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A Thorough Examination of Perception, Knowledge and Adoption of Solar Technology in Nepal

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Abstract

As a viable renewable energy source to lessen reliance on fossil fuels and combat climate change, solar technology has attracted a lot of attention. The purpose of this study was to evaluate public attitude, awareness, and knowledge about solar technology. Data were gathered on respondents' awareness, knowledge, perceived benefits, adoption barriers, and variables influencing the acceptability of solar technology through a survey given to a varied sample of participants. The results showed that although a sizable percentage of respondents knew something about solar technology, awareness and knowledge raising still needs to happen. Although the media was the most popular source of information, there are other possible sources as well, including community-based activities, education, friends, and family. The advantages of the benefits of solar technology were acknowledged, but obstacles to its widespread use, such as price, accessibility, and ignorance, were noted. It has been discovered that sociodemographic characteristics like age, income, and education affect how people see and use solar technology. The results suggest that cooperative initiatives involving the media, academic institutions, government agencies, non-governmental organizations, and local communities should be undertaken to raise awareness and knowledge of solar technology, with a particular focus on disadvantaged populations. To further address the adoption hurdles, strategies including maintenance services, subsidies, and financial incentives should be taken into account. The report emphasizes how critical it is to raise public awareness, understanding, and positive opinions about solar technology in order to encourage a broader use of this technology for a sustainable energy future.

Keywords: *Solar Technology, Adoption, Barriers, Awareness, Knowledge, Perception, and Renewable Energy.*

I. INTRODUCTION

Nepal, a South Asian nation with a high population density, has several energy-related issues, such as widespread energy poverty, restricted access to consistent electricity, and reliance on fossil fuels for energy production.

One promising approach to overcoming these obstacles is solar energy. Bangladesh has a wealth of solar resources, and solar technology has the potential to be a cheap, sustainable, and clean energy source. It can also help reduce poverty and promote environmental sustainability. The ability of solar energy to deliver electricity to isolated and off-grid locations where grid extension is not economically feasible is one of its main benefits in Nepal. The majority of people reside in rural communities, which stand to gain from this by enabling income-generating activities, raising living standards, and improving access to healthcare and education.

By lowering household spending on pricey and environmentally harmful energy sources, solar energy can also help reduce poverty by freeing up money for other essentials. Solar energy can also lessen Nepal reliance on fossil fuels and the unfavourable environmental effects that come with their use. The nation is extremely vulnerable to climate change, as a large percentage of its people reside in low-lying deltaic regions that are frequently hit by storms and flooding. Solar energy can lessen climate change by reducing greenhouse gas emissions. alter and enhance the quality of the air, providing several advantages for the environment and human health. Additionally, by broadening the nation's

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energy mix and lowering its reliance on imported fossil fuels, solar energy can help ensure energy security. At the moment, Nepal's energy security and balance of payments are at jeopardy due to its heavy reliance on imported fossil fuels.

By offering a domestic, renewable, and sustainable energy source, solar energy can lessen the nation's vulnerability to unstable international fuel costs and geopolitical unrest. There are obstacles standing in the way of Nepal's effective adoption of solar technology, despite the potential advantages. Adoption of solar technology can be hampered by a lack of local understanding, acceptance, and awareness of it, particularly in rural areas where awareness levels may be low. Accessibility and affordability of solar technology can also be a problem, especially for households with limited resources. However, solar energy may play a significant part in tackling Nepal's energy difficulties and promoting sustainable development in the nation with the help of supportive legislation, financing choices, and awareness-raising initiatives. Understanding solar technology is essential to educating people and communities about its potential advantages. applications as well as restrictions.

Making educated judgments about solar technology adoption can be facilitated by providing people with information about the technical features, operation, and maintenance of solar systems. Additionally, it can enable them to successfully make the most of solar energy by using it for their energy demands. People's perceptions of solar energy as a practical and sustainable source of electricity are greatly influenced by awareness. Dispelling myths, concerns, and misconceptions regarding solar technology can be accomplished in part by increasing public awareness of solar energy through a variety of initiatives, including public campaigns, education programs, and community engagement. Additionally, it can foster a favourable picture of solar energy and increase trust in its efficacy and dependability, which will increase adoption and acceptance. Furthermore, acceptance plays a key role in accelerating solar technology uptake. If individuals do not believe that solar technology is a practical alternative for their energy needs, they may not adopt it even with knowledge and understanding need.

The inclination of individuals to adopt solar technology can be influenced by a number of factors, including perceived risks and advantages, social acceptance, and cultural norms. Thus, encouraging the acceptance and implementation of solar technology requires an awareness of and attention to the tastes, concerns, and motivations of the local populace. It is critical to comprehend Nepalese society's level of solar technology adoption in terms of knowledge, awareness, and acceptability. In order to remove obstacles and encourage the wider use of solar technology, initiatives to educate, create awareness, and resolve concerns can be helpful. Nepal has the capacity to harness solar energy to tackle its energy issues and promote sustainable development by creating an atmosphere that is conducive to education, understanding, and acceptance. societal and cultural norms, among others, as influencing elements in rural Nepal's adoption of solar household systems (Ojong, 2021). In Nepal, people's desire to adopt solar technology was found to be significantly shaped by social influence, including peer pressure and community norms (Zeng et al., 2022). Even with the body of material already available on solar energy adoption, understanding, awareness, and acceptability, there are still unanswered questions that support the need for more study. Nepal can utilize solar energy to its fullest capacity to solve its energy problems and support the nation's sustainable development.

First off, nothing is known about the precise knowledge gaps that exist across Nepal's many stakeholder groups, including homes, companies, and communities. Determining the precise knowledge gaps can assist in creating educational programs and interventions that are specifically tailored to meet the needs and demands of various stakeholders. Second, there aren't many thorough research that look at Nepal's various stakeholders' degrees of solar energy awareness (Li et al., 2020). Awareness-raising campaigns and tactics can be influenced by the assessment of awareness levels, which can offer insights into the perception and acknowledgment of solar energy as a practical and sustainable source of electricity. Finally, further study is required on social acceptance, particularly cultural and social norms, in relation to the use of solar energy in Nepal. In order to effectively promote the adoption of solar energy, methods that take into account social networks, community dynamics, and cultural norms can be developed with an understanding of how social factors affect people's propensity to adopt solar technology.

II. LITERATURE REVIEW

- *An Analysis of Pertinent Literature on the Adoption, Awareness, and Acceptance of Solar Energy*

An overview of the pertinent literature on solar energy adoption, understanding, awareness, and acceptability is given in the literature review. In the context of Bangladesh, it also reviews previous research on solar energy and pinpoints knowledge gaps that support the necessity of the current investigation. Adoption of solar energy is affected by a number of variables, such as cultural norms, socioeconomic level, and individual attitudes, perceptions, and beliefs (Irfan et al., 2021). Numerous studies have looked into the variables that affect solar technology adoption, including perceived benefits, costs, dangers, technical expertise, and social influence (Schulte et al., 2022). According to Yadav et al. (2019), this research has emphasized the significance of comprehending the knowledge, awareness, and acceptability of solar technology across various stakeholders, including homes, businesses, and communities.

For example, an Indian study discovered that one of the biggest obstacles to rural households adopting solar technology was their lack of knowledge about it (Sharma et al., 2021). Similarly, a study conducted in Pakistan discovered that one of the main barriers to solar energy

adoption in rural populations was a lack of knowledge about the technology's advantages (Irfan et al., 2021). Acceptance is another key element that affects the uptake of solar energy, including social acceptance. Studies have shown that people's readiness to adopt solar technology is significantly shaped by social acceptance, cultural norms, and perceived social standards. For instance, a French study discovered that social acceptance—including social norms—influenced homeowners 'adoption of solar panels (Peñaloza et al., 2022). An additional investigation by in China discovered that social acceptance and cultural norms had an impact on households' adoption of solar water heaters (Wang et al., 2019).

Numerous research has looked at solar energy adoption in Nepal and the factors that affect it. For instance, a study by discovered that one of the main obstacles to solar technology adoption among Nepali rural households was a lack of information about it (Amin et al., 2021). Another study by Khan, Rahman, and Hasan discovered that misconceptions about solar technology and a lack of knowledge about the advantages of solar energy were impediments to its implementation in Nepal (Khan et al., 2020). Additionally, Ojong's survey from 2021 revealed social approval.

- *An Analysis of Solar Energy Studies within the Nepalese Context*

Regarding Nepal, solar energy has drawn a lot of interest lately as a possible remedy for the nation's energy problems. Numerous studies (Hasan and Emon, 2023; Saim and Khan, 2021; Sarker et al., 2020) have looked into the adoption of solar technology in Nepal, focusing on a variety of factors, including household energy use, rural electrification, and off-grid solar systems. These studies have shown that sociodemographic, economic, and cultural aspects, in addition to knowledge, awareness, and acceptability of solar technology, are important elements that influence its adoption in Bangladesh. In a study, Saim and Khan looked at the uptake of solar home systems (SHS) in Nepal's rural areas and discovered that awareness of the advantages of solar energy, like lower electricity adoption of SHS was favourably correlated with reduced costs, enhanced health, and environmental sustainability (Saim and Khan, 2021).

The study also discovered that a key predictor of adoption was knowledge of SHS's availability and the government's subsidized programs. Furthermore, the research emphasized the significance of social acceptance, encompassing both cultural and social norms, in influencing people's inclination to embrace SHS in rural Bangladesh. Another study by looked into the factors influencing Nepalese farmers' adoption of solar irrigation systems (SIS) (Rana et al., 2021). According to the study, farmers' decisions to adopt SIS were greatly impacted by their awareness of the technology, the financial advantages, and the operational factors. The study also showed that a key factor influencing adoption was knowledge of the possible advantages of SIS, such as higher agricultural output and lower irrigation costs. Additionally, the study indicated

Furthermore, societal acceptance—which encompasses both cultural and social norms—is a major factor in determining how likely people are to use solar technology. These results highlight the necessity for customized educational initiatives, awareness-raising efforts, and tactics that take into account the particular knowledge gaps, awareness levels, and social dynamics of various stakeholder groups in Nepal in order to effectively encourage the adoption of solar energy. It is important to remember that the research that have already been done have limitations. The majority of research are cross-sectional, relying on self-to comprehend their distinct knowledge, awareness, and acceptability dynamics in the context of solar energy adoption. These stakeholder groups include businesses, industries, and communities.

- *Determining Research Gaps and Justification for the Present*

The paucity of qualitative research that offers a thorough grasp of Nepali people's knowledge, awareness, and acceptance of solar technology is one of the research gaps in the body of current literature. Qualitative research can offer a more nuanced understanding of the local context, cultural norms, and social dynamics that shape people's perceptions and behaviours towards solar technology, even though quantitative studies have been very helpful in illuminating the factors that influence the adoption of solar energy. Qualitative research techniques, including focus groups and interviews, can reveal more about the intricate sociocultural elements that affect Nepal's adoption of solar energy while also capturing the lived experiences, attitudes, and motivations of individuals. The little investigation of sociodemographic, economic, and cultural elements influencing the adoption of solar energy in Nepal (Masukujjaman et al., 2021).

III. MATERIALS AND METHODS

The study's sample selection, data collection procedures, and research design are all covered in the methods section. It also covers ethical issues, study limits, and the operationalization of important factors, such as knowledge, awareness, and acceptability of solar technology. In order to investigate and comprehend Bangladesh's knowledge, awareness, and acceptance of solar technology, this study uses a qualitative research design. This study is well suited for qualitative research since it provides a deeper insight of the attitudes, experiences, and practices of the community around solar technology. Purposive sampling is used in the study to choose participants with prior exposure to and expertise of solar technology. To capture a range of viewpoints, the sample consists of people from various sociodemographic backgrounds, including both rural and urban areas.

Interviews that are only loosely structured are used to get data. Open-ended questions in semi-structured interviews help participants to express their understanding, awareness, and acceptance of solar technology in their own words. With participants' permission, audio recordings of interviews and conversations are made during the data collecting process, which takes place in the

local tongue. By categorizing and analysing the qualitative data, the three main factors of knowledge, awareness, and acceptability of solar technology are operationalized. Thematic analysis is a method used in data analysis that includes extracting categories, themes, and patterns from the data. Throughout the entire study process, ethical issues are taken into account. Prior to data collection, participants provide their informed consent and are guaranteed anonymity and confidentiality. Sensitivities related to culture and setting are also taken into account in the study when gathering and analysing data.

IV. RESULTS AND FINDINGS

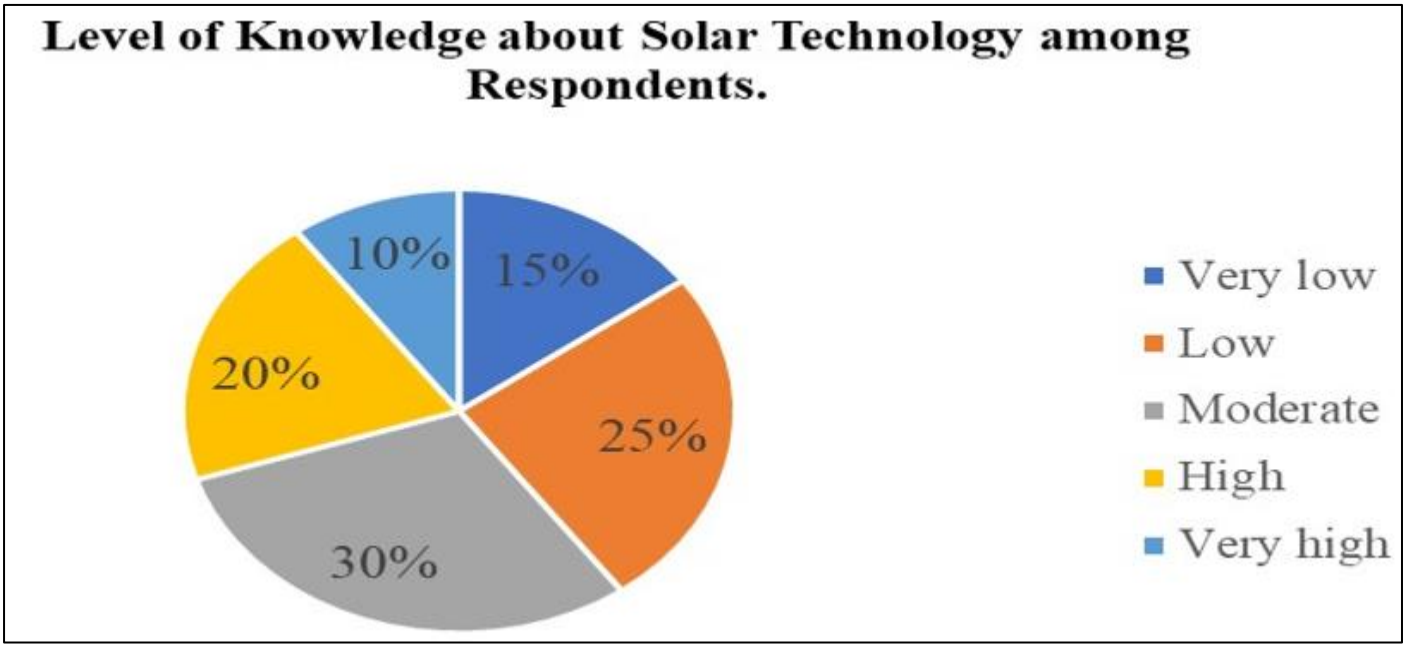

Fig 1 Level of Knowledge about Solar Technology among Respondents

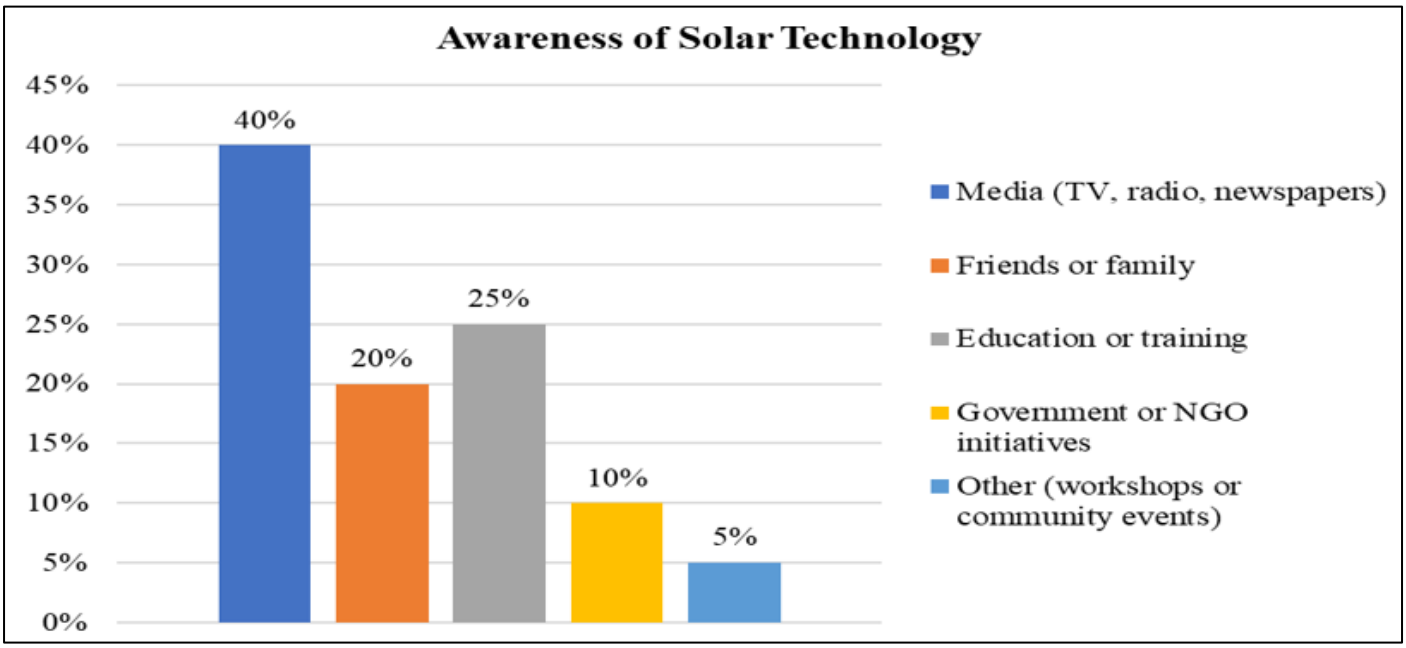

Fig 2 Awareness of Solar Technology

According to poll results, 30% of participants said they knew only a moderate amount about solar technology, which represents the majority of respondents. Furthermore, regarding solar technology, 25% of respondents know very little, 20% know a lot, and 15% know very little. Just 10% of those surveyed said they knew a great deal about solar technology. This indicates that although a considerable proportion of the participants has a certain degree of understanding of solar technology, there exists opportunities for enhancing awareness and knowledge regarding this sustainable energy source. In order to improve public comprehension and knowledge about solar technology, further education and awareness-raising initiatives could be required.

According to the results, the media—including radio, TV, and newspapers—is the most popular place to learn about solar technology, with 40% of respondents selecting

it as their primary source of information. Twenty percent of respondents cited friends and family as a source of awareness, whereas twenty-five percent cited school or training. Ten percent of respondents cited government or non-governmental organization initiatives as a source of information regarding solar technology. Fifteen percent of the respondents identified other sources, like workshops or community activities.

These results emphasize how crucial media and educational outlets are to educating the public about solar technology. It also raises the possibility of friends, family, and neighbourhood-based campaigns playing a part in educating people about solar technology. Collaborations between the media, academic institutions, government agencies, non-governmental organizations, and local communities may be successful in raising public knowledge and comprehension of solar technology.

V. DISCUSSION

The survey's outcomes and conclusions provide numerous significant insights on the respondents' degree of solar technology awareness, knowledge, and perception. First, 25% of respondents had little understanding, 20% had good knowledge, and 15% had extremely low knowledge about solar technology, compared to the bulk of respondents (30%) who had moderate knowledge. Merely 10% of participants possess extremely high knowledge of solar technology, suggesting that there is potential for enhancing the general public's awareness and comprehension of this sustainable energy source. According to 40% of respondents, the media—which includes radio, TV, and newspapers—was the most popular source of information regarding solar technology. Twenty percent of respondents named friends or family, and education or training. made up 25% of those surveyed. This emphasizes how crucial media and educational outlets are to educating the public about solar technology.

Include of its capacity to produce power in remote locations, its clean and renewable nature, its long-term cost effectiveness, and its decreased reliance on fossil fuels. These results show that most respondents believe solar technology to be a clean, economical, and sustainable energy source that can help lessen reliance on limited resources and supply electricity in remote locations. The usage of solar panels for home electricity, solar-powered water pumps for irrigation, and solar-powered lamps for lighting in rural regions were all mentioned by 40% of respondents as experiences with solar technology. Nonetheless, 60% of respondents said they had no prior experience with solar technology, with the primary causes being limited availability in their location, high initial cost, and lack of understanding the Cost-effectiveness, availability of financial incentives or subsidies, solar technology's performance and dependability, accessibility to maintenance and repair services, social and cultural acceptance, environmental concerns, and government policies and support are some of the factors influencing acceptance or willingness to adopt solar technology.

VI. CONCLUSION

The results of the poll show that although a sizable fraction of the participants knew something about solar technology, there is still opportunity to raise public awareness and knowledge of this renewable energy source. Most respondents knew only a little about solar technology, and the media was the most common source of information. But there are also other possible sources of awareness that can be very helpful in raising awareness, including friends, family, education, the government, non-governmental organizations, and community-based projects. According to the answers, there are several advantages to solar technology, such as its clean and renewable nature, long-term cost-effectiveness, ability to provide electricity in remote places, and environmental friendliness.

The results of this study clearly show that more has to be done to raise public awareness and knowledge of solar technology, with a focus on those with less knowledge. Information can be effectively disseminated and awareness raised by working together with the media, educational institutions, government, non-governmental organizations, and communities. To further address the adoption barriers, strategies like maintenance services, subsidies, and financial incentives should be taken into account. In general, greater understanding, awareness, and positive opinions about solar technology can support its wider.

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