

Factors affecting the performance of the Provincial Electricity Authority, Region 2 (Northeastern Region)

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ABSTRACT

This study aims to develop a causal model identifying antecedent factors that influence the performance of the Provincial Electricity Authority (PEA), Region 2 (Northeastern Region), Thailand. Drawing upon extensive literature reviews and content analysis, the research identifies three principal constructs—Green Leadership, Green Innovation, and Corporate Social Responsibility (CSR)—as critical drivers of organizational performance within the context of the green energy transition. The study employs a documentary research methodology to analyze relevant academic and institutional sources, leading to the formulation of a conceptual framework and a set of hypotheses regarding the direct influence of leadership on green innovation, CSR, and overall performance. The findings emphasize the strategic role of environmentally conscious leadership in advancing sustainable energy practices, the importance of innovation in improving operational efficiency and competitiveness, and the value of CSR in enhancing stakeholder trust and long-term viability. The proposed model provides a theoretical foundation for future empirical validation and practical guidance for improving public sector energy services in line with Thailand's sustainability objectives.

Keywords: Green Leadership, Green Innovation, Corporate Social Responsibility, Organizational Performance, Sustainable Energy, Structural Equation Modeling, Provincial Electricity Authority

INTRODUCTION

Electricity has become an indispensable energy source with profound impacts on all dimensions of human life. As a fundamental utility, it powers various electrical devices, bringing about convenience and enhancing living standards. In the realm of education, electricity facilitates access to digital technologies and online learning platforms, thereby promoting equitable learning opportunities and skill development across populations. Within the healthcare sector, electricity supports the operation of modern medical equipment and the maintenance of pharmaceutical storage systems, thereby improving service delivery and public health infrastructure. Moreover, electricity is central to public safety systems, powering surveillance cameras, alarm systems, and smart building technologies that effectively mitigate crime and natural disasters (U.S. Energy Information Administration, 2005; Durmus Senyapar, 2024; Lee & Jung, 2024; Yoon, 2023; The Bangkok Insigne, 2025; Chester, 2015; Otsuka, 2024; Provincial Electricity Authority, 2025). Electricity is equally essential to national economic growth and industrial development. As a critical driver of production, commerce, and services, it enables industrial operations that rely almost entirely on electric power. In the agricultural sector, electricity plays a transformative role in boosting productivity and product quality through automated irrigation systems, smart greenhouses, and advanced agricultural machinery, thereby improving farmers' income and competitiveness. In transportation and logistics, electricity powers eco-friendly public transport systems and improves delivery efficiency, helping reduce operational costs and enhance business

competitiveness. Furthermore, the energy sector increasingly relies on electricity to develop renewable energy infrastructure aimed at achieving energy security, reducing fossil fuel dependence, and advancing the green economy toward long-term sustainability (Siam Deposit, 2024; SDG Move, 2021; D'Sa & Murthy, 2006; Lee & Jung, 2024; Gong et al., 2023).

Amid escalating environmental concerns and the growing impact of global warming on ecosystems and human well-being, countries worldwide are prioritizing green energy for electricity generation. This transition, driven by public policies and investments in renewable technologies, aligns with global sustainability goals. Thailand, for instance, has set ambitious targets to generate 50% of its electricity from renewable sources by 2037 and 70% by 2049. In support of these goals, the Ministry of Energy is promoting clean energy production, including an initial 5,000 MW of capacity and an additional 3,000 MW in subsequent phases (Provincial Electricity Authority, 2025; 2023). Similarly, Singapore has prioritized solar energy, achieving a capacity of 1 GW in 2023 and targeting 2 GW by 2030, while planning to import renewable electricity from Indonesia, Cambodia, and Vietnam. Japan has also placed significant emphasis on hydrogen energy and clean power technologies, collaborating with Thailand to co-develop hydrogen-natural gas hybrid systems to reduce carbon emissions and promote sustainability (LESS, 2017; The Bangkok Insigne, 2025; Siam Deposit, 2024). The global momentum toward green energy reflects a collective effort to lower greenhouse gas emissions, balance energy needs, and foster sustainable economic growth. Sustainable energy—defined as energy produced and consumed without depleting natural resources or harming the environment—has become a cornerstone of international policy, particularly under the United Nations' Sustainable Development Goal 7, which promotes access to affordable, reliable, sustainable, and modern energy for all (Asif, Fiaz & Zulfikar, 2022; Aktas et al., 2015; Fisher-Vanden et al., 2015; Knoll & Senge, 2019; Alizadeh et al., 2020). Across the globe, countries are deploying renewable energy sources and advanced technologies such as solar, wind, hydro, biomass, and hydrogen to achieve these aims (Farmer, 2022; Fowler et al., 2017; Kong et al., 2024).

In the Thai context, the Provincial Electricity Authority (PEA), Region 2 (Northeastern Region)—a state enterprise under the Ministry of Interior—is tasked with the reliable distribution of electricity to households and businesses throughout northeastern Thailand. In addition to maintaining and developing power distribution systems, the agency is committed to promoting renewable energy and conservation initiatives. Its comprehensive services also include electrical engineering consultation, system design, construction, installation, and maintenance to support regional socio-economic development (Provincial Electricity Authority, 2025; 2011; 2020; 2021; 2023; 2024). In response to evolving global energy demands, the PEA has adopted green energy and sustainability as core operational pillars. Its notable initiatives include the Utility Green Tariff (UGT1) for non-specific renewable sourcing, Renewable Energy Certificates (REC) for carbon-neutral organizations, and CARBONFORM, a platform for carbon emissions assessment and management. Additional projects include PEA LED for Cultural Tourism, which installs energy-saving LED lights at historical sites, EV promotion initiatives through the PEA Volta Platform, and rural electrification to support agricultural productivity and sustainable rural development (The Bangkok Insight, 2025; Siam Deposit, 2024; LESS, 2017; PEA, 2023–2025). Consequently, the performance of PEA Region 2 now depends not only on traditional service delivery but also on its green and sustainable energy initiatives. Based on a synthesis of concepts related to electricity authority operations, green energy, and sustainable energy, three key factors have emerged as critical to performance outcomes: Green Leadership, Green Innovation, and Corporate Social Responsibility (CSR) (U.S. Energy Information Administration, 2005; Durmus Senyapar, 2024; Aneja & Mathpal, 2022; Murshed, 2020; Gong et al., 2023).

Green Leadership is particularly influential in guiding the PEA's sustainability efforts. Leaders who prioritize environmental responsibility can effectively integrate green strategies into electricity distribution, invest in clean energy R&D, and foster employee participation through incentive-based programs. Such leadership not only aligns the PEA with clean energy trends but also enhances its organizational efficiency, environmental compliance, and public image (Newman et al., 2017; Matsunaga, 2018; Li et al., 2017; Liu et al., 2020). Green Innovation, including smart grid technologies, renewable systems, and energy storage, helps reduce energy loss, lower operational costs, and increase infrastructure lifespan. It also aids in meeting environmental standards and attracting stakeholders

aligned with Environmental, Social, and Governance (ESG) values, thus strengthening the PEA's competitiveness in the clean energy market (Kong et al., 2024; Buechler & Martínez-Molina, 2021; Cao & Liu, 2022). Similarly, Corporate Social Responsibility (CSR) enhances the PEA's public trust, brand image, and long-term viability. Through CSR programs—such as rural electrification, green energy promotion, and smart grid development—the organization builds strong relationships with government bodies, investors, and local communities. These efforts also align with ESG expectations, further contributing to organizational sustainability and investment attractiveness (Rhodes & Fleming, 2020; BlackRock, 2018; Stobierski, 2021). Given the critical role of the PEA Region 2 in providing essential power services and promoting sustainable development, this research proposes a conceptual model to explore how Green Leadership, Green Innovation, and CSR influence its performance. The study aims to identify strategies to enhance the PEA's operational effectiveness and contribute to Thailand's broader goals of economic, social, and environmental sustainability.

OBJECTIVE

- (1) To explore and identify appropriate variables that serve as key components in a model explaining the performance of the Provincial Electricity Authority, Region 2 (Northeastern Thailand).
- (2) To examine the nature of influential relationships and to develop a research framework that leads to the construction of a structural equation model capable of forecasting the performance level of the Provincial Electricity Authority, Region 2 (Northeastern Thailand).

METHODOLOGY

This research adopts a documentary research approach by reviewing literature related to sustainable tourism innovations for the elderly in Thailand, covering developments from the past to the present. The study involves the collection and analysis of documents and materials relevant to the topic, including official documents, academic books, research reports, theses, newspapers, printed media, magazines, journals, articles, and bulletins. These documents serve as the foundational data sources for the development of this study. Research tools and data collection methods include the use of official documents, academic publications, research reports, theses, newspapers, printed media, magazines, journals, articles, and newsletters. The researcher collected data independently from a variety of sources such as websites, libraries, and other information centers. The collected data were organized according to predetermined research objectives. The data analysis process involved categorizing information based on the research objectives, followed by descriptive analysis of the contents. The information was then synthesized using content analysis methodology, and the findings were presented in essay format to convey the conclusions derived from the study.

RESULTS

Leadership, particularly green leadership, refers to a leadership style that places strong emphasis on environmental consciousness and sustainable development. This form of leadership prioritizes eco-friendly management practices, encourages innovation aimed at minimizing environmental impact, and promotes organizational growth aligned with sustainability goals. Green leaders play a key role in shaping organizational values and fostering a culture that supports green innovation by encouraging environmental awareness among employees and openness to new ideas that reduce ecological footprints (Green Swan Conference, 2023; Hickel & Kallis, 2019; Heizmann & Liu, 2018). Environmentally conscious leaders also serve as strategic drivers of organizational direction. They are instrumental in planning and implementing policies that facilitate the adoption of green technologies. Such leaders often allocate financial and human resources to green projects, and invest in research and development (R&D) focused on clean energy and waste-reducing production methods. Their efforts often aim to create environmentally friendly products and production systems that align with global sustainability standards (Newman, Eva & Herbert, 2017; Matsunaga, 2018; Li, Li & Li, 2017; Li, 2015).

Furthermore, green leadership actively encourages employee participation in eco-innovation initiatives. These leaders foster creativity by offering rewards and incentives for environmental initiatives, recognizing employee-driven projects, providing bonuses for practical green innovations, and cultivating work environments that encourage experimentation and idea generation (Liu et al., 2020; Liu & An, 2020; D'Sa & Murthy, 2006; U.S. Energy Information Administration, 2005; Chester, 2015). These observations align with the findings of Zacher, Kühner, Katz, and Rudolph (2024), who developed an integrated conceptual model describing the antecedents and consequences of green leadership behaviors across multiple levels. Their research highlights that environmentally responsible leadership significantly promotes green innovation within organizations. Leaders who demonstrate eco-friendly behavior can establish a workplace environment that supports the development of sustainable innovations, thereby enhancing the environmental performance of the organization. Similarly, the study by Dubey, Gunasekaran, and Ali (2015) revealed a positive correlation between environmental leadership and green innovation. Their findings suggest that environmental leaders contribute to the overall quality management of organizations and strengthen supplier relationships, resulting in improved environmental outcomes. Further supporting this perspective, Su et al. (2020) examined the relationship between environmental leadership, green innovation practices, and organizational performance. Their results confirmed that leaders who prioritize environmental issues positively influence the implementation of green practices. Moreover, environmental knowledge learning was found to enhance this relationship, as acquiring such knowledge amplifies the capacity of leaders to drive sustainable innovation internally. In light of this literature review, a solid body of academic evidence supports the formation of a research hypothesis proposing that leadership has a direct influence on green innovation.

H:1 Leadership has a direct influence on Green Innovation

Organizational leadership plays a crucial role in shaping both the direction and the outcomes of corporate social responsibility (CSR) initiatives. Leaders are responsible for defining the organization's vision and mission, both of which directly influence the strategic implementation of CSR. When leadership prioritizes sustainability and social accountability, there is a higher tendency for CSR principles to be effectively integrated into core business strategies (General Motors, 2022; Zuo, Schwartz & Wu, 2017; Egri & Herman, 2000; Bolden & Gosling, 2007). Leadership behavior also significantly influences organizational culture and employee motivation. When leaders embody CSR values through their decisions and conduct, employees are more likely to align with and act upon these values. Even when CSR policies are in place, a lack of leadership support can hinder their successful execution. Leaders are in a position to allocate crucial resources—including budgets, personnel, and technology—to drive CSR programs forward (Alwheshi, Alzubi & Iyiola, 2024; Anunthawichak et al., 2015; Amaladoss & Manohar, 2013; Banerjee, 2008). This notion is supported by David, Abreu, Carreira & Goncalves (2010), whose study found a positive link between CSR practices and improved performance indicators. Their research suggests that leadership involvement in CSR activities contributes to better organizational outcomes. Similarly, Shabana, Buchholtz, and Carroll (2017) proposed a three-stage model explaining how isomorphic mechanisms influence CSR reporting practices. Their findings highlight how leaders play a key role in guiding organizations through the phases of CSR adoption by responding strategically to external pressures and enabling organizational adaptation. Further insight comes from Ban (2020), who analyzed executive discourse surrounding CSR in labor-related contexts. The study found that while leaders often express rhetorical support for CSR, such support frequently remains superficial, avoiding deep structural change. Executives tend to focus on minimal compliance or surface-level improvements aimed at preserving the corporate image, rather than initiating transformative actions that might challenge existing power dynamics or affect profitability. This highlights the influential role of leaders in determining both the direction and depth of CSR engagement. Dickson (2016), along with Hemingway, emphasized the ethical dimension of leadership in CSR. Leaders with strong moral convictions and personal values often function as corporate social entrepreneurs, spearheading responsible practices within the organization. Their proactive engagement in socially responsible behavior underscores the idea that morally driven leadership is a significant enabler of CSR advancement. Based on the review of the literature presented above, there is a substantial body of academic evidence suggesting that leadership exerts a direct influence on the implementation of corporate social responsibility (CSR) within organizations.

H:2 Leadership has a direct influence on Corporate Social Responsibility

Leadership is recognized as a critical factor that directly influences organizational performance. Leaders are responsible for setting the organization's direction, formulating strategies, and motivating employees to work efficiently (Knoll & Senge, 2019; Khadijah, Mohammad & Suhana, 2017; Portugal & Yukl, 1994). Visionary leaders who clearly define appropriate goals guide their organizations toward success while fostering a sense of shared purpose among employees. This alignment often leads to increased productivity and overall performance (Wang, Liu & Zhang, 2022; Ogunbiyi & Oladokun, 2023; Sanchez & Robert, 2010; Alarcon & Serpell, 1996). Leadership also plays a pivotal role in shaping organizational culture—whether that be a culture of innovation, customer focus, or professionalism. Furthermore, leaders are essential in managing organizational resources, including budgets, personnel, and technology. When leaders can effectively allocate and optimize these resources, organizations tend to gain a competitive edge and reduce operational costs. Strong cost management skills are particularly vital during periods of economic instability, as they help ensure the organization's survival and resilience (Altbach, Reisberg & Rumbley, 2019; Borden & Bottrill, 1994; Luneva, 2015). Organizations that successfully adapt to economic, technological, and societal changes are better positioned to remain competitive. In such transformations, leadership is a driving force. Leaders influence how organizations develop new products, enhance services, and improve processes—elements that are essential to achieving a sustainable competitive advantage (Chaisritha & Sukserm, 2021; Rungruangand & Srisuk, 2023; Supprasert & Chomchey, 2021). This is consistent with the findings of Asif, Fiaz, and Zulfiqar (2022), who observed that sustainable energy management and improved financial performance are often linked to the strategic decisions made by organizational leaders. Their research confirms that effective leadership fosters sustainability and financial efficiency. Similarly, Aktas, Croci, and Petmezas (2015) noted that efficient working capital management is commonly associated with strategic leadership decisions, thereby enhancing operational performance. In the Thai context, Owatsuwan et al. (2023) examined the relationship between transformational leadership and employee performance in state enterprises. The study revealed that transformational leadership positively influences job satisfaction, which in turn directly impacts performance outcomes. Moreover, transformational leadership was found to shape organizational culture, strengthen employee commitment, and thus contribute indirectly to performance enhancement. Chaiyachue and Saengmahachai (2022) conducted a comparative study between high- and low-performing community enterprises and found significant differences in leadership styles, management practices, and other organizational characteristics such as member participation, location, age of the enterprise, and external support. Their findings underscore that leadership is a determining factor in the success and effectiveness of community enterprises in Thailand, with different leadership approaches playing a role in driving performance. Based on this literature review, there is strong empirical support for the development of the following research hypothesis.

H:3 Leadership has a direct influence on Performance

Organizations in the energy sector that effectively implement green innovation can significantly enhance their competitive advantage, reduce operational costs, promote long-term sustainability, and increase profitability (Kong, Cao & Fei, 2024; Buechler & Martínez-Molina, 2021; Cao & Liu, 2022). Adopting green innovation strategies contributes to cost reduction in energy and production processes, extends the lifespan of infrastructure and equipment, and minimizes energy loss in transmission and distribution systems (Aneja & Mathpal, 2022; Harrison, 2022; Otsuka, 2024). Beyond operational efficiency, green innovation plays a critical role in reducing carbon emissions and mitigating the effects of global warming. It helps organizations lower compliance costs related to environmental regulations and strengthens their position in global markets. Environmentally conscious practices can also attract investors who prioritize sustainable and ethical businesses, enhancing the organization's image and market opportunities (Li, Li & Li, 2017; Li, Tian, Liu & Li, 2024). Moreover, green innovation builds consumer and investor confidence, which contributes to a stronger market presence, especially in sectors that emphasize Environmental, Social, and Governance (ESG) standards. It opens new avenues for partnerships and collaborations with like-minded organizations that value sustainability (Wang et al., 2020; Wang & Wang, 2021; Nair et al., 2024; Feng & Ma, 2020). This aligns with findings from Yoon (2023), whose study on public procurement policy reform in South Korea highlights the importance of innovation in enhancing efficiency, transparency, and cost-effectiveness in public administration.

Innovative procurement processes were also found to support regional development, job creation, and economic stimulation—indicating that innovation directly impacts performance in public sector organizations. Similarly, Li, Li, and Li (2017) demonstrated that green innovation enhances resource efficiency while reducing environmental impacts. Their research showed that implementing green technologies and production methods leads to lower energy consumption, reduced raw material use, and decreased production costs—all while improving productivity. These innovations also contribute to better public health and environmental outcomes, positioning organizations favorably among stakeholders and consumers, and creating potential for long-term business growth. Liao and Li (2022) investigated the effectiveness of green innovation in Chinese urban areas, identifying it as a crucial driver in the transition toward an environmentally friendly economy. Efficient green innovation in cities contributes to resource conservation and pollution reduction, which in turn enhances both environmental quality and public health. Their study further emphasized that several key factors influence the success of urban green innovation, which directly affects the overall sustainability performance of urban economic systems. Based on this review of relevant literature, there is strong empirical evidence supporting the development of the following research hypothesis.

H:4 Green Innovation has a direct influence on Performance

Organizations that implement corporate social responsibility (CSR) effectively not only reap business benefits but also contribute to long-term organizational stability and sustainability (Rhodes & Fleming, 2020; BlackRock, 2018; Stobierski, 2021; Banerjee, 2008; Steensen & Villadsen, 2020). CSR enhances the corporate image, which can lead to increased sales and revenue, as consumers tend to support businesses that demonstrate social accountability. Moreover, CSR contributes to cost reduction through efficient resource utilization and attracts investors who prioritize Environmental, Social, and Governance (ESG) principles. Through the cultivation of a trustworthy and responsible brand image, CSR strengthens customer loyalty and enhances stakeholder relationships. These elements together improve the organization's long-term competitiveness and drive sustainable business success (Kazmi, Leca & Naccache, 2016; Dickson, 2016; Murtola & Vallely, 2023). According to General Motors (2022), CSR efforts play a vital role in improving multiple dimensions of business performance. These include greater public trust, enhanced employee morale and pride, reduced legal and reputational risks, and opportunities to differentiate the organization in the market—ultimately helping expand market share. This perspective is reinforced by Ghosh (2015), who emphasized the role of CSR in workforce development. The study indicated that CSR-driven skill training programs can help address inequities in the labor market. It highlighted how technical training under corporate CSR initiatives may offer more credibility and market value than government-run vocational institutes. Therefore, CSR initiatives contribute not only to business needs but also to social advancement by fostering inclusive skill development and reducing labor discrimination. Further supporting this argument, Zuo, Schwartz, and Wu (2017) examined CSR practices in China's food industry. They found that societal and media pressure significantly influenced corporate behavior. Responsive CSR strategies helped businesses improve their public image and build consumer trust—factors essential for sustainability in highly visible industries. In a similar vein, Shabana, Buchholtz, and Carroll (2017) suggested that CSR allows organizations to effectively respond to stakeholder expectations, capitalize on new opportunities, and maintain their competitive standing. These findings underscore CSR's strategic importance in achieving long-term business goals and building resilient, future-ready enterprises. Based on the reviewed literature, substantial academic evidence supports the following research hypothesis.

H:5 Corporate Social Responsibility has a direct influence on Performance

Based on these hypotheses, the researcher can develop the following conceptual framework for the study.

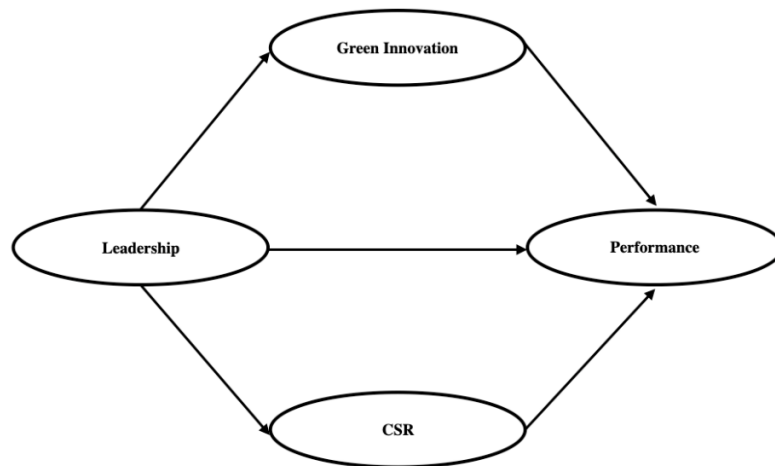


Figure 1: The Research Framework

CONCLUSION

This research set out to investigate the antecedent factors that influence the performance of the Provincial Electricity Authority, Region 2 (Northeastern Thailand), through a comprehensive review of relevant literature. By adopting a documentary research methodology, the study synthesized academic insights from diverse sources to develop a conceptual model grounded in three core constructs: Green Leadership, Green Innovation, and Corporate Social Responsibility (CSR). The findings from the literature reveal that leadership, particularly when environmentally conscious, plays a central role in guiding organizational strategy, promoting sustainable innovation, and fostering a culture of responsibility that aligns with global energy transitions. Green Innovation was shown to not only reduce costs and environmental impact but also to strengthen competitive capabilities and long-term organizational sustainability. Similarly, effective CSR initiatives were consistently linked with improved stakeholder engagement, reputational enhancement, and financial performance. The convergence of these elements underscores the strategic importance of aligning organizational values and operations with sustainability goals in the energy sector. The research offers a theoretically grounded causal model, which integrates these constructs into a framework that can be empirically tested in future studies. This conclusion affirms that Leadership, Green Innovation, and CSR are not only interdependent but are also directly influential in shaping the overall performance of energy organizations in today's environmentally and socially conscious landscape.

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