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AN EXPLORATORY STUDY ON YOUTH PERCEPTION AND AWARENESS TOWARDS SOLAR POWERED BUILDINGS

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Abstract:

The solar-powered buildings are structures that generate power using solar energy technology. Youth are more open to new concepts and technological advancements. By educating youth about the advantages of solar-powered buildings and their role in supporting renewable energy solutions. This study examines youth attitudes and perceptions of solar-powered buildings, emphasising their perceived advantages and level of awareness. The survey examines the element of benefits, like environmental sustainability, energy independence and energy bill savings, and motivating reasons for government subsidiaries and awareness campaigns. The study is descriptive in nature. 373 approx. youth samples were gathered from different colleges in the Thane district. It also examines the role of youth in promoting renewable energy solutions, awareness of modes of installing solar technologies, and their acceptance level for solar buildings in the future. The results show that although young people are generally in favour of solar-powered buildings because of their environmental advantages and energy independence, Policymakers, renewable energy advocates, and researchers can align policies to promote sustainable development by understanding the preferences of the younger generation. The study recommends involving youth in promoting and launching mass media campaigns and providing subsidies to address public scepticism about future energy options.

Keywords: *Solar powered buildings, Youth perception and awareness.*

Introduction:

The relevance of sustainable development techniques has been emphasized by the increasing urgency to solve environmental issues, especially in the energy and construction industries. Buildings have become a focal point for implementing creative, environmentally friendly solutions because they contribute significantly to global energy consumption and greenhouse gas emissions Among these, solar-powered structures make a strong case for using renewable energy sources to promote energy independence and lessen environmental impact.

India evolved into a global leader in solar energy adoption thanks to its advantageous geographic location and aggressive renewable energy goals. Under the National Action Plan on Climate Change, the Indian government has started programs like the National Solar Mission with the goal of installing 280 GW of solar power by 2030. This entails using subsidies, tax breaks, and net metering laws to promote solar parks, rooftop systems, and solar-powered buildings. Buildings with solar power are becoming more popular in India's cities, where energy consumption is highest. Solar technology is being used more and more in residential, commercial, and industrial buildings to save electricity costs and improve sustainability. Solar-integrated housing communities, energy-efficient workplaces, and government-led green building initiatives that adhere to international standards are a few examples.

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Young people are crucial in determining the course of sustainable development since they will be the leaders and decision-makers of the future. The adoption and use of sustainable practices can be strongly impacted by their attitudes, awareness, and views of renewable energy technology, such as solar power. Therefore, to encourage broad adoption and integration of solar energy solutions in building design and urban planning, politicians, educators, and industry stakeholders must have a thorough understanding of the young perspective.

Review of Literature:

- **Hussein, Mohamad, Mustakim Pakorn, Waleed, Azizi (2020)**

  In this study, the researcher looked at UUM (University Utara Malaysia) personnel and students' knowledge of solar energy. The purpose of this study was to find out how much personnel and students at University Utara Malaysia (UUM) knew about the rooftop solar energy on the building. It seemed that the interviewers who know about green technologies claimed that green technology lowers the cost of electricity. They felt that because solar energy and green technologies expand the scene, harmony, serenity, calm, and coolness, they are beneficial to employ. Utilizing rooftop solar energy has several advantages, such as cooling the building, lowering energy usage, and selling extra electricity when applied to a building, particularly a home. Increasing public awareness campaigns is one strategy that may be employed to raise awareness of rooftop solar energy.

- **P. Easwaran, Dr. S. Rani and P. Nagalakshmi 2020**

  In this study, products using solar energy are environmentally beneficial. The kids of today have the key to the future. In order to highlight the significance of solar products in the next future, we should focus on raising students' knowledge and interest. This study demonstrates that while most students are content with their awareness, some are still not. Additionally, this study found a substantial correlation between awareness of solar products and characteristics such as age group, gender, and educational attainment. In order to raise knowledge and interest in purchasing solar products in the future, the government and solar companies wish to focus more. The cost of solar products is falling annually as a result of technological advancements. A new clean world will be created by government advertising and new policies, as well as by solar companies.

- **R. Ragu Prasadh, Jayshree Suresh 2016**

  The purpose of the current study was to investigate students' knowledge about renewable energy and climate change. Additionally, it aimed to examine the main determinants of their intention to adopt renewable energy. Nadu. According to the study's findings, most respondents had a cursory understanding of renewable energy technology and climate change. Nonetheless, 30% of those surveyed said they would be open to using renewable energy in the future. The findings showed that respondents' intention to adopt renewable energy was significantly influenced by behavioral control, awareness, and their view of the technology's utility and ease of use.

- **Dr. K. Chandramouli, J. Sree Naga Chaitanya, B. Krishna**

  The author has concentrated on solar-powered buildings, solar panel installations, and solar panel operation. Research is purely based on secondary data; solar construction is an innovative way to harness the sun's energy for heating and cooling. It is a concept within the growing green building movement. In an attempt to reduce temperature fluctuations for inside settings in both summer and winter, engineers have experimented with different

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building materials, raised the wall's thickness, and changed the form of the outer wall. As a result, there is too much energy. As a result, there is now more pollution in the environment due to excessive energy usage.

- **Padmini K, James K, 2013**

  Despite obvious misunderstandings and inconsistencies, the study's findings showed that high school pupils were familiar with and had a basic comprehension of photovoltaic. Although most students were aware that solar panels, such as those pictured in the poll and in the classroom, made it possible to generate power, there appeared to be some misunderstanding about the type of energy that these panels absorbed in order to produce electricity. Although many students cited light as the main component affecting a photovoltaic cell's efficiency, many also indicated heat as being as significant.

- **Gurleen Arora Dr. Mandeep Bhatia Goyal (2021)**

  Over the past few years, the rate of power generation from renewable sources has increased. Perceptions and prejudices held by people and society are also thought to have a significant impact on energy use. This study examines the perceptions and purchasing habits of "Zoomers," a demographic that has grown significantly in popularity and visibility because of social media. According to the researcher, the government will be able to meet the goals set in Paris if it can use this sector as effectively and efficiently as possible.

  - **Noël, Rene, Cesar 2012** The study focuses on providing conceptual clarity regarding a number of solar energy-related terms, including: The Energy Usage in a Typical Office Building; Solar Technology Systems in Buildings; Passive Solar Systems; Building Orientation; Passive Solar Heating and Cooling; Active Solar Systems; Active Solar Heating; Solar Electric System; Hybrid Solar Systems; Building Integrated Photovoltaic System; and Building-Integrated Photovoltaic Thermal System. The research emphasizes that the incorporation of renewable technologies into building structures is causing a real revolution in solar architecture today.

Modes /forms of solar energy:

Solar Thermal Systems: A black surface that collects light, heats up, and then transfers the heat into a working fluid is all that a solar thermal panel is. It may be either glazed or unglazed. Glazed panels might consist of a series of glass tubes or be flat. The working fluid transfers the heat to a location where it may be used, like a swimming pool, hot water store, or straight to a building's interior heating.

Photovoltaic (PV) Systems

Photovoltaic (PV) cells, which directly convert light into electricity, were initially used in space before becoming widely used in gadgets like watches and calculators and in places that aren't connected to the electrical grid. Building-integrated photovoltaic (BIPVs), rooftop installations, and solar farms all make extensive use of these systems. Appliances, lights, and heating systems can all be powered by the electricity produced; extra energy is frequently stored in batteries or returned to the grid.

Concentrated Solar Power (CSP): CSP systems provide tremendous heat by focusing sunlight onto a tiny area using mirrors or lenses. Steam created from this heat powers turbines to produce energy. Large scale power generation projects are usually where CSP is utilized. Only in direct sunlight can the solar concentrator function. As a result, they are only utilized in regions that have brighter days with clear skies.

Building-integrated photovoltaic: BIPVs incorporate solar cells straight into roofing, windows, and facades. In addition to offering energy generation possibilities, this mode improves the visual attractiveness of

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structures. Building integrated photovoltaic or the installation of photovoltaic panels inside buildings to replace elements like windows, function as both a building material and a power source. BIPV is a desirable option for modern architecture, including new sustainable homes and buildings, because of its dual function.

Social Relevance of study:

1. Job creation
2. Reduced
3. Operation of benefit
4. Tax benefits
5. Contribution individuals development
6. Environmental conservation
7. Improve public health enhance

Role of youth to promote sustainable energy (solar energy)

1. Awareness creating
2. Leading by example
3. advocating for policy change
4. Support for installation by collaboration

Research Gaps & Need of the study

- Limited research on solar powered buildings, major results were on consumer perception of male and female rather than youth
- Limited research on Youth awareness, role of youth.
- Majority of study were undertaken on parameters like awareness, usefulness are in relation to climatic changes and Renewable energy, Govt. Initiatives/ subsidy, products, modes, steps of installation, suggestion to youth need to study, Driving forces for adoption of solar powered buildings for sustainable and renewable energy efficient Society/ Economy.

Objectives of the study:

- To study the perception of youth towards solar buildings technology.
- To understand the role of youth in creating and promoting renewable energy solutions.
- To explore various benefits of solar-powered buildings

Hypotheses of the study:

H_0: There is no significant impact on the perception of youth towards building solar energy.

H_1: There is a significant impact on the perception of youth towards building solar energy.

H_0: There is no significant contribution of youth towards creating and promoting renewable energy.

H_1: Youth significantly contribute to creating and promoting renewable energy.

H_0: Solar power energy does not significantly provide benefits as compared to conventional energy.

H_1: Solar power energy significantly reduces the cost and gives benefits as compared to conventional energy.

Limitation of the study

- The study is restricted to Thane district, due to time restriction, responses are assumed to be true.
- The current study completely focuses on the solar energy and no other kind of energy is considered for the research.

Research Methodology:

The primary and secondary data used in this study was collected on attitudes, perceived advantages, obstacles, and awareness levels about solar-powered buildings. Secondary sources such as reports, relevant research publications, articles, online open-access journal. To gather a variety of perspectives, the survey had demographic questions, Likert-scale items, and multiple-choice questions. 373 respondents between the ages of 15 and 24 from urban, semi-urban, and rural areas were chosen using a stratified random sample technique. The questionnaire was tested with the reliability test using spss software to get better understanding. The purpose of this paper, "An Exploratory Study on Youth Perception and Awareness Towards Solar-Powered Buildings," is to investigate how young people think about using solar energy in

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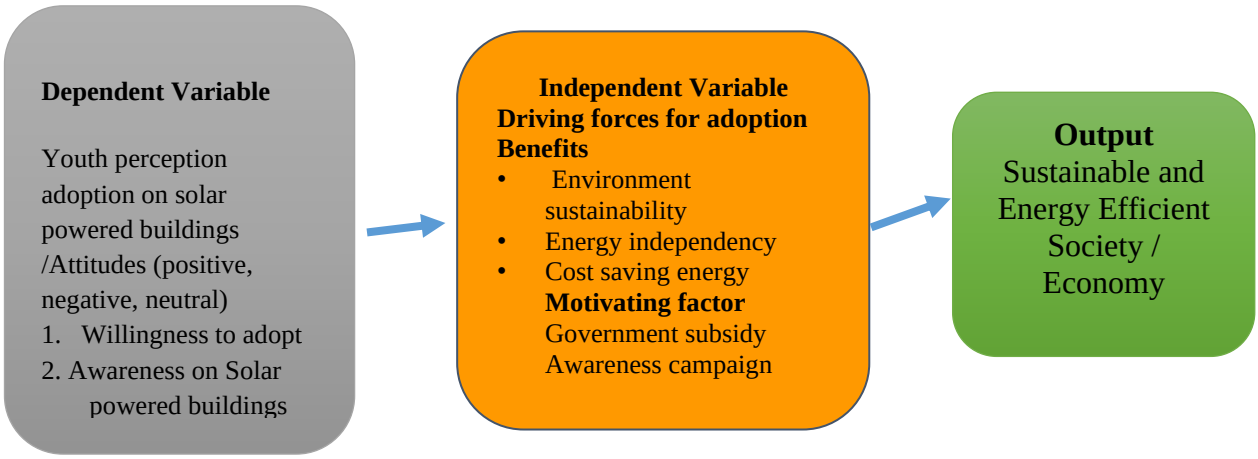
infrastructure. We have included the parameters/ indicators as driving forces for the adoption of solar energy i.e. benefits such as environment sustainability, energy independence, cost saving energy and motivating factors like government subsidy and awareness campaign. The research consisted of two approaches, namely a focused on existing literature within this field and gathering qualitative data and quantitative from youth.

Conceptual Framework:



Data Analysis:

Demographic data:

Gender	Age	Educational Background	Area of Residence			Total
			Urban	Suburban	Rural	
Male	15-20	Higher Education	41	31	17	89
		Secondary Education	24	04	12	40
		Diploma	00	01	00	01
	21-24	Higher Education	03	03	01	07
		Secondary Education	00	01	00	01
		Diploma	01	00	00	01
Female	15-20	Higher Education	47	57	7	111
		Secondary Education	63	18	20	101
		Diploma	05	00	00	05
	21-24	Higher Education	11	02	00	13
		Secondary Education	03	00	00	03
		Diploma	01	00	00	01
		Total	**199**	**117**	**57**	**373**

The dataset offers information about the respondents' age, gender, level of education, and place of residence. There are 373 responders in the entire sample, including both male and female participants. The prevalence of urban education levels indicates that higher education is more accessible in urban areas. Compared to men, women in the 15–20 age range are more likely to be enrolled in higher education. The low level of higher education participation in rural areas suggests possible obstacles including resources and accessibility. According to this data, specific educational initiatives are required to close the gap between rural and urban communities and advance access to higher education in various areas.

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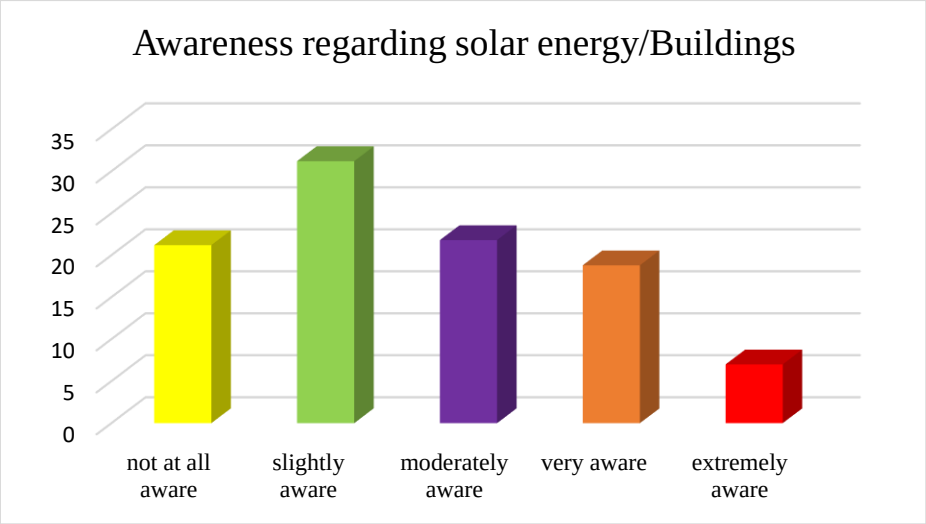
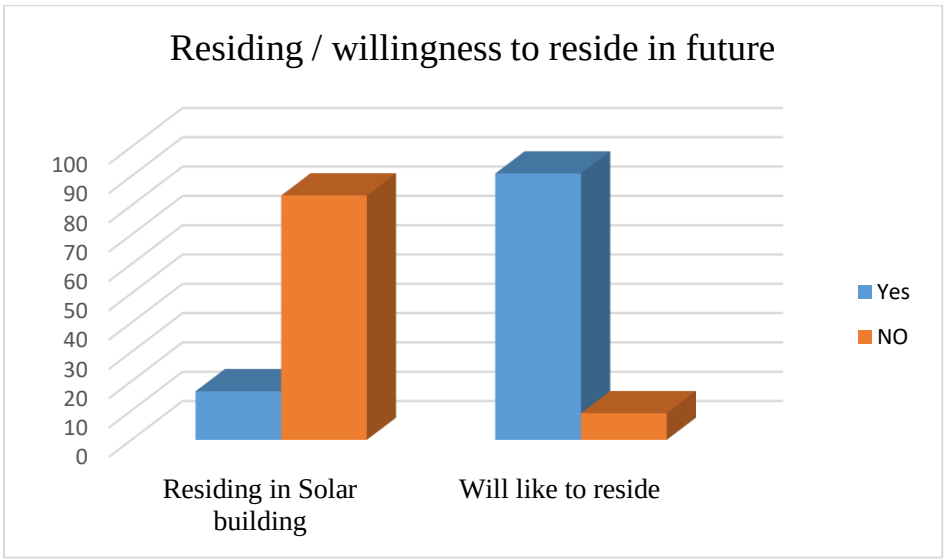


The data reflects different levels of awareness towards solar energy and buildings: a significant proportion of respondents (31.2%) indicate that they have some knowledge and a basic understanding but limited knowledge. 21.8% have moderate knowledge, indicating a good understanding but no in-depth knowledge. However, 21.2% of the respondents had no information at all, highlighting a lack of knowledge about the concept of solar energy. Meanwhile, 18.8% are very knowledgeable, demonstrating strong knowledge, and only 7% are extremely knowledgeable, indicating deep expertise. Overall, the data suggest that while awareness exists, it is generally at a basic or moderate level. Initiatives such as education campaigns and awareness programs can increase public understanding and encourage wider adoption of solar energy solutions.



According to the data, there is a notable difference between current residency and prospective residency. 83.4% of respondents do not now live in the area, compared to just 16.6% who do. However, 90.9% of respondents said they would be interested in living there in the future, while only 9.1% said they would not. This implies that although while the current rate of residency is low, there is a high chance that people may migrate or live in the area in the future, perhaps as a result of advantageous circumstances or expected advancements. It may be possible to convert this curiosity into real residency expansion by addressing the barriers to existing residence.

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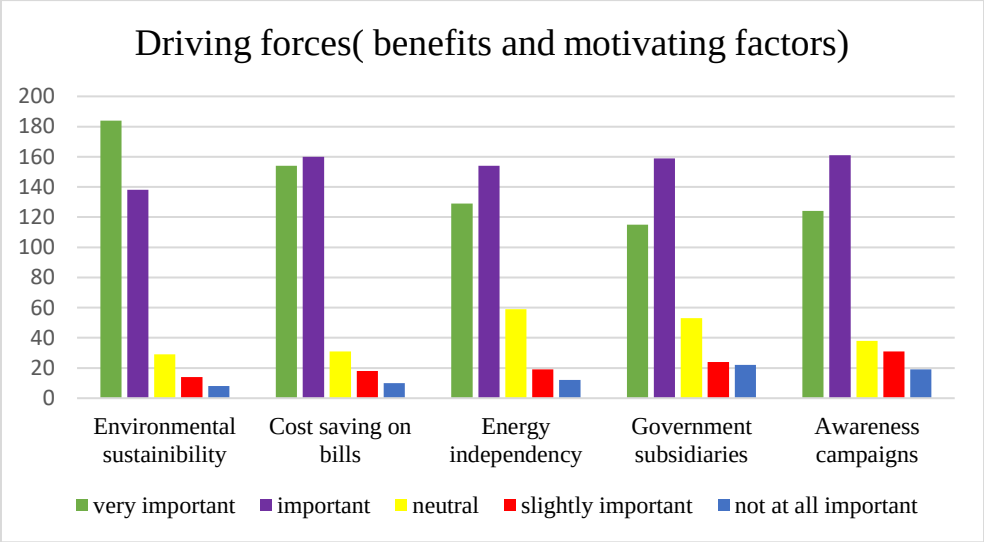

The chart shows the importance of different factors influencing the adoption of sustainable energy.

Environmental sustainability is the highest priority factor, with 184 respondents rating it as "very important" and 138 as "important," indicating a high level of awareness of environmental issues. Saving on bills is another major concern, with 160 respondents rating it as "important" and 154 as "very important," reflecting economic motivations. Energy independence shows a balanced importance, with 154 respondents rating it as "important" and 129 as "very important," indicating a moderate priority. Government subsidies were rated most frequently as "important" (159), indicating that incentives have a major influence on adoption decisions. Awareness campaigns were also highlighted, with 161 responses rated "important" and 124 rated "very important," highlighting the role of education in decision-making. In general, environmental sustainability and financial incentives drive interest in sustainable energy, with government support and awareness campaigns also playing an important role.

ANOVA (Analysis of variance):

is a statistical technique utilized in research to identify if there are significant differences among the means of three or more groups. It assesses the variance among groups in relation to the variance groups to evaluate the impact of one or more independent variables. A significant outcome indicates that at least one group means different. Anova is commonly employed in experimental research to analyze the effects of treatments or intervention.

Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
PA (Age)	373	399	1.069705	0.065021		
V04	373	742	1.989276	1.13967		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	157.7064	1	157.7064	261.8207	0.000	3.853988
Within Groups	448.1448	744	0.602345		SIGNIFICANT	
Total	605.8512	745				

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Reject H_0 as the P value is less than 0.05

Hence, we concluded here, there is significant impact on the perception of youth towards building solar energy.

The results of the Anova show that PG (Gender) and V04 contribute significantly differently to the perception of youth towards building solar energy, with a p-value of 0.00 (less than 0.05). The rejection of the null hypothesis confirms that youth (V04) make a significantly greater contribution than PG. Youth play a vital role, as indicated by the high F-value (261.8). The significance of perception of youth towards building solar energy is emphasized by these findings.

Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
PG (Gender)	373	607	1.627346	0.234411		
V09.1	373	708	1.898123	1.03798		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	13.67426	1	13.67426	21.49379	0.00	3.853988
Within Groups	473.3298	744	0.636196		SIGNIFICANT	
Total	487.004	745				

Reject H_0 as the P value is less than 0.05, Hence we concluded here, there is significant impact on the perception of youth towards building solar energy. The results of the Anova show that PG (Gender) and V09.1 contribute significantly differently to the promotion of renewable energy, with a p-value of 0.00 (less than 0.05). The rejection of the null hypothesis confirms that youth (V09.1) makes a significantly greater contribution than PG. Youth play a vital role, as indicated by the high F-value (21.49). The significance of youth-led efforts in renewable energy initiatives is emphasized by these findings.

Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
PG (Gender)	373	607	1.627346	0.234411		
V19	373	407	1.091153	0.083067		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	53.6193	1	53.6193	337.7826	1.74799E-62	3.853988
Within Groups	118.1019	744	0.158739		SIGNIFICANT	
Total	171.7212	745				

Reject H_0 as the P value is less than 0.05

Hence, we concluded here, Solar energy significantly reduces the cost and gives benefits as compared to conventional energy. According to the Anova results, there is a significant difference in how PG (Gender) and V19 perceive solar

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energy, with a p-value of 1.75E-62 (less than 0.05). The alternative hypothesis is accepted, and the null hypothesis is rejected, demonstrating that solar energy outperforms conventional energy in terms of cost reduction and benefits. Solar energy's financial benefits are further highlighted by the high F-value (337.78). Its potential as an economical and sustainable energy source is highlighted by this.

Research Finding:

- The results of the Anova show that PG (Gender) and V04 contribute significantly differently to the perception of youth towards building solar energy, with a p-value of 0.00 (less than 0.05).
- The results of Anova show that PG (Gender) and V09.1 contribute significantly differently to the promotion of renewable energy, with a p-value of 0.00 (less than 0.05).
- The results show that there is a significant difference in how PG (Gender) and V19 perceive solar energy, with a p-value of 1.75E-62 (less than 0.05).
- It is discovered that most of the youth are unaware of the various modes of installation of solar energy.
- The respondents believe that the youth can play their role in promoting solar energy through awareness campaigns (58%) and by collaborating with distributors for supporting installation (30%).
- It was found that more than 80% of the youth want to encourage the use of solar technology for benefits such as environmental sustainability (50%) and energy independence (35%) and more than 60% of the youth are motivated to adopt the solar technology due to Government subsidiaries (30%) and community efforts (33%).
- Youth who believe solar power buildings reduce long term energy cost are more likely to support their adoption.
- Higher Awareness of Solar Power Building is a positively allocated with favorable attitude towards adopting such buildings. Youth with higher environmental concern are more likely to practice solar building as beneficial for sustainability

Conclusion:

This exploratory study emphasizes how crucial it is to comprehend young people's attitudes and awareness to hasten the adoption of solar-powered structures. Youth have the power to bring about revolutionary change in the energy industry through capacity building, entrepreneurship, change advocacy, and education. Young people may play a key role in creating sustainable and energy-efficient societies by collaborating with international organizations and utilizing educational and training opportunities.

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