

The Application of digital technologies in ESG monitoring in Energy firms: Evidence from emerging markets

Abstract:

Amid growing global pressure for sustainable development and Net Zero commitments, ESG has emerged as a strategic priority in the energy sector. However, in emerging markets such as Vietnam, Indonesia, and the Philippines, institutional voids continue to hinder the effective implementation of ESG practices.

This paper explores the role of digital technologies in enhancing ESG (Environmental, Social, and Governance) monitoring within energy enterprises operating in emerging markets. Grounded in three foundational theoretical lenses—organizational technological capabilities, ESG implementation, and institutional voids—the study proposes a multidimensional classification framework to assess the extent of ESG digitalization across firms.

The framework is operationalized through thematic coding and cross-case comparison in a multi-country case study design, validated by data from 12 in-depth interviews and more than 20 secondary sources, including ESG reports, dashboards, and SCADA systems from leading enterprises such as EVNGENCO3 and BCG Energy (Vietnam), Pertamina (Indonesia), and AboitizPower (Philippines).

Findings indicate that these firms are actively leveraging digital tools to bridge institutional gaps, improve ESG oversight, and enhance access to green finance. Blockchain is employed for clean equipment traceability, AI for early warning of operational risks, and dashboards for real-time ESG disclosure. While digital technologies have strengthened transparency and ESG performance, challenges persist in terms of cost, data standardization, and internal capabilities.

The paper concludes by distinguishing policy implications for both the public and private sectors, aimed at advancing ESG digital transformation in emerging market context.

Keywords: ESG monitoring, digital platforms, SCADA, AI, blockchain, energy sector, emerging markets, Vietnam, Indonesia, Philippines.