

**Socio-Economic Impact Of
Solar Based Irrigation System:
*Focused on Dang District***



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*Master of Business Administration
(MBA)*

Development Management

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Title: To study the Socio-Economic Impact of Solar Based Irrigation System: Focus on Dang District. (It may include migration, empowerment (group decision-making), group management, farm productivity, crop yield, and farm income)

INTRODUCTION:

Sustainable agriculture is essential for achieving many sustainable development goals such as poverty alleviation, food security, inclusive economic growth, and sustainable production methods. Currently, agricultural production is becoming more challenging due to the increasing global population, climate change, increasing demand for food and shrinking agricultural land area. To address these issues, various sustainable production methods such as precision agriculture, conservation, organic farming, agroforestry, and integrated Agro-agricultural systems are being practiced worldwide.

The remote areas of Dang district in Gujarat depend on traditional irrigation methods and some areas lack resources for irrigation. Therefore, the area is mostly dependent on rainfed agriculture, where agriculture is the main occupation. Uncertainty of electricity, diesel pumps, increasing cost of production due to this, crop losses are the challenges to be faced. The region's socio-economic development is closely linked to its agricultural productivity, making irrigation advancements critical to the well-being of local communities as well as environmental sustainability and increasing agricultural productivity.

Another sustainable agricultural production method is to use (solar based irrigation system) solar photovoltaic (PV) pumps as an alternative to diesel pumps or electric pumps for irrigation. With the help of solar pumps, farmers have access to high-quality electricity available for irrigation as the system is portable and can be assembled at any preferred location at any time. An evidence-based literature review shows that PV pumps can increase the adaptive capacity of farmers by increasing agricultural productivity and their income while mitigating climate change by reducing CO₂ emissions. Additionally, unused energy from solar irrigation systems can be used to power other applications. With the increasing use of these systems, the cost comes down significantly, making them an efficient, convenient, and cost-effective solution for off-grid rural areas.

RESEARCH QUESTION:

1. What is the impact of solar-based irrigation systems on farm productivity, crop yield, farm income, livelihoods and water use compared to conventional irrigation methods?
2. How solar-based irrigation system is effective for farmer empowerment?

3. What are the initial costs and long-term financial viability of installing and maintaining a solar-based irrigation system for farmers?

OBJECTIVES:

- To Assess the economic impact of solar-based irrigation systems on farmers' income and overall livelihoods.
- To understand the technology's efficiency and sustainability.
- To study the social dimensions of solar-based irrigation systems with focus on farmer empowerment and community mobilization.
- To Investigate the economic feasibility of installing and maintaining solar-based irrigation systems for long-term sustainability
- To Identify potential benefits and challenges of solar-based irrigation systems.

HYPOTHESIS:

H1: Adoption of solar-based irrigation systems will positively impact the socio-economic conditions of farmers, leading to increased income, increased agricultural productivity, increased community empowerment and long-term economic stability.

Ho: Adoption of solar-based irrigation system will not have any positive impact on the socio-economic conditions of the farmers.

MATERIAL AND METHODS:

STUDY DESIGN: A mixed method research approach involving quantitative and qualitative studies and illustrations, assessing one data set at a time, and providing a holistic understanding of socio-economic dynamics associated with adoption. Solar-based irrigation. A descriptive cross-sectional study will be conducted using a post-test only design to measure potential factors.

SETTING: This study explores the socio-economic outcomes of farmers adopting solar-based irrigation in Dang district. The diverse agricultural landscape and hilly terrain of this district in the southeastern part of the state of Gujarat serve as a unique backdrop for the use of renewable energy (solar based irrigation systems).

STUDY POPULATION:

- Inclusion criteria: The study covers farmers and agricultural stakeholders in Dang district who have adopted solar-based irrigation systems. Inclusion criteria are defined based on active participation in agricultural practices and use of solar energy irrigation technology.
- Exclusion Criteria: Individuals or communities not actively involved in agriculture or not adopting solar-based irrigation systems will be excluded from the study. This exclusion criterion ensures focused analysis on specific populations directly affected by the intervention.

DURATION OF STUDY: 15th March 2024 to 16 Jun 2024 (3 months)

SAMPLE SIZE: Out of a total of 826 farmers adopting and actively participating in solar based irrigation system, we considered 20% i.e. 165 farmers as a sample.

SAMPLING TECHNIQUE: A study would be used of technique Simple Random Sample in research.

DATA COLLECTION PROCEDURE: Surveys and interviews will be conducted using structured questionnaires, in addition to case studies in selected areas, in-depth interviews will provide qualitative insights into the local context.

OPERATIONAL DEFINITIONS:

Solar-Based Irrigation System: A sustainable agricultural practice harnessing solar energy to power irrigation systems, reducing dependence on conventional energy sources. This innovative technology involves the utilization of solar panels to generate power for water pumping, subsequently enhancing water resource management and crop cultivation efficiency.

Social Impact: The discernible and intangible consequences experienced by farmers because of external factors, initiatives, or technologies, influencing their social well-being, community interactions, and overall way of life. This encompasses changes in community dynamics, cultural practices, and individual relationships within the farming context.

Economic Impact: The measurable effects and outcomes experienced by farmers due to solar based irrigation system, directly impacting their financial well-being, income stability, and overall economic status. This includes changes in income levels, employment opportunities, and the overall economic resilience of farmers within their agricultural pursuits.

DATA ANALYSIS PLAN:

The collected data will be analyzed using statistical software (e.g. Excel, SPSS), the analyzed data will be presented in the form of tables and graphs.

ETHICAL CONSIDERATIONS:

- Informed consent will be obtained from all participants.
- Privacy and confidentiality of participants will be strictly maintained.
- The study will be conducted in adherence to ethical guidelines and regulations.

IMPLICATIONS OF RESEARCH:

The findings of this research have profound implications for sustainable development and policy making in Dang District. By elucidating the socio-economic impact of solar-based irrigation systems, the research aims to inform future interventions, guide resource allocation, and promote resilient agricultural practices. These insights are essential for stakeholders, policy makers and local communities to collectively enhance the socio-economic fabric by promoting the harmonious integration of renewable energy into the agricultural sector of Dang District. This research enables stakeholders such as farmers and policy makers to make informed choices about solar irrigation and maximize its positive social and economic impact on Dang district.

REFERENCES:

<https://www.akrspindia.org.in/web/resources/publication>

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