilization of concerned tools and technology in determining the paddy yielding. But there is no a study which describe the role of mechanisation in the wholesome practices of paddy farming. Hence, this study focused to assess the impact of mechanization among the different paddy farming practices in India.

IV. RESEARCH METHODOLOGY

The present study applied the stratified random sampling technique to collect the required data for this study. The researcher collected 160 samples from the different locations in Tenali revenue division of Andhra Pradesh. Researcher used a self-administered questionnaire and collected the data. After collecting the data, the researcher applied paired t-test method and analyzed the data. The specific results are mentioned in the following paragraphs.

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V. V.DATA ANALYSIS

Testing the impact of Mechanisation in paddy farming over the Primary Tillage

Assessing the impact of Mechanisation in paddy farming over Primary tillage:

The impact of Mechanisation in paddy farming over the primary tillage in the paddy farming is tested with the paired t-test. The mean scores before the mechanisation and after the mean scores are paired to test the results. The results are presented the following tables.

Table - 1 Paired Sample Statistics of the Primary tillage

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Primary tillage Before Mechanisation in paddy farming	4.2895	160	0.68241	0.05535
Primary tillage After Mechanisation in paddy farming	3.5877	160	1.07722	0.08737

The above table - 1 depicted that the mean score of the primary tillage before Mechanisation in paddy farming is found to be 4.2895 and the same mechanisation is found to be 3.5877. The standard deviation values are 0.68241 and 1.07722 before and after respectively. The standard error mean values are found to be 0.05535 and 0.08737 respectively.

Table - 2: Paired Sample Correlation of Primary tillage

Paired Samples Correlations			
	N	Correlation	Sig.
Primary tillage Before Mechanisation in paddy farming & Primary tillage After Mechanisation in paddy farming	160	0.571	0.000

The above table - 2 revealed about the paired sample correlation between the before and after the mechanisation in paddy farming over the primary tillage practices in the paddy farming. The results disclosed that the correlation value is 0.571 which indicates that there is a moderate correlation and the p-value is found to be 0.000.

Table - 3: Paired Sample Test results of Primary tillage

Paired Samples Test							
	Paired Differences					t	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
BPT - APT	0.70175	0.88663	0.0719	0.5596	0.8438	9.758	0.000

The results of paired sample test of primary tillage presented in table – 3 revealed that the mean of the sample is found to be 0.70175. the standard deviation is found to be 0.88663, standard mean is 0.0719. The bootstrapping results of the test yielded the lower control limit as 0.5596 and the upper control limit as 0.8438. The concerned confidence intervals did not observe zero between them which we can interpret that the sample results are significant. The t-value is found to be 9.758 and the p-value is found to be 0.000.

VI. CONCLUSION:

The test results showed a significant increase in primary tillage after Mechanisation in paddy farming. P- value is less than 0.05 and the mean difference is equal to 0.702. The results therefore corroborates that fact the Primary tillage initiatives incorporated in Mechanisation are engendering effective results. Hence, we conclude that the proposed null hypothesis (H10) is disproved and alternative hypothesis (H1) is accepted.

Assessing the impact of Mechanisation in paddy farming over Secondary tillage:

The impact of Mechanisation in paddy farming over the secondary tillage in the paddy farming is tested with the paired t-test. The mean scores before the mechanisation and after the mean scores is paired to test the results. The results

are presented the following tables.

Table - 4 Paired Sample Statistics of the Secondary tillage

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Secondary tillage Before Mechanisation in paddy farming	3.3771	160	0.85558	0.08556
Secondary tillage After Mechanisation in paddy farming	3.9600	160	0.59893	0.05989



The above table – 4 depicted that the mean score of the secondary tillage before Mechanisation in paddy farming is found to be 3.3771 and the same mechanisation is found to be 3.9600. The standard deviation values are 0.85558 and 0.59893 before and after respectively. The standard error mean values are found to be 0.08556 and 0.05989 respectively.

Table - 5: Paired Sample Correlation of Secondary tillage

Paired Samples Correlations			
	N	Correlation	Sig.
Secondary tillage Before Mechanisation in paddy farming & Secondary tillage After Mechanisation in paddy farming	160	0.344	0.000

The above table - 5 revealed about the paired sample correlation between the before and after the Mechanisation in paddy farming over the Secondary tillage practices in the paddy farming. The results disclosed that the correlation value is 0.344 which indicates that there is a low correlation and the p-value is found to be 0.000.

The results of paired sample test of secondary tillage revealed that the mean of the sample is found to be 0.58286. The standard deviation is found to be 0.85947, standard mean is 0.08595. The bootstrapping results of the test yielded the lower control limit as -0.75339 and the upper control limit as -0.41232. The concerned confidence intervals did not observe zero between them which we can interpret that the sample results are significant. The t-value is found to be -6.782 and the p-value is found to be 0.000.

Table - 6: Paired Sample Test results of Secondary tillage

Paired Samples Test							
	Paired Differences					t	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
BST - AST	0.58286	0.85947	0.08595	-0.75339	-0.41232	-6.782	0.000

Conclusion:

The test results showed a significant increase in secondary tillage after Mechanisation in paddy farming. P- Value is less than 0.05 and the mean difference is equal to 0.085. The results therefore corroborates that fact the Secondary tillage initiatives incorporated in Mechanisation are engendering effective results. Hence, we conclude that the proposed null hypothesis (H20) is disproved and alternative hypothesis (H2) is accepted.

Assessing the impact of Mechanisation in paddy farming over Plantation:

The impact of Mechanisation in paddy farming over the plantation in the paddy farming is tested with the paired t-test. The mean scores before the mechanisation and after the mean scores is paired to test the results. The results are presented the following tables.

Table - 7 Paired Sample Statistics of the Plantation

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Plantation Before Mechanisation in paddy farming	3.4401	160	0.69705	0.07431
Plantation After Mechanisation in paddy farming	3.9380	160	0.27996	0.02984

plantation before Mechanisation in paddy farming is found to be 3.4401 and the same mechanisation is found to be 3.9380. The standard deviation values are 0.69705 and 0.27996 before and after respectively. The standard error mean values are found to be 0.07431 and 0.02984 respectively.

Table - 8: Paired Sample Correlation of Plantation

Paired Samples Correlations			
	N	Correlation	Sig.
Plantation Before Mechanisation in paddy farming & Plantation After Mechanisation in paddy farming	160	0.528	0.000

The above table – 8 revealed about the paired sample correlation between the before and after the Mechanisation in paddy farming over the Plantation practices in the paddy farming. The results disclosed that the correlation value is 0.528 which indicates that there is a moderate correlation and the p-value is found to be 0.000. The results of paired sample test of plantation revealed that the mean of the sample is found to be -0.49793. The standard deviation is found to be 0.59851, standard mean is 0.06380. The bootstrapping results of the test yielded the lower control limit as -0.62475 and the upper control limit as -0.37112. The concerned confidence intervals did not observe zero between them which we can interpret that the sample results are significant.

The above table – 7 depicted that the mean score of the

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The t-value is found to be -7.804 and the p-value is found to be 0.000.

Table - 9: Paired Sample Test results of Plantation:

Paired Samples Test							
	Paired Differences					t	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
BPLNT – APLNT	-0.49793	0.59851	0.06380	-0.62475	-0.37112	-7.804	0.000

VII. CONCLUSION:

The test results showed a significant increase in plantation after Mechanisation in paddy farming. P- Value is less than 0.05 and the mean difference is equal to 0.063. The results therefore corroborates that fact the Plantation initiatives incorporated in Mechanisation are engendering effective results. Hence, we conclude that the proposed null hypothesis (H30) is disproved and alternative hypothesis (H3) is accepted.

Assessing the impact of Mechanisation in paddy farming over Intercultural Operations:

The impact of Mechanisation in paddy farming over the Intercultural Operations in the paddy farming is tested with the paired t-test. The mean scores before the mechanisation and after the mean scores is paired to test the results. The results are presented the following tables.

Table - 10 Paired Sample Statistics of the Intercultural Operations:

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Intercultural Operations Before Mechanisation in paddy farming	3.1689	160	1.10192	0.11019
Intercultural Operations After Mechanisation in paddy farming	3.9689	160	0.58028	0.05803

The above table – 10 depicted that the mean score of the Intercultural Operations before Mechanisation in paddy farming is found to be 3.1689 and the same mechanisation is found to be 3.9689. The standard deviation values are 1.10192 and 0.58028 before and after respectively. The standard error mean values are found to be 0.11019 and 0.05803 respectively.

Table - 11: Paired Sample Correlation of Intercultural Operations

Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	Intercultural Operations Before Mechanisation in paddy farming & Intercultural Operations	160	0.752	0.000

	After Mechanisation in paddy farming			
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The above table – 11 revealed about the paired sample correlation between the before and after the Mechanisation in paddy farming over the Intercultural Operations practices in the paddy farming. The results disclosed that the correlation value is 0.752 which indicates that there is a high correlation and the p-value is found to be 0.000.

Table - 12: Paired Sample Test results of Intercultural Operations:

Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	Intercultural Operations Before Mechanisation in paddy farming & Intercultural Operations After Mechanisation in paddy farming	160	0.752	0.000

The results of paired sample test of Intercultural Operations revealed that the mean of the sample is found to be -0.80000. The standard deviation is found to be 0.76785, standard mean is 0.07679. The bootstrapping results of the test yielded the lower control limit as -0.95236 and the upper control limit as -0.64764. The concerned confidence intervals did not observe zero between them which we can interpret that the sample results are significant. The t-value is found to be -10.419 and the p-value is found to be 0.000.

Conclusion:

The test results showed a significant increase in Intercultural Operations after Mechanisation in paddy farming. P- Value is less than 0.05 and the mean difference is equal to 0.076. The results therefore corroborates that fact the Intercultural Operations initiatives incorporated in Mechanisation are engendering effective results. Hence, we conclude that the proposed null hypothesis (H40) is disproved and alternative hypothesis (H4) is accepted.

Assessing the impact of Mechanisation in paddy farming over Harvesting and Threshing:



The impact of Mechanisation in paddy farming over the harvesting and threshing in the paddy farming is tested with the paired t-test. The mean scores before the mechanisation and after the mean scores is paired to test the results. The results are presented the following tables.

Table - 13 Paired Sample Statistics of the Harvesting and Threshing

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Harvesting and threshing Before Mechanisation in paddy farming	3.4097	160	1.09756	0.11202
	Harvesting and threshing After Mechanisation in paddy farming	4.2708	160	0.66809	0.06819

The above table - 13 depicted that the mean score of the harvesting and threshing before Mechanisation in paddy farming is found to be 3.4097 and the same mechanisation is found to be 4.2708. The standard deviation values are

Table - 15: Paired Sample Test results of Harvesting and Threshing:

Paired Samples Test							
	Paired Differences					t	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
Harvesting and threshing	-0.86111	1.03242	0.10537	-1.07030	-0.65192	-8.172	0.000

The results of paired sample test of harvesting and threshing revealed that the mean of the sample is found to be -0.86111. The standard deviation is found to be 1.03242, standard mean is 0.10537. The bootstrapping results of the test yielded the lower control limit as -1.07030 and the upper control limit as -0.65192. The concerned confidence intervals did not observe zero between them which we can interpret that the sample results are significant. The t-value is found to be -8.172 and the p-value is found to be 0.000.

VIII. CONCLUSION:

The test results showed a significant increase in harvesting and threshing after Mechanisation in paddy farming. P-Value is less than 0.05 and the mean difference is equal to 0.105. The results therefore corroborates that fact the Harvesting and threshing initiatives incorporated in Mechanisation are engendering effective results. Hence, we conclude that the proposed null hypothesis (H₀) is disproved and alternative hypothesis (H₁) is accepted.

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1.09756 and 0.66809 before and after respectively. The standard error mean values are found to be 0.11202 and 0.06819 respectively.

Table - 14: Paired Sample Correlation of Harvesting and Threshing

Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	Harvesting and threshing Before Mechanisation in paddy farming & Harvesting and threshing After Mechanisation in paddy farming	160	0.399	0.000

The above table – 14 revealed about the paired sample correlation between the before and after the Mechanisation in paddy farming over the Harvesting and threshing practices in the paddy farming. The results disclosed that the correlation value is 0.399 which is indicates that there is a low correlation and the p-value is found to be 0.000.

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