

LEVERAGING AI FOR REAL-TIME SUPPLIER DEVELOPMENT IN CARBON CAPTURE AND HYDROGEN PRODUCTION

Irshadullah Asim Mohammed

Project Manager, Department of Supply Chain, Fuel Cell Energy Inc, Connecticut, USA

Received: 14 Oct 2024

Accepted: 17 Oct 2024

Published: 20 Oct 2024

ABSTRACT

This paper explores the application of Artificial Intelligence (AI) to enhance supplier development processes in the context of carbon capture and hydrogen production industries. As global efforts intensify to meet decarbonization goals, the need for efficient, scalable, and reliable supply chains for green technologies has never been more critical. We propose an AI-driven framework for real-time supplier development, utilizing machine learning algorithms and predictive analytics to optimize supplier selection, performance evaluation, and risk management. Specifically, we focus on how AI can improve the dynamic identification of supplier capabilities, mitigate operational risks, and drive continuous improvement through data-driven insights. We discuss the integration of AI with Internet of Things (IoT) devices for real-time monitoring, blockchain for transparency, and advanced analytics to predict demand fluctuations and ensure timely delivery of components essential for carbon capture and hydrogen production. Our findings suggest that AI can significantly reduce lead times, improve product quality, and enhance collaboration between suppliers and manufacturers. Furthermore, the paper highlights the challenges and opportunities in deploying AI within these industries, including data privacy concerns, supplier adoption barriers, and technological infrastructure requirements. Through a comprehensive case study, we demonstrate the potential for AI to transform supplier development strategies, ultimately contributing to the scaling of carbon capture and hydrogen production solutions.

KEYWORDS: *Artificial Intelligence, Supplier Development, Carbon Capture, Hydrogen Production, Predictive Analytics, Machine Learning, Supply Chain Optimization, Real-Time Monitoring, Industry, Sustainability, Risk Management*

JEL Codes: *D22 – Firm Behavior: Empirical Analysis, O32 – Management of Technological Innovation and R&D, O33 – Technological Change: Choices and Consequences, Q42 – Alternative Energy Sources, Q55 – Environmental Economics: Technological Innovation Q58 – Environmental Economics: Government Policy*