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# Attitude of farmers towards use of solar energy in agriculture

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**Abstract**

The present study was conducted in Nagpur district of Vidarbha region with sample size of 120 respondents from 5 tahsils. After statistical analysis it was observed that majority of respondents 62.50 percent had moderately favourable attitude towards use of solar energy in agriculture while 37.50 percent of the farmers had most favourable attitude and 00.00 percent had less favourable attitude towards use of solar energy in agriculture. This outcome might be due to significant association of education, source of irrigation, cropping pattern, extension contact, mass media exposure, risk orientation, innovativeness and knowledge with their attitude of respondents towards use of solar energy in agriculture, as majority of variables falls in to the medium score categories. In the constraints analysis attacked of monkeys and caused damage to solar panel, poor linkage with MEDA and updated information of solar energy technology through PM-KUSUM scheme were not received by farmers, solar energy is sunlight dependent and solar panel not worked in gloomy weather condition, high initial cost for installing solar panel in their farm, spare components of solar panel not readily available in the market, weather predictions not supplied on a weekly basis properly village to village, technical & maintenance requirement for operating solar water pump, respondents were not encouraged to employ solar energy in agriculture, solar energy storage is expensive, faced problem regarding solar water pumps not easily available, faced problem of subsidies not made available to them for solar powered machinery, space needed for installing solar panel in their farm, installation of solar panel is difficult were the major constraints faced by the farmers in study area.

**Keywords:** Knowledge, attitude, solar energy, constraint

## Introduction

Present study identifies the prevailing gaps in farmer's practices and recommended/improved solar energy use in agriculture. The analysis of personal, social and psychological factors may substantiate the presence of gaps to a considerable extent. The attempts can be made to eliminate constraints in the process of adoption of solar energy technologies in agriculture. Another dimension of this study is the awareness and attitude of farmers in use of solar energy in agriculture. The results of the study will be helpful to the policy makers, and the administrators to formulate effective extension strategies to promote use of solar energy in rural areas, so that higher adoption of solar energy technology in agriculture by the farmers can be achieved.

It is vital to add renewable energy sources to the current energy in order to support agriculture, given the significance of sustainable energy. Families can simply switch to solar energy to supplement their current energy usage patterns for cooking, heating, lighting, irrigation, and farming activities including spraying, drying grain, and picking cotton. Because solar energy is so helpful in conserving the finite amount of non-renewable energy resources on Earth, it has been chosen for the current research project. In addition, solar energy produces cleaner energy without posing a threat to the environment or causing pollution. It is also infinitely renewable. In this context, efforts were undertaken to evaluate farmers' level of knowledge regarding the use of solar energy in farming systems and identify farmers' attitudes towards use of solar energy in agriculture. The relationship between a few selected personal elements that may have an impact on farmers' knowledge and attitudes on the use of solar energy in agriculture was investigated because respondents' attitudes toward solar technology are significantly influenced by their degree of knowledge. The study's findings will be useful in helping different organizations and institutes create training programs and policies that are realistic, effective, and focused on the needs of farmers.

## Methodology

The present study was carried out in Nagpur district of Vidarbha region in Maharashtra State. An exploratory research design of social research was used for the study. Five tahsils of Nagpur district were selected purposively on the basis of different cropping systems *viz*., Citrus, Cotton, Soybean, Vegetables and Pulses are followed in this district hence purposively selected for the study of use of solar energy in agriculture. Solar energy in agriculture is uses in all tahsils of Nagpur district out of which five tahsils *viz*. Mauda, Ramtek, Kuhi, Parseoni and Narkhed was selected purposively on the basis of more no of farmers use the solar energy in agriculture. Use of solar energy in agriculture is not village specific hence where more no of farmers use the solar energy in agriculture through PM-KUSUM scheme only that villages were selected purposively from selected tahsils. From the selected villages farmers who use the solar energy in agriculture was selected randomly by simple random sampling method to constitute 120 respondents for the present study. For collection in data interview structured schedule was prepared by following logical steps. Data here collected by personal interview of respondents. Their responses were considered for the purpose of the study. To study the attitude of farmer towards use of solar energy in agriculture attitude were tested against the practices finalised for the study. Attitude test was developed for the study and responses of selected farmers were noted on five point continuum i.e. strongly agree, agree, undecided, disagree and strongly disagree. After administration of dependent variables index was developed for attitude. Constraints faced by the respondents farmer towards use of solar energy in agriculture were identified and ranked. Objectives of this research are to study the attitude of farmer towards use of solar energy in agriculture and to identify the constraints faced by farmers in use of solar energy in agriculture.

## Results and Discussion

### Attitude of farmers towards use of solar energy in agriculture

The attitude of farmers towards use of solar energy in agriculture was further ascertained practice wise distribution have been reported in the Table 1.

**Table 1:** Distribution of the respondents according to Attitude of farmers towards use of solar energy in agriculture

| Sl. No. | Statements | SA | AG | UN | DA | SD |
|---|---|---|---|---|---|---|
| | | 5 | 4 | 3 | 2 | 1 |
| 1 | Solar energy is a desirable and renewable source of energy | 56 | 53 | 00 | 11 | 00 |
| | | (46.67) | (44.17) | (00.00) | (09.17) | (00.00) |
| 2 | Solar energy is useful in farming system | 26 | 67 | 00 | 27 | 00 |
| | | (21.67) | (55.83) | (00.00) | (22.50) | (00.00) |
| 3 | Solar power is a cheaper source of energy | 33 | 50 | 00 | 37 | 00 |
| | | (27.50) | (41.67) | (0.00) | (30.83) | (00.00) |
| 4 | Solar power saves the money | 06 | 50 | 26 | 38 | 00 |
| | | (05.00) | (41.67) | (21.67) | (31.67) | (00.00) |
| 5 | Solar energy is better source than traditional/conventional energy source? | 00 | 98 | 22 | 00 | 00 |
| | | (00.00) | (81.67) | (18.33) | (00.00) | (00.00) |
| 6 | Solar energy can reduce farm electricity bills | 38 | 54 | 11 | 17 | 00 |
| | | (31.67) | (45.00) | (09.17) | (14.17) | (00.00) |
| 7 | Solar spray pump help to reduce drudgery | 29 | 38 | 00 | 53 | 00 |
| | | (24.17) | (31.67) | (00.00) | (44.17) | (00.00) |
| 8 (-ve) | Technical supports are not easily available to operate solar energy units | 00 | 12 | 00 | 64 | 44 |
| | | (00.00) | (10.00) | (00.00) | (53.33) | (36.67) |
| 9 | Solar power is eco-friendly and helps to reduce pollution | 70 | 49 | 00 | 01 | 00 |
| | | (58.33) | (40.83) | (00.00) | (00.83) | (00.00) |
| 10 | Government subsidies are helpful to increasing the use of solar energy | 00 | 108 | 00 | 00 | 12 |
| | | (00.00) | (90.00) | (00.00) | (00.00) | (10.00) |
| 11 | Government provides helpful information to establish solar energy units | 33 | 01 | 00 | 86 | 00 |
| | | (27.50) | (00.83) | (00.00) | (71.67) | (00.00) |
| 12 | Solar power is best alternative to interrupted power supply in agriculture | 00 | 71 | 11 | 38 | 00 |
| | | (00.00) | (59.17) | (09.17) | (31.67) | (00.00) |
| 13 (-ve) | Maintenance cost to operate solar energy units is more | 00 | 55 | 00 | 27 | 38 |
| | | (00.00) | (45.83) | (00.00) | (22.50) | (31.67) |
| 14 | KUSUM scheme is a boon for increasing the solar energy use in agriculture | 11 | 56 | 27 | 00 | 26 |
| | | (09.17) | (46.67) | (22.50) | (00.00) | (21.67) |
| 15 | Initial cost of solar power set / system is high | 44 | 28 | 00 | 48 | 00 |
| | | (36.67) | (23.33) | (00.00) | (40.00) | (00.00) |
| 16 | During night/ gloomy days it is difficult to operate/ run | 27 | 45 | 37 | 00 | 11 |
| | | (22.50) | (37.50) | (30.83) | (0.00) | (09.17) |
| 17 | Solar water pumps help to reduce the irrigation problem | 27 | 49 | 06 | 38 | 00 |
| | | (22.50) | (40.83) | (05.00) | (31.67) | (00.00) |

The results regarding respondents according to their attitude towards use of solar energy in agriculture in table 1 indicated that, majority 46.67 percent of the respondents had strongly agree on solar energy is desirable and renewable

source of energy, followed by 44.17 percent of the respondents had agree, while 09.17 percent of respondents disagree. Significant percentage 41.67 percent of the respondents had agree about solar power is a cheaper source of energy, followed by 30.83 percent of respondents had disagree, while 27.50 percent respondents had strongly agree. Large majority 55.83 percent of the respondents had agree about solar energy is useful in farming system, and 22.50 percent of respondents had disagree while 21.67 percent of respondents had strongly agree with the statement. 41.67 percent of the respondents had agree about solar power saves the money, whereas 31.67 percent had disagree and 21.67 percent were undecided with the statement. Large majority percentage 81.67 percent and 18.33 percent of the respondents had agreed and undecided about solar energy is better source than traditional/conventional energy source respectively. Majority 44.17 percent of the respondents had disagreed about solar water pumps help to reduce the drudgery, while 31.67 percent of respondents had agreed and 24.17 percent respondents were strongly agreed. 45.00 percent and 31.67 percent of the respondents had agreed and strongly agreed about solar energy can reduce farm electricity bills and very meagre percentage 14.17 and 09.17 percent of respondents had disagreed and undecided respectively. In case of solar water pumps help to reduce the irrigation problem 40.83 percent of the respondents had agreed followed by 31.67 percent of respondents had undecided, 22.50 percent of respondents had strongly agreed and very meagre 05.00 percent of respondents had undecided. Regarding solar power is the best alternative to interrupted power supply in agriculture, majority 59.17 percent of the respondents had agreed whereas 31.67 percent respondents had disagreed and 09.17 percent respondents were undecided. With concern to solar power is eco-friendly and helps to reduce pollution, more than half 58.33 percent of the respondents had strongly agreed followed by 40.83 percent of respondents had agreed and very negligible 00.83 percent respondents had disagree. Statements government subsidies are helpful to increasing the use of solar energy majority 90.00 percent of the respondents had agreed followed by 10.00 percent of respondents had strongly disagreed. In case of government provides helpful information to establish solar energy units majority 71.67 percent respondents had disagree, 27.50 percent respondents had strongly agree and very negligible 00.83 percent respondents had agreed. Significant percentage 53.33 percent of the respondents had disagreed about technical supports are not easily available to operate solar energy units, followed by 36.67 percent of respondents had strongly disagreed, only 10.00 percent of respondents had agreed with the statement. 45.83 percent of the respondents had agreed about maintenance cost to operate solar energy units is more, followed by 31.67 percent of respondents had strongly disagreed and 22.50 percent respondents had disagreed. Majority 46.67 percent of the respondents had agreed about KUSUM scheme is a boon for increasing the solar energy use in agriculture, whereas 22.50 percent of respondents had undecided and 21.67 percent respondents had strongly undecided and very meagre 9.17 percent respondents had strongly agree with the statement. With the statement like initial cost of solar power set/system is high, 40.00 percent of the respondents had disagreed, followed by 36.67 percent of respondents had strongly agreed, 23.33 percent of the respondents had agreed. 37.50 percent of the respondents had agreed about during night it is difficult to operate/run(Solar pump), whereas 30.83 percent of respondents had undecided and 22.50 percent and very meagre percentage 09.17 percent of the respondents were strongly disagreed with the statement.

The analysis of overall attitude of the farmer towards use of solar energy in agriculture is shown in the table 2.

**Table 2:** Overall attitude of the farmer towards use of solar energy in agriculture.

| Sl. No. | Attitude | Respondents (n = 120) | |
|---|---|---|---|
| | | Frequency | Percentage |
| 1 | Less favourable | 00 | 00.00 |
| 2 | Moderate favourable | 75 | 62.50 |
| 3 | Most favourable | 45 | 37.50 |
| | Total | 120 | 100.00 |

From the table 2, it was clear that, majority 62.50 percent of the respondents had moderately favourable attitude towards use of solar energy in agriculture whereas 37.50 percent of the farmers had most favourable attitude and 00.00 percent had less favourable attitude towards use of solar energy in agriculture. This outcome might be due to significant association of education, source of irrigation, cropping pattern, extension contact, mass media exposure, risk orientation, innovativeness and knowledge with their attitude of respondents towards use of solar energy in agriculture, as majority of variables falls in to the medium score categories. The findings of this investigation are aligned with those of a previous study done by Darandale and Soni (2011) [2] and Hole (2014) [6].

**Constraints faced by farmers**

The constraints faced by respondents towards use of solar energy in agriculture were ascertained by researcher. The problems related to various aspects of attitude towards use of solar energy in agriculture were identified by obtaining response of individual respondent. The relevant data in this regard has been presented in Table 3.

Data from the Table 3 shows, a large majority 97.50 percent of respondents had constraint of attacked of monkeys and caused damage to solar panel. Majority 95.00 percent respondents reported that solar energy is sunlight dependent and solar panel not worked in gloomy weather condition. About 91.66 percent of respondents had constraint of poor linkage with MEDA and updated information of solar energy technology through PM-KUSUM scheme were not received by farmers. About 80.83 percent respondent reported that high initial cost for installing solar panel in their farm. Majority 79.60 percent respondents reported that spare components of solar panel not readily available in the market. About 74.16 percent respondents reported that weather predictions not supplied on a weekly basis properly village to village. 71.66 percent respondents had Technical & maintenance requirement for operating solar water pump. About 65.00 percent respondents were not encouraged to employ solar energy in agriculture. Nearly half 47.50 percent respondents reported that solar energy storage is

expensive. About 28.33 percent respondents faced problem regarding solar water pumps not easily available. Nearly 22.50 percent respondents faced problem of subsidies not made available to them for solar powered machinery. About 15.00 percent respondents had constraint of space needed for installing solar panel in their farm. Nearly 11.66 percent respondents reported that installation of solar panel is difficult.

**Table 3:** Constraints faced by respondents towards use of solar energy in agriculture

| SI. No. | Constraints | Respondents (n=120) | | |
|---|---|---|---|---|
| | | Frequency | Percentage | Rank |
| 1. | Attacked of monkeys and caused damage to solar panel | 117 | 97.50 | I |
| 2. | Sunlight dependent and not worked in gloomy weather condition | 114 | 95.00 | II |
| 3. | Due to poor linkage between MEDA and farmers, updated information of solar energy technology through PM-KUSUM scheme were not received by farmers | 110 | 91.66 | III |
| 4. | High initial cost for installing solar panel | 97 | 80.83 | IV |
| 5. | Spare components of solar panel not readily available in the market | 95 | 79.16 | V |
| 6. | Weather predictions not supplied on a weekly basis properly village to village | 89 | 74.16 | VI |
| 7. | Technical & maintenance requirement for operating solar water pump | 86 | 71.66 | VII |
| 8. | Farmers are not encouraged to employ solar energy in agriculture | 78 | 65.00 | VIII |
| 9. | Solar energy storage is expensive | 57 | 47.50 | IX |
| 10. | Solar water pumps not easily available to farmers | 34 | 28.33 | X |
| 11. | Subsidies not made available to farmers for solar powered machinery | 27 | 22.50 | XI |
| 12. | Space needed for installing solar panel | 18 | 15.00 | XII |
| 13. | Installation of solar panel is difficult | 14 | 11.66 | XIII |

## Conclusion

It is concluded from the findings that majority of respondents had moderately favourable attitude towards use of solar energy in agriculture. Major constraints identified regarding this was attacked of monkeys and caused damage to solar panel, constraint of poor linkage with MEDA and updated information of solar energy technology through PM-KUSUM scheme were not received by farmers, solar energy is sunlight dependent and solar panel not worked in gloomy weather condition, constraint of high initial cost for installing solar panel in their farm. Also there is need to popularise this low cost technology through campaigns and trainings at village levels. To change the attitude of the farmers and motivate them to adopt this solar energy technology, the field functionaries should organize field trips to show the live demo of the solar energy technology and remove the doubt of the farmers regarding this technology. They should also show the worth of solar energy technology on the farmers field by comparative analysis of solar energy technology with existing technology.

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