

Dimensions and Determinants of Farm Mechanization in Irrigated Area of Western Maharashtra

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ABSTRACT

Agricultural mechanization is the use of various power sources and improved farm tools and equipment. However, all the farmers may not utilize the improved farm implements at the sametime and at the same range. This article seeks to know the extent of knowledge and utilization of farm implements by the farmers and the factors which determine knowledge and utilization of farm implements in irrigated area of Western Maharashtra. The findings of the study showed that, in irrigated area, majority of the respondents were in the middle age group, literate, had moderate farming experience, lived in joint family, having favourable attitude towards the farm implements, medium annual income, used all sources of information in moderate to high extent. In knowledge context; more than three fourth of the respondents had medium knowledge of farm implements, followed by high knowledge, low knowledge and very high knowledge. Regarding the utilization; about half of the respondents had medium utilization level, followed by high utilization, low utilization, very low utilization and very high utilization. From the correlation it is found that the levels of education, family type, size of family, attitude, cropping pattern, implement possession, size of land holding, annual income and sources of information increased then the knowledge of the respondents about the farm implements too increased. From the study it is concluded that Department of Agriculture and manufactures should focus on this aspect and make available small, user friendly and handy implements for the farmers. Majority of the respondents had used all sources of information from moderate to high extent. Therefore, extension education methods like agricultural exhibitions, print media are important source of transfer of technologies and play important role in creating awareness and finally purchase of the implements.

Key words: Knowledge, utilization, correlation, farm implements, mechanization, irrigated

INTRODUCTION

In the context of increasing commercialization of agriculture, mechanization is very important. Farm mechanization is the use of various power sources and improved farm tools and equipments, for reducing the drudgery of the human beings and draught animals, enhancing the cropping intensity, precision and timelines of efficiency in utilization of various crop inputs and reducing the losses at different stages of crop production. There has been a considerable increase in the use of farm machinery in Indian Agriculture because quite a few farmers have understood the advantages farm mechanization and realized that it helps to enhance the overall productivity and production with the lowest cost of production. But all the farmers may not utilize the improved farm implements and machineries at the same time and at the same range due to knowledge gap and other reasons. Also, it is

very important for the policy maker, researcher, extension functionaries, implements manufacturers and the persons who are engaged in the same to know the extent of knowledge and utilization of farm implements and machineries by the farmers. Therefore, the study entitled, 'Dimensions and Determinants of Farm Mechanization in Irrigated Area' was conducted.

Objectives of the Study

The main objectives of the study were to study the personal, socio-economic, psychological and communicational characteristics of the farmers in irrigated area; to assess the knowledge level of the farmers about farm implements and machineries in irrigated area; to assess the extent of utilization of farm implements and machineries by the farmers in irrigated area and to ascertain the relationship between personal, socio-economic psychological

and communicational characteristics of the farmers with their knowledge and utilization of farm implements and machineries.

METHODOLOGY

The study was conducted in Newasa, and Rahuri, tahsils of Ahmednagar district and Pandharpur, and Malshiras tahsil of Solapur district of Western Maharashtra in India. A total of 144 representative farmers were selected from the eight villages and four tahsils in these districts 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 instruments like frequency, percentage, mean, standard deviation and Karl's correlation coefficient 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 scale developed by Patil, 2015 (Patil and Shinde, 2016)

RESULTS AND DISCUSSION

I. Characteristics of the respondent farmers

The respondents were distributed into different categories based on their selected characteristics and presented in Table1.

Table: 1
Characteristic of the respondent farmers

| Sl. No. | Variables | Category | Irrigated Area Respondents(n=144) |
|---------|--------------------|---|-----------------------------------|
| 1 | Age | Young (Up to 31 years) | 28 (19.44) |
| | | Middle age (Between 32 to 52 years) | 93 (64.58) |
| | | Old (53 years and above) | 23 (15.97) |
| 2 | Education | Illiterate (having no formal education) | 7 (4.86) |
| | | Pre-primary and Primary education (1st to 7th standard) | 29(20.14) |
| | | Secondary / high school (8th to 10th standard) | 49 (34.03) |
| | | Higher secondary (11th to 12th standard) | 26 (18.06) |
| | | Graduate and above (13th standard and above) | 33(22.92) |
| 3 | Farming experience | Least (up to 10 years) | 32(22.22) |
| | | Less(11 to 19 years) | 31(21.53) |
| | | Moderate (20 to 28 years) | 44(30.56) |
| | | More (29 to 37 years) | 30(20.83) |
| | | Most (above 37 years) | 7(4.86) |
| 4 | Family type | Single | 45(31.25) |
| | | Joint | 99(68.75) |

| Sl. No. | Variables | Category | Irrigated Area Respondents(n=144) |
|---------|---------------------------------|--|-----------------------------------|
| 5 | Family size | Small (up to 4 members) | 32(22.22) |
| | | Medium (5 to 9 members) | 88(61.11) |
| | | Large (10 members and above) | 24(16.67) |
| 6 | Attitude level | Highly unfavourable (up to 18) | 0(0.00) |
| | | Unfavourable (19 to 26) | 0(0.00) |
| | | Moderate (27 to 34) | 3(2.08) |
| | | Favourable (35 to 42) | 81(56.25) |
| | | Highly favourable (above 42) | 60(41.67) |
| 7 | Land holding (ha) | Marginal (up to 1.00 ha) | 27(18.75) |
| | | Small (1.01 to 2.00 ha) | 41(28.47) |
| | | Semi medium (2.01 to 4.00 ha) | 53(36.81) |
| | | Medium (4.01 to 10.00 ha) | 22(15.28) |
| | | Large (10.01 ha and above) | 1(0.69) |
| 8 | Annual income (Rs.) | Low (Up to Rs. 2,62,347/-) | 20(13.89) |
| | | Medium (Rs. 2,62,348/- to Rs. 8,79,441/-) | 89(61.81) |
| | | Moderate (Rs.8,79,442/- to Rs.12,90,836/-) | 19(13.19) |
| | | High (Rs.12,90,837/- to Rs.17,02,232/-) | 11(7.64) |
| | | Very high (Above Rs. 17,02,233/-) | 5 (3.47) |
| 9 | Information sources use (score) | Low (up to 57) | 39(27.08) |
| | | Medium (58 to 103) | 88 (61.11) |
| | | High (above 103) | 17 (11.81) |
| 10 | Irrigation status (score) | Very low (up to 15) | 15 (10.42) |
| | | Low (16 to 30) | 86(59.72) |
| | | Medium (31 to 45) | 39(27.08) |
| | | High 46 to 60) | 2 (1.39) |
| | | Very high (above 60) | 2 (1.39) |
| 11 | Cropping pattern | Poor (up to 5) | 48 (33.33) |
| | | Fair (6 to 9) | 63 (43.75) |
| | | Good (10 and above) | 33 (22.92) |
| 12 | Implement Possession | Less (up to 37) | 46 (31.94) |
| | | Medium (38 to 70) | 88 (61.12) |
| | | Good (71 and above) | 10 (6.94) |

(Figures in the parentheses indicate percentages)

Age: From Table 1, it is found that in irrigated area respondents among young, middle and old age groups were 19.44 per cent, 64.58 per cent and 15.97 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 Dhere (2012) and Singh *et al.* (2014).

Education: It is observed from Table1 that, in general, very few respondents were illiterate (4.86 %), about one fifth had education of pre-primary and primary level (20.14 %), more than half of the (52.09 %) respondents possessed secondary and higher secondary education and more than one fifth (22.92 %) 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 a good percentage of literate people are engaged in the field of agriculture. It is generally understood that literate people have broader view, more receptive and always are in search for new information and technologies. Therefore, they easily accept and adopt new technology than others.

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 22.22 per cent, 21.53 per cent, 30.56 per cent, 20.83 per cent and 4.86 per cent, respectively.

Type of family: The data from the Table 1 revealed that about two thirds of the respondents (68.75 %) lived in joint family while, about one third in single family (31.25 %). This might be due to the disintegration of the families. It seems to be gaining prevalence in the rural area rather than in urban. These findings are contradictory to the findings of Singh *et al.* (2014).

Size of Family: The data projected in Table 1 indicated that about three fifths of the respondents (61.11%) belonged to medium size of family, one fourth (22.22 %) belonged to small family size and 16.67 per cent belonged to large family size category. This may be due to the migration of the family members to cities in search of jobs and / or separation of large families into the smaller ones. These findings are in line with the findings of Dhare (2012).

Attitude: Overall, it is concluded that majority (56.25 %) 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 Dhare (2012).

Size of Land holding: It can be observed from the Table 1, that about one third (36.81 %) of the respondents had semimedium size of land holdings, followed by small size of land holdings (28.47 %), marginal size of land holdings (18.47%), medium size of land holdings (15.28 %) and big size of land holdings (0.69%).

Annual Income: Regarding the Annual Income it can be said that more than three fifth (61.81 %) of the respondents belonged to medium annual income group, followed by low annual income group (13.89 %) and moderate income group (13.19 %). But at the same time, few respondents were in the high annual

income group (7.64 %) and very high annual income group (3.47 %).

Information sources use (score): About more than three fifth of the respondents (61.11 %) had sources of information to medium extent followed by low extent (27.08 %) and high extent (11.81 %).

Irrigation Status: Considering the irrigated area respondents, it is concluded that about three fifth (59.72 %) of the respondent were in the category of low level of irrigation status, followed by medium of irrigation status (27.08 %) while, few respondent had very low level (10.42 %), high level and very high level of irrigation status (1.39 %). The irrigation status is important as it decides the cropping pattern of the respondents and ultimately affects and decides utilization of farm implements. The findings of the study are in line with the findings of Singh *et al.* (2014).

Cropping Pattern: Considering the irrigated area respondents, it is concluded that about more than two fifth (43.75 %) of the respondent were in the category of fair level of cropping pattern, followed by poor level of cropping pattern (33.33 %) and good level of cropping pattern (22.92 %). The findings of the study are in line with the findings of Dhare (2012) and Singh *et al.* (2014).

Implement Possession: It was observed that more than half of the respondents had medium availability of farm implements (61.12 %), followed by less availability (32.94 %) and good availability of farm implements (6.94 %). The findings of the study are in line with the findings of Dange (2012) and Dhare (2012).

II. Knowledge of the farmers about the farm implements

The knowledge refers to the awareness of the farmers about farm implements. The awareness of the farmers about farm implement, equipments and machineries was ascertained and the findings in this regard are presented under this subhead. 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

| Sl. No. | Knowledge level (score) | Irrigated Area Respondents(n=144) |
|----------------|--------------------------------|--|
| 1 | Very low (up to 67) | 2 (1.39) |
| 2 | Low (68 to 74) | 6 (4.17) |
| 3 | Medium (75 to 89) | 110 (76.39) |
| 4 | High (90 to 96) | 23 (15.97) |
| 5 | Very high (above 96) | 3 (2.08) |
| | Total | 144 (100.00) |
| | Mean | 83.72 |

(Figures in the parentheses indicate percentages)

Table 2 revealed that in the irrigated area large majority i.e. more than three fourth (76.39 %) of the respondents had medium knowledge level of farm implements followed by, high knowledge (15.97 %), low knowledge (4.17 %) and very high knowledge level of implements (2.08 %). The knowledge level of farm implements in the irrigated area is quite better. This could be because respondents from irrigated area possessed and utilized more implements. Besides this, respondents from irrigated area used power drawn and highly sophisticated implements even on hired basis and therefore, their ultimate score of knowledge level was more.

It is seen that there is a wider gap between the expected knowledge level and existing knowledge level of the respondents about the farm implements. Therefore, attention of the extension agencies needs to be diverted to this important aspect in order to boost up the knowledge level of the farmers about the farm implements. This warrants the need for

launching a massive publicity campaign about the farm implements.

The findings of the study are in line with the findings of Dhere (2012) and Nagraj *et al.* (2013).

III. Utilization of farm implements by the farmers

The term utilization of farm implements has been 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". The utilization level for each respondent was calculated by using the scale developed by Patil, 2015. 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

| Sr. No. | Utilization level (score) | Irrigated Area Respondents(n=144) |
|----------------|----------------------------------|--|
| 1 | Very low (up to 53) | 3 (2.08) |
| 2 | Low (54 to 62) | 23 (15.97) |
| 3 | Medium (63 to 81) | 68 (47.22) |
| 4 | High (82 to 91) | 48 (33.33) |
| 5 | Very high (above 91) | 2 (1.39) |
| | Total | 144 (100.00) |
| | Mean | 74.45 |

(Figures in the parentheses indicate percentages)

From Table 3 it is revealed that in the irrigated area about half (47.22%) of the respondents had medium utilization level of farm implements followed by high utilization level (33.33 %) and low utilization level (15.97%), very low utilization level (2.08%) and very high utilization level of farm implements (1.39 %).

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. Extension agencies, therefore, need to focus on this important aspect in order to boost up the utilization

level of farmers about the farm implements. This brings forward the need for launching a massive publicity campaign and increase the subsidy of farm implements in the irrigated areas.

IV. 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

| Sl. No. | Selected Characteristics of respondents | 'r' values in Irrigated area | 'r' values in Irrigated area |
|---------|---|------------------------------|------------------------------|
| | | Knowledge | Utilization |
| 1 | Age | -0.282*** | -0.750*** |
| 2 | Education | 0.168** | 0.406*** |
| 3 | Farming Experience | -0.207** | 0.812*** |
| 4 | Family Type | 0.184** | 0.054 |
| 5 | Family Size | 0.221*** | 0.103 |
| 6 | Attitude | 0.362*** | 0.088 |
| 7 | Land Holding | 0.323*** | 0.154 * |
| 8 | Annual Income | 0.291*** | 0.118** |
| 9 | Information Sources Use | 0.263*** | 0.183** |
| 10 | Irrigation Status | 0.277*** | 0.143* |
| 11 | Cropping Pattern | 0.226*** | 0.092 |
| 12 | Implement Possession | 0.422*** | 0.165** |

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.

Age with knowledge and utilization

The age of the respondents showed a negative but significant relationship with their knowledge about the farm implements in irrigated area ($r = -0.282$). Similarly, in the case of utilization, the age of the respondents showed a negative but significant relationship in irrigated area ($r = -0.750$). 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 contradictory with the Dhere (2012).

Education with knowledge and utilization:

The education of the respondents shows positive and significant relationship with knowledge ($r = 0.168$) and utilization of farm implements ($r = 0.406$). 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 Singh *et al.* (2014).

Farming Experience with knowledge and utilization:

The farming experience of the respondents showed negative but significant relationship with knowledge ($r = -0.207$) and utilization of farm implements ($r = -0.812$). 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.

Family Type with knowledge and utilization:

The respondents' family type and knowledge level showed a significant and positive relationship ($r = 0.184$). The findings are similar to the findings of Singh *et al.* (2014).

While, respondents family type and utilization level showed non-significant and positive relationship in irrigated area ($r = 0.054$). The findings are dissimilar with the findings of Joseph (2007).

Family Size with knowledge and utilization:

The family size of the respondents from the irrigated area showed significant and positive relationship with their knowledge level ($r = 0.221$). The findings are similar to the findings of Dhare (2012).

However, the family size of the respondents from the irrigated area showed positive but non-significant relationship with their utilization level in the irrigated area ($r = 0.103$). This shows that as family size increases the utilization of the individual about farm implements increased but they are not related to each other. This could be because of other factors like implement possession, income etc., and affect the utilization of implements. The findings are similar to the findings of Joseph (2007).

Attitude with knowledge and utilization

In the irrigated area, the attitude of the farmers and the level of their knowledge were positive and highly significant ($r = 0.362$). 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).

At the same time, the attitude of farmers and the level of their utilization about the farm implements found positive but non-significant in the irrigated area ($r = 0.088$). The findings are contradictory with Yuantari *et al.* (2015)

Land holding with knowledge and utilization:

There was a highly significant relationship between the size of land holding and the knowledge level of the respondents ($r = 0.323$) and size of land holding and utilization of farm implements in the irrigated area ($r = 0.154$). This indicated that the respondents with larger farm size had more benefits and monetary returns than others. The findings are in line with findings of Dhare (2012) and Singh *et al.* (2014).

Annual income with knowledge and utilization:

The annual income of the respondents showed positive and significant relationship with their knowledge ($r = 0.295$) and utilization level of the farm implements.

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 ($r = 0.263$) and utilization level ($r = 0.183$). 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 contradictory with the findings of Dange (2012).

Irrigation status use with knowledge and utilization:

There was a highly significant and positive relationship between the irrigation status and knowledge level of the respondents ($r = 0.277$) and significant and positive relationship between the irrigation status and utilization level of respondents about farm implements in the irrigated area ($r =$

0.143). In other words, respondents having highly irrigated area are getting more income from farming which enables them to get more utilization and vice versa. The findings are in line with the findings of Singh et al. (2014).

Cropping pattern use with knowledge and utilization:

There was a highly significant and positive relationship between the cropping pattern and knowledge level of respondents ($r = 0.226$). The findings are in line with the findings of Dhare (2012). While, the correlation between the cropping pattern and the utilization was found to be positive and non-significant in the irrigated area ($r = 0.092$). The findings indicated that though there was a positive trend in the cropping pattern and the utilization of farm implements, it was non-significant and that the utilization of the farm implements was not influenced by the cropping pattern. This might be because, in the irrigated area farmers cultivated mostly cash crops like sugarcane and utilized the implements either their own or on hired basis to a minimum extent and at very few times in a year. The findings are in line with the findings of Verma (2008).

Implement possession use with knowledge and utilization:

The correlation between implement possession with knowledge ($r = 0.422$) and utilization ($r = 0.165$) was found to be positive and highly significant in the irrigated area. This indicates that respondents who had a good number of implements had more knowledge and utilization and vice versa.

CONCLUSION

Regarding the knowledge and utilization of farm implements it is concluded that the knowledge level of the respondents about the farm implements in the irrigated area is quite better. This could be because the respondents from the irrigated area possessed and utilized more implements. Besides this, the respondents from the irrigated area used power drawn and highly sophisticated implements even on hired basis, and their ultimate score of knowledge level was more. Therefore, the attention of the extension agencies need to be diverted to this important aspect in order to boost up the knowledge and utilization level of farmers about the farm implements. This brings forward the need for launching a massive publicity campaign and the increase subsidy of farm implements.

From correlation it is concluded that in the irrigated area knowledge of the respondents about farm the implements increased with the increased in level of education, family type, size of family, attitude, cropping pattern, implement possession, size of land holding, annual income and sources of information because there was a positive and significant relationship in these variables and knowledge of the respondents. Therefore from the study it is concluded and suggested that Department of Agriculture and manufactures should focus on this aspect and make available small, user friendly and handy implements to the farmers. Majority of the respondents had used all sources of information. Therefore, extension education methods like agricultural exhibitions, print media are important sources of transfer of technologies and play an important role in creating awareness and finally purchase of the implements.

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