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# An Empirical Study on Farm Mechanisation Pattern and Preference of Paddy farmers in Erode district of Tamil Nadu

**Abstract:** Farm mechanisation has been helpful to bring about a significant improvement in agricultural productivity. Thus, there is strong need for mechanisation of agricultural operations. In recent years, non-availability of farm labours and fragmentation of land holdings (smaller land holdings) are forcing many farmers to mechanise their farms and over the last few years, there has been a considerable progress in agricultural mechanisation. Hence, the study aimed to analyse the farm mechanisation pattern and preference of paddy farmers in Erode District of Tamil Nadu. Results showed that the major problem in adopting farm mechanisation in the study area is high hiring cost. Results also revealed that the adoption behaviour of farmers preferring farm mechanisation is extremely determined by the factors like education, farm experience, paddy land and paddy income.

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Name of the Authors:

**Dr.D.Muthamizh Vendan Murugavel**
*Associate Professor of Commerce*
*Dr GRD College of Science*
*Coimbatore -641014*

## INTRODUCTION

In the context of increasing commercialisation of agriculture, mechanisation is very important. There has been increase in the use of farm machinery in Indian agriculture as it contributed to the increase in output due to timeliness of operations and increasing precision in input application. Most of the mechanical inputs have displaced human and bullock labour which is socially unjustified.

Farm mechanisation has been helpful to bring about a significant improvement in agricultural productivity. Thus, there is strong need for mechanisation of agricultural operations. The factors that justify the strengthening of farm mechanisation in the country can be numerous. The timeliness of operations has assumed greater significant in obtaining optimal yields from different crops, which has been possible by way of mechanisation. Higher productivity of land and labour is another factor, which clearly justifies farm mechanisation. The various operations such as land levelling, irrigation, sowing and planting, use of fertilisers, plant protection, harvesting and threshing need a high degree of precision to increase the efficiency of the inputs and reduce the losses.

Transplanting, weeding and harvesting operations consume most of the labour requirements in paddy cultivation and hence thrust should be given for mechanising these operations in order to reduce the labour requirement in paddy cultivation. High labour demand during peak periods adversely affects timeliness of operation, thereby reducing the crop yield. The steady drift of agricultural labour to industrial sector is adding more to the woes of the paddy farmer. To offset these problems stress on mechanisation is the need of the hour.

Keeping the above perspectives in view, an attempt has been made in this study to analyse the farm mechanisation pattern and preference of paddy farmers in Erode District of Tamil Nadu.

## REVIEW OF LITERATURE

**Sarma (1999)** conducted a study in Titabor sub-division of Jorhat district of Assam on the impact of farm mechanisation through power tiller on productivity and employment. The findings revealed that farms with mechanisation appeared to have higher farm size, higher rate of literacy and greater participation of their workforce

and thereby indicating better economic status. The findings also revealed that mechanisation allows farmer to allocate more area to high income crops, increase cropping intensity and to incur lower cost per cropped hectare. It was also found that there has been an increase in productivity with the increase in levels of mechanisation. Further it was also found that with the increase in levels of mechanisation, there has been a decrease in the level of human labour employment.

**Ghosh (2010)** attempted to study the determinants of farm mechanisation in west Bengal. Results revealed that the factors such as irrigation, access to institutional credit, size of land holding were found to have positive significant influence on the level of farm mechanisation. The study also revealed that younger generation was more opt for mechanisation than the old. It was also evident that the size of land holding acts as a constraint for farm mechanisation in the study area. Also small assets base of small and marginal farmers prevents their access to institutional credit and this in turn affects the utilization of agricultural machinery and implements. The farmers were also not well trained to use the modern costly machineries efficiently.

**OBJECTIVES OF THE STUDY**

1) To analyse the farm mechanisation pattern of paddy farmers.
2) To identify the reasons for preferring mechanisation in paddy farms.
3) T evaluate the farm mechanisation adoption behaviour of the paddy farmers.
4) To examine the constraints faced by the farmers in adopting mechanisation in paddy cultivation.

**HYPOTHESIS OF THE STUDY**

Farmers' decision on adoption of farm mechanisation is independent of the variables such as age, farm size, education, family size, farm experience, paddy land, extension contact, number of labours, wet land size and income from paddy.

**PERIOD OF THE STUDY**

The study has been conducted during the year 2014.

**METHODOLOGY - SAMPLING DESIGN**

This study is an empirical research based on survey method. The present study is confined to Erode district of Tamil Nadu. Erode district, where the paddy farmers are following both traditional method and SRI method of paddy cultivation, has been purposively chosen for the study considering its huge contribution in paddy production in the state. In Erode district, there are 14 blocks. Out of 14 blocks in the district, five blocks namely Gobichettipalayam, T.N.Palayam, Modakurichi, Bhavani and Erode have been purposively selected for the present study as they contribute huge in terms of area of paddy cultivation and production of paddy during the year 2012-13. The sample size of the present study is 500 farmers. The farmers who cultivate paddy at least in one acre of land with 2 years of continuous experience in cultivation of paddy in the selected blocks have been considered for the study. From each selected block, 100 farmers have been selected purposively. Out of 100 paddy farmers considered from each block, 80 farmers who follow traditional method of paddy cultivation and 20 farmers who follow system of rice intensification method of paddy cultivation have been purposively selected. Hence, the total sample size of the study is 500 farmers consisting of 400 farmers following traditional method of paddy cultivation and

100 farmers following SRI method of paddy cultivation.

**DATA**

The study includes only primary data that have been collected well structured and non-disguised Interview Schedule.

**TOOLS USED FOR ANALYSIS**

The statistical tools such as Percentage analysis, Mean, Mean score ranking analysis, Logistic regression analysis and Scaling the ranking analysis have been used to get the results.

**FARM MACHINERIES USED IN PADDY CULTIVATION IN THE STUDY AREA**

The following are the details of the farm machineries that are used by the paddy farmers in the study area.

***Tractor:*** Tractors are available in two power ranges. Small power range tractor is meant for paddy cultivation. It is a lightweight tractor with four wheel drive with rotavator used for puddling. It has a small turning radius. Traffic ability problem can be avoided with this tractor due to its light weight.

***Power Tiller:*** It is a self propelled machine specifically useful for paddy fields and orchards as it can take short turns. It comes with a package of implements like rotavator for puddling, cultivator for land preparation. It can be used for operations like pumping, threshing and for farm transport.

***Paddy Transplanter:*** It is a self-propelled machine driven by diesel engine. The machine transplants at a row spacing of 23 cm with a provision to vary the plant to plant distance of 10-12 cm and vary the depth of planting and number of plants per hill. It requires mat type nursery. The machine helps in a net saving in labor of about 40 per cent. The machine is more suitable for light textured soils. Further at present, the mechanical transplanters can plant 2 seedlings per hill at a spacing of 24 cm ( row to row ) and 12- 24 cm (plant to plant) for adoption of other SRI principles. This will be a very good development in promoting SRI in large scale. Cono Weeder: In SRI, first weeding is done after 10-12 days of transplantation. Subsequently weedings are done every 10 days, until the crop permits operation. Weeding at 10 days interval is necessary. The field is irrigated one day before weeding and at least half inch water is retained for easy operation. Weeder is moved front and back between every two rows both vertically and horizontally.

Mechanical weeding alone increased the plant height and enhanced the grain yield by 10.9% as compared to manual weeding. Use of appropriate weeding equipment's coupled with suitable weedicides gives the best results against weeds. Cono weeder can be used as a package implement for row seeder and extensively used in the SRI type of cultivation.

***Power Sprayer:*** A sprayer is a device used to spray a liquid. In paddy field, power sprayer is used to spray nozzles to apply herbicides, pesticides, and fertilisers to paddy crops.

***Combine Harvester:*** This is self-propelled machine which cuts, conveys, threshes, cleans and bags the produce from the field. It can harvest even a lodged crop. Wheel and chain combines are available. The chain combine is having more manoeuvrability by having lesser turning radius. The straw disposal and utilization seems to be problematic with the use of combines. Thresher: Traditionally threshing is done by treading by bullocks or trampling by tractors.

It takes more time and loss of yield through un-threshed paddy is more. This has been replaced by power operated threshers with either diesel or electrical power driven source.

## ANALYSIS & INTERPRETATION FARM MECHANISATION PATTERN

Farm mechanisation implies the use of various power sources, improved farm tools and equipment, with a view to reduce the drudgery of the human beings and draught animals, thereby increasing crop production and productivity. In recent years, non-availability of farm labours and fragmentation of land holdings (smaller land holdings) are forcing many farmers to mechanise their farms and over the last few years, there has been a considerable progress in agricultural mechanisation. Tractors are the main power source for various farm operations and India is the world leader in tractor production with over 5 lakh tractors produced annually. Past studies on efficiency of farm mechanisation revealed that if the mechanisation used properly a farmer can save seeds 15-20 per cent, fertiliser 20-30 per cent, time 20-30 per cent, labourers 5-20 per cent, increase cropping intensity 10-15 per cent and higher productivity 15-20 per cent. Farm mechanisation practices followed by the paddy farmers in the study area are discussed in this section.

## FARM MACHINERIES OWNED BY THE PADDY FARMERS

Paddy farmers are also modernising their farms by using implements such as tractor, power tiller, paddy transplanter, cono weeder, power sprayer, combine harvester, thresher etc. The farmers either owned or hired those machineries. Table 1 presents the details of farm machineries owned by the paddy farmers in the study area.

**Table 1 - Farm Machineries Owned by the Paddy Farmers**

| Farm Machineries | Frequency | Percentage |
|---|---|---|
| Tractor | 08 | 1.6 |
| Power tiller | 79 | 15.8 |
| Transplanting machine | 00 | 0.0 |
| Cono weeder | 18* | 18 |
| Power sprayer | 86 | 17.2 |
| Combine harvester | 11 | 2.2 |
| Thresher | 04 | 0.8 |

* *denotes frequency out of 100 SRI farmers only as cono weeder is designed for SRI method alone whereas others denote frequency out of 500 farmers.*

Table 1 depicts that 18% of the SRI paddy farmers alone (as it is more suitable and specially designed for SRI method of cultivation only) own the cono weeder, 17.2% of the paddy farmers own the power sprayer, 15.8% of the paddy farmers own the power tiller, 2.2% of the paddy farmers own the combine harvester, 1.6% of the paddy farmers own the tractor, 0.8% of the paddy farmers own the thresher and no single paddy farmer owns the paddy transplanting machine in the study area. Due to high cost of tractors, paddy trans planters, combine harvesters and threshers, most of the farmers are not able to buy those machineries, though loans are available for this purpose, and instead they hire those machineries.

## EXTENT OF ADOPTION OF FARM MECHANISATION IMPLEMENTS BY THE PADDY FARMERS

To know the adoption level of the paddy farmers towards the farm implements such as tractors, power tillers, transplanting machines, cono weeders, power sprayers, combine harvesters and threshers, farmers are asked to provide their farm mechanisation adoption status. Table 2 gives the details of extent of adoption of farm mechanisation implements by the paddy farmers in the study area.

**Table 2 - Extent of Adoption of Farm Mechanisation Implements by the Paddy Farmers**

| Farm Machineries | Adopted Frequency | Percentage |
|---|---|---|
| Tractor | 347 | 69.4 |
| Power tiller | 390 | 78.0 |
| Transplanting machine | 12 | 2.4 |
| Cono weeder | 36* | 36 |
| Power sprayer | 406 | 81.2 |
| Combine harvester | 351 | 70.2 |
| Thresher | 149 | 29.8 |

* *denotes frequency out of 100 SRI farmers only as cono weeder is designed for SRI method alone whereas others denote frequency out of 500 farmers.*

Table 2 indicates that 81.2% of the paddy farmers have adopted power sprayer in their farm operation, 78.0% of the paddy farmers have adopted power tiller in their farm operation, 70.2% of the paddy farmers have adopted combine harvester in their farm operation, 69.4% of the paddy farmers have adopted tractor in their farm operation, 36% of the SRI paddy farmers alone have adopted cono weeder in their farm operation (as it is more suitable and specially designed for SRI method of cultivation only), 29.8% of the paddy farmers have adopted thresher in their farm operation and only 2.4% of the paddy farmers have adopted transplanting machine in their farm operation.

It can be concluded that the adoption level of majority of the sample paddy farmers in the study area is above the average level regarding farm mechanisation practices in paddy cultivation. This indicates still a vast scope for the development departments to intervene and improve the adoption level of farmers about farm mechanisation practices. Further, paddy transplanting method is now only gaining popularity in the study region. However, its operation, specific requirements like mat nursery, trays etc all still in dwindling stage in the scientific community itself. Therefore, the researchers and extension personnel of the development departments should guide and advise the farmers about its advantages or even difficulties clearly.

**USAGE PATTERN OF FARM MACHINERIES IN PADDY CULTIVATION**

The usage pattern of farm machineries differs from one another. Usage pattern refers to the number of hours particular agricultural machinery is used in the farm operation, cost incurred per hour and total cost incurred in using that machine per acre. Table 3 depicts the usage pattern of different farm machineries considered in this study.

**Table 3 - Usage Pattern of Farm Machineries in Paddy Cultivation**

| Farm Machineries | Hours Used (per acre) | Amount per hour per acre ` | Cost per acre ` |
|---|---|---|---|
| Tractor | 2.59 | 771.33 | 1997.74 |
| Power tiller | 5.72 | 345.90 | 1978.56 |
| Transplanting machine | 4.85 | 401.17 | 1945.67 |
| Cono weeder | 1.46* | 219.35* | 320.25* |
| Power sprayer | 1.06 | 158.50 | 168.01 |
| Combine harvester | 1.92 | 1349.74 | 2591.50 |
| Thresher | 1.07 | 665.42 | 712.00 |

*denotes the average hours used, amount per hour and cost per acre of cono weeder operated by 36 SRI farmers out of 100 SRI farmers considered in this study.*

Table 3 clearly exhibits that the average hours used is the highest for power tiller with 5.72 hours per acre. The average hours used for transplanting machine is 4.85 hours per acre and the average hours used for tractor is 2.59 hours per acre. The average hours used for combine harvester and cono weeder are 1.92 hours and 1.46 hours per acre respectively. Thresher has been used for 1.07 hours per acre and the average hours used for a power sprayer is 1.06 hours per acre in paddy farm operation.

Results also showed that the average cost incurred for a combine harvester used in the paddy farm operation per acre is the highest i.e. ` 2591.50 followed by ` 1997.74 for a tractor used in the paddy farm operation per acre, ` 1978.56 for a power tiller used in the paddy farm operation per acre, ` 1945.67 for a paddy transplanting machine used in the paddy farm operation per acre, ` 712.00 for a thresher used in the paddy farm operation per acre, ` 320.25 for a cono weeder used in the paddy farm operation per acre and ` 168.01 for a power sprayer used in the paddy farm operation per acre.

**REASONS FOR PREFERRING MECHANISATION IN PADDY CULTIVATION**

Table 4 displays the reasons for preferring mechanisation in paddy cultivation by the farmers in the study area with the help of mean score ranking analysis.

Table 4 interprets that non availability of manpower, large size of land holding, availability of farm machineries, reduction in production cost and land suitability are ranked as the major reasons for preferring mechanisation in paddy cultivation with the highest mean scores of 4.75, 4.29, 4.23, 4.19 and 4.11 respectively. Non availability of labours is emerging as a biggest threat to agriculture production which ultimately forces the farmers to prefer mechanisation. The reasons such as achieving timeliness in farm activities availability of credit facilities and subsidies, increase in cropping intensity, increase in productivity, increase in gross income and good quality work are moderately influencing the preference of mechanisation in paddy cultivation and are ranked as sixth, seventh, eighth, ninth, tenth and eleventh respectively. The factors like efficient use of costly inputs, saves labour, multiple cropping, reducing the field losses in seedling, harvesting and threshing, reducing human and animal labour and improving safety in production operations are having least influence in mechanising paddy farms with least mean scores.

**Table 4 - Reasons for Preferring Mechanisation in Paddy Cultivation – Mean Score Ranking Analysis**

| Reasons | Total Score | Mean score | Rank |
|---|---|---|---|
| Non availability of manpower | 2374 | 4.75 | I |
| Large size of land holding | 2143 | 4.29 | II |
| Availability of farm machineries | 2117 | 4.23 | III |
| Reduction in production cost | 2093 | 4.19 | IV |
| Land suitability | 2055 | 4.11 | V |
| Achieving timeliness in farm activities | 2020 | 4.04 | VI |
| Increase in cropping intensity | 2016 | 4.03 | VII |
| Increase in productivity | 1979 | 3.96 | VIII |
| Availability of credit facilities and subsidies | 1947 | 3.89 | IX |
| Increase in gross income | 1934 | 3.87 | X |
| Good quality work | 1929 | 3.86 | XI |
| Efficient use of costly inputs | 1844 | 3.69 | XII |
| Saves labour | 1829 | 3.66 | XIII |
| Multiple cropping | 1693 | 3.39 | XIV |
| Reducing losses in seedling, harvesting and threshing | 1682 | 3.36 | XV |
| Reducing human and animal labour | 1656 | 3.31 | XVI |
| Improving safety in production operations | 1647 | 3.29 | XVII |

*Source: Field Survey*

**ADOPTION BEHAVIOUR MODEL FOR FARM MECHANISATION IN PADDY CULTIVATION - ESTIMATED LOGISTIC REGRESSION FUNCTION**

The set of explanatory variables determining the level of farm mechanisation is examined by applying a logit model analysis. Though it is very difficult to measure the level of mechanisation achieved by the farmers, it is decided to apply an index based on farmers' use of modern agricultural machineries such as tractor, power tiller, paddy transplanter, power sprayer, combine harvester and thresher. Farmers' responses to these parameters are codified into scores. The total scores on these codifications could vary from 1 to 6 depending on the level of farm mechanisation achieved by the respective farmers. Finally, if the score of a farmer exceeds 50% of the maximum achievable scores, that farm is considered to be mechanised and a value of 1 is assigned to that farm and 0 otherwise. Accordingly, a logit analysis has been worked out. Thus, the logit regression model has been specified as Equation (1):

$$L_i = .(P_i / 1 - P_i) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 \ldots + \beta_9 X_9 + e_i \ldots\ldots \quad (1)$$

Where,

$L_i$ = Logit or log of odds ratio

$P_i$ = Adoption of mechanisation in paddy cultivation

$1 - P_i$ = Adoption of traditional methods in paddy cultivation

$\beta_0$ = Constant term

$\beta i$ to $\beta_9$ = Coefficients to be estimated

$e_i$ = error term

$X_1$ = Age of the farmer (years)

$X_2$ = Farm Size (acres)

$X_3$ = Education (years)

$X_4$ = Family Size (numbers)

$X_5$ = Farm Experience (years)

$X_6$ = Paddy Land (acres)

$X_7$ = Extension contact (times per month)

$X_8$ = Number of Labours (numbers)

$X_9$ = Wet Land Size (acres)

$X_{10}$ = Paddy Income (`)

The parameters in equation (1) are estimated using SPSS 17 computer software.

**ADOPTION BEHAVIOUR MODEL FOR FARM MECHANISATION – ESTIMATED LOGISTIC REGRESSION FUNCTION**

The logit framework discussed has postulated that the probability of a respondent to adopt mechanisation (Li) is dependent on the socio-economic characteristics of the respondents such as age, farm size, education, family size, farm experience, paddy land, extension contact, number of labours, wet land size and paddy income. The index variable Li is a dichotomous variable, i.e. it takes the value of one if a respondent is adopting mechanisation (Li = 1) and takes the value zero otherwise (Li = 0). Li has been shown to be logarithm of odds ratio. The maximum likelihood estimate of the coefficients of the logit model for the respondents' adoption behaviour of farm mechanisation is presented in Table 5.

Table 5 describes that the results of the logistics regression model indicates that the fit of data is good as indicated by the statistical significance ($P < 0.01$) of the $\chi 2$ (chi-square). Negelkeke R2 tells that all the explanatory variables in the significantly fitted model could explain 66.0 per cent of variance in adoption of farm mechanisation. The parameter estimates that six variables (farm size, education, farm experience, paddy land, number of labours and paddy income) have significantly influenced the choice of adoption of mechanisation in paddy cultivation. From the results obtained, it is found that the coefficients of family size and extension contact are minimal. The coefficients of age and wet land size are negative and not significant.

**Table 5 - Maximum Likelihood Estimates of Factors that Influence Adoption of Farm Mechanisation – Logit Model**

| Variable | Parameter | Logistic Regression Coefficients (βi) | Standard Error | Significance | Exp(β) |
|---|---|---|---|---|---|
| Age | $X_1$ | -0.017 | 0.022 | 0.441 | 0.983 |
| Farm Size | $X_2$ | 0.261*** | 0.051 | 0.000 | 1.370 |
| Education | $X_3$ | 0.144*** | 0.029 | 0.000 | 1.154 |
| Family Size | $X_4$ | 0.034 | 0.097 | 0.723 | 1.035 |
| Farm Experience | $X_5$ | 0.033** | 0.016 | 0.038 | 1.034 |
| Paddy Land | $X_6$ | 0.345*** | 0.118 | 0.003 | 1.412 |
| Extension Contact | $X_7$ | 0.015 | 0.020 | 0.462 | 1.015 |
| Number of Labours | $X_8$ | -0.068*** | 0.017 | 0.000 | 0.934 |
| Wet Land Size | $X_9$ | -0.015 | 0.014 | 0.301 | 0.985 |
| Paddy Income | $X_{10}$ | 0.247*** | 0.058 | 0.000 | 1.280 |
| Constant | | 1.641 | 1.878 | 0.382 | 5.162 |
| $\chi^2$ | 107.479 | | | | |
| -2 log likelihood | 374.072 | | | | |
| Negelkeke $R^2$ | 0.660 | | | | |

**** indicates Significant at 1%, ** Significant at 5% & * Significant at 10% level of probability.*

The results clearly indicated that farm size, education, farm experience, paddy land and paddy income are positive and highly significant. It could be inferred that one unit change in the positive and significant coefficient would increase the probability of a respondent to adopt mechanisation in paddy cultivation by the appropriate percentage.

The results of this analysis would imply that the choice to adopt mechanisation in paddy cultivation would be influenced by the factors considered in this model. Further, out of ten variables subjected for analysis, the variable paddy land is found to be influencing the adoption decision on a high degree tending to increase the rate of adoption by 1.4 times for a unit increase in the variable followed by the variables farm size, paddy income, education and number of labours. Farm size has influenced the rate of adoption by 1.3 times and an increase in paddy income has tended to increase the adoption behaviour by 1.2 times. The increase in the education level of the respondents has influenced the rate of adoption by 1.15 times. The negative and significant sign for the number of labours indicated that respondents who are using less number of labourers are more likely to adopt mechanisation in paddy cultivation.

**PROBLEMS IN ADOPTING FARM MECHANISATION IN PADDY CULTIVATION - SCALING THE RANKING ANALYSIS**

Table 6 gives the problems in adopting mechanisation in paddy cultivation with the help of scaling the ranking analysis. As per the scale conversion Table, the scale value for the first rank is 1.87. Similarly the scale values for the other fifteen ranks are computed and they are1.32, 1.01, 0.78, 0.58, 0.4, 0.23, 0.08, -0.08, -0.23, -0.4, -0.58, -0.78, -1.01, -1.32 and-1.87 respectively. A total score value is calculated for each factor by multiplying the number of farmers with respective scale values.

Table 6 clearly explains that high hiring cost, high cost of fuel for power tiller and tractor, loss due to wastage of straw and wastage of grains are ranked as the major constraints in mechanisation of paddy farm with the highest mean scores of 0.444, 0.309, 0.308 and 0.204 respectively. The problems such as not suitable for unlevelled land, small and scattered land holding, high price of power tiller parts, lack of repair and replacement facilities, increased debt and also needs human labour harvesting are considered as moderate problems and are ranked as fifth, sixth, seventh, eighth, ninth and tenth respectively. The factors like inadequate training facilities for operation and maintenance of farm machineries, lack of knowledge to purchase, operate and maintain farm machineries, lack of power tillers for tillage operations, lack of harvesting machines, lack of awareness on credit facilities and poor quality of equipment's are identified as least problems in mechanising paddy farms with least mean scores.

**Table 6 - Problems in Adopting Farm Mechanisation in Paddy Cultivation: Scaling the Ranking Analysis**

| Problems in Paddy Farm Mechanisation | Scale & Score Values | Total Score | Mean Score | Rank |
|---|---|---|---|---|
| High hiring cost | 1.87 | 221.94 | 0.444 | I |
| High cost of fuel for power tiller and tractor | 1.32 | 154.58 | 0.309 | II |
| Loss due to wastage of straw | 1.01 | 154.01 | 0.308 | III |
| Wastage of grains | 0.78 | 101.77 | 0.204 | IV |
| Not suitable for unleveled land | 0.58 | 79.19 | 0.158 | V |
| Small and scattered land holding | 0.40 | 55.52 | 0.111 | VI |
| High price of power tiller parts | 0.23 | 5.64 | 0.011 | VII |
| Lack of repair and replacement facilities | 0.08 | 1.24 | 0.002 | VIII |
| Increased debt | -0.08 | -15.6 | -0.031 | IX |
| Also needs human labour harvesting | -0.23 | -46.03 | -0.092 | X |
| Inadequate training facilities for operation and maintenance of farm machineries | -0.40 | -54.37 | -0.109 | XI |
| Lack of knowledge to purchase, operate and maintain farm machineries | -0.58 | -92.78 | -0.186 | XII |
| Lack of power tillers for tillage operations | -0.78 | -122.99 | -0.246 | XIII |
| Lack of harvesting machines | -1.01 | -127.09 | -0.254 | XIV |
| Lack of awareness on credit facilities | -1.32 | -140.07 | -0.280 | XV |
| Poor quality of equipment's | -1.87 | -153.08 | -0.306 | XVI |

## SUGGESTIONS OF THE STUDY

The following suggestions have been offered to develop the paddy farm mechanisation and farmers' income in the study area:

- It is found that the adoption behaviour of farmers preferring farm mechanisation is extremely determined by the factors like education, farm experience, paddy land and paddy income. Hence, it is suggested that efforts are needed to strengthen these socio-economic factors for ensuring the adoption of farm mechanisation in paddy cultivation in the study area. This may be done through providing the better financial and support services to the farmers for mechanisation of their farms so as to gain the maximum possible benefits of the modern technological development in agricultural sector. Though the paddy is cultivated by majority of the farmers in the study area, their scientific knowledge about the farm mechanisation in paddy crop and scientific adoption of the farm implements was up to the mark only in certain implements. One of the best ways to overcome this is to vigorously utilise the scientific expertise of Krishi Vigyan Kendras (KVKs) for organizing field and farmers' day and agriculture machine exhibitions help and encourage the farmers to know about the advantages of adoption of improved farm implements in different agricultural operations.

- It is found that the major problem in adopting farm mechanisation in the study area is high hiring cost. Most of the farmers in the study region are hiring the farm machineries for their use. Hence, it is suggested that Government should provide farm machineries at concessional rates through cooperative societies and other Government agencies in order to reduce the financial burden of the farmers. Though this has already been done by the Government in the study area, more efforts have to be taken by the Government to familiarise this concessional scheme. Further, Government should provide liberal and concessional credit to the farmers in the study area for purchasing farm machineries to mechanise their paddy farms.

## CONCLUSION

Based on the findings of the study, quite a few valuable and fruitful suggestions have been offered to the farmers and the Government. If these suggestions are appropriately taken into consideration by them, paddy cultivation and marketing in the study area would be undoubtedly developed, the income and the standard of living of the farmers would be surely increased and our country's economic development as well as food security would also be eventually achieved.

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