

## FACTORS AFFECTING FARM MECHANIZATION IN RAINFED AREA OF WESTERN MAHARASHTRA IN INDIA

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### ABSTRACT

*Farm mechanization implies to use of various power sources, improved farm tools, equipment and farm machinery in the agriculture. This paper attempts to explore the factors affecting the farm mechanization in rainfed area of Western Maharashtra in India. The findings of the study showed that, in rainfed area, majority of the respondents were literate, having favourable attitude towards the farm implements, medium to small size of land holdings, low annual income, used sources of information in low to medium extent and less implement possession. Therefore, more focus should be given to increase the availability of small, user friendly and handy implements for the farmers in rainfed area. The study revealed that, about two third of the respondents had medium knowledge and utilization level of farm implements. In this context, emphasis should be given on Short Training Courses to minimise the knowledge and adoption gap. From the correlation it is found that, knowledge and utilization of the respondents about farm implements was increased with the increased in level of education, attitude, implement possession, annual income and sources of information. Therefore, it is suggested that extension agencies should give wide publicity to small and user friendly hand tools and farm equipment by using different extension education methods for creating awareness.*

**Keywords:** rainfed, farm mechanization, knowledge, utilization

### INTRODUCTION

Farm mechanization plays a key role and considered as an essential input in improving agricultural in commercial way. Farm mechanization is the use of various power sources and improved farm tools, equipment's and farm machinery. Appropriate and timely use of mechanized inputs into agriculture has a direct and significant effect on overall productivity and production with the lowest cost of production. But, it is hardly possible in developing and underdeveloped countries. All the farmers may not utilize the improved farm implements and machineries at the same time and at the same range. In short, the farm mechanization depends on different factors like socioeconomic characteristics, knowledge gap, mechanization gap etc. Therefore, the study entitled, 'Factors affecting farm mechanization in rainfed area of Western Maharashtra in India' was conducted with the following objectives.

### OBJECTIVES

- (1) To study the characteristics of the farmers
- (2) To assess the knowledge level of the farmers about farm

implements and machineries

- (3) To assess the extent of utilization of farm implements and machineries by the farmers
- (4) To ascertain the relationship between characteristics of the farmers with their knowledge and utilization of farm implements and machineries

### METHODOLOGY

The study was conducted in rainfed area of Karjat and Pathardi tahsils of Ahmednagar district; and at Karmala and Mohol tahsils of Solapur districts. A total of 144 representative farmers were selected from eight villages from these four tahsils by identifying 18 farmers from each village using proportionate random sampling procedure.

The data were collected through a specially developed interview schedule. The data were analyzed, tabulated and interpreted with suitable statistical parameters like frequency, percentage and mean and standard deviation method. (Patil, 2015).

In this study, the term knowledge and utilization of

farm implements and machineries was measured as follows:

### Measurement of the Knowledge level

The term *knowledge* in the present study means factual information possessed by an individual about farm implements and machineries. To work out the knowledge level, eleven knowledge parameters were finalized and the same were posed to the respondent farmers at the time of interview. (Patil, 2015).

### Measurement of utilization level

In this study, the term *utilization* of farm implements and machineries was operationalized as the behaviour of the farmer with regard to type and number, nature of ownership, experience in using, extent and type of use, maintenance

and repairs and storage of farm implements developed and recommended by the MPKV, Rahuri for performing various agricultural operations. For measuring the utilization of farm implements and machineries, the responses of the respondents about utilization were collected and the score was assigned according to the mechanization scale. (Patil, 2015 and Patil and Shinde, 2016)

## RESULTS AND DISCUSSION

### Characteristics of the respondent farmers

The respondents were distributed into different categories based on their selected characteristics and presented in Table 1.

**Table 1 : Characteristic of the respondent farmers from rainfed area**

(n=144)

Sr. No.	Characteristics	Category	No. (Percent)
1	Age	1 Young (Up to 31 years)	31 (21.53)
		2 Middle age (Between 32 to 52 years)	86 (59.72)
		3 Old (53 years and above)	27 (18.75)
2	Education	1 Illiterate (having no formal education)	15 (10.42)
		2 Pre-primary and Primary education (1 <sup>st</sup> to 7 <sup>th</sup> standard)	35 (24.31)
		3 Secondary / high school (8 <sup>th</sup> to 10 <sup>th</sup> standard)	38 (26.39)
		4 Higher secondary (11 <sup>th</sup> to 12 <sup>th</sup> standard)	31 (21.53)
		5 Graduate and above (13 <sup>th</sup> standard and above)	25 (17.31)
3	Farming experience	1 Least (up to 10 years)	31(21.53)
		2 Less (11 to 19 years)	44 (30.56)
		3 Moderate (20 to 28 years)	35 (24.31)
		4 More (29 to 37 years)	26 (18.06)
		5 Most (above 37 years)	08 (5.56)
4	Family type	1 Single	64 (44.44)
		2 Joint	80 (55.56)
5	Family size	1 Small (up to 4 members)	45 (31.25)
		2 Medium (5 to 9 members)	85 (59.03)
		3 Large (10 members and above)	14 (9.72)
6	Attitude level	1 Highly Favourable (43 to 50 score)	21 (14.58)
		2 Favourable (35 to 42 score)	107 (74.31)
		3 Moderate (27 to 34 score)	16 (11.11)
		4 Unfavourable (19 to 26 score)	0 (0.00)
		5 Highly unfavourable (10 to 18 score)	0 (0.00)
7	Land holding	1 Marginal (up to 1.00 ha)	27 (18.75)
		2 Small (1.01 to 2.00 ha)	45 (31.25)
		3 Semi medium (2.01 to 4.00 ha)	42 (29.17)
		4 Medium (4.01 to 10.00 ha)	28 (19.44)
		5 Large (10.01 ha and above)	02 (1.39)
8	Annual income	1 Low (Up to ₹ 2,62,347/-)	85 (59.03)
		2 Medium (₹ 2,62,348/- to ₹ 8,79,441/-)	58 (40.28)
		3 High (₹ 8,79,442/- and above )	1 (0.69)

Sr. No.	Characteristics	Category	No. (Percent)
9	Information sources use	1 Low (up to 57 score)	86 (59.72)
		2 Medium (58 to 103 score)	50 (24.72)
		3 High (above 103 score)	08 (5.56)
10	Implement Possession	1 Less (up to 37 score)	81 (56.25)
		2 Medium (38 to 70 score)	62 (43.06)
		3 Good (71 and above score)	01 (0.69)
11	Cropping pattern	1 Poor ( up to 5 score)	59 (40.97)
		2 Fair (6 to 9 score)	70 (48.61)
		3 Good (10 and above score)	15 (10.42)

**(1) Age**

From Table 1, it is found that in rainfed area respondents among young, middle and old age groups were 21.53 per cent, 59.72 per cent and 59.72 per cent, respectively. From the above findings, it is concluded that majority of the respondents were from middle age group. The findings are in line with the findings of Singh *et al.* (2014).

**(2) Education**

It is observed from Table1 that, in general, few respondents were illiterate (10.42 %), about one fourth had education of pre-primary to primary level (24.31%), about half of the (47.92 %) respondents possessed secondary and higher secondary education and 17.31 per cent were graduate and or post-graduate. It means that most of the respondent were literate and had formal education which might have helped them in using different information sources to seek information about farm implements.

It is a good sign that literate people are engaged in the field of agriculture. It is generally understood that literate people have broader view, more receptive, always are in search for new information and it is easier for them to grasp the advanced technologies.

**(3) Farming experience**

Table1 grouped the respondents according to farming experience as least farming experience, less farming experience, moderate farming experience, more farming experience and most farming experience; and they constituted 21.53 per cent, 30.56 per cent, 24.31 per cent, 18.06 per cent and 5.56 per cent, respectively. The findings are in line with the findings of Ayandiji and Olofinsao (2015).

**(4) Type of family**

The data from the Table 1 revealed that majority of the respondents (55.56 %) lived in joint family while, 44.44 per cent lived in single family. This might be due to

the disintegration of the families. It seems to be gaining prevalence in the rural area rather than in urban.

**(5) Size of family**

The data projected in Table1 indicated that about two third of the respondents (59.03 %) belonged to medium size of family, about one third (31.25 %) belonged to small family size and 9.72 per cent belonged to large family size category. This may be due to the migration of the family members to cities in search of for jobs and / or separation of large families into the smaller ones. These findings are in line with the findings of Dhere (2012).

**(6) Attitude**

Overall, it is concluded that majority (74.31 %) of the respondents had favourable attitude towards farm implements though some of the farmers used the farm implements and machineries on hired basis. Due to this, not a single respondent was found in the highly unfavourable and unfavourable categories of attitude. These findings are in line with the findings of Dhere (2012).

**(7) Size of land holding**

It can be observed from the Table 1, that about one third (31.25 %) of the respondents had small size of land holdings, followed by semi medium size of land holdings (29.17 %), medium size of land holdings (19.44 %), marginal size of land holdings (18.75 %) and big size of land holdings (1.39 %).

**(8) Annual income**

Regarding the annual Income it can be said that about three fourth (59.03 %) of the respondents belonged to low annual income group, followed by medium annual income group (40.28 %) and high income group (0.69 %).

**(9) Information sources use**

About more than three fifth of the respondents

(59.72 %) had sources of information to low extent followed by medium extent (24.72 %) and high extent (5.56 %).

**(10) Implement possession**

It was observed that more than half of the respondents had less availability of farm implements (56.25 %), followed by medium availability (43.06%) and good availability of farm implements (0.69 %).

**(11) Cropping pattern**

Considering the rainfed area respondents, it is concluded that about one half (48.61%) of the respondent were in the category of *fair level* of cropping pattern, followed by *poor level* of cropping pattern (40.97 %) and *good level* of cropping pattern (10.42 %). The findings of the study are in line with the findings of Dhere (2012).

**Knowledge of the farmers about the farm implements**

The knowledge refers to the awareness of the farmers about farm implements. The distribution of respondents according to knowledge level about the farm implements and machineries is given in Table 2.

**Table 2 : Distribution of the respondents according to knowledge level** (n=144)

Sr. No.	Knowledge level (Score)	Frequency	Per cent
1	Low ( up to 79)	20	13.89
2	Medium (80 to 90)	92	63.89
3	High (91 and above)	32	22.22

(Figures in the parentheses indicate percentages)

Table 2 revealed that, in rainfed area, majority (63.89 %) of the respondents had medium knowledge level of farm implements and machineries, followed by high knowledge level (22.22 %), and low knowledge level of farm implements and machineries (13.89 %).

It is seen that, there is a wider gap between the expected knowledge level and existing knowledge level of the respondent farmers about the farm implements and machineries. Therefore, attention of the extension agencies need to be diverted to this important aspect in order to boost up the knowledge level of farmers about the farm implements and machineries. This brings forward the need for launching a massive publicity campaign about farm implements and machineries. The findings of the study are in line with the findings of Dhere (2012) and Nagaraj *et al.* (2013).

**Utilization of farm implements by the farmers**

The distribution of respondents according to utilization level about the farm implements and machineries is given in Table 3.

**Table 3: Distribution of respondents according to their utilization level** (n=144)

Sr. No.	Utilization level (Score)	Frequency	Per cent
1	Low (up to 67)	29	20.14
2	Medium (68 to 87)	87	60.42
3	High (88 and above)	28	19.44

(Figures in the parentheses indicate percentages)

From Table 3 it is revealed that in case of rainfed area majority (60.42%) of the respondents had medium utilization level of farm implements and machineries, followed by low utilization level (20.14%), and high utilization level (19.44 %).

It is seen that there is a wider gap between the expected utilization level and existing utilization level of the respondents about the farm implements and machineries. Attention of the extension agencies therefore, need to be diverted to this important aspect in order to boost up the utilization level of farmers. This brings forward the need for launching a massive publicity campaign and increase subsidy of farm implements in the rainfed area.

**Relationship between the selected characteristics of the farmers with their knowledge and utilization of farm implements**

Coefficient of correlations ‘r’ was worked out between the selected characteristics of the farmers with their knowledge and utilization of farm implements. The ‘r’ values are given in Table 4.

**Table 4: Coefficient of correlation between selected characteristics of the respondents with knowledge and utilization about the farm implements** (n=144)

Sr. No.	Selected characteristics of respondents	‘r’ values in rainfed area with knowledge	‘r’ values in rainfed area with utilization
X <sub>1</sub>	Age	-0.432***	-0.489***
X <sub>2</sub>	Education	0.697***	0.347***
X <sub>3</sub>	Farming Experience	-0.444***	-0.614***
X <sub>4</sub>	Family Type	-0.120	0.005
X <sub>5</sub>	Family Size	-0.081	-0.051

Sr. No.	Selected characteristics of respondents	'r' values in rainfed area with knowledge	'r' values in rainfed area with utilization
X <sub>6</sub>	Attitude	0.179**	0.208**
X <sub>7</sub>	Land Holding	0.126	0.022
X <sub>1</sub>	Annual Income	0.150*	0.141*
X <sub>8</sub>	Information Sources Use	0.247***	0.216***
X <sub>9</sub>	Implement Possession	0.135*	0.136*
X <sub>10</sub>	Cropping Pattern	0.067	0.140*

**Note:** \*\*\* Significant at 1 %, \*\* Significant at 5 % and \* Significant at 10 % level of probability.

From Table 4 the discussions about the noticed relationship are as follows.

**(1) Age with knowledge and utilization**

The age of the respondents showed a negative but highly significant relationship with their knowledge about the farm implements in rainfed area ( $r = -0.432$ ). Similarly, in the case of utilization, the age of the respondents showed a negative but highly significant relationship in rainfed area ( $r = -0.489$ ). Means as the age of farmers increased the knowledge and utilization was decreased. This may be because the older farmers are less literate than the younger generations. The findings are in line with the findings of Sabi *et al.* (2014) but in contradictory with the Dhare (2012).

**(2) Education with knowledge and utilization**

The education of the respondents showed positive and highly significant relationship with knowledge ( $r = 0.697$ ) and utilization of farm implements ( $r = 0.347$ ). This showed that as education increases, the knowledge and utilization of the farm implements by individuals increased. This may be because of the fact that the educated individual is more exposed to new ideas through different literatures and may have more capacity to acquire knowledge and adopt new thing easily. The finding is similar to the findings of Sabi *et al.* (2014) and Singh *et al.* (2014).

**(3) Farming experience with knowledge and utilization**

The farming experience of the respondents showed negative but significant relationship with knowledge ( $r = -0.444$ ) and utilization of farm implements ( $r = -0.614$ ). This indicated that as the farming experience of farmers increased the knowledge and utilization decreased. This may be because the older farmers are less literate and hesitate to adopt the new technology than the younger generations. The findings are in line with the findings of Ayandiji and Olofinsao (2015).

**(4) Family type with knowledge and utilization**

The correlation between type of family and knowledge in rainfed area was found to be negative and non-significant ( $r = -0.120$ ). The findings indicated that knowledge about farm implements was not influenced by the type of family. The findings are similar to the findings of Singh *et al.* (2014).

Respondents family type and utilization index showed non-significant and positive relationship in rainfed area ( $r = 0.005$ ). This shows that as joint family type increases the utilization of the individual about farm implements increases but they were not related to each other. This may be because of the fact that there are some other factors may influence on utilization like education, implement possession etc.

**(5) Family size with knowledge and utilization**

The family size of the respondents from the rainfed area showed negatively non-significant relationship with their knowledge level ( $r = -0.081$ ) and utilization level in the rainfed area ( $r = -0.051$ ). In other words, the respondents from the small and large family had more or less equal knowledge and utilization about farm implements.

**(6) Attitude with knowledge and utilization**

The attitude of the farmers and the level of their knowledge ( $r = 0.179$ ) and utilization were positive and highly significant ( $r = 0.208$ ). This indicates that respondents with favourable attitude seek to get more knowledge and vice versa. The findings are in line with the findings of Dhare (2012).

**(7) Land holding with knowledge and utilization**

There was a non-significant relationship between the size of land holding and the knowledge level of the respondents ( $r = 0.126$ ) and utilization of farm implements in the rainfed area ( $r = 0.022$ ).

The findings indicated that there was a positive trend in land holding of respondent's. But in knowledge and utilization it was not significant, meaning thereby, that knowledge and utilization about farm implements were not influenced by the size of land holding. This may be because of farmers having good land holding but due to rainfed farming they are unable to cultivate whole land. The findings are contradictory with the findings of Dhare (2012), Singh *et al.* (2014) and Arun *et al.* (2019)

**(8) Annual income with knowledge and utilization**

The annual income of the respondents showed positive and significant relationship with their knowledge ( $r = 0.150$ ) and utilization level ( $r = 0.141$ ) and of the farm implements. The finding is similar with the findings of Sabi *et al.* (2014) and Arun *et al.* (2019)

### (9) Information sources use with knowledge and utilization

Utilization of the source of information by the respondents exhibited positive and highly significant relationship with their knowledge ( $r = 0.247$ ) and utilization level ( $r = 0.216$ ). This indicates that as the sources of information increased, there was an increase in the knowledge of the respondents about farm implements. The findings are in line with the findings of Sabi *et al.* (2014).

### (10) Implement possession use with knowledge and utilization

The correlation between implement possession with knowledge ( $r = 0.135$ ) and utilization ( $r = 0.136$ ) was found to be positive and significant in the rainfed area. This indicates that respondents who had a good number of implements had more knowledge and utilization and *vice versa*.

### (11) Cropping pattern with knowledge and utilization

The correlation between cropping pattern and knowledge in rainfed area was found to be positive but non-significant ( $r = 0.067$ ). The findings indicated that there was positive but not significant trend in cropping pattern and knowledge. It means that knowledge about farm implements was not influenced by the cropping pattern. The findings are contradictory with the findings of Dhere (2012). While, the correlation between the cropping pattern and the utilization was found to be positive and significant in the rainfed area ( $r = 0.140$ ).

## CONCLUSION

From the study it is concluded that, in rainfed area, majority of the respondents were in the middle age group, literate, lived in medium size joint family, had favourable attitude towards the farm implements, medium to small size of land holdings, low annual income and less implement possession. About two third of the respondents had medium knowledge and utilization level of farm implements.

Therefore from the study it is suggested that Department of Agriculture and manufactures should give more focus on this aspect and make available small, user friendly and handy implements to the farmers in rainfed area. In the context of knowledge and utilization level Department of Agricultural and State Agricultural Universities should assist the farmers in rainfed area by organizing workshops, conferences, seminars and Short Training Courses on farm machinery management and maintenance. This will help in enhancing the awareness and skills of farmers regarding the farm mechanization and increase the knowledge and utilization of farm implements.

From the correlation it is observed that, knowledge and utilization of the respondents about farm implements

was increased with the increased in level of education, attitude, implement possession, annual income and sources of information. However, the age and farming experience showed negative but significant relationship with knowledge and utilization of farm implements. The cropping pattern and size of land holding showed positive and non-significant relationship with knowledge and utilization of farm implements. Therefore, it is suggested that extension agencies should give wide publicity to small and user friendly hand tools and farm equipment's by using different extension education methods like agricultural exhibitions and mass media for creating awareness and finally divert the farmers to purchase them.

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