VILNIUS TECH
Vilnius Gediminas Technical University

Business, Management and Economics Engineering
ISSN: 2669-2481 / eISSN: 2669-249X
2025 Volume 23 Issue 01

"GREEN AFFINITY: THE INFLUENCE OF AWARENESS, CONCERN, FEASIBILITY, AND EXTERNAL SUPPORT."

Dr. Kanchan Akshay
Assistant Professor, VPM's Dr. V. N. Bedekar Institute of Management Studies

Dr. Shripad Bapat
Assistant Professor, VPM's Dr. V. N. Bedekar Institute of Management Studies

Abstract: -.
This study investigates the impact of Environmental Awareness (EA), Environmental Concern (EC), Green Feasibility (GF), and External Environmental Support (EES) on Green Affinity (GA) in the context of India's commitment to achieving Net Zero carbon emissions by 2070. This ambitious mission relies on the adoption of renewable energy resources, free from greenhouse gas emissions, by individual citizens. Data were collected from 133 participants, and multiple linear regression analysis revealed a strong correlation between the predictors and Green Affinity, with the model explaining 76.7% of the variance in Green Affinity. Significant predictors included Environmental Concern, Environmental Awareness, and Green Feasibility. External Environmental Support did not significantly affect Green Affinity. The findings highlight the crucial role of EC, EA, and GF in promoting Green Affinity, which is essential for the successful adoption of clean energy sources like Green Hydrogen. Given the challenges in producing and accepting Green Hydrogen as a viable alternative to fossil fuels, this research provides valuable insights for policymakers and educators in supporting India's Net Zero mission.

Keywords: Green Affinity; Environmental Awareness; Environmental Concern; Green Feasibility; External Environmental Support; Renewable Energy; Green Hydrogen; Net Zero Emissions; India; Clean Energy Adoption

Introduction:

United Nations have framed Sustainability Development Goals (SDGs) for making Earth a better planet to dwell. The SDG dedicated for Climate Action calls for transformational steps towards attaining de-carbonization across the globe and the developed nations like USA and Japan are attempting for Net Zero carbon emissions by year 2050, followed by China to attain it in year 2060 and India by the year 2070 (World Economic Forum, 2021). This major leap towards beating global warming as an environmental crisis, demands for several initiatives. It attempts changing the current scenario of exhaustive use of fossil fuels and energy sources emitting carbon dioxide and other greenhouse gases through industrial activities. Major industrial activities indulging production and transportation are at core leading to global warming. Use of cleaner and renewable energy resources for these activities are much amid the

considerations for transformation to ecofriendly energy consumption processes and reduction of greenhouse gas emissions. Apart from these drawbacks, Nonrenewable energy resources pose multiple problems like scarcity and pollution along with being expensive to use. Alternative solutions thus need to be reinstated as part of energy efficient goals by the globe at earliest (Ang T.et al 2022). Shifting from Petrol driven vehicles to Electric Vehicles, using Solar Panels to electrify the residential and nonresidential infrastructures, producing compost fertilizers from bio degradable waste are some of the commonly used yet inadequate measures to fight this crisis. Recent studies indicate Hydrogen variants possess tremendous potential of being used as a fuel of renewable nature. Yet it is critical to analyze whether use of all types of Hydrogen lead to cleaner alternative meeting the Net Zero criterion or the world needs specifically to focus only on Green Hydrogen as a viable option. Further emphasis also needs to be there on the production feasibility of Green Hydrogen in essential quantum considering the expenses incurred keeping in mind the challenges and benefits anticipated.

Green Hydrogen' an alternative clean fuel:

Hydrogen has proved to be a wonderful power delivering resource. It is a renewable energy resource as the fundamental raw material to extract Hydrogen is water or H2O which is in abundance on this planet. Hydrogen thus produced from water comes in different variants and has a range of applications based on its nature. The Grey Hydrogen which is most commonly used fuel in today's world has inherent limitation of emitting carbon dioxide and polluting traces when used as fuel. The Blue Hydrogen which boasts of lessening the harmful emissions by tapping the carbon emissions while production still has adverse impact on environment because of its dependency on natural gases (non-renewable energy) for its production. Thus, Green Hydrogen can be treated as the most prominent and viable alternative energy resource which is comparatively clean and hassle free because of its peculiar production process involving use of renewable energy sources (Sarpong J., 2023). Yet production of this variant is challenging in terms of quantum and costs and requires huge contribution from Government and Industry.

Objectives behind Replacing Traditional Energy Resources:

Several challenges exist in the current fuel consumption pattern by the globe. Industries are producing consumable and industrial goods on an extremely large scale to meet the ever up-scaling demands of materialistic world with soaring populations. Some of the critical objectives to be considered while canvassing the use of renewable and clean energy resources include:

a) High pollution levels due to combustion of nonrenewable energy sources.

b) Scarcity of Crude Oil, Coal and Fossil Fuel as limited stocks exist on the planet.

c) Enhanced Global Warming as an outcome of greenhouse gases tapping the heat in atmospheric layers including the large quantities of emitted carbon dioxide, methane, chlorofluoro carbon gases, ozone and others.

d) Weakening eco systems due to lack of fresh air, eroding oxygen belts and environmental imbalance resulting in degraded quality of human life.

Features of 'Green Hydrogen' as Clean Energy Resource:-

Some key features of Green Hydrogen include:

a) Basic raw material i.e. water is available in abundance in natural form on this planet.
b) Requires a specialized scientific process termed as electrolysis to produce it in its usable form.
c) The production process makes use of renewable energy sources emitting cleaner outcomes.
d) The carbon neutrality enables it to be treated as cleaner variant of fuel as compared to traditional sources of energy including fossil fuels, crude oil and coal.
e) Requires more space to store (is less compressible) leading to one of its major limitations in industrial applications.

Mission Net Zero by Indian Government:

Indian Government as a representative and a responsible nation member of United Nations is strongly determined to bring down the carbon footprints of its industrial activities to zero and has declared to strive for attaining Net Zero mission by year 2070. This will largely contribute to the Sustainability Development Goal of Climate Action demanding environment friendly policies by nations across the globe (Biswas et al, 2020). Considering the large devastating impacts of global warming many nations across the globe including India were triggered for an action call against de-carbonization in 2015 at Paris through an agreement. The trigger further initiated sound steps taken in the direction of carbon neutrality leading to the National action planning by Ministry of Environment, Forest and Climate Change towards sustainability. Subsequently in year 2021, Honorable Prime Minister of India Mr. Narendra Modi committed the Net Zero Mission to be achieved by year 2070 in the COP26 (United Nations Global Convention related to Climate Change) Summit held at Glasgow.

Advantages & Challenges of Using 'Green Hydrogen' as Contributor to Mission Net Zero:

Some significant benefits of Green Hydrogen usage to citizens include:
a) Cleaner source of energy.
b) Sustainable application.
c) Lessens Pollution.
d) Prevents Global Warming

Some barriers or limitations of the Green Hydrogen include:
a) Expensive manufacturing.
b) Specialized techniques of production essential.
c) Storage Space required is bigger as compared to traditional fuels.
d) Lack of adequate refilling stations for vehicles using Green Hydrogen.

Government Inclination for 'Green Hydrogen':

Union Cabinet of Indian Government in year 2022 declared its National Green Hydrogen Mission revolving round major objectives including:
a) India becoming a leading producer and supplier of Green Hydrogen
b) Generation of opportunities for exporting Green Hydrogen along with its derivatives
c) Reducing energy dependency on imported nonrenewable energy sources.
d) Developing indigenous production capabilities.
e) Generation of investment opportunities for industry through green power alternative.
f) Aiming employment generation and development of national economy.
g) Initiating and enhancing research projects in direction of clean energy reliance.

Corporate initiatives towards Production of 'Green Hydrogen:

Considering the wide application in industrial field business organizations are moving towards consuming cleaner energy sources like Green Hydrogen. This transition invites the production of Green Hydrogen on considerable scale with a dual purpose in mind. The first boosting the environment friendly image of the company in society and the other leading to sustainable development initiated by Indian government. Some major applications of Green Hydrogen can be witnessed in areas like industrial processes, transportation, chemical industries, hydrogen fuel cells etc. This calls for large Indian companies investing in production, storage and distribution of this clean fuel.

Table 1: Prominent Indian Companies Producing / Storing / Distributing Green Hydrogen

Companies in India	Sub-Sector
Reliance Industries Ltd	Oil & Gas – Refining
Oil and Natural Gas Corporation Ltd	Oil & Gas – Exploration
NTPC Ltd	Power Generation
Power Grid Corporation of India (PGRD)	Power Transmission & Distribution
Adani Green Energy Ltd	Renewable Energy
Indian Oil Corporation Ltd	Oil & Gas – Refining
Adani Total Gas Ltd	Gas Distribution
Adani Transmission Ltd	Power Infrastructure
Adani Power Ltd	Power Generation
GAIL (India) Ltd	Gas Distribution

Source: Authors' research

Global Warming has become the key concern being addressed by every environmentalist of today's world. Governments of developing nations like India and organizations in the country are fighting to prevent its odds and are committed towards bringing down the carbon foot prints of industrial and non-industrial activities. The crisis can be only controlled with strong and dedicated steps like announcing and vigorously pursuing mission Net Zero. This dream to come in reality further requires innovative approaches towards inventing and utilizing green gas emission free energy resources replacing the existing conventional energy resources adding to global pollution. Researchers thus attempt here to analyze the feasibility and hurdles in using 'Green Hydrogen' as an alternative clean energy resource that has a potential to contribute to the mission Net Zero.

Review of Literature & Hypothesis Development:

Shahzad U. (2015) in his article has rightly pointed out the threats to earth and its habitats due to the increasing crisis of global warming which is the outcome of ignored care and concern by the citizens of this planet. Author has imbibed on creating barriers to the hazards of this environmental crisis through innovative measures being deployed as early as possible.

Ang T. et al (2022) have meticulously studied and brought to surface the renewable energy sources and technologies those benefit the planet. Authors have emphasized on the fact that the

solution to the energy crisis is through the application of energy that is cleaner in nature and can be renewed for its sustainable usage for long run.

Thapa B.S. and Thapa B. (2020) have suggested that hydrogen being used as a fuel constitutes a major chunk in today's industrial world. Yet it is important that it be produced through cleaner sources and technologies like electrolysis of water producing cleaner and better outcomes contributing to worlds carbon emission mission.

Maka A. and Mehmood M.(2024) have insisted that production of green hydrogen would lead to sustainable and eco friendly environment for a healthy life on this planet. Authors in their article have highlighted the potential in green hydrogen as a clean energy resource and need of channelizing efforts by nations for producing it for the better results in terms of environmental sustainability.

Marouani I. et al (2023) in their research have systematically indicated how various countries have started considering the advantages of Green Hydrogen being used as a sustainable energy resource and are focusing on producing it for the crisis resolution in terms of fossil fuels and other traditional sources of energy. Authors have emphasized on need of partnering by nations in this venture of producing a cleaner energy source.

Priyadarshini L. (2023) had indicated the need of proper governance with respect to the climate action plan for lessening of carbon emissions. Author has emphasized on the fact that without proper regulatory framework being set by governments of countries the environmental crisis would not be controlled and so it is important to understand the legalities pertaining to it.

Das A. et al (2023) have emphasized on the technological aspects, cost benefit analysis and capacity for production in terms of Indian power sector scenario focusing on future development of a sustainable nation. Authors have suggested various renewable energy resources those can be helpful in replacing the traditional fuel resources to meet the current and future needs of power by citizens in the country.

With the increasing urgency to combat climate change and reduce carbon emissions, there's a growing interest in green technology – eco-friendly solutions that help protect the environment. This study investigates what makes people like or support green technology. Specifically, it explores how factors like knowing about the environment (Environmental Awareness), caring about environmental issues (Environmental Concern), seeing green solutions as practical (Green Feasibility), and getting help from organizations and government (External Environmental

Support) affect people's liking for green technology, which we will call Green Affinity. India has set a big goal: to have no carbon emissions by 2070. Achieving this goal means getting everyone on board with cleaner, more sustainable energy options. That is where understanding what makes people interested in green technology becomes important.

Environmental Awareness refers to seeking information about environmental issues, like climate change. Researchers have found that when people know more about the environment, they are more likely to take action to protect it. Thus more the awareness about environmental crisis more are people likely to be shifting towards greener practices like using green hydrogen (H1). Also more the concern about environmental crisis and prevention more will be citizens driven towards eco-friendly applications in their routines (H2).

Green practices though a best measure to be followed has its own challenges of various types including cost, time, location, practicability etc. and hence more it is feasible to use cleaner fuels more will be the likelihood of the its application (H3).

External Environmental Support is the one provided b Government and Industrial organizations towards shifting to green practices. It has been observed through research that people may rely on this external aspect that triggers their affinity towards green practices and cleaner energy resources being used (H4).

This study aims to fill in the gaps in identifying factors those influence behaviour of individuals towards green practices and use of cleaner alternative resources like green hydrogen making the Net Zero mission realize. By understanding more about how things like knowing, caring, practicality, and support affect people's attitudes towards green tech, we can find better ways to encourage its use.

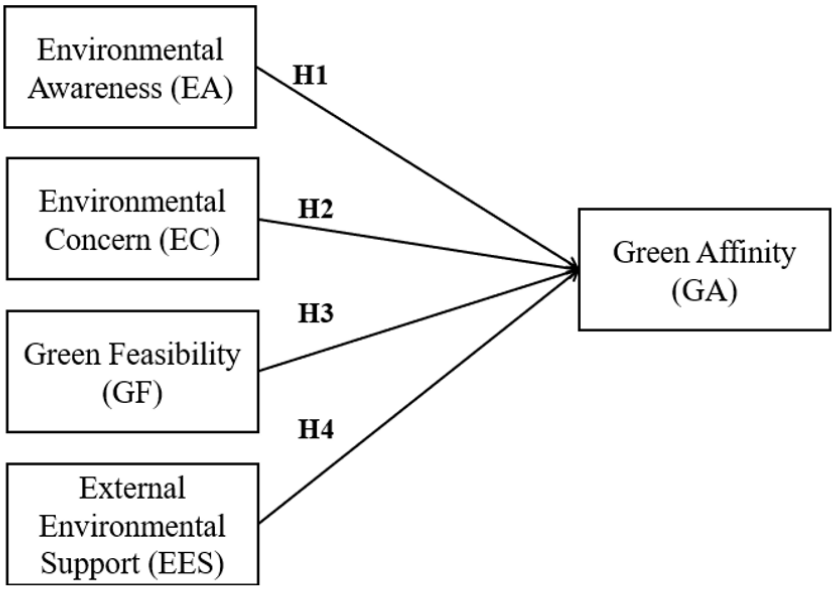

Figure 1. Theoretical Framework

Research Methodology:

The primary aim of research was to understand the awareness among citizens about Green Hydrogen as a fuel for various industrial and non-industrial purposes. So, we deployed convinence sampling and conducted quantitative descriptive research. The real contribution of the use of Green Hydrogen to Mission Net Zero is only feasible through participation of citizens through its application in their lives. Thus, citizens from different demographic backgrounds were surveyed to register their opinions. The sample size selected was 133 citizens. The structured questionnaire was devised to capture the effects of Environmental Awareness (EA), Environmental Concern (EC), Green Feasibility (GF), and External Environmental Support (EES) on Green Affinity (GA). Existing scales were used to measure the constructs.

Results

A multiple linear regression analysis was performed to evaluate the effects of Environmental Awareness (EA), Environmental Concern (EC), Green Feasibility (GF), and External Environmental Support (EES) on Green Affinity (GA). The model's Multiple R was 0.876, indicating a strong correlation between the predictors and the dependent variable. The R Square was 0.767, meaning the model explained 76.7% of the variance in Green Affinity. The Adjusted R Square was 0.760, which accounts for the number of predictors in the model. The standard error of the estimate was 0.348, with a sample size of 132 observations.

The coefficient for the intercept was 0.030 with a standard error of 0.209, a t-statistic of 0.145, and a P-value of 0.885, indicating it is not statistically significant. Environmental Concern (EC) had a coefficient of 0.555 with a standard error of 0.070, a t-statistic of 7.990, and a P-value of 7.09E- 13, making it a significant predictor of Green Affinity. Environmental Awareness (EA) had a coefficient of 0.250, a standard error of 0.058, a t-statistic of 4.347, and a P-value of 2.80E-05, also indicating significance.
Green Feasibility (GF) had a coefficient of 0.148 with a standard error of 0.067, a t-statistic of 2.213, and a P-value of 0.029, making it a significant predictor. However, External Environmental Support (EES) had a coefficient of 0.014, a standard error of 0.064, a t-statistic of 0.220, and a P- value of 0.826, indicating it is not a significant predictor of Green Affinity.
In summary, the analysis showed that Environmental Concern, Environmental Awareness, and Green Feasibility significantly influence Green Affinity. External Environmental Support does not have a significant impact. The model is robust, explaining a substantial portion of the variance in Green Affinity.

Findings:

The major findings of the research are as follows:

1) Respondents are aware of and supportive of cleaner energy initiatives, recognizing both the benefits and the challenges.
2) Respondents indicated concern about the practicality of Green Affinity despite recognizing global warming issues.
3) Respondents have strong support for moving to cleaner energy but also feel shifting to different fuel variants has become a trend rather than a necessity.
4) Respondents are also concerned about the cost of green hydrogen which may restrict them to shift.
5) Respondents have shown less concern about the efforts from government and organizations in promoting cleaner energy resources.
6) Respondents feel if green affinity is cost effective it can be made a primary alternative for fuel.
7) There are challenges with respect to useability of green hydrogen.
8) Respondents feel there are concerns about the availability and feasibility of clean energy resources.

Overall the findings reveal a complex interplay of perceptions and attitudes toward vehicle ownership, alternative fuels, and clean energy initiatives. While there is broad support for cleaner energy and recognition of its importance, practical concerns about cost, accessibility, and personal values play a significant role in shaping opinions.

Recommendations:

1) There is a need to enhance awareness about the benefits and practical aspects of using clean energy. Government can provide financial incentives for purchasing clear energy vehicles.
2) Investing in market research would help to identify the means to work upon the cost.
3) Adequate support would be required from infrastructure development perspective to store and refuel.
4) People need to be made aware about the alternatives to fuel and emphasis should be on long term environment benefits.
5) Subsidies and Grants can be offered to make green hydrogen more affordable. Partnering with private institutions may help.
6) To achieve the Net Zero Mission, communication and awareness would play a very important role, followed by policies.
7) Lot of work is yet to be done on making infrastructure, designing policies and innovative approaches to make clean energy available.

The efforts have already been started and soon the results shall be visible. Above were few recommendations which can help to channelize the efforts to make green hydrogen and clean energy resource possible.

Limitations and Future Research:

Researchers wish to admit here that some limitations those need to be considered include the limited sample size which is less as considered to the major travelling population in the nation. Also the respondents belong to a specific a category i.e. owners of two or four wheeler vehicles making use of private transport.

Industrial applications other than transportation have not been considered making it a study dedicated to a particular segment or application area.

These limitations provide the further scope for research by researchers in future that would be oriented towards clean fuel applications in corporate world. It also provides scope for studying measures to overcome the feasibility challenges towards its wide application in personal and professional context.

Conclusion:

The study revolved round understanding the liking or inclination of citizens towards usage of green practices and cleaner energy resources as part of environment conservation which in turn would lead to the achievement of Net Zero mission by Indian government. Factors like environmental awareness, environmental concern and green feasibility were found to contribute largely towards green affinity in citizens making positive contribution to the mission. Yet surprisingly it was noticed that people are not relying on external environmental support while deciding on their energy choices and more rely on their personal motives and values. Thus it is important to spread awareness about environmental crisis, generate concern among citizens to prevent this crisis and make it applicable through various aspects like

practicability, technicality, economy, availability, accessibility and time through various measures to ensure people contribute to the mission accomplishment.

Bibliography:

- Butler, C. D. (2018). Climate change, health and existential risks to civilization: A comprehensive review (1989–2013). International Journal of Environmental Research and Public Health, 15(10), 2266. https://doi.org/10.3390/ijerph15102266
- Kumara, S., Singha, P., Verma, K., Kumar, P., & Yadav, A. (2022). Environmental Issues and their Possible Solutions for Sustainable Development, India: A Review. Current World Environment, 17(3), 531-541. https://doi.org/10.12944/CWE.17.3.3
- Marouani, I., Guesmi, T., Alshammari, B. M., Alqunun, K., Alzamil, A., Alturki, M., & Hadj Abdallah, H. (2023). Integration of renewable-energy-based green hydrogen into the energy future. Processes, 11(9), 2685. https://doi.org/10.3390/pr11092685
- Maka A., Mehmood M. (2024), Green hydrogen energy production: current status and potential, Advance access publication, Clean Energy, 2024, Vol. 8, No. 2, 1–7 https://doi.org/10.1093/ce/zkae012
- Thapa B. S., Thapa B. (2020), Green Hydrogen as a Future Multi-disciplinary Research at Kathmandu University, Journal of Physics: Conference Series 1608 012020 doi:10.1088/1742- 6596/1608/1/012020
- Shahzad U., (2015), Global Warming: Causes, Effects and Solutions, Durreesam in Journal (ISSN: 2204 - 9827) August Vol 1 Issue 4
- Sarpong J. (2023), Green Hydrogen, https://www.researchgate.net/publication/369794068
- Baum z., Diaz L. L., Konovalova T., Angela Q. (2022), Materials Research Directions Toward a Green Hydrogen Economy: A Review, ACS Omega 2022 7 (37), 32908-32935, DOI: 10.1021/acsomega.2c03996
- Biswas, Tirtha, Deepak Yadav and Ashish Guhan. (2020). A Green Hydrogen Economy for India: Policy and Technology Imperatives to Lower Production Cost. New Delhi: Council on Energy, Environment and Water.
- Das A, Saini V., Parikh K., Parikh J., Ghosh P., Tot M. (2023), Pathways to net zero emissions for the Indian power sector, Elsevier Ltd., Energy Strategy Reviews 45 (2023) 101042
- Phebe Asantewaa Owusu & Samuel Asumadu-Sarkodie | (2016) A review of renewable energy sources, sustainability issues and climate change mitigation, Cogent Engineering, 3:1, 1167990, DOI: 10.1080/23311916.2016.1167990
- Ang T., Salem M., Kamarol M., Shekhar H.D., Alhuyi M. N., Prabaharan N.(2022), A comprehensive study of renewable energy sources: Classifications, challenges and suggestions Elsevier Ltd., Energy Strategy Reviews 43 (2022) 100939
- Risco-Bravo, A., Varela, C., Bartels, J., & Zondervan, E. (2024). From green hydrogen to electricity: A review on recent advances, challenges, and opportunities on power-to-

hydrogen-to- power systems. Renewable and Sustainable Energy Reviews, 189, 113930. https://doi.org/10.1016/j.rser.2023.113930

- Priyadharshini, L., & Sundaram, A. (2023). Analyzing the feasibility and impacts of achieving net zero emissions by 2050 in India: A techno-economic and socio-political perspective. BioGecko, 12(3), 5668-5671. https://www.researchgate.net/publication/372278884
- World Economic Forum. (2021). Mission 2070: A Green New Deal for a Net Zero India. World Economic Forum. https://www.weforum.org/reports/mission-2070-a-green-new-deal-for-a-net- zero-india
- Website: https://www.smallcase.com/collections/green-hydrogen-stocks-in-india/#national- green-hydrogen-mission2023