Agriways 10 (1) : 56-58, June 2022

ISSN: 2321-8614 (Print)
ISSN: 2454-2318 (Online)

Research Article

Constraints faced by stakeholders in adoption of solar water pumps

S. Likith, S. Moghana Lavanya*, K. Mahendran, S. Senthilnathan, M. Prahadeeswaran

Centre for Agriculture and Rural Development Studies, Tamil Nadu Agricultural university,

Coimbatore, Tamil Nadu, India

***Corresponding author Email:** smoghana@tnau.ac.in

Received: 15 June 2022/Accepted: 25 June 2022

Abstract Government of India has initiated Jawaharlal Nehru National Solar Mission in January 2010 to promote solar water pumps. Installation of Solar water pumps were highly promoted by the government through subsidies from 2013. In Tamil Nadu, Solar water pump policy is implemented by Tamil Nadu Energy Development Agency (TEDA) and State Nodal Agency. Installation of solar water pumps was dependent on three stakeholders such as farmers, company and Government agencies. The study was undertaken to identify the constraints faced by the stake holders and to provide suggestions for the improvement of adoption of solar water pumps The results of the study would be helpful for the governing bodies and other agencies to understand the needs of the farming community, thereby improving the adoption of solar pumps for irrigation.

Keywords: Solar water pumps, constraints, Garett ranking tecniques,stakeholders

Introduction

Tamil Nadu state has a land area of 1,30,058 square km which constitutes 4 percent of land area but only 2.5 per cent of water resources in India (http://tnenvis.nic.in/database/tn-envis_791.aspx). The state is highly dependent on monsoon for its water . Efficient water management techniques were necessary to meet the needs of the state. Energy is found to be the major cost driver in the operation pumping system for agriculture. Renewable energy was found to be the best alternative not only for reducing the cost but also for environment friendly. Installation of Solar water pumps were highly promoted by the government through subsidies from 2013. Tamil Nadu state is promoting the usage of renewable energy sources such as solar water pumps with 90 per cent subsidy. Solar Water Pumps offer a clean, convenient method of irrigation in Tamil Nadu. The state receives relatively high solar insulation of 5.6 – 6.0 kWh/ sq.m16 and has around 300 sunny days a year. This technology promises to provide a clean, green and convenient form of irrigation for farmers. The solar water pumps are provided to the farmers who forego their free electricity connection. The policy note of State Energy Department reported that 2826 of 5 HP SWPs were installed in Tamil Nadu with the subsidy amount of Rs.101.40 crores between 2013-2014 and 2017-2018.

Solar Water Pump was introduced in 2013-14 by Ministry of New and Renewable Energy (MNRE), Government of India through National Bank for Agricultural and Rural Development (NABARD) and State Nodal Agencies (SNA). Tamil Nadu has a high installation rate with 2,669 Solar Water Pumps until April 2016. In Coimbatore district totally 157 SWPs were installed between 2014-2015 and 2017-2018. Installation of solar water pumps was dependent on three important stakeholders such as farmers, company, and Government agencies. Under these circumstances the research study was conceived to understand the constraints faced by the stakeholders in adoption of solar water pumps in Coimbatore district of Tamil Nadu

Review of Past Studies

Naseem and Imran (2016)measured the viability of using renewable energy for agriculture. The results of the study revealed that renewable energy such as solar was a viable alternate to both diesel and electricity.

Sreewirote and Leelajindakrairerk (2016)defined solar

water pump system as a "system where wate

According to Friedman and Miles (2006)stakeholders are the persons who are interested in performance of an organizations.

Werther Jr and Chandler (2010) defined stakeholder in an organization as an individual or a group of persons who leads organization to achieve the objectives of the firm.

Ogunleye and Awogbemi (2011)discussed about the constraints in adoption of SPV system. They founded that high capital cost was the only constraint for the farmer to switch over to a diesel generator rather than solar PV system. The other constraints were low knowledge on operation of pumps, lack of skilled/experience persons for maintenance, and lack of awareness about the benefits of the solar pumps.

Materials and Methods

Coimbatore district was purposively selected as it is one of the leading districts in installation of solar water pumps in Tamil Nadu (154 pumps). The farmers were selected through random sampling method from the list of beneficiaries obtained from Agricultural Engineering Department ,Coimbatore. Garrett ranking technique was adopted to analyse constraints in adoption of solar water pumps . The sample respondents were asked to rank the reasons and constraints based on their experience. The ranks assigned by the sample respondents were converted to scores using the formula given below:

$$\text{Percent position} = \frac{100(R_{ij} - 0.5)}{N_j}$$

Where, Rij = Rank given for i[th]reasons and constraints by j[th]individual

N_j =Number of reasons and constraints ranked by j[th]individual

The percent positions of each rank were then converted into scores by referring the Garrett's conversion table. Mean scores was estimated for each reasons and constraints. The mean score for all the reasons and constraints were arranged in the descending order and the reasons and constraints with highest mean score was given first rank followed by other reasons and constraints.

Results and Discussion

Installation of solar water pumps was dependent on three stakeholders such as farmers, company and Government agencies. The major constraints faced by the stakeholders was obtained and presented below

Constraints faced by Farmers in Adoption of Solar Water Pumps

The major constraints faced while adoption of solar water pumps were ranked by the farmers and presented in the following table 1

Table 1 Constraints faced by Farmers in Adoption of Solar Water Pumps

S.No	Constraints	Mean score	Rank
1.	Long duration for getting approval to Installation	55.70	I
2.	Poor response by Companies	55.26	II
3.	No storage facility for Solar Energy Generated	54.65	III
4.	Energy output changes with Weather	53.18	IV
5.	Can be Operated only in day time	52.00	V
6.	Less availability of Spare parts	47.10	VI
7.	Easily damaged by natural calamities	46.57	VII
8.	Skilled Manpower required for Maintenance	41.08	VIII
9.	Consumes huge land area for installation of solar panels	39.28	IX

From the table 1, it could be inferred that longer duration for getting approval was the major constraint faced by the farmers and it was ranked first (55.70).The approval process involves myriad of documentation so the duration was found to be longer. Farmers ranked poor response by companies as second constraint (55.26) followed by absence of storage facility for solar energy generated (54.65), and energy output changes with weather (53.18). Most of the farmers opined that energy generated cannot be stored and during rainy season the energy generation was found to be less.

Constraints faced by Agricultural Engineering Department

The Installation of SWPs in Coimbatore district was undertaken by Executive Engineer, Agricultural Engineering Department (AED) Coimbatore. The main constraints were provision of incorrect information about cropping pattern of the farms ,improper land document,withdrawal of electric connection and delay in installation of SWPs by companies in farmers' field.

Constraints faced by Companies

There are nine companies which are involved in the installation of SWPs in Coimbatore district. Constraints faced by companies while dealing with solar water pumps were presented in table 2

Table 2 Constraints faced by Companies

S.No	Constraints	Number of Companies	Percentage to total companies
1.	Minimum profit to company while installing through subsidy	7	77.78
2.	Improper maintenance of solar water pumps by the farmers.	9	100
3.	Lack of awareness among the farmers about the parts of solar water pumps.	9	100
4.	Replacement and Warranty issues	5	55.55
5.	Huge cost was spent by the companies for maintenance.	3	33.33
6.	Delay in subsidy dispersal from (TANGEDCO) –TNEB.	7	77.78

From the table 3, it could be inferred that all the companies (100 percent) involved in installation of SWPs faced problem of improper maintenance of solar water pumps by the farmers and lack of awareness among the farmers about the components of solar water pumps followed by minimum profit to company while installation through subsidy and delay in subsidy dispersal (77.78 percent).

Conclusion

It can be concluded from the study that the major constraint faced by farmers was long duration for getting approval followed by poor response of companies and absence of storage backup facility for solar energy. The study also revealed the issues faced by government agencies namely from farmers such as incomplete information in land documents which results in delay in process. The major constraints faced by the companies involved in installation of SWPs was the problem of improper maintenance of solar water pumps by farmers. Based on the results it is suggested that Awareness programme and demonstration about the maintenance and usage of solar water pumps can be conducted along with establishment of repair and maintenance centers Further, Installation of battery for storage of solar energy in peak hours in Photovoltaic system can be explored.

References

Chandramouli, Rajesh. 2017. "Agriculture gets solar push with 90 % subsidy." *The Times of India*. https://timesofindia.indiatimes.com/city/chennai/agriculture-gets-solar-push-with-90-subsidy/articleshow/61956991.cms.

Friedman, Andrew L, and Samantha Miles. 2006. *Stakeholders: Theory and practice*: Oxford University Press on Demand.

Naseem, Zenab, and Sadia Imran. 2016. "Assessing the viability of solar water pumps economically, socially and environmentally in Soan Valley, Punjab." *Int J Environ Chem Ecol Geol Geophys Eng* 10 (6):711-716.

Ogunleye, I. O., and O. Awogbemi. 2011. "Constraints to the use of solar photovoltaic as a sustainable power source in Nigeria." *American Journal of Scientific and Industrial Research* 2 (1):11-16.

Sreewirote, B, and M Leelajindakrairerk. 2016. "Design and development of solar water pump." 2016 19th International Conference on Electrical Machines and Systems (ICEMS).

Werther Jr, William B, and David Chandler. 2010. *Strategic corporate social responsibility: Stakeholders in a global environment*: Sage. http://tnenvis.nic.in/database/tn-envis_791.aspx.