

Opinion leadership in Solar rooftop adoption: Empirical evidence from commercial and industrial electricity users in Pune, Maharashtra

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ABSTRACT

India targets to achieve 40 Giga Watt (GW) of Solar rooftop by 2022 but is far from realizing it within the set timelines. While much has been documented about the known barriers, the existence of opinion leadership in solar rooftop adoption has not been tested adequately as yet. Most researchers have proven that opinion leadership has emerged as the key factor behind the diffusion of new and innovative technologies. The objective of this study is to analyze the status of opinion leadership in the adoption of solar rooftop PV amongst large consumers of electricity in Maharashtra. Using a qualitative research approach, seven in-depth interviews were conducted with large electricity consumers and users of solar rooftop PV within the state, to check for opinion leadership / peer effects. Findings reveal that while users are satisfied with significant amounts of cost savings, yet presence of opinion leadership is not up to the expectation, and that is accentuating adoption barriers. In conclusion, recommendations are presented to expedite green energy adoption, as also adding to the existing body of literature, where this subject has been found under-explored. Most of the existing research talks about peer effects or adoption in residential complexes only, so this study explores the adoption scenario in case of commercial and institutional buildings. Observations from this study can be used by policy-makers in order to strategize promotion in solar rooftop adoption.

Keywords

Diffusion, Opinion theory, Solar PV rooftop, Peer effect, Renewable energy, Qualitative research

Article Received: 10 August 2020, Revised: 25 October 2020, Accepted: 18 November 2020

Introduction

With the increase for environmental concerns all around the world, electricity generation from renewables have been growing every year. Renewable sources are expected to help in meeting 40 per cent of India's power needs by 2030 and by 2019, 84.4 GW of installed renewable energy has already been achieved (Bridge to India, 2019). Out of all available sources, development of solar energy is in focus due to reasons like climate change, energy access, local environmental and social impacts. Cost reduction in solar tariff, reduced environmental impact, energy independence act as a major motivation factor for shift towards self consumption sources of power by increase in installation of solar rooftop PV in residential, commercial, and industrial premises (schelly). If energy production is more than consumption, then feed in facilities to the grid is also available. Solar rooftop has helped in saving transmission and distribution losses and proper utilisation of available land. The dispersion of solar PV innovation is of great enthusiasm to strategy makers since expanded adoption prompts reduced greenhouse gas outflows. Major factors behind the adoption of innovation by individuals other than the economic benefits from the technology includes access to these ownership models and clear understanding on how the solar system works. This includes technology being used by the current users who can be neighbours or peers (Varun Rai D. C., 2015). The opinion leaders who play a crucial role in diffusion of solar PV are close social relationships or social influencers like colleagues, neighbours, friends who form a network of interconnected individuals. This paper is based on qualitative surveys and interviews done regarding

decentralized solar PV rooftop adoption in order to analyse current status of factors that affect opinion leadership towards adoption by commercial and institutional buildings in Pune city. The results can be used as a base by NGOs, policy makers and other responsible persons for encouraging a shift towards solar energy in order to achieve an ambitious target set by MNRE – (Ministry of New and Renewable Energy) of 40 GW generation using solar PV rooftop system by 2022. This research study is organised as follows. Section 1 discusses Pune socio-demographic and cultural factors that spur solar rooftop adoption amongst C&I consumers. In Section 2, related literatures are reviewed along with the gaps of those research, hence forming the outline for this paper. Section 3 describes the methodology followed for conducting surveys, interviews for data collection. In Section 4, results are provided based on analysis and are further discussed. Section 5 presents conclusions and recommendations and states future research opportunities and states the further research opportunities.

A. About Pune City

Of 1,095 MW (Mega Watt) solar rooftop PV installed capacity in India, Maharashtra has achieved the number one position by achieving the maximum number of installations along with highest capacity at 145.09 MW (MNRE, 2019). This study is conducted in Pune, second largest city of Maharashtra, that has achieved power generation capacity of 130 MW by installing 2.24 GW of solar rooftop, which is highest as compared to other cities (Bridge to India, 2019). Pune receives around 2900 hours of sunshine in a year which makes it around 8 hours of sunshine per day on an

average, which can produce 2320 watts electric power in a day. The major demand and adoption for solar rooftop systems is found in the commercial and industrial sector and reason behind this is Indian states charging much higher rates for electricity from them when compared with residential households and commercial or industrial complexes have greater space available to install panels. This acts as a motivational factor to these potential adopters to invest in the solar rooftop power plants and start generation for self-consumption. Also due to larger space available with these complexes for installation, financial institutions like renewable energy firms and banks provide loans with much more willingness and ease for the initial cost of installation and setting up the panels. Other benefits for these customers are of depreciation tax shield as an accelerated depreciation of 40% is allowed in the 1st year of the life of the solar system (quartz India).

Opinion Leadership & Solar Rooftop Adoption

A. Peer effect or opinion leadership

In the backdrop of new ideas and technology spreading for more than five decades in different settings, there has been existence of theory on diffusion of innovation. The reason behind this has been the society structure of interconnected individuals, and personal communication act a major push towards promoting behaviour change. The model is based on computation of the trajectory from the most central to most peripheral members of the network, leading to increase in the relative speed of diffusion. Empirical studies have been conducted to measure the diffusion of innovations and to explicitly observe interpersonal communication patterns that would complement the simulations to explain effective diffusion strategies (Davis, 1999). Spatial and socioeconomic aspects often mediate the diffusion of new technology. In residential society, the adoptions are decreasing and the major reason behind that is it being occupied as rental dwellings, this leads to the fact that large complexes or centres becomes more important for diffusion, as it can be counted under common areas. The importance of neighbour effects is useful for PV system marketers and interested policy makers in promoting PV systems, for it suggests carefully considering steps spatial neighbour effects that can be useful. For greater promotion of solar PV systems in densely populated corners of the country and to make it more acceptable in middle income earning community, then there is a need of reduction in the regulatory barriers that are being faced when it comes to shared solar or community solar facilities, it can be achieved by bringing in changes in policies (Gillingham, 2014). Mainly, there are major methods of measuring opinion leadership: the sociometric technique in which members are being asked about who they will share information about innovation with or they will give advice to, second is key informants in a social system who may be asked to appoint such leaders and lastly the self designating technique under which an individual go through a series of questions in order to understand the degree of him being an opinion leader (Cartano, 1962).

Adoption is considered as a micro process under the macro process of diffusion describing the spread of technology,

which involves few steps that involves a mental decision making process at different stages that an individual has to analyse and go through while making any decision The outline of the practice is the invention adoption model proposed by Rogers between five phases that are basic. His model is comparable to the AIDA and hierarchy of effects models that talks about such attributes: awareness (learn about existence of new product), interest (increased desire for the specific nature of product), evaluation (based on information gathered, assessing the product), trial (adopted on limited basis) and adoption (purchasing and adopting the product) (Meenaghan, 2014).

B. Solar rooftop adoption

Initiatives that are being undertaken at national and global level would face resistance regardless of policies launched by authorities, if stakeholders do not find the technology compatible and useful. In order to stabilize CO2 emissions and avoid catastrophic changes occurring to climate along with fulfilling the ever increasing demand for power, there is a need to design various methods and bring in technology, the examples for this include scaling up electricity generation from solar photovoltaic systems.

Michigan state government is actively promoting the use of green energy in form of solar, wind and biomass by passing a law that requires all electricity providers to create an energy portfolio that includes at least 10 per cent from renewable energy sources. Major focus to increase adoption is towards communicating clear information about benefits over current options being used for electricity, and compatibility of innovations with consumer's lifestyle (Kami J. Silk, 2014). In the studied area by author, peer effect was proven to be a key channel in spread of solar information. 50 percent and more respondents felt that the advices shared and information they gained from the existing solar installers were extremely relevant and important, thus it was concluded that installers have major impact on potential consumer's information gathering. They could guide and dominate in providing different types and forms of data, which can emerge as the primary source of information for their customers when the decision-making process is initiated by installers. Direct marketing received the similar kind of results from potential adopters who have the tendency to reach out to and have value of the information shared by their peers, so this behaviour suggested that it can act as a substitute of opinion leadership in few situations. An observation made by the author was about the value given to different information by the competing information sources like the peers and installers, have a key effect in the decision making process adopted by the consumer at the early stage, this will act as a great marketing technique (Varun Rai D. C., 2015).

Several factors which prevent rooftop PV adoption are the amount of rooftop being limited and also not all buildings have useable rooftop. Due to efficiency and equity considerations and the challenge of instituting appropriate tariffs being crucial, the sort of 'free riding' by rooftop PV adopters is being encouraged by the existing tariff incentives act in US act, regardless of solar rooftop PV adoption not requiring a call for urgent policy change by itself (Mohammed Muaafa, 2017). The average PV adopter in

Texas is more educated and has a higher income, PV in a general belief is a financially prudent investment, and a desire to reduce environmental footprint is considered as a major motivator for adoption. Also, as a plenty of information is available to the potential adopters of PV, so at the time of installation, consumers experience least uncertainty (Varun Rai K. M., 2011).

India is on a growth trajectory, with both increase in population as well as development, and to maintain this pace with fuel availability and environmental concerns, there is a huge need to explore and shift towards renewable or commonly known as green energy. In order to decrease the dependency of electricity generation on fossil fuel and to reduce the carbon footprint of power sector, several initiatives are being undertaken by government of India to make country more sustainable, secure and reliable in power generation. Programmes like “grid connected solar rooftop PV, solar cities and green buildings division” by MNRE (Ministry of New and Renewable Energy) is an attempt towards development of designated solar cities all over the country with at least one such city in every state by providing them with financial support. Another example is one of India’s key policy and scientific experiments, the Jawaharlal Nehru National Solar Mission (JNNSM), under nation’s vision for solar technology has an aim of installation of 22 GW of solar capacity by 2022.

Despite of high interest in solar technology, consumers find high upfront cost of solar rooftop installations as a major concern. And still majority of marketing is through social media outlets and internet, there is a lack of consumer education on the topic and current users don’t come forward to share their experiences and act as a marketing source (Kappagantu, 2015). There are additional limitations also prevailing which have reduced the pace of adoption in the root level including lack of consciousness about the technology, lack of transparency in implementing the policies, limited number of institutions for monetary support and the shortage of skilled workforce. Apart from launching schemes and programmes, government might have to enable financial institutions, in order that they can offer loans easier and in a low interest rates with tax incentives to the end consumers (Pushpendra Kumar Singh Rathore, 2018). With continuous drop in price of residential solar rooftop PV and increase in price of fossil fuels, grid parity will occur in several states of India where large solar source is available and also have predominant high tariff of power. Also, land source in India is quite limited and per capita land has been routinely shrinking, utility scale PV plant requires huge land and this massive land requirement restrict consumer to install utility scale PV plant in the country (Arora, 2013).

Methodology

For this study, a qualitative survey has been adopted, under which seven telephonic and video interviews were performed with consumers having existing solar rooftop adoption in their organisation’s (commercial or institutional) complexes. The surveys were conducted with no knowledge on pre-existing social networks or background of the consumers. As can be observed in the literature reviewed, most studies have been conducted based on quantitative survey for opinion leadership in residential societies. These

gaps in the literature studied have helped in designing the interview guide for study. After researching through internet and by contacting solar panels providers, we shortlisted a list of thirty such consumers who were using solar rooftop in their campus, and out of those thirty, seven got back to us.

For the first step, such respondents were identified who were residents of Pune or nearby places, working at administrative positions at the organisation that has adopted solar rooftop and had ability to provide useful information. In the interviews conducted for data collection, information was collected on area of installation, Bill before and after the solar rooftop adoption, capacity and cost of installation, and whether the electricity produced is being sold to the grid or being self-consumed. Understanding of reasons that triggered the adoption of solar rooftop in their organisation, what was the process followed, and if they faced any problems during the process. Their opinions on role of government in this adoption along with what have been the advantages of this adoption was also reviewed.

In second half of the survey, a self-designated opinion leadership scale was created and studied. This included,

- (1) During the past six months, have you told anyone about the solar rooftop that you have adopted? Yes/ No
- (2) Compared to your professional network, how likely are you/your organization to be asked for advice on solar rooftop adoption? Less Likely/ More Likely
- (3) When was the last discussion you held with other large consumer of electricity/ when was the last time someone visited you to check your solar rooftop model? In the last 3 months/ Between the last 3-6 months/ More than 6 months back
- (4) In your last discussion about solar rooftop for large commercial users: You were asked by others about the RTS experience/ You asked others about it/ I have not participated in any such discussion yet
- (5) When you and your friends/people in your professional network discuss about RTS, do you: Mainly listen/ Try to convince them of your ideas about RTS/ We don’t discuss about solar RTS at all
- (6) Which of the following happens more often: You tell others about the solar RTS experience/ Others tell you about the use of Solar RTS in offices/ Neither of the above
- (7) Do you regard yourself as a good source of information on use of RTS in residential societies: Yes/ No

Lastly, their views after using solar rooftop on how according to them the adoption can be increased in commercial and institutional consumers. All the answers given by consumers interviewed are transcribed and studied on basis of following attributes, first their relative advantage (how can opinion leaders present advantage over to the existing alternatives), their compatibility on further discussion about topic, complexity (consumers perceived difficulty to understand the technology, so making innovation understandable), and observability (the visibility of the results of shifting to green energy other than panels visible to neighbours leading to generation of curiosity to know about innovation, so giving a trial experience by giving tour of installed panel site). The adoption of any innovation happens at different stages like knowledge, persuasion, decision, implementation, and confirmation. In this survey, we tried to figure out the stage where opinion leadership existence can expediate the adoption.

Results

As the study focuses on exploring existence or role of opinion leadership / peer effect in the adoption of solar PV rooftop, so in this section, the results from survey were reviewed and analysed to understand the role of peer effect in decision making, to recognize if the respondents are opinion leaders. The findings offer a solid speculation on the existence and relation of opinion leadership and increase in the installation of solar PV rooftop

A. Adoption of technology among existing users

The respondents concentrated on few common reasons that triggered their decision towards adoption, these motives were rising cost of power, subsidy offered by government, payback period being less than 4 years, rooftop area and its utilization if idle, and decrease in system congestion with higher adoption of self-consumption solar PV systems, which also enhances tail end grid voltages. The topmost motive remains the savings on electricity bills to an average of 1000 rupees per month, following the rooftop installation of 1KW plant. Even if there are not much rooftop space available, nevertheless buildings found it beneficial by utilizing the electricity produced for self-consumption and in cases whereas manufacturing is more than the ingestion. When requested after having high installation cost, why consumers find installing solar rooftop beneficial and majorly as an economic solution, a solar adviser, who himself is a consumer of solar rooftop in his firm complex in both Mumbai and Kolkata, said, "Solar is not a technological product; it is an investment product. I have my own industry and I want to increase my profit, there are two ways I can increase my profit- increasing my revenue or decreasing my expenses."

Even after technology being economically viable, the initial investment is high and still Indian Consumers look at short term benefits over long term benefits. Also, the overall perception of these end users is the fact that the investments with payback period that is high are risky. Whilst going for adoption so, subsidy is sought for by them. Over the years as price of solar installations decreased, govt has stopped giving subsidy, but it's still available under coverages. This has led to a confusion among consumers; consequently, government needs to market these details correctly. Government has undertaken commendable actions to implement and enhance installation of solar PV adoption. However, the rate of adoption is reduced because of the confusion created by policy changes and because of pressure conditions created by DISCOMs (Distribution Companies).

In Maharashtra, major adoption of solar energy is occurring with installation under net metering standards, according to this most of the power is self-consumed and then it's being fed into the grid, when any surplus power is being produced. There is one problem with this system pointed out from MIT campus, which has adopted green energy in kind of solar PV, "The problem is that in Maharashtra, there is no net metering above 1 MW. So, we have stuck to a consumption based model – whatever we consume is deemed generated. If there is no consumption, then the generation is stopped. Example on Sundays, where there is lesser load, there is a possibility that the generation is more than consumption.

But we have included a curtailment option in the module, whereby the modules will be stopped automatically – thereby stopping excess generation." Even huge campuses like this find investment in batteries for storage of extra creation of electricity not feasible and economical as batteries have huge maintenance cost and has to be recharged every couple of years rather than like solar panels together with lifecycle of 25 years with minimal maintenance, which majorly need only cleaning one in a while with water.

Significantly less than 3000 rupees towards opting for rooftop being reluctant is since they do not find it feasible on analysing the rationale behind small campuses with monthly power bill, and the campuses going for the rooftop adoption. Maharashtra per square feet cost of property is somewhere around 20,000 to 40,000 rupees which makes the cost of installation to increase to 40 lakh rupees, whereas cost of panels is around 40 to 60 thousand. So, generally until unless it's being left idle, people do not want to waste the rooftop area. Other than the absence of roof area shadowing is a significant issue. Only buildings are able to use the sun for electricity generation, as if large buildings are not tall enough or surround the buildings trees then project performance suffers time or in many cases.

B. Effect of Opinion leadership on adoption

After analysing the surveys, and getting to know the perspective of respondents that were different we knew who can be identified as opinion leader. As someone who looks after industrial associations that are not aware about technologies in detail or the administrative work in an organisation, either tend to obtain knowledge. And when rolled out tender and got PV installed, they know just about the benefits they get after installation concerning the decrease in electricity bills. Because of this they do not consider themselves as a good supply. Whereas all of the institutions or complexes with large areas or multiple campuses, gain the knowledge about the technologies, its own pros and cons, all which have to be taken care before installation and about postoperative upkeep. These folks take initiatives to educate others and they attempt to convince potential adopters if a person indulges in conversation on their adoption. They act as self identified opinion leaders.

When requested prof of MIT, Pune, about part of educational institution acting as opinion leaders and encouraging adoption of renewable energy," he said "Educational institutes should - like my management is ready to go and talk to people and make them understand. We are trying to arrange a conference this year and trying to tell people about our experience. This is our social initiative. We have a program called "suryamitra" where we are spending money to educate and skill people/students to work in the renewable sector in the future. We are trying to develop good solar technicians, and through them people will become more aware. Many people today don't know, that before installing rooftop solar, you should do the shadow analysis - how will the shadow impact the generation from rooftop solar."

Opinion leadership is important in making adaptors that are potential comprehend the long term benefits of PV, as still

long term investments are thought of risky. For small or moderate scale customers payback period is large, although payback period in the event of customers is less than 4 years. The payback period vulnerability that is large makes potential customers mindful to take part in long term investment, since they are more concerned with short term difficulties, which includes all of the earmarks of being diagnosed with unstable way of life. Therefore, is a huge need of customers sharing advices and their own experiences with others technologies are confused about the subsidy system or since the majority of the individuals are not aware about the benefits. For example, initially government gave a funding subsidy to everyone who is adopting power as an alternative source of electricity, but they have stopped. A very few people understand, that this service remains open for educational institutes and residential societies, i.e. that they will still get subsidy of 14000 rupees per KW of solar power installed. On discussion about what are the disadvantages of locally powerful individuals coming forward and accepting about their experience of their adoption, respondents shared their concern stating that there are only a few customers who aren't fully aware of the technologies and regardless of how solar technologies are of low maintenance, nevertheless they want timely cleaning for continued results for years. If customers don't maintain their panels guided, then the creation capacity of panels drop down, which is considered as negative performance of the system, and the adoption rate can be brought down by frustrated consumers. Opinion leaders ought to be such companies or individuals who have appropriate knowledge on technologies, so they can guide a possible adopter correctly and give them an experience where they feel they have had trial of their technology. To check whether respondents consider themselves as opinion leaders and a good supply of advice, few questions were asked as mentioned in table 1.

TABLE I. RESPONSE ANALYSIS

| Responses on Opinion Leadership Scale | | | |
|---------------------------------------|---|--------|--------|
| | | Yes | No |
| 1. | More table cop Have told people that they have solar PV rooftop? | 100% | - |
| 2. | Are people more likely to come and ask them about the adoption? | 100% | - |
| 3. | Did you try to engage in conversation with other large commercial users for adoption? | 85.71% | 14.29% |
| 4. | Do you consider yourselves as a good source of information? | 85.71% | 14.29% |

Respondents believe that presence of peer effect is very important to diffusion of technologies. 85.71% of those interviewed people feel that calling a present user who's known or local is highly essential for influencing the final decision of adoption by increasing their interest in solar PV. Although sample of respondents consisted of hardly any individuals, yet it was impartial of these being an opinion leader of knowledge the observation stated that nearly all of them have profound knowledge of their product and technology. All these adopters had previously contacted other users who investigated regarding the same over internet, then had installed systems. When asked, if they believe after talking to you, people adopted solar PV, a respondent mentioned, "Lots of people have come to use to know about the plant we have done. At least 20-25 companies have come to see our plant in the last 1 year. I

think of the people who came to see our plant, 8-10 people have done it also. There is awareness, but there are many questions about its uncertainty. Will the costs be recovered or not? Will there be commercial benefits? There are concerns about whether what the vendor is saying will be realised or not."

The interviews revealed that the diffusion occurs with present networks where you know the individual through neighbourhood, local or specialist relations, people don't tend to go from their contact networks to seek advices. Also, it was mentioned by the interviewees even a PV consumer intending to enlarge comes to seek advice or that largely conversations that happened over the topic was if a person saw panels and topic came up came to meet. It is uncommon that someone contacts of knowing about PV adoption with a reason. Largely, the information shared with these present customers are of basic awareness, i.e. it does not demand detailed methods of feasibility and cost evaluation to affect the investment and neither it talks about technologies in depth. It is made up of information like benefits following existing benefits from government, the adoption such as savings in electricity bills, and basic technology for installing the panels necessary.

After all these interviews were analysed, it was observed that people don't call themselves as opinion leaders or perhaps the men they contacted before adoption are being mentioned as individual from the section or users. Labelling is lacking from the society, and it might require high degree of participation for acceptance.

Discussion

In this study, presence of opinion leaders was assessed on two parameters, one being how adaptor came into decision of adoption and other being their experience following the adoption, i.e. once embraced, whether did they share the information or individuals approached them for advice on adoption. On our investigation we discovered that institutional or commercial buildings which have embraced PV have been speaking about it to individuals, they provide advices. However, in most of the cases this discussion has been held themselves to encourage the adoption. But in few cases, we observed that they didn't talk about adoption if not asked from, however when someone shows interest, they do attempt to convince them of the thoughts. Also, because the installation by made in their large commercial spaces or educational institution, they believe themselves as a source of information, as they have conducted proper research on system or acquired information from experience.

Analysis of this overview results demonstrates that the peer influence has a significant role in encouraging PV system selection to get a substantial number of adopters. All respondents focused on the fact that they consulted with an existing user prior in order to get to attaining the decision by knowing their perspectives. Additionally, from seven respondents, just one was such who did not go ahead to discuss the adoption and didn't indulge in further discussions concerning solar PV, whereas he also mentioned that there were individuals who asked him about the performance of solar PV installation in their campus, he did share the info with them. Rest 6 respondents mentioned that they talk to other people about their experiences and also in their duty

towards environment and fact as a social support encourage this energy by convincing others.

The attributes which can be effected and function of opinion leadership in them can encourage adoption of solar PV rooftop are: (1) comparative advantage -- to grow the adoption there's a huge need to describe potential adopter for those reasons which make this technology better than the conventional supply of electricity generation and describe benefits of shifting green energy. That is information based, and as an initiative, should be educated to everyone in the society. Generally, influencers with enormous subsequent foundation or government officials act at this stage as opinion leaders. (2) Their grasp on further discussion about topic -- at this stage, people who can be converted into potential customers are recognized, this includes if they have rooftop space available and also the monthly electricity bill is high enough to make the project viable. Opinion leader at this point share their experiences, advantages of this adoption, they describe government policy to adopters. (3) Complexity -- among those issues during the process of adoption is understanding the technology. Opinion leader has an important part as they can provide a trial feel of solar power to prospective adopters and can describe technology. They can clarify that panels for 25 years with minimal maintenance. And (4) Observability -- when people come to seek out details regarding the invention on basis of panels visible. Role played with opinion leaders at these phases may lead to increase in adoption and installation of solar PV. While this adoption of this innovation is happening at different phases like knowledge, persuasion, decision, implementation and confirmation.

A. Recommendations to policy makers

The findings provide recommendations for some policy changes. To begin with, since they are relied on to make additional adoptions through peer effect, policy makers should concentrate on specific people to become PV adopters. The findings indicate that well people that are connected ought to be more targeted when compared to owners of buildings with solar rooftop systems that are visible. Secondly, advices or information given by random people who are neither connected within social networking are much knowledgeable on the topic have less effect or influence compared to specialists, so such PV adopters may be inhabited with information campaigns as a nutritional supplement to different methods of data marketing. Individuals could be forced to get involved in question answer sessions and talks stored in local conventions for information sharing so that potential adopter and they can easily connect to their own perspectives or they can be appointed with their contact details shared at the neighbourhood. Lastly, all the study visits could be kept in the place of installation for better understanding where they can understand the technologies behind the PV systems, and it gives a trial experience to the customer. These tips will be shown as cost effective even if the adopters or the opinion leaders have been paid for their commitment.

Conclusion

In this research paper, the basic understanding we had is that the major motivating factor to install this relatively new technology of solar systems is the continuously increasing rates of electricity. This study reveals insight into need and the role of two way communication to increase the understanding about the innovation among the potential consumers and its relational effect in the diffusion of solar PV systems. Depending on the findings from the interviews conducted, the results reveal that potential consumers use interpersonal communication for data and advice in their process of making decision. Interested folks can reach out leaders by two ways: one when these leaders go right ahead and share their experiences in seminars conducted for these consumers, other is if one sees the rooftop panels in their campus and out of eagerness to know put in efforts to reach out to these leaders for advice. Government should encourage these opinion leadership methods so as to encourage diffusion of PV systems among consumers to adopt in the first phase, since consumers tend to get hold of them for advice and get trial experience on performance and investment. As potential consumers are having bad experiences or hearing about them from existing users, most of them are pointed towards the missing technologically training among vendors. When asked about this, respondent said, "Due to vendor issues we had to stop the plant at Erandwane for 2 years. Due to these issues, company management does not give quick permission to do renewables in offices. Even if they give, expansion is not easy. One bad experience can deter for many - if shadow analysis, or panel fixing is not proper, then the generation is not up to what is promised." Through social connection, a strong urge to acquire the innovation is created by presenting trial experience of the performance of the power system before making decision to adopt. To achieve this, meeting need to be set up for potential consumers at the site of installed panels. This relates to clients putting their decisions together to the trialability of solar frameworks by others who've had experiences and from administrations and technological standpoint extended by a technology provider. When consumers are educated about the upsides and downsides of a solar rooftop framework then it becomes easier for them to accept risks or uncertainties with the financial investment needed for adoption.

A. Recommendations to policy makers

Another major cause of the adoption was presence of subsidy version. Existing consumers believe that the procedure and policies pertaining in their state regarding the solar adoption are not clear enough, so opinion leaders or the consumers who've gone through the procedure, if explain this to potential consumers then the relaxation and trust of individuals increases in the technology and a huge gain in the installation could be observed. The study also has another significance, it has practical implication for the policy makers to organize policies in a way to promote adoption and as originally it can broaden the standard presence of peer influences, which focuses on communication.

The results from this study recommend that they upgraded the perception of PV systems with respect, and that the peer consequences worked through a considerable part of the diffusion of innovation process. The principle ability of opinion leadership in terms of promoting adoption of PV appears to have been a verification from a dependable source (i.e. a person that the members understood and that was in a similar situation to them), that the innovation worked in as expected and without any difficulty. The information or data passed through the connections of this network wasn't of a character that was propelled, however yet were considered useful and helpful by the potential adopters and acted as an excellent push and persuasive element in adoption.

The results uncovered that lively (through direct social contact) peer influences for the most part occurred through existing social networks (partners, associates, relatives) as opposed to involving acquaintances which didn't have some familiarity together. It was observed from the study, that the existing consumers seek help or advice about the adoption from known individuals and connected with them multiple times to understand the technology before final adoption. The results propose that detached peer effects i.e. adoption on basis of observation or reaching out by looking at installed panels were of less significance than lively peer effects, which had known social connections and networks available.

The uptake has rapidly changed the power market by introducing solar PV technology. The major contribution of this study is that the analysis of this interactions varies in different scenarios, and understanding between the individuals and technologies. The reactions of the respondents in this research outline the path for further study comparing before and after adoption phases. This will permit policy makers to verify consumption of power from grid and self-consumption solar panels, thus creating base for them to structure PV policies for future.

Limitations

In this research paper, the role of opinion leaders or presence of peer reviewed was analysed in the marketing of PV adoption by collecting views and information from the present consumers of rooftop in the construction. But further clarification of the role of opinion leaders in solar systems can be gotten in a better way by research conducted in future if it is adopted among people. In India, as of now it is believed the diffusion is in its early stage, which recommends that a generous degree of all adopters to date possess a more elevated degree of opinion leadership than population. So, after further diffusion, the distinctions in levels of remark leadership among adopters will be more different, and will lead to empowering refinement of outcomes.

Another prospect for further research can be conducting a web based survey conducted to get data. As the world is shifting towards internet even while decision making regarding adoption, so this can give a further clarification if opinion leaders are comfortable using it as a source of diffusion. Assessing internet's impact in decision making regarding the diffusion of PV was outside of range for this research, but can be taken up in further research.

Acknowledgment

I would like to thank Prof. Vasundhara Sen, faculty at SCMHRD, for mentoring me throughout the process and helping me in getting this research paper published. Also, I would seek this opportunity to thank all interviewees at Symbiosis infotech campus, MIT, Savitribhai Phule University, TULS Group, Persistent, Commercial office blocks at Mercedes Benz and Basilica for giving their valuable time and views related to renewable energy adoption.

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