

Market Analysis For The Adaptation Of Green Hydrogen in Industries Connected To Hyetron Energy Pvt Ltd, Chennai

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Abstract- This study explores the feasibility, challenges, and opportunities surrounding the adoption of green hydrogen across industrial sectors. Green hydrogen, produced via electrolysis using renewable energy, represents a clean, sustainable alternative to fossil fuels, with applications in steel, cement, refining, and transportation industries. Despite its potential, widespread adoption remains hindered by high production costs, infrastructure limitations, and policy uncertainties. The research adopts a mixed-method approach combining primary data through surveys with 30 industry participants and secondary data from global reports and scholarly articles. Statistical tools such as chi-square tests, logistic regression, and Spearman correlation were employed to assess the relationship between industry behavior and green hydrogen adoption.

Keywords- Electrolysis, Green Energy Adoption, Hydrogen Economy, Industrial Decarbonization, Sustainability.

I. INTRODUCTION

The adaptation of green hydrogen in industries is gaining momentum as companies seek sustainable alternatives to fossil fuels. Green hydrogen, produced through electrolysis using renewable energy, offers a clean and efficient energy source with applications across various sectors, including manufacturing, transportation, and power generation. However, its widespread adoption faces challenges such as high production costs, infrastructure limitations, and policy uncertainties. Market analysis for green hydrogen adoption requires assessing industry demand, cost competitiveness, technological advancements, and government incentives. Understanding these factors will help identify key opportunities, potential barriers, and strategic pathways for accelerating green hydrogen integration into industrial applications.

Hyetron Energy Private Limited, founded in June 2024 and based in Chennai, focuses on advanced AEM electrolyser technology for clean hydrogen production. With a 'Right First Time' approach and deep R&D expertise, Hyetron is enabling

industrial decarbonization. Hyetron manufactures AEM (Anion Exchange Membrane) electrolysers tailored for green hydrogen generation using renewable energy.

II. REVIEW OF LITERATURE

- **RSC Sustainability (2025):** This study critically examines the current state-of-the-art in green hydrogen production technologies, including water electrolysis powered by renewable energy and methane pyrolysis. It identifies opportunities in hydrogen's application, such as its role in circular economies, regional development, and energy democratization.
- **International Energy Agency (IEA) (2024):** his annual publication tracks hydrogen production and demand worldwide, as well as progress in infrastructure development, trade, policy, regulation, investments, and innovation. The 2024 report includes a special focus on Latin America and assesses greenhouse gas emissions associated with different hydrogen supply chains.
- **International Energy Agency (2024):** The IEA reports that investment in hydrogen projects has significantly increased, with final investment decisions doubling in the past year, primarily led by China. These investments could quintuple low-emission hydrogen production by 2030, surpassing rapid solar expansion.
- **Harvard University (2024):** A study from Harvard University indicates that the cost of producing, transporting, and storing green hydrogen is currently higher than the costs associated with using fossil fuels and capturing the resulting carbon emissions. The report suggests that while hydrogen production costs might decrease, the entire supply chain remains costly.

III. OBJECTIVES OF THE STUDY

PRIMARY OBJECTIVE

To analyse the feasibility, challenges, and opportunities of green hydrogen adoption.

SECONDARY OBJECTIVES

- Identify key industries
- Evaluate the current and future market demand for green hydrogen in industrial applications.
- Assess the cost competitiveness of green hydrogen compared to conventional fuels.
- Analyse the impact of regulations, subsidies, and incentives on the adoption of green hydrogen in industries.

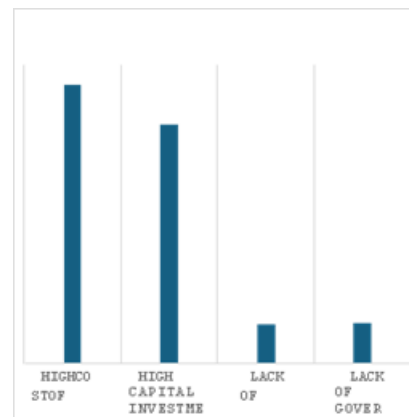
IV. RESEARCH METHODOLOGY

This study adopts an exploratory research design to investigate the market adaptation of green hydrogen in industries. Given the emerging nature of the green hydrogen market, this research will utilize a qualitative and quantitative mixed-method approach to gain comprehensive insights into its adoption, challenges, and potential opportunities. The researcher's source of data can be categorized into two main ways: primary and secondary data. Primary data are gathered through questionnaires, schedules, and direct conversations with company representatives. Schedules help researchers grasp consumer demographics and behavior. Secondary data are collected through books, journals, articles, company websites, and online searches, providing information about industries, companies, and historical records.

V. DATA ANALYSIS

1. Barriers to Green Hydrogen Adoption

Barrier	Percentage
High cost of green hydrogen	46.7
High capital investment for infrastructure	40
Lack of awareness	6.6
Lack of government incentives	6.7



INTERPRETATION

From the above chart, it shows that the biggest challenge employees face is lack of managerial support (30.5%), indicating the need for better encouragement from management. Preference for on-the-job learning (27.4%) and lack of time (23.2%) also hinder participation. Additionally, irrelevant content (17.9%) suggests that training programs may not always align with job roles. A small 1.1% cited other reasons. To improve participation, organizations should provide relevant content, managerial support, and flexible training schedules.

TEST OF RELATIONSHIP BETWEEN GENDER AND EDUCATIONAL QUALIFICATION

H₀- There is no relationship between gender and educational qualification

H₁- There is a relationship between gender and educational qualification

OBSERVED FREQUENCY TABLE

Gender	Master's Degree	Bachelor's Degree	Professional Certification	Other	Total
Female	28	13	23	6	70
Male	11	2	11	1	25
Total	39	15	34	7	95

EXPECTED FREQUENCY TABLE

Gender	Master's Degree	Bachelor's Degree	Professional Certification	Other	Total
Female	28.7368	11.0526	25.0526	5.15789	70
Male	10.2631	3.94736	8.94736	1.84210	25
Total					

CHI-SQUARE CALCULATION

Gender	Master's Degree	Bachelor's Degree	Professional Certification	Other	Total
Female	0.018893	0.343108	0.168178	0.137487	0.667666
Male	0.052901	0.960702	0.470898	0.384962	1.869463
Total					$\Sigma=2.537130$

Degree of freedom = 5

Chi Square Value = **2.537130**

Critical value at 0.05 significance level = 7.815

INTERPRATATION

The null hypothesis cannot be rejected because the Chi Square value of 2.537130 is less than 7.815. This indicates that at the 5% significance level, there is no meaningful relationship between gender and educational level.

TEST OF RELATIONSHIP BETWEEN PROFICIENCY LEVELS ACROSS DIFFERENT SKILLS REQUIRED FOR THE ROLE (ANOVA)

PURPOSE-To state the relationship between proficiency levels across different skills required for the role

TRYING TO FIND OUT - whether employees exhibit similar proficiency levels across different skills required for the role or if there are significant differences.

H₀: There is no difference in the proficiency levels across different skills required for the role

H₁: There is at least one difference in the proficiency levels across the different skills.

PARTICULARS	NO KNOWLEDGE	BASIC	INTERMEDIATE	ADVANCED	EXPERT
Financial Analysis	4	19	40	24	8
Risk Management	4	18	35	32	6
Customer Handling	5	15	38	32	5
Data Analytics	7	15	34	34	5
Communication	5	12	26	39	13

ANOVA-SINGLE FACTOR

SUMMARY				
Groups	Count	Sum	Average	Variance
Column1	5	95	19	203
Column2	5	95	19	205
Column3	5	95	19	234.5
Column4	5	95	19	201.5
Column5	5	95	19	182.5

ANOVA

Source of Variation	SS	df	MS	F	P-Value	Fcrit
Between Groups	0	4	0	0	1	2.866081
Within Groups	4106	20	205.3			
Total	4106	24				

INTERPRATATION

- P-value = 1.000 → This is greater than 0.05, meaning no significant difference exists between groups.

- $F\text{-value}=0.0 \rightarrow$ Since F is smaller than the F critical value, we fail to reject the null hypothesis.

The test shows no significant differences between Finance Analysis, Risk Management, Customer handling, Data Analytics, and Communication skill levels.

VI. CONCLUSION

In conclusion, the study on Training Need Analysis at Hedge Equity, Kochi, highlights the significance of identifying and addressing employee training requirements to enhance overall performance and organizational efficiency. The findings emphasize the pivotal role of structured training programs in improving employee skills, boosting productivity, and ensuring long-term business growth.

Insights from employees and management reveal the importance of assessing training needs accurately to develop tailored training programs that align with both individual and organizational objectives. By actively involving employees in the training process and prioritizing skill enhancement, Hedge Equity can foster a culture of continuous learning and professional development.

The project report, "A Study on Training Need Analysis of Employees at Hedge Equity, Kochi," indicates that the majority of employees recognize the value of training programs currently offered by the company. The positive perception of Hedge Equity's training initiatives compared to industry standards is encouraging. However, there is scope for improvement in areas such as training content customization, advanced learning opportunities, and evaluation methods. While a significant portion of employees find the current training strategies effective, addressing the concerns of those seeking more specialized and practical training sessions remains crucial.

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