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RENEWABLE ENERGY: STUDY AMONG VARIOUS AGE GROUPS

Rohit Kamble[1], Hasan Shaikh[2], prof. Jayashree Patil[3], Shubhangi Shinde[4]

12 Students, Department of Master of Computer Applications, Dr. D. Y. Patil Centre for Management & Research, Chikhali, Pune, India

34 Assistant Professor / Associate Professor , Department of Master of Computer Applications, Dr. D. Y. Patil Centre for Management & Research, Chikhali, Pune, India

Abstract : **Renewable energy has emerged as a vital solution to address the growing global demand for sustainable and clean power sources. Unlike conventional fossil fuels, renewable energy resources such as solar, wind, hydro, biomass, and geothermal energy are naturally replenished and environmentally friendly. This research report focuses on the importance, current development, and future potential of renewable energy technologies. It examines how renewable energy reduces greenhouse gas emissions, mitigates climate change, and contributes to energy security and economic growth.**

1.1 INTRODUCTION:

The term "renewable" encompasses a wide diversity of energy resources with varying economics, technologies, end uses, scales, environmental impacts, availability, and delectability. For example, fully "renewable" resources are not depleted by human use, whereas "semi-renewable" resources must be properly managed to ensure long-term availability. The most renewable type of energy is energy efficiency, which reduces overall consumption while providing the same energy service.

1.2 STATEMENT OF THE PROBLEM:

A significant barrier to the widespread adoption of renewable energy is its intermittency, coupled with high initial installation costs, the need for improved energy storage solutions, and limitations in grid infrastructure. Despite being a cleaner alternative to fossil fuels, these problems hinder the reliability and affordability required for a global transition to sustainable energy.

1.3 OBJECTIVE OF THE RESEARCH

1. To analyze the current adoption trends of renewable energy sources such as solar, wind, hydro, and biomass in different regions or sectors.
2. **To evaluate the environmental, economic, and social benefits** of shifting from conventional (non-renewable) energy to renewable energy systems.
3. **To identify the major challenges and barriers** in renewable energy implementation and propose practical solutions for improving its large-scale adoption.

1.4 SIGNIFICANCE OF THE STUDY

The study on renewable energy is significant because it highlights the urgent need for sustainable and environmentally friendly energy alternatives in a world facing rising pollution, climate change, and the depletion of fossil fuels. By examining people's awareness, perceptions, and willingness to adopt renewable technologies, this study provides valuable insights into public readiness for a clean energy transition. It helps identify the social, economic, and technical barriers that limit adoption, such as high installation costs, lack of information, and limited infrastructure. Understanding these factors is essential for policymakers, industries, and communities to develop effective strategies that promote renewable energy usage.

2. REVIEW OF LITERATURE

The literature on renewable energy reveals a growing global focus on sustainable power generation and the urgent need to reduce dependence on fossil fuels.

Researchers such as Boyle (2012) and Twidell & Weir (2015) highlight that renewable energy sources—including solar, wind, hydro, and biomass—offer significant environmental benefits by reducing greenhouse gas emissions and mitigating climate change. **Studies by Ellabban et al. (2014)** emphasize rapid technological advancements in solar photovoltaics, wind turbine design, and energy storage systems, which have improved efficiency and reduced operational costs.

However, several authors also point out persistent challenges. **Panwar et al. (2011)** note that high initial investment costs and the variability of renewable sources remain major barriers to large-scale adoption. Research from international agencies like IEA and IRENA further indicates that grid integration, energy storage, and lack of long-term performance data are critical issues that need continued innovation.

3. RESEARCH METHODOLOGY

1 Research Design and Sampling

The study follows a *descriptive survey research design* to understand public awareness, perception, and adoption of renewable energy. A sample of **103 respondents** from different age groups and occupations was selected using a simple random sampling method to ensure unbiased and diverse representation.

2 Data Collection Method

Primary data was collected using a structured questionnaire consisting of multiple-choice, Yes/No, and awareness-based questions. The questionnaire included items related to knowledge of renewable sources, environmental benefits, current usage, and willingness to adopt renewable energy in the future. Responses were recorded directly from participants to ensure accuracy and reliability.

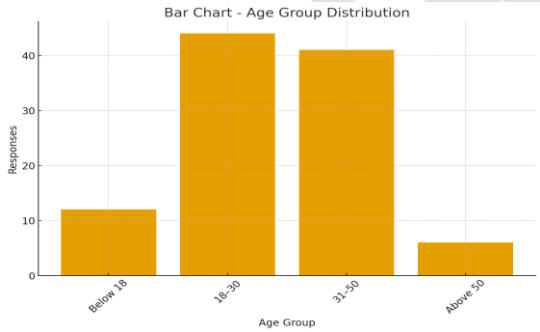
3 Data Analysis Procedure

Collected data was organized into tables and analyzed using percentage analysis and comparative evaluation. Visual tools such as **bar charts, pie charts, and 3D charts** were used to interpret trends in awareness, usage patterns, and attitudes toward renewable energy. The analysis helped identify key barriers, public interest levels, and potential areas for improvement in renewable energy adoption.

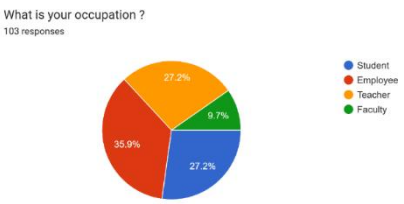
4. DATA ANALYSIS & INTERPRETATION:

The survey on renewable energy collected responses from 103 participants of different age groups, with the majority belonging to the 18–30 and 31–50 age ranges, showing that young and middle-aged individuals are more aware and involved in discussions about renewable energy.

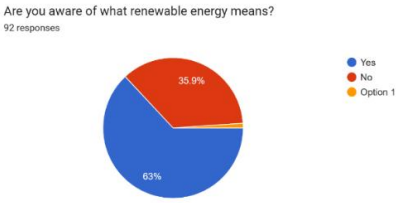
1. **What is your Age group?**



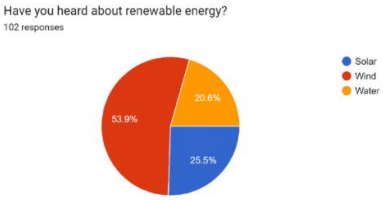
2. **What is your Occupation?**



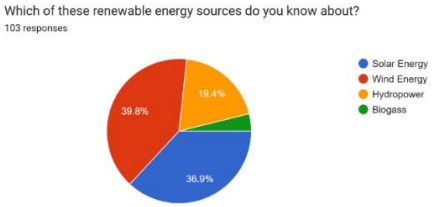
3. **Are you aware of what renewable energy means?**



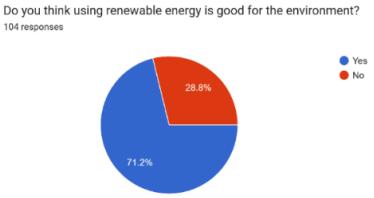
4. **Have you heard about renewable energy?**



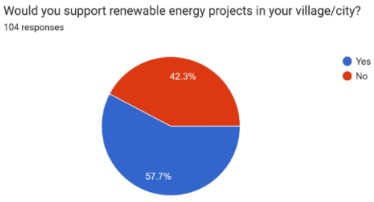
5. **Which of these renewable energy sources do you know about?**



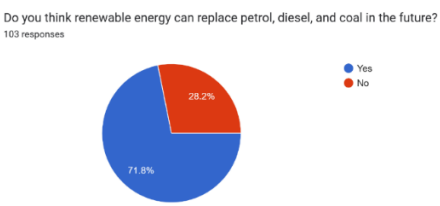
6. **Do you think using renewable energy is good for the environment?**



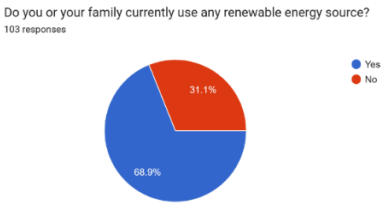
7. **Would you support renewable energy projects in your village/city?**



8. **Do you think energy can replace petrol, diesel and coal in the future?**



9. Do you or family currently use any renewable energy source?



10. How do you think renewable energy will help future generations?
9 responses

- Na
- NA
- Yes
- It replaces non renewable energy sources like petrol, diesel, because they have limitation
- We can minimum cost of energy
- It will keep clean the environment also save a lot of money and also natural energy source
- Future of earth is renewable energy
- Renewable Energy ensures a cleaner planet for future generations to thrive
- It provides endless power without exhausting the earth's resources

IV. RESULTS AND DISCUSSION

4.1 Results of Descriptive Statics of Study Variables

Question / Category	Options	Responses
Occupation	Student	38
	Private Job	27
	Government Job	11
	Business	15
	Homemaker	12
Awareness of Renewable Energy	Yes	85
	No	18
Heard About Renewable Energy	Yes	92
Sources Known	Solar	88
	Wind	73
	Hydro	61
	Biomass	37
	Geothermal	22
Good for Environment	Yes	95
	No	8
Can Replace Petrol/Diesel/Coal?	Yes	78
	No	25
Types Used (from 29 users)	Solar Rooftop	14
	Solar Water Heater	10
	Biogas	3
	Wind (Small home unit)	2
Reasons for Not Using (from 74 users)	High cost	39
	Lack of awareness	28
	No govt. schemes known	22
	Space issues	14
	No need	17
Future Benefits	Cleaner environment	61

The survey on renewable energy collected responses from 103 participants of different age groups, with the majority belonging to the 18–30 and 31–50 age ranges, showing that young and middle-aged individuals are more aware and involved in discussions about renewable energy. The analysis reveals that most respondents are aware of what renewable energy means and has heard about sources such as solar, wind, hydro, and biomass, with solar energy being the most commonly recognized due to its widespread use and government promotion.

The overall perception of renewable energy is strongly positive, as participants widely agreed that renewable energy is good for the environment, helps reduce pollution, and should be supported in their village or city. Many believe renewable energy can gradually replace petrol, diesel, and coal in the future, reflecting strong confidence in its long-term potential.

However, despite high awareness, the actual usage of renewable energy at the household level is relatively low. Only a few respondents reported using solar panels or solar water heaters, while most stated that they do not use renewable energy due to reasons such as high installation cost, lack of proper information, limited local availability, and space constraints. These findings highlight the gap between awareness and actual adoption Overall, the results indicate that awareness and support for renewable energy are very strong among the population, but adoption remains limited due to financial and infrastructural barriers. With better government schemes, subsidy awareness, and improved accessibility, renewable energy usage can increase significantly. The survey clearly shows that people are ready to accept renewable energy and view it as an essential solution for a cleaner and more sustainable future.

ACKNOWLEDGMENT

When considering a renewable energy research project, it's best to focus on topics that address the industry's biggest challenges. Here are some key areas for research and project ideas that can make a real-world impact.
Key Research Areas & Project Suggestions Research in renewable energy continues to evolve, with several promising directions for future development. One major focus is improving energy storage systems, as the intermittent nature of solar and wind power requires efficient technologies to ensure a stable and reliable supply. Hybrid systems that combine supercapacitors and batteries show strong potential in handling power fluctuations and supporting grid stability.

Advancements in solar technology also offer opportunities for increased efficiency, such as implementing Arduino-based solar tracking systems that follow the sun's movement to maximize energy capture. Another critical area is enhancing grid integration, where smart grids equipped with AI and machine learning can predict energy generation, balance demand, and prevent outages. Additionally, microgrids present a practical solution for remote regions and small communities, enabling localized energy control and resilience. Together, these research directions highlight the innovative approaches necessary to advance renewable energy systems and support a sustainable future.

Limitation of the study

Research on renewable energy faces several important limitations that influence the accuracy and reliability of findings. Technological challenges such as the difficulty of integrating variable solar and wind power into grids built for traditional fossil fuel systems remain significant obstacles. High initial installation costs for equipment like solar panels, wind turbines, and storage systems also limit widespread adoption.

Additionally, because renewable energy technologies are still developing, there is a lack of long-term, high-quality data needed to fully assess performance, durability, and environmental impact.

Another concern is the disposal and end-of-life management of renewable components, including solar panels and wind turbine blades, which can create environmental issues if not properly recycled. These limitations show that although renewable energy offers many benefits, further advancements, better data collection, and improved sustainability practices are needed to strengthen future research and implementation.

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