



Sustainable Energy Management Strategies in Reducing the Impact of Fossil Energy on Climate Change and Green Energy Implementation in the Business Sector

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Abstract : *This research aims to examine the management of environmental risks arising from the use of fossil energy and strategies for transitioning to green energy in the business sector. The main focus of the research is to analyze the managerial role in facing environmental regulatory challenges, as well as how leaders and managers can develop a culture of sustainability within the organization. This research uses a qualitative approach with in-depth interview techniques and document analysis on large companies in the industrial and manufacturing sectors that have adopted or are transitioning to green energy, in the period June-September 2024. The results show that companies that successfully reduce environmental risks have a clear and strong energy transition strategy, including investments in green technology and managerial training related to sustainability. The biggest challenges faced are government policy uncertainty and the high costs involved in green energy implementation. In addition, this study also highlights the important role of visionary leaders and competent managers in driving organizational culture change towards sustainability. The implication of this research is the importance of a proactive, innovative management approach and compliance with environmental regulations in the face of green energy transition.*

Keywords: Risk Management, Green Energy, Environmental Regulation, Energy Transition, Sustainability

1. INTRODUCTION

This introduction discusses the importance of energy transition from fossil fuel use to green energy as an effort to reduce environmental impacts, which has been a global concern since the last few decades. Fossil energy use has been known to contribute greatly to climate change and wider environmental damage, especially in terms of greenhouse gas emissions (Vatcharadze, 2023). Therefore, environmental risk management is crucial, especially for business sectors that still rely heavily on fossil energy. These risks include regulatory uncertainty, stakeholder pressure, and fluctuating energy prices that can affect the stability of the company (Keyghobadi et al., 2020).

An energy transition strategy towards green energy also requires an integrated approach in organizational management. Companies are expected to make investments in renewable energy technologies and energy efficiency as part of their long-term strategy, which will not only reduce environmental impacts, but also increase the competitiveness of the company in the future (Tesfaye et al., 2023).

As regulations tighten and public awareness of sustainability increases, the role of leaders and managers in building a culture of sustainability becomes increasingly important in ensuring that companies are able to adapt to change and achieve long-term goals in line with sustainability principles (Salvioni & Almici, 2020).

The energy transition from fossil fuels to green energy requires not only technological change, but also adjustments in corporate governance and risk management. In this context, environmental risk management becomes crucial to ensure the sustainability of company operations. Companies must be able to identify, assess and mitigate environmental risks stemming from fossil energy use, such as air pollution and climate change that can negatively impact their image and business sustainability. For example, a comprehensive risk management approach can help companies comply with environmental regulations and reduce the likelihood of fines or sanctions arising from violations of those rules (Axon & Darton, 2021).

Energy transition strategies also require the support of visionary top management, capable of setting sustainability goals and steering the company towards investments in renewable energy. The adoption of green energy not only offers environmental benefits, but can also enhance a company's reputation in the eyes of increasingly sustainability-conscious consumers. These strategies include adopting new energy technologies such as solar and wind power, as well as improving energy efficiency through smarter management practices (Rafiq et al., 2022). However, there are significant managerial challenges in executing this transition strategy. One of the main challenges is the regulatory uncertainty and high costs associated with investing in green energy. Companies often have to balance between short-term profits and long-term investments in green technologies that may take time to generate financial returns. In addition, resistance to change in corporate culture can also be a significant barrier to adopting green energy. Therefore, the role of leaders and managers is critical in steering this transition. Leaders who are committed to sustainability can drive innovation, increase employee engagement, and ensure that the energy transition is not only the responsibility of technical departments, but also an integral part of the overall business strategy (Schulte et al., 2020).

By integrating risk management approaches and strong leadership, companies can better prepare for the challenges posed by the green energy transition and remain competitive in an increasingly sustainability-focused business environment.

Theoretical Basis and Hypothesis Development

1. Environmental risk management related to fossil energy use

Environmental risk management is particularly important in the context of fossil energy use due to its significant impact on climate change and the global ecosystem. Fossil energy, such as coal and oil, contributes to greenhouse gas emissions, which exacerbate global warming. Companies therefore need to implement risk management strategies that involve monitoring environmental impacts and implementing policies to mitigate these risks. For example, companies in the oil and gas sector are beginning to implement more collaborative risk management practices focused on compliance with international environmental regulations to match global sustainability needs (Tesfaye et al., 2023).

2. Organizational energy transition strategies for adopting green energy

Energy transition in organizations leads to major changes in policy and technology, including reducing dependence on fossil fuels and switching to renewable energy such as solar and wind energy. It involves using more efficient technologies, utilizing renewable energy, and adjusting business models to meet sustainability standards. Research shows that a successful energy transition requires synergies between technology and policy, including the development of energy storage technologies to support long-term sustainability (Kabeyi & Olanrewaju, 2022).

3. Managerial challenges in dealing with environmental policies and regulations

Increasingly stringent environmental policies pose challenges for company management, especially in terms of compliance with regulations that force companies to reduce carbon emissions and switch to green energy. Management must be able to navigate policy uncertainty as well as the huge cost burden of investing in new technologies. In addition, companies often face pressure from stakeholders to improve corporate social responsibility and comply with international environmental standards (Vatcharadze, 2023).

4. The role of leaders and managers in developing a culture of sustainability in the organization

Leaders and managers play an important role in building a culture of sustainability in organizations. They must be able to drive organizational change towards the adoption of green energy and the implementation of environmentally friendly policies. Research shows that sustainability-focused transformative leadership can significantly reduce employee turnover and increase their engagement in corporate sustainability efforts (Li et al., 2021).

These approaches show that to overcome the negative impacts of fossil energy and adopt green energy, companies need integrated management strategies, appropriate technology and Sustainability-oriented leadership. The following visualization of the research concept shows the main flow from fossil energy use, its impact on the environment, to managerial and leadership strategies in green energy transition and sustainability. This visualization helps understand the relationship between environmental risk management, energy transition strategies, managerial challenges, and the role of leaders in developing a culture of sustainability in organizations.

2. METHODS

This research used a qualitative approach to explore environmental risk management strategies related to fossil energy use and the transition to green energy within the Organization (Umar, 2019). This method was chosen because it allows a deep understanding of managerial challenges and the role of leadership in developing a culture of sustainability. This research method provides an in-depth understanding of the dynamics of energy transition within companies and how management and leadership play a role in achieving sustainability goals.

1 . Research Design

This research adopts a case study design that focuses on several companies in the industrial and energy sectors that have implemented or are transitioning from fossil energy to green energy. Case studies are used to explore in depth how these companies manage environmental risks and implement sustainability strategies (Saady, 2020).

2. Sample and Participants

The research sample included large and medium-sized companies operating in the energy and industrial sectors in Indonesia. The main participants in this study were top managers, operational managers, and unit leaders responsible for environmental and sustainability policies. The sampling technique was purposive, with the criteria being companies that have an energy transition policy or plan.

3. Data Collection

Data were collected through in-depth interviews and analysis of company documents. Interviews were semi-structured to get first-hand views from leaders and managers on how they manage environmental risks and implement energy transition strategies. Document analysis included sustainability reports, energy policies, and environmental regulatory documents implemented by the companies.

4. Data Analysis

Data was analyzed using the thematic analysis method. This process involved coding the data to identify key themes related to environmental risk management, energy transition strategies, regulatory challenges, and the role of leadership in promoting a culture of sustainability. The findings were analyzed to identify patterns and relationships between the variables.

5. Data Validity

To ensure data validity, triangulation techniques were used by combining data from interviews, document analysis, and observations. In addition, member checking was conducted by requesting feedback from participants regarding data interpretation.

3. RESULTS AND DISCUSSION

This research has several significant positive impacts. First, the reduction in carbon emissions from less reliance on fossil energy has a positive impact on the global environment and society, with reduced air pollution and climate change risks. In addition, companies that invest in green technologies can also improve energy efficiency and save long-term operating costs, providing direct benefits to companies, investors and consumers in the form of more competitive products. Companies' reputations also tend to improve with their commitment to sustainability, which is welcomed by the public and stakeholders, and has a positive impact on employees who are proud to work for an environmentally responsible organization. On the other hand, green energy-related training for employees develops their competence in sustainable technology and management, which is important for career advancement in the green energy sector.

However, the study also identified some negative impacts that need to be considered. The high cost of implementing green energy technologies can be a burden for companies, especially in the initial investment phase. In addition, uncertainties in environmental policies and regulations pose a challenge for leaders and managers who must ensure the company's strategy is in line with dynamic regulations. For employees, the transition can create uncertainty or fear around the need for new skills, challenging them to adapt to the changing culture and technology. Quite often, management teams also face internal resistance from organizational members who may be reluctant to accept changes in sustainability culture or the use of new technologi

The long-term positive impact of this research will be felt by companies committed to sustainability, policy makers who support green energy, and communities who will enjoy a cleaner and healthier environment. The research found that companies that successfully manage the energy transition from fossil fuels to green energy have effective environmental risk management and sustainability strategies integrated into their operations. Companies that succeed in the energy transition have a strong strategic approach, supported by sound risk management and leadership committed to sustainability. Some key findings are as follows:

1. Environmental Risk Management

Companies operating in the energy and industrial sectors face significant environmental risks associated with the use of fossil energy. These risks include greenhouse gas emissions, air pollution, as well as pressure from increasingly stringent environmental regulations. To address this, companies are starting to implement more proactive environmental risk management systems. They identify and mitigate environmental impacts by investing in green technologies and complying with international standards on carbon emissions.

2. Energy Transition Strategy

The transition to green energy is made through the adoption of new technologies such as solar, wind and bioenergy. Companies that are more advanced in this transition have diversified their energy sources, minimizing dependence on fossil energy. However, many companies still face challenges in terms of high investment costs and technologies that are not yet fully mature. Nonetheless, companies investing in green energy are seeing significantly improved efficiency and reduced environmental impact

3. Managerial Challenges

The main challenges faced by the company were regulatory uncertainty and the high cost burden of adopting green energy. In addition, there is resistance from some parts of the organization that are reluctant to make changes due to cost and retraining needs. These challenges require an adaptive and innovative management approach to overcome barriers to sustainability strategy implementation.

4. The Role of Leadership

Visionary leadership has proven to be a key factor in the success of the energy transition and the development of a culture of sustainability. Leaders who support green initiatives are able to drive organizational change by creating a clear vision of sustainability and building commitment from all levels of the organization.

Companies that have advanced in the green energy transition are adopting new technologies such as solar, wind and bioenergy. This diversification of energy sources is proven to reduce dependence on fossil energy and provides significant benefits, including improved energy efficiency and reduced environmental impact. Past studies support this, where the use of renewable energy sources such as solar and wind, along with energy efficiency initiatives, contribute to reduced carbon emissions and better energy sustainability (Kabeyi & Olanrewaju, 2022). The main challenge in this transition is the high initial investment cost, but the long-term benefits of green technologies make the transition economically viable in the long run (Bogdanov et al., 2021).

The main challenges companies face in adopting green energy are regulatory uncertainty and high investment costs. In addition, internal resistance from some parts of the organization, especially related to the need for retraining, is a major obstacle. According to (Markard et al., 2020), the challenges of acceleration in sustainability transitions often involve system-wide changes, multi-system interactions, as well as resistance from established organizations. These challenges require innovative and adaptive managerial approaches in order to overcome the barriers.

4. CONCLUSION

The conclusion of this study shows that the transition to green energy in the industrial and energy sectors presents great opportunities, but also challenges. Companies that successfully adopt new technologies such as solar, wind and bioenergy, can reduce dependence on fossil energy, increase efficiency and reduce environmental impacts. However, this transition is not free from managerial challenges, such as regulatory uncertainty and high investment costs. Internal resistance within organizations is also a significant obstacle, especially regarding the need for retraining and changes in work culture. In this case, visionary leadership proved to be crucial. Sustainability-focused leaders are able to drive organizational change by creating a clear vision and building commitment from all levels of the organization. Thus, adaptive and innovative management approaches, as well as strong leadership, are key to success in meeting the challenges of the energy transition and developing a culture of sustainability within the company. This research provides an in-depth understanding of how companies can manage the energy transition more effectively to achieve long-term sustainability goals.

REFERENCES

- Axon, C. J., & Darton, R. C. (2021). Sustainability and risk – a review of energy security. *Sustainable Production and Consumption*, 27, 1195–1204. <https://doi.org/10.1016/j.spc.2021.01.018>
- Bogdanov, D., Ram, M., Aghahosseini, A., Gulagi, A., Oyewo, A. S., Child, M., Caldera, U., Sadvovskaia, K., Farfan, J., De Souza Noel Simas Barbosa, L., Fasihi, M., Khalili, S., Traber, T., & Breyer, C. (2021). Low-cost renewable electricity as the key driver of the global energy transition towards sustainability. *Energy*, 227, 120467. <https://doi.org/10.1016/j.energy.2021.120467>
<https://doi.org/10.5772/intechopen.98345>
- Kabeyi, M. J. B., & Olanrewaju, O. A. (2022). Sustainable Energy Transition for Renewable and Low Carbon Grid Electricity Generation and Supply. *Frontiers in Energy Research*, 9. <https://doi.org/10.3389/fenrg.2021.743114>
- Keyghobadi, A. R., Ebadi, A., Yeganegi, M. R., & Motadel, M. R. (2020). The Analysis of Sustainable Supply Chain Risks Based on the FMEA Method in the Oil and Gas industry and Factors Affecting Risk Management. *Petroleum Business Review*, 4(1), 95–116. <https://doi.org/10.22050/pbr.2020.115177>
- Lee, S.-C., & Huang, S. Y. B. (2023). The effect of Chinese-specific environmentally responsible leadership on the adoption of green innovation strategy. *Energy & Environment*, 0958305X2311777. <https://doi.org/10.1177/0958305X231177731>
- Li, L., Zhu, B., Che, X., Sun, H., & Tan, M. (2021). Examining Effect of Green Transformational Leadership and Environmental Regulation through Emission Reduction Policy on Energy-Intensive Industry's Employee Turnover Intention in China. *Sustainability*, 13(12), 6530. <https://doi.org/10.3390/su13126530>
- Markard, J., Geels, F. W., & Raven, R. (2020). Challenges in the acceleration of sustainability transitions. *Environmental Research Letters*, 15(8), 081001. <https://doi.org/10.1088/1748-9326/ab9468>
- Rafiq, M., Akbar, A., Maqbool, S., Sokolová, M., Haider, S. A., Naz, S., & Danish, S. M. (2022). Corporate Risk Tolerance and Acceptability towards Sustainable Energy Transition. *Energies*, 15(2), 459. <https://doi.org/10.3390/en15020459>
- Saady, A. F. (2020). *Penelitian Kualitatif ; Phenomenology dan Grounded Theory* (G. Firryant (ed.); Pertama). PT Firyant Pratama.
- Salvioni, D. M., & Almici, A. (2020). Transitioning Toward a Circular Economy: The Impact of Stakeholder Engagement on Sustainability Culture. *Sustainability*, 12(20), 8641. <https://doi.org/10.3390/su12208641>
- Schulte, J., Villamil, C., & Hallstedt, S. I. (2020). Strategic Sustainability Risk Management in Product Development Companies: Key Aspects and Conceptual Approach. *Sustainability*, 12(24), 10531. <https://doi.org/10.3390/su122410531>
- Tesfaye, F. K., Getaneh, A. M., & Birhan, M. (2023). The management of sustainable energy sources in the mechanical sector. *Urban Resilience and Sustainability*, 1(2), 138–145. <https://doi.org/10.3934/urs.2023010>
- Umar, H. (2019). *Metode riset manajemen perusahaan*. books.google.com. <https://books.google.com/books?hl=en%5C&lr=%5C&id=CSyUDwAAQBAJ%5C&oi=fnd%5C&pg=PP1%5C&dq=sdm+perusahaan%5C&ots=ZkygELO27j%5C&sig=KgnlL9BNw3034BoB1DW6C5474HA>

Vanegas Cantarero, M. M. (2020). Of renewable energy, energy democracy, and sustainable development: A roadmap to accelerate the energy transition in developing countries. *Energy Research & Social Science*, 70, 101716. <https://doi.org/10.1016/j.erss.2020.101716>

Vatcharadze, A. (2023). THE ROLE OF ECONOMIC POLICY IN THE PROCESS OF TRANSITION TOWARD “GREEN ENERGY.” *Economic Profile*, 18(2(26)), 24–31. <https://doi.org/10.52244/ep.2023.26.04>