Solar Photovoltaic Technology: A Supplement to Sustainable Energy

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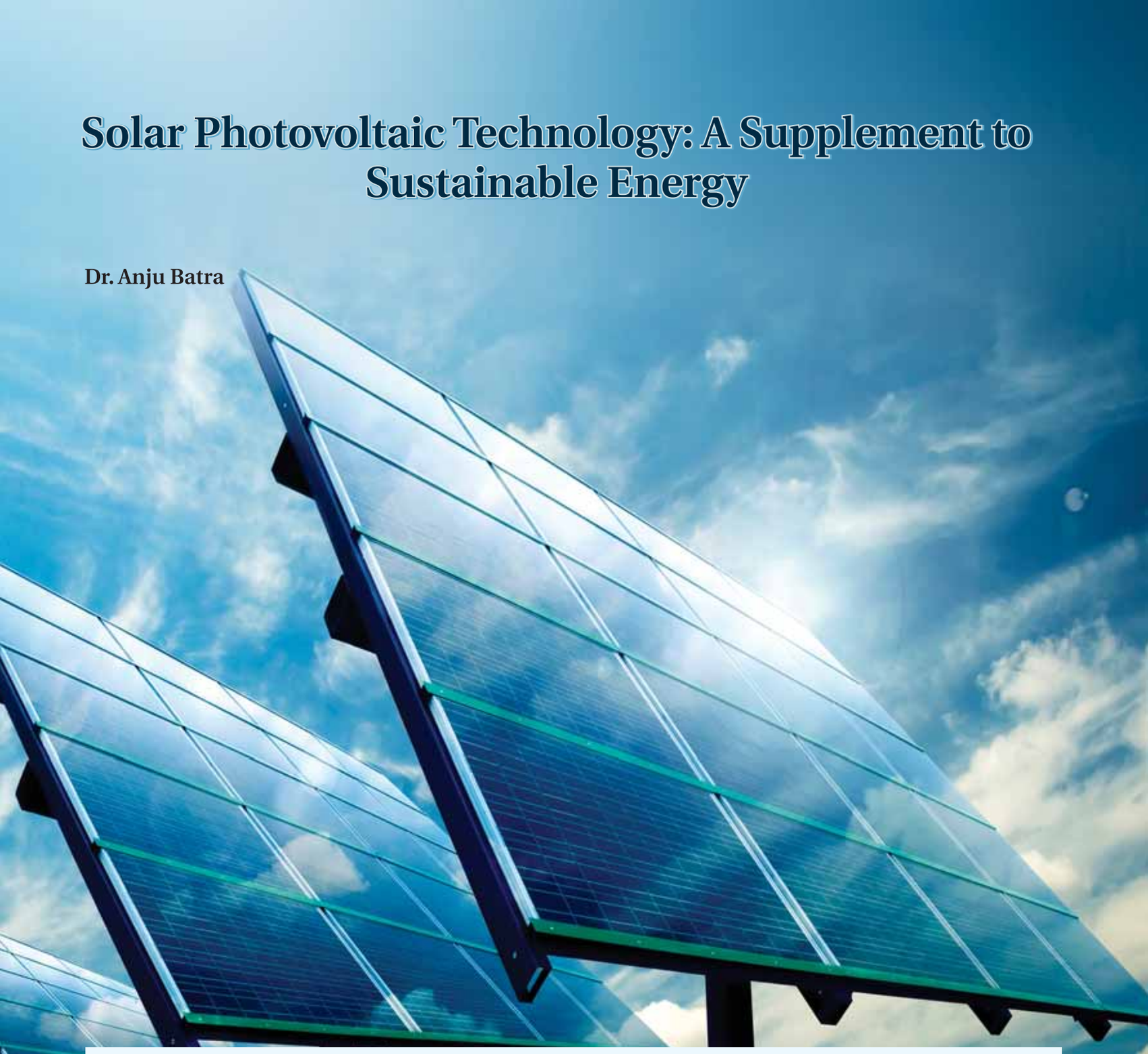

ABSTRACT

The 'surging demand for energy' has become a new parameter to interpret the growth chart of economies these days. The world's electricity consumption has increased incessantly over the past half a century, due to rising household demand as well as substantial developmental activity in all the nations. Regular energy supply is the major propelling force for productivity and growth in primary sector, secondary sector & tertiary sector, leading to overall economic development. But excessive use of conventional resources for electricity generation has posed big challenge to the sustainability and environmental conservation. Governments of various nations today, are planning to tap renewable and eco-friendly resources for power generation like solar photovoltaic technology and are taking measures to create awareness amongst the organizations as well as domestic users. Present research paper juxtaposes the scope and acceptance of solar photovoltaic (PV) technology for energy generation in India. An empirical study has been made using TAM(Technology Acceptance Model) to assess the adaptability of solar photovoltaic (PV) technology by the user organizations. Through statistical rigor of regression and path analysis, the relationship between attitude towards use of solar photovoltaic (PV) technology and intention to use solar photovoltaic (PV) technology has been explored, in the light of government initiatives to popularize and commercialize it as additional sustainable energy.

Keywords: *Fossil Fuels, Environment Conservation, Sustainable Development Goals, Renewable Energy Capacity, Solar Photovoltaic Energy, Adaptation, Vserss' Attitude to Use Solar (PV) Technology, Behavioral Intention to Use.*

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NTRODUCTION

The 'surging demand for energy' has become a new parameter to interpret the growth chart of economies these days. The need for electricity is inevitable to keep the wheel of development gyrating in all the sectors of an economy. The world's electricity consumption has continuously grown over the past half a century and has reached approximately 556.63 exajoules in 2020. As per the International Energy Agency (IEA) report, "inspite of 4% reduction in electricity demand in year 2020 because of COVID-19 pandemic, the global energy demand in 2021 has increased by 4.6% and is forecasted to increase three times by the year 2030." Along with the increased electricity requirement for domestic use by approximately 7.8 billion of world population, power has been the major propelling force in all production activities of primary sector, secondary sector & tertiary sector. (Shahsavari & Akbari, 2018).

All over the world, maximum electricity generation takes place in power plants run on fossil fuels like oil, coal and natural gas; or by uranium to fuel nuclear reactors for nuclear fission for electricity. But producing energy from these non-renewable resources takes a severe toll on our sustainability and environment as well. In the process of power generation, if on one hand the reservoirs of natural resources are depleting fast; on the other environmental degradation issues related to air, land, and water pollution are causing a serious concern.

According to Oil & Gas Journal's annual assessment, the world's proved oil reserves are left 'total 1,724.5 billion barrels (bbl) at year end 2021 and natural gas reserves are estimated to be 7,254 trillion cubic feet (tcf) which are just enough for our requirement of approximately five decades. Coal reserves are also exhausting due to its huge demand in thermal power plants & industry. Being finite reserves, these resources will cease to be available for use, as an economically viable energy source. Whereas, the fossil fuels are formed through long natural processes, the replenishment of these fuels reserves is sluggish in comparison to their use and demand by humans. Thus, these sources will run out sooner or later. This poses a big question on sustainability of our natural resources, which should be conserved for the needs of our future generations.

Indian economy has to depend upon huge imports of crude oil to address its energy requirements. Approximately 85% of India's crude oil imports are made from west Asian countries like Iraq, Saudi Arabia and UAE. According to the pre-pandemic reports "India's strategic reserves have a hoarding capacity of 5.33 million tons, or 39 million barrels, which is sufficient for requirements of just 9.5 days''. India holds for about 9% of the world's total coal reserves of 1,139,471 million tons and about 1% of the world's total natural gas reserves of 6,923 trillion cubic feet (tcf). Moreover, nuclear energy is too costly in our country. As per India Energy Outlook Report-2021 for an expanding economy like India, which has huge population, urbanization and industrialization at faster pace, the energy demand is going to be 132 billion units (BU)per month.

Secondly electricity generation process by conventional methods causes environmental pollution and poses a big threat to human health. Due to use of fossil fuels approximately 35% of the global greenhouse gas emissions are directly or indirectly caused by electricity and heat generation. Huge amount of sulfur dioxide (SO2) is discharged in the process, which causes acid rain, increases respiratory ailments, and aggravates cardiovascular diseases in the people. Similarly, air pollutants like nitrogen oxides (NOx) are released from electricity generation which react with sunlight and create ground level ozone called smog. This irritates the human lungs and lowers their immunity from respiratory diseases and is very harmful for human health. Particulate matter discharged in thermal plants, industry, and use of vehicles, causes a type of air pollution called soot, which increases chronic lung diseases, and even cancer.

Long-term effects associated with fossil fuel burning could be even more alarming. Carbon dioxide (CO2) emission brings in climate change causing global warming. Global warming can lead to air quality problems, extreme weather conditions, ecological imbalance, crops failures and increase in tropical diseases. Nuclear energy has unique threats of its own type. It is not only dangerous to transport nuclear energy facilities, but to dispose of radioactive waste is equally challenging. Hazardous effects on health due to radiation and radioactive waste in this type of energy generation can be seen as cancer, leukemia, immune system damage, deformities and genetic mutations and stillbirths etc. In the coal-fired power plants dreadfully toxic metal Mercury is released, which accumulates in biological organisms and causes grave health issues. It goes on constantly recycled in the environment as it moves up the food chain.

The finite supplies of non-renewable resources of energy, as well as their dangerous effects on environment, human health have compelled the nations all across the globe to find out alternatives with fuel diversification and concentrate more on energy efficiency, energy conservation and renewable energy. All United Nations Member countries in the year 2015, have adopted Seventeen "**Sustainable Development Goals**" as a universal call, which aim at balanced social, economic and environmental sustainability. The seventh goal refers to an easy access to reasonable, reliable, and sustainable energy for everyone. It also proliferates protection of our planet earth by 'clean energy' and thus, aims at perking up the lives and good prospects of future generations. Almost all the nations have agreed to substantially increase the renewable energy share in the global energy mix. The Nations' Governments have committed to forward international cooperation to facilitate an access to clean energy through more research and technology on renewable energy, better energy infrastructure and energy efficiency. "In November 2021, at the UN climate change meeting in Glasgow, Prime Minister Narendra Modi pledged that by 2030 India will generate 50 per cent of its energy from non-fossil sources and will also install 500 GW of renewable energy. The country plans to tap eco-friendly sources like solar power generation and aims to generate 175 GW through renewable sources by 2022, of which 100 GW through solar power."

What is meant by Renewable energy?

Renewable energy is an energy derived from the natural resources which restock themselves over a period of time automatically without being exhausted. Energy produced

from sunlight, wind, tidal force, bio-mass and the thermal energy stored in the crust of earth, are few examples of renewable energy. It enhances fuel diversification, energy security, energy price stability and reliable power supplies in the country.

On the one hand renewable energy helps decreasing dependence on fossil fuels and import of oil; on the other it safeguards environmental degradation. These resources being abundant in supply, help in conservation of nation's existing natural resource and reduce risks of environmental damage. Renewable energy is a good substitute for traditional sources of energy and extends many benefits to people, business, and the planet also. It helps in providing energy security through more and regular power supply as well as conserving environment through controlling the emissions of Carbon into the atmosphere.

- The diversified power with more supply lowers retail electricity prices and natural gas bills of consumers, so gives them financial cushion.
- It has potential of creating more jobs in new projects of renewable energy generation.
- It helps in fuller utilization of resources by engaging untapped resources of energy.
- It enhances energy efficiency, curtails transportation cost and decreases risk of fuel spills by reducing the need for imported fuels, and thus, protects eco-system.
- It helps nations in achieving more economic development along with a healthier environment. Renewable energy is the best answer for reduction of GHG emissions and meeting climate change targets.
- "Achieving a 100% renewable based power system can be attainable and more cost effective as compared to fossil fuel-based systems."

EED FOR RENEWABLE ENERGY IN INDIA

Indian economy needs to adopt and expand the solar photovoltaic (PV) technology projects due to following reasons-

A. Since India has a goal to fulfill 40% of its total energy requirement via eco-friendly sources by 2030, it is exploring and operating the potential sources of energy. Solar energy is the best form of power to meet its energy needs and bridge the gap between energy demand and supply. In fact, India is a country which falls geographically in the region near the equator and thus, has 'tropical climate'. It has an abundance of bright & sunny days throughout the year. The solar energy potential in India is vast and largely untapped, which can be effectively utilized. Thus, solar photovoltaic (PV) can be an appropriate technology to tap this perpetual source of solar energy. 'The National Solar Mission' also promotes solar PV energy options through extensive deployment goals, aggressive Research & Development activities and long-term policy as this industry has huge growth potential in India.

B. Our country is considered to be the world's third-largest energy consuming country today, courtesy rising incomes and improved standards of living emanating from fast paced GDP growth rate. But still, grid extensions in remote rural areas and hilly areas are not viable financially as well as technically. So, the solar photovoltaic (PV) happens to be an appropriate cost-effective technology for a source of renewable electricity in India.

C. Rapid industrialization and energy consumption in the growth process has alarmingly increased India's contribution to global carbon emissions off late. One of the biggest advantages of photovoltaic is that it cleans and decarbonizes the energy supply. Since, "solar photovoltaic can also be used to reduce demand for fossil fuels and associated emissions, including carbon dioxide (CO2), nitrogen oxides (NOx) and sulfur dioxide (SO2) etc. In views of (Shahsavari & Akbari, 2018) the use of PV systems can facilitate reduction of 69–100 million tons of CO2, 126,000–184,000 tons of SO2 and 68,000–99,000 tons of NOx by 2030. In case, fast developing countries like India bring into practice concentrating solar power (CSP) systems, each square meter of concentrator surface will be enough to save about 200–300 kg of CO2 emissions annually. So, renewable energy is the best answer for reduction of GHG emissions. Seemingly, there is a shift taking place from traditional sources of energy to the non-conventional sources in order to combat the problems of harmful environmental effects of conventional sources of energy. 'Francesco La Camera', Director-General IRENA, (2021) has also insisted that countries should rapidly turn green by adopting energy transition to renewable resources to help in our fight against climate change.

D. Gulagi, Choudhary, Bogdanov, & Breyer, (2017) have reiterated the possibility to achieve a 100% renewable based power system which is more cost effective in comparison with fossil fuel-based systems. I**nternational Renewable Energy Agency Report** (2020) also substantiates that the competitiveness of solar power and utility-scale solar photovoltaic are undercutting fossil fuels and by default are becoming economic choice for new capacity since last decade. Shearer et al. (2021), have investigated that the "average cost of power generation in thermal power plants of coal in 2020 has been more expensive than electricity produced via solar PV which is causing underutilized capacity in stranded thermal plants."

E. The costs of solar PV projects have shown a downward trend from the year 2014 to 2018, indicating a drop in prices from 6.17 per unit cost to 2.44 per unit cost (Ministry of New and Renewable Energy Report, 2018). Even (IRENA Reports 2019) have observed that the costs for setting up solar PV projects have fallen by about 80% in India between 2010 and 2018, and now have started increasing again marginally. The cheaper cost may be the single biggest driver for popularizing solar energy usage.

India has launched the International Solar Alliance (ISA) with the countries positioned in between the Tropic of Capricorn and the Tropic of Cancer during COP 21. This coalition addresses the special energy needs of member countries by

providing a platform to identify gaps and collaborate on procurement of solar resources through an agreed approach. "Renewable Energy and Energy Efficiency Partnership (REEEP), International Energy Agency (IEA), Renewable Energy Policy Network for the 21st Century (REN21), United Nations bodies etc. are currently working on creating networks and roping in synergies to enhance their efforts in a sustainable, and mutually supportive manner" (Gulagi, 2017). It has been observed that "Human development and economic growth in the SAARC region; particularly in India can be realized through growth in energy usage and it its spread to all remote areas" as per Gulagi (2017).

Keeping up with the global trend, India has also shifted towards renewable sources of energy to meet its energy demands. "National Solar Mission has taken up the key role in India's National Action Plan on Climate Change. The Government of India intends that all of its states participate in harnessing effectively this huge potential of solar photovoltaic power". "To encourage generation of solar power in the country various attractive schemes like Solar Park Scheme, VGF Schemes, Canal bank & Canal top Scheme, CPSU Scheme, Grid Connected Solar Rooftop Scheme etc. have been initiated by Ministry of New and Renewable Energy (MNRE) ."To obtain the cumulative capacity of 40,000 MW from only Rooftop Solar (RTS) Projects by the year 2022, the institutions & industry are required to install grid-connected solar power plants, mandatorily. In many states of the country all the new buildings have compulsion to install a solar system with a capacity of 3-5% of their connected load. Lucrative incentives like Central Financial Assistance, CFA @ 40% for capacity up to 3 kWp, CFA @ 20% for capacity beyond 3 kWp and up to 10 kWp and CFA @ 20% for GHS/RWA capacity up to 500 kWp" are being offered. "Both the Central Government as well as State Nodal Agencies, namely MNRE, IREDA, and local DISCOM offer multiple subsidy schemes to the people for installing rooftop PV systems." As per MNRE Reports the excess solar power can be sold back to the grid by the firms, organizations or people installing solar units, for which they may get a predetermined fare as per local DISCOM policy. Along with it benefits like "Accelerated Depreciation (AD) tax benefits" are being offered to the industrial and commercial customers to reduce the tax burden in initial years of installation of solar plants, which makes it more attractive to users.

The Indian Government is hopeful to achieve the targeted energy capacity up to 175 GW from renewable resources only, by the year 2022. It plans to produce 100 gigawatts (GW) through solar energy, 60 gigawatts (GW) through Wind power, 10 gigawatts (GW) from Bio energy and 5 gigawatts (GW) through small hydro power projects.

Table 1: Installed Renewable Energy Capacity in India

Source	Target (GW)	Installed Capacity (GW) as on 28 Dec. 2021
Solar Power	100	48.55 GW.
Wind power	60	40.08 GW.
Bio Energy	10	10.61 GW.
Small Hydro	5	4.83 GW.

Source: Ministry of New and Renewable Energy, Government of India.

RESEARCH GAP

As per Table 1, it has been observed that India has promising plans for solar energy sector to meet its obligations, but the installed capacity is falling short of the targets. Despite substantial benefits of solar PV technology, solar dreams are not easy to be achieved due to many barriers. Such barriers have raised questions on the adoption of this technology by the general public as these make the usage of this technology difficult.

Amongst the renewable sources, India's abundant solar energy has the largest potential, but the number of people adopting solar PV technologies is still relatively low. As a result, getting full advantages offered by solar PV technology still haven't been possible, majorly due to customer's skepticism stemming from their lack of social awareness about this technology.

RESEARCH OBJECTIVE

This research study has been made to explore the following objectives-

- To find out the significance and prospects of sustainable resource of energy in India.
- To examine the acceptance of Solar Photovoltaic (PV) Technology by the users.

RESEARCH METHODOLOGY

This study uses Descriptive as well as exploratory Research Design. Since the renewable energy proposition got major attention after the year 2014, many reports of energy sector and research articles have been studied to develop its descriptive framework. To investigate and explore users' acceptance of Solar PV technology, the TAM framework (Technology Acceptance Model)has been used as a reference framework.

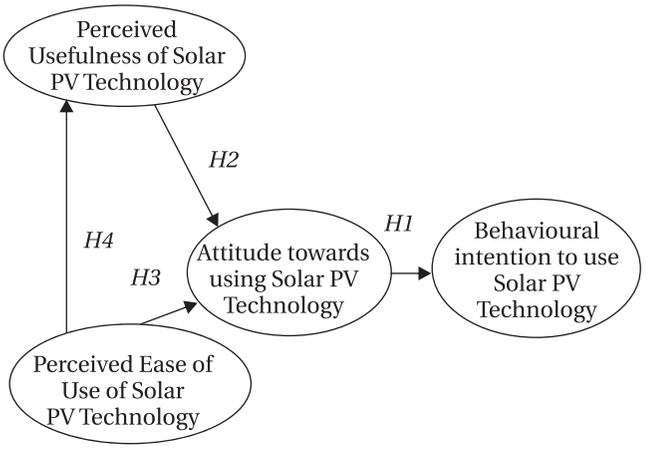
Both secondary data & primary data have been used in this research. The significance of energy, current status of non-renewable as well as renewable energy and the need for renewable energy has been gathered from various international & national energy reports, research articles and newspapers etc.

Primary data has been collected through survey research method using structured questionnaire in this study. The questionnaire developed for this research consists of questions following the TAM. Two constructs, perceived usefulness and perceived ease of use with four items and six items respectively, have been taken from questionnaire framed by Davis et al. (1989). Other two constructs, attitude towards using and behavioural intentions with four items and three items respectively, have been taken from questionnaire framed by Todd and Taylor(2011). For data collection and measurement 5 point Likert Scale has been used. By using Non-Probability Convenience Sampling method 137 respondents (small industrialist and commercial users) of Delhi-NCR were contacted to gather primary data. For data

analysis Confirmatory Factor Analysis and Multiple Linear Regression has been used in this study.

PROPOSED RESEARCH MODEL

The proposed model in the study undertakes four constructs namely "attitude towards using solar PV technology, ease of use in solar PV technology, usefulness of using solar PV technology, and intention to use solar PV technology"



HYPOTHESES

In this research following alternative hypotheses have been established, to be tested for statistical references to get conclusions-

"**H1:** The users' attitude towards using solar PV technology positively affects the behavioural intention to use solar PV technology."

"**H2:** The perceived usefulness of the solar PV technology to users positively affects the attitude towards using the solar PV technology."

"**H3:** The perceived ease of use of the solar PV technology to users positively affects the attitude towards using the solar PV technology."

"**H4:** The perceived ease of use of the solar PV technology positively affects the perceived usefulness of the solar PV technology."

DATA EVALUATION AND INTERPRETATION

The analysis of data in this research study has been made in four steps-

1. Reliability Analysis
2. Validity Analysis
3. Testing Model Fitness
4. Path Analysis / Regression Analysis

Reliability Analysis

A standardized questionnaire based on the following constructs from Davis et al. (1989) and Todd & Taylor (2011) have been taken up in the study.

Table 2: Description of Measurement of the Constructs for the Study

Perceived Usefulness	• Solar electricity can serve my daily needs of electricity • By using solar electricity, I can lower my electricity bill • Solar electricity can enable me to complete my tasks with same ease as normal • I am confident that solar power can be source of electricity for future	Davis et al.(1989)
Perceived Ease of Use	• I find solar electricity easy to use as a source of electricity • I find learning to use Solar energy easy to use • It is easy for me to become skilful in using Solar electricity • I find solar technology to be an easy & flexible technology to use • My house is suitable for solar installations • I think there are many technical obstacles in using solar electricity	Davis et al.(1989)
Attitude towards Using	• I find solar electricity to be major source of electricity in future • I believe it is good (or right time) to use solar electricity in my house • I like the idea of using clean source of electricity in my house • Overall, I think I will enjoy Solar technology as a source of electricity in my house	Todd and Taylor(2011)
Behavioral Intention	• I intend to use Solar electricity for my house • I plan to have some RE technology for my house for generation of electricity • I am planning to have Solar electricity for my house in 3-4 years; 2-3 years; Before 1 year	Todd and Taylor(2011)

Table 3: Cronbach alpha values of the constructs

Constructs	Cronbach alpha value
Overall Questionnaire	0.917
Ease of Use of Solar PV technology	0.922
Usefulness of Solar PV technology	0.889
Intention to use Solar PV technology	0.916
Attitude towards using Solar PV technology	0.877

Assessing reliability of various constructs under study is very crucial in the process of developing measurement scale. It is generally assessed by the Cronbach alpha coefficient. The Cronbach alpha values for all the four factors, namely, Ease of use of solar PV technology, Usefulness of solar PV technology, Intention to use solar PV technology and Attitude towards using solar PV technology is > 0.7, which validates constructs. The overall questionnaire Cronbach alpha value is also 0.917, which shows good reliability as shown in Table 3.

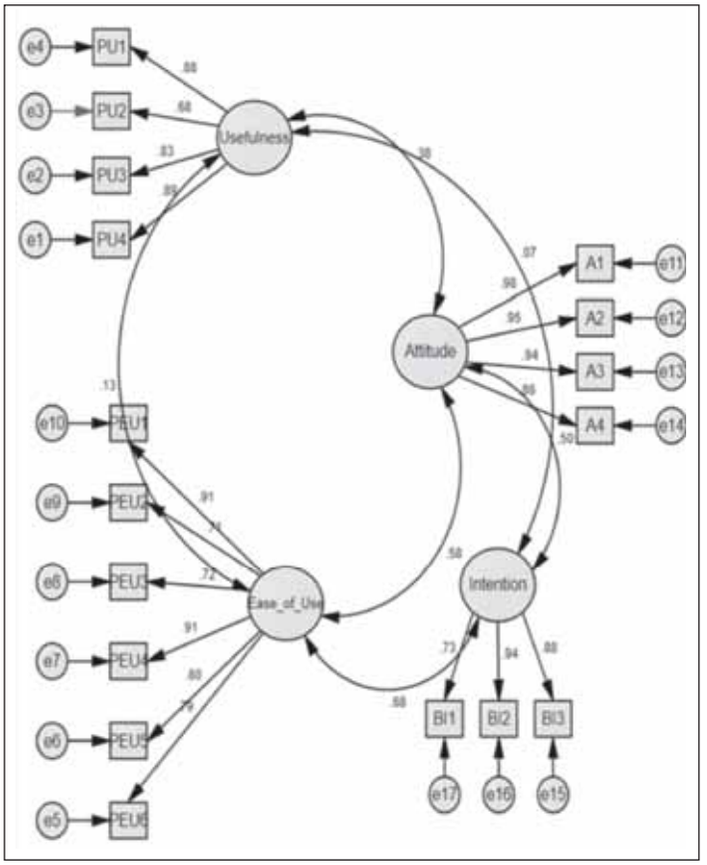


Figure 1: First Order CFA Model

Validity Analysis-

The validity of the constructs relates to the degree to which the operational constructs are assessed empirically for their convergent validity and discriminant validity. According to (Hair, Black, Babin & Anderson, 2010) the convergent validity of a construct is found at fulfilment of three conditions, i.e., if Composite Reliability (CR) is greater than 0.7; if Average Variance Extracted (AVE) is greater than 0.5 and CR>AVE.

Table 4: Reliability and Validity of First Order CFA Model

	CR	AVE	MSV	ASV
Attitude	0.966	0.876	0.335	0.245
Usefulness	0.895	0.682	0.147	0.057
Ease of Use	0.919	0.656	0.466	0.273
Intention	0.889	0.729	0.466	0.241

Source: Author's analysis

Discriminant validity, according to (Fornell & Larcker, 1981) compares Average Variance Extracted (AVE) of the constructs to shared variance between the constructs. It refers to the extent to which factors are distinct and uncorrelated and so, it finds out about the constructs in the model are highly corelated or not. As per rule, the variables should strongly relate to their own factor in comparison to another factor. The discriminant validity is measured through Average Variance Explained (AVE) and Maximum Shared Variance (MSV). In opinion of (Hair, Black, Babin & Anderson, 2010) the discriminant validity of a construct is found when these two conditions get fulfilled, i.e., Maximum Shared Variance (MSV) < Average Variance Explained (AVE) and Average Shared Variance (ASV) < Average Variance Explained (AVE).

The Convergent validity as well as discriminant validity in this research has been measured from the first order CFA model in figure1. The AVE measures the variance level captured by a construct vis-à-vis the level due to measurement error. The values lying above 0.7 are taken as very good and at the level of 0.5 are considered to be acceptable. The values for composite reliability (CR) above 0.7 are taken as very good and acceptable. From Table 4, it has been observed that the composite reliability i.e. (CR)for all the constructs happens to be greater than 0.7 and average variance extracted (AVE) is greater than 0.5. In case of constructs Attitude, usefulness, Ease of use and Intention to use, CR>AVE.

Table5: Testing Model fitness

Model Element	Values	Acceptable range
CMIN/DF	2.298	CMIN/DF < 3 good;< 5 sometimes permissible (Hair et al., 2010)
GFI	0.838	GFI> 0.8 is acceptable (Baumgarther & Homburg, 1996)
AGFI	0.775	AGFI > 0.8 is acceptable (Baumgarther & Homburg, 1996)
CFI	0.902	CFI > 0.95 great; 0.90 traditional; > 0.80 sometime permissible (Hair et al., 2010)
RMSEA	0.094	RMSEA < 0.05 good; 0.-0.10 moderate; > 0.10 bad (Hair et al., 2010)

Source: Author's analysis

Path Analysis / Regression Analysis

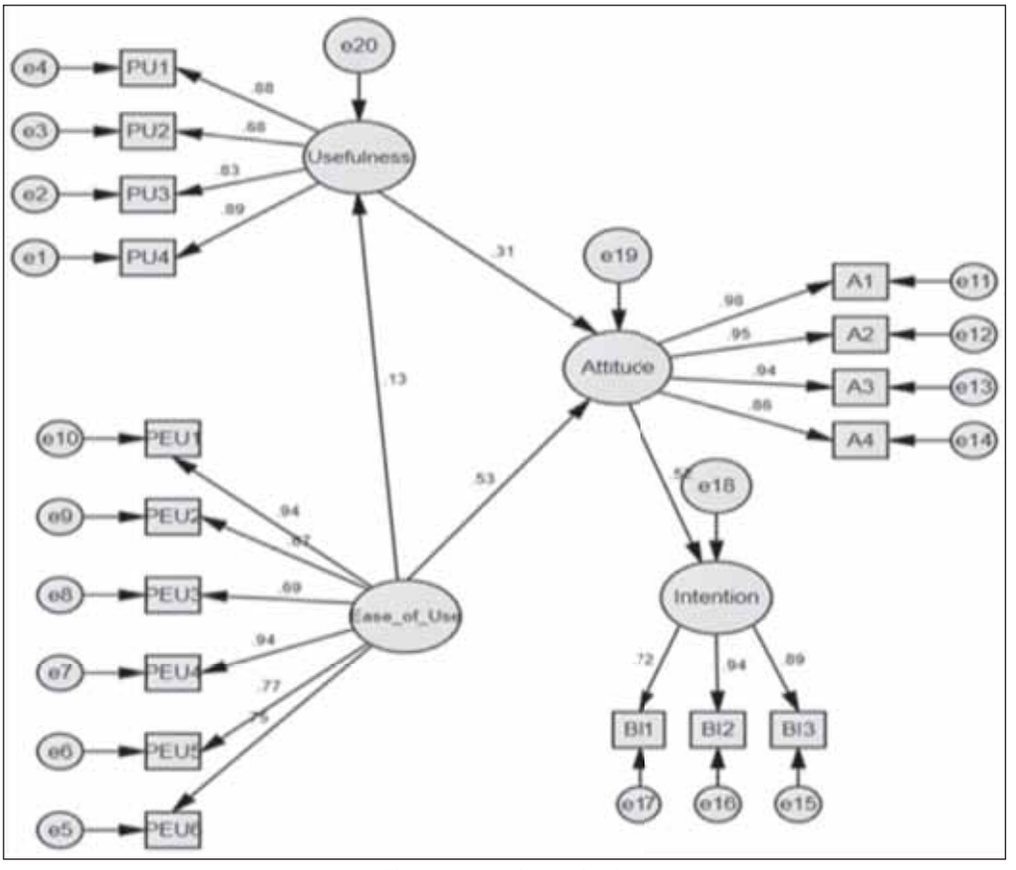


Figure 2: Path analysis

Discriminant validity has also been confirmed as average variance explained (AVE) for all of the constructs happens to be larger than maximum shared variance (MSV). Similarly, average variance explained (AVE) for above mentioned constructs happens to be greater than average shared variance (ASV).

To assess the efficacy of structural models, Goodness of Fit is the perfect instrument. It is evaluated by Chi square statistics which signify the difference between sample covariance matrix and the estimated covariance matrix. The different heuristics like (CFI) i.e. comparative fit index, Root Mean Square of Approximation (RMSEA), Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI) help in investigation of model fitness. Table 5 reflects chi-square fit statistics/degree of freedom (CMIN/DF) value to be 2.298 which is higher than recommended value > 0.90. Similarly, GFI, AGFI and CFI are 0.838, 0.775 and 0.902 respectively, which fall in acceptable range. The RMSEA value is 0.094 placing in moderate range. So, there is no rationale of changing the hypothesized model as all fit indices are acceptable and good.

Table 6: Regression Weights

			Estimate (Unstandardized)	Estimate (Unstandardized)	P
Perceived Ease of Use	←	Usefulness Perceived	.129	.062	.517
Attitude towards Perceived Usefulness	←	Using	.465	.528	***
Behavioral Intention Attitude towards	←	Using	.587	.425	***
Behavioral Intention Perceived	←	Ease of Use	.477	.384	***

Source: Author's analysis

ONCLUSION

In structural equation modeling (SEM) the structural relationships are assessed by the size and the significance of beta coefficient, which has been indicated in figure 2 below. Similarly in Table 6 we see user's attitude towards using solar PV technology is found to have a positive and significant effect on behavioral intention to use the solar PV technology. Thus, H1 is accepted. In the table again it is shown that user's perceived usefulness of Solar PV Technology as well as user's perceived ease of use of Solar PV Technology both have a positive and significant effect on user's attitude towards using solar PV technology. So, H2 as well as H3 are accepted. But perceived ease of use of Solar PV Technology has insignificant effect on user's perceived usefulness of solar PV technology and H4 is not accepted. It has been observed that user's attitude towards using solar PV technology comes out to be a reliable predictor of behavioural intention to use the solar PV technology during the initial phase of this technology adoption. The two original core constructs of TAM, i.e., user's perceived usefulness of Solar PV Technology and ease of use of solar PV technology show positive and significant relationship with another construct attitude for using solar PV technology. These results have similarity with conclusions derived by Verma et al. (2018) and other researchers like Cheung and Vogel (2013) It depicts that the users' attitude matters a lot with regard to acceptance of renewable energy. The results this study are further supported by Gefen and Straub (2000) who concluded that perceived usefulness is a rejoinder to users' assessment regarding effectiveness, efficiency and task-oriented goals of some new technology. If the organizations and domestic users have a positive perception regarding solar energy usefulness, they will have a positive attitude toward it for sure. This will strengthen their intention to use this form of renewable energy also as an alternative. In the study Khazaei, Kazemi, Pool et al. (2016) it was deduced that a better perceived ease of use i.e., design and operational simplicity, generally forms familiarity and positive attitude towards implementation of technology and the usefulness associated with it. The study suggest that awareness about its usefulness and ease of use of solar PV technology are vital for solar PV technology acceptance in the country as both of these factors play an important role in affecting the intention to use solar PV technology thus both of these factors should be highlighted. Since, a new technique requires more effort and cannot be used without difficulty, users are a bit sceptical. Along with it, lack of adequate awareness may be one of the reasons of weaker relationship between constructs ease of use of solar PV technology and user's perceived usefulness of solar PV technology (H4). The individuals and organizations who find solar PV technology easy to use are adopting this and are opting its use, the observation is sinking well with study of Venkatesh and Davis (2008). So, the perceived ease of use is very crucial for encouraging the adoption of this form of sustainable energy. With adequate knowledge and simplified installation and operational processes only, the users will tend to identify and acknowledge the benefits of solar PV technology.

The Government of India is launching many schemes to popularize solar PV technology and encouraging people for its adoption. But knowledge of users' attitude and behavioural intention towards the use of renewable energy is also very crucial, because all programs and policies connected to the deployment and promotion of solar PV technology depend on these and it will be futile if these types of studies are not considered. It is suggested that Central Government as well as State Governments should create more social awareness about the solar PV technology, so that common people as well as organizations shed their inhibitions in its adoption and use. Government should extend financial incentives and improvise the regulatory framework with lucrative policies to attract investors for starting up utility-scale solar projects. India's banks should be an approachable and easy source of financing for starting up new solar projects. Many of the state governments have not kept up with their 'Renewable Purchase Obligations' (RPO), which creates dilemma to most of the producers of solar energy who want to sell the energy they generate, to the state. Thus, Power Purchase Agreements should be simplified and user friendly. Similarly, high solar tariffs should be reduced. In our country approximately 90% of the solar panels being used are imported, and 70% tariff duty is levied against these imports. It is discouraging for potential users; so, duty should be lowered to encourage people for more installation of solar PV technology projects. At this critical juncture, it is highly demanded that the people as well as the Government should step forward to safeguard the planet earth and ensure sustainable development.

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