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The Influence of Risk Management on Business Sustainability Mediated by Environmental Performance

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Keywords:
risk management; environmental performance; business sustainability; mediation; structural equation modeling (SEM).

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Abstract

Businesses face increasing environmental pressures, regulatory requirements, and operational uncertainties that threaten their long-term viability. Risk management is widely recognized as a strategic approach to anticipating and mitigating these challenges; however, its contribution to business sustainability remains insufficiently understood. This study aimed to examine the relationship between risk management and business sustainability, with environmental performance serving as a mediating variable. A quantitative research approach was employed, and primary data were collected from 100 respondents using an online questionnaire administered through Google Forms. The data were analyzed using structural equation modeling with partial least squares (PLS-SEM) through SmartPLS software, encompassing measurement model assessment, structural model evaluation, and mediation analysis. The findings revealed that risk management did not have a statistically significant direct effect on business sustainability but had a significant positive effect on environmental performance. Furthermore, environmental performance significantly influenced business sustainability and mediated the relationship between risk management and business sustainability. These findings suggest that effective risk management contributes to business sustainability primarily through improvements in environmental performance rather than through a direct relationship. Environmental performance therefore serves as a key mediating mechanism through which risk management practices contribute to long-term business sustainability. The study highlights the importance of integrating risk management strategies with measurable environmental performance improvements to strengthen organizational resilience and support sustainable business operations.

INTRODUCTION

In an era of accelerating globalization and increasingly evident climate change, business sustainability has become a strategic priority for companies across various sectors, particularly the energy sector, which has substantial environmental impacts. Energy companies in Indonesia face growing pressure not only to achieve economic profitability but also to minimize the environmental consequences of their operations and contribute to sustainable development. In this context, risk management plays a crucial role as a strategic mechanism that enables companies to identify, assess, manage, and mitigate risks that may threaten business continuity, including financial, operational, and environmental risks. Previous studies have indicated that Indonesian energy companies continue to face significant challenges in managing environmental risks, which, if inadequately addressed, may contribute to environmental degradation and adversely affect corporate reputation and stakeholder

confidence (Aidara et al., 2021; Georgakellos et al., 2024; López-Torres et al., 2022; Maksum et al., 2024; Mošková & Buganová, 2023; PwC Indonesia, 2023).

Environmental performance is a key indicator of a company's effectiveness in managing and minimizing the environmental impacts of its operations. The adoption of environmental management standards, such as ISO 14001, and participation in Indonesia's Corporate Performance Rating Program in Environmental Management (PROPER), administered by the Ministry of Environment and Forestry, provide important frameworks for evaluating corporate environmental management practices and performance. Companies that demonstrate improved environmental performance can strengthen regulatory compliance while enhancing stakeholder trust, corporate reputation, and community support (Hadi et al., 2025). These outcomes may contribute to long-term business sustainability by reinforcing competitive advantages, improving stakeholder relationships, and supporting overall corporate value creation (Hernita et al., 2021; Jawak & Lubis, 2023; Kheireddine et al., 2024; Lehenchuk et al., 2023; Mukhibad et al., 2024; Pérez Estébanez & Sevillano Martín, 2025; Zhang et al., 2025).

Organizational culture also plays an important role in promoting sustainable business practices by embedding environmental responsibility, social accountability, and sustainability principles into organizational values and daily operations. A sustainability-oriented organizational culture can encourage employees and management to adopt proactive risk management practices and contribute to continuous improvements in environmental performance. Such a culture fosters collective awareness, shared responsibility, and organizational commitment, providing a foundation for environmentally responsible decision-making and long-term business sustainability (Adisti et al., 2024; Gorzeń-Mitka & Wieczorek-Kosmala, 2023).

Despite growing scholarly attention to risk management and corporate sustainability, several research gaps remain regarding the relationship between risk management, environmental performance, and business sustainability in Indonesia's energy sector. Previous studies have frequently examined these relationships across multiple industries, while sector-specific investigations addressing the distinctive environmental risks, regulatory requirements, and operational characteristics of Indonesian energy companies remain relatively limited. Furthermore, the mediating role of environmental performance in explaining how risk management contributes to business sustainability requires further investigation, particularly in industries with substantial environmental impacts (Al-Nimer, 2024; Dewi et al., 2024; Indawati et al., 2024; Resende et al., 2024). Although organizational culture has been recognized as an important factor in promoting sustainable practices, its potential role in shaping risk management effectiveness and environmental outcomes has not been comprehensively explored. Methodologically, existing research has often relied on secondary quantitative data or relatively limited survey-based approaches, potentially restricting insights into the organizational processes underlying risk management and sustainability practices. Moreover, contextual factors, including Indonesian environmental regulations, market pressures, and local sociocultural dynamics, have not always been adequately incorporated into existing research frameworks. Addressing these gaps may provide a more comprehensive understanding of the mechanisms through which risk management contributes to business sustainability, particularly through improvements in environmental performance within Indonesian energy companies.

Accordingly, this study aimed to examine the relationship between risk management and business sustainability, with environmental performance serving as a mediating variable, in a leading energy company in Indonesia. Specifically, the study investigated whether risk management directly influenced business sustainability and whether environmental performance mediated this relationship. By clarifying these relationships, the study sought to

provide empirical evidence to support the development of more effective risk management strategies and environmentally responsible business practices. The findings were expected to contribute theoretically to the understanding of environmental performance as a mediating mechanism linking risk management and business sustainability. From a practical perspective, the study aimed to provide insights for energy company managers and policymakers seeking to strengthen organizational resilience, enhance environmental performance, improve competitiveness, and promote long-term business sustainability amid increasingly complex environmental, economic, and regulatory challenges.

METHOD

This study employed a quantitative research design with a correlational approach to examine the relationship between risk management and business sustainability, with environmental performance as a mediating variable. The study population comprised employees and management personnel of an Indonesian energy company who were involved in risk management and environmental management activities. Respondents were selected using purposive sampling based on their relevant knowledge and professional experience. The proposed minimum sample size was 150 respondents, based on considerations for structural equation modeling (SEM).

Data were collected using a structured questionnaire with a five-point Likert scale. Data analysis involved data screening and cleaning, descriptive statistical analysis, and assessment of measurement validity and reliability. Structural equation modeling (SEM) was employed to examine the relationships among variables and test the mediating effect of environmental performance (Hair et al., 2019). Instrument reliability was assessed using Cronbach's alpha, with values above 0.70 considered acceptable. Measurement validity was evaluated through the relevant validity assessment procedures. Respondent confidentiality and informed consent were considered throughout the data collection process.

The study examined three variables: risk management as the independent variable, business sustainability as the dependent variable, and environmental performance as the mediating variable. All variables were measured using a five-point Likert scale ranging from strongly disagree to strongly agree. The measurement indicators and questionnaire items are presented in Table 1.

Table 1. Measurement variables

Variable	No	Indicator
Risk Management		
	1	The company has conveyed clear risks and hazards regarding the work
	2	The company is always open to receiving consultations on the hazards and risks found in the work area
	3	So far, the company has set rules and policies on safe working procedures
	4	The risks set by the company have provided benefits to operators
	5	Risks that often arise due to unsafe actions in unsafe conditions
Environmental Performance		
	1	The company implements energy saving practices
	2	The company implements water saving practices
	3	The company is actively involved in environmental protection activities to reduce total operating costs
	4	The company is actively involved in environmental protection activities to reduce water use and electricity consumption
	5	The company is actively involved in environmental protection activities to reduce the risk of work accidents and legal action

Variable	No	Indicator
Business Sustainability		
	1	Business always profits every year
	2	Social media provides investment opportunities to boost my business
	3	Social media provides investment opportunities to boost my business
	4	Management of knowledge owned by human resources will increase business sustainability
	5	Cost efficiency can guarantee the sustainability of my business

RESULTS AND DISCUSSION

Before hypothesis testing is conducted, construct validity and reliability tests are conducted first. In this study, convergent validity (loading factor), composite reliability (CR), and average variance extracted (AVE) tests were conducted. The initial stage of the convergent validity test is to measure the validity of the reflective indicators by looking at the outer loading value of each indicator. The outer loading value of each indicator that is below 0.7 is considered invalid and will be removed from the next process. For the variables Environmental Performance and Business Sustainability, all outer loading values are above 0.7, while for the Risk Management variable, indicator RM 3 has a value below 0.7, so it must be removed and not included in the next test. For the reliability test, it is seen from the AVE and Cronbach's alpha values. According to Hair et al. (2014), data are declared reliable if they have a Cronbach's alpha value > 0.7 and an AVE value > 0.5. The Cronbach's alpha and AVE values of this data are presented in Table 2.

Table 2. AVE and Cronbach's alpha

Variable	*Average Variance Extracted*	*Cronbach's Alpha*
Risk Management	0.974	0.991
Environmental Performance	0.752	0.917
Business Sustainability	0.669	0.880

Based on the R square value, the Environmental Performance variable = 0.664, meaning that 66.4% of the Environmental Performance variable in this study can be explained by the Risk Management variable, and the remaining 33.6% is outside this study. For the Business Sustainability variable, R square = 0.683, meaning that the Business Sustainability variable can be explained by the Risk Management and Environmental Performance variables by 68.3%, and the remaining 31.7% is explained outside this study (Table 3).

Table 3. R square

Variable	R Square	R Square Adjusted
Business Sustainability	0.690	0.683
Environmental Performance	0.668	0.664

The path diagram of this research is presented in Figure 2.

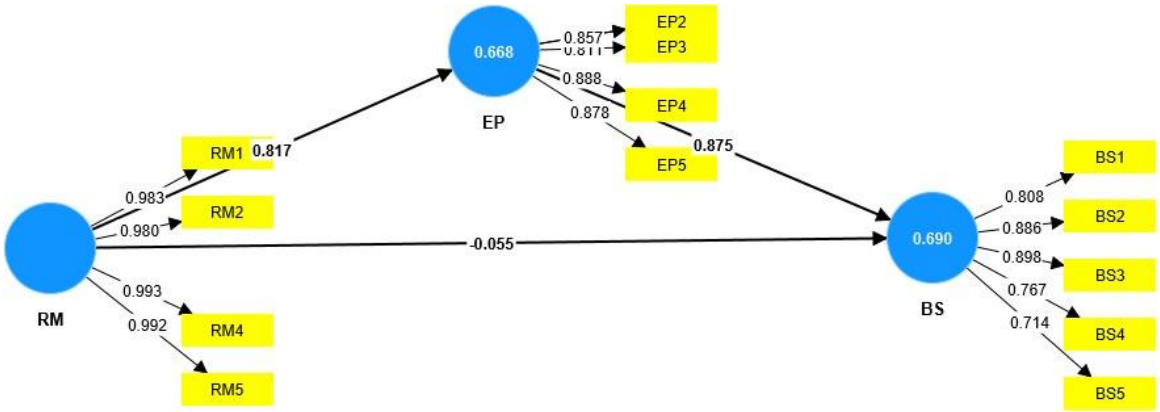

Figure1. Path diagram

Hypothesis testing in this study showed the results presented in Table 4.

Table 4. Hypothesis testing

Hypothesis	Statement	T Value	P Value	Information
H1	Risk Management has an effect on Business Sustainability	0.642	0.521	Data does not support the hypothesis
H2	Risk Management has an effect on Environmental Performance	23.151	0.000	Data supports the hypothesis
H3	Environmental Performance has an effect on Business Sustainability	12.639	0.000	Data supports the hypothesis
H4	Environmental Performance mediates the relationship between Risk Management and Business Sustainability	10.860	0.000	Data supports the hypothesis

The first hypothesis, Risk Management has an effect on Business Sustainability, is not proven in this study. Although risk management is important, several factors such as ineffective implementation, limited scope of managed risks, or too narrow a focus on financial risks without considering social and environmental risks can cause risk management to have no significant impact on supporting business sustainability. Risk management aims to identify, evaluate, and control risks that can disrupt business operations. However, not all risks managed contribute directly to sustainability aspects that include economic, social, and environmental dimensions. In the context of sustainability, the most relevant risks are risks that have an impact on the creation of inclusive long-term value, not only financial risks but also reputational, social, and environmental risks. Many companies only focus on traditional financial and operational risks without considering risks related to social and environmental aspects that are the core of sustainability. Risk management that is not integrated with sustainability strategies or is not implemented effectively in strategic decision making will fail to have a positive impact on business sustainability. If risk measurement indicators and methods do not include sustainability factors, the results of the risk analysis do not reflect the risks that contribute to business sustainability. The availability and quality of data on non-financial risks such as social and environmental risks are often still limited, so that risk management cannot optimize its role in the context of sustainability.

The second hypothesis, Risk Management has an effect on Environmental Performance, can be proven in this study. Risk management helps organizations identify, manage, and mitigate risks that have the potential to damage the environment, thereby improving overall environmental performance. By developing environmental risk mitigation strategies, companies can prevent damage, optimize resource use, and comply with environmental regulations more effectively. Risk management includes identifying threats to

the environment such as pollution, hazardous waste, climate change, and the impact of operational activities. Once these risks are identified, organizations can establish controls and preventive actions (mitigation) to minimize negative environmental impacts. This process includes environmental audits, regulatory compliance evaluations, the use of environmentally friendly technologies, and the development of an environmental-based risk management system. Risk management allows companies to anticipate environmental incidents such as chemical spills, waste leaks, or habitat damage, so that handling can be done more quickly and effectively. By mapping regulatory and legal risks related to the environment, companies can avoid detrimental fines and sanctions and improve their reputation as responsible business actors.

The third hypothesis, Environmental Performance has an effect on Business Sustainability, can also be proven in this study. Good environmental performance shows that the company is able to manage the environmental impacts of its operations effectively, which supports long-term business continuity through reducing environmental risks, regulatory compliance, resource efficiency, and improving the company's image in the eyes of stakeholders. This directly contributes to the economic, social, and environmental aspects that are the main pillars of business sustainability. Good environmental performance indicates that the company is proactively managing negative impacts such as waste, emissions, and use of natural resources. This reduces operational and regulatory risks that can threaten business continuity. Increasing resource efficiency and reducing waste means reducing production costs and increasing the economic competitiveness of the business, so that financial sustainability is maintained. Compliance with environmental regulations helps companies avoid fines, sanctions, and legal conflicts that can disrupt business continuity. The image of a company that is environmentally responsible increases the trust of consumers, investors, and the community, which socially strengthens the business position and opens up new market opportunities.

The next hypothesis, Environmental Performance mediates the relationship between Risk Management and Business Sustainability, is proven in this study. Environmental performance serves as a mediating variable because effective risk management helps companies identify and address environmental risks. Thus, risk management improves environmental performance, which in turn strengthens business sustainability. In short, success in managing environmental risks is reflected in good environmental performance, which is the foundation for sustainable business. Risk management identifies, assesses, and mitigates environmental risks from business operations. This practice leads to concrete actions to improve environmental performance, such as reducing emissions, waste, and efficient use of resources. Good environmental performance provides the foundation for sustainable business continuity by maintaining the company's reputation, complying with regulations, and managing resources wisely, all of which are important for long-term profitability and sustainability. The triple bottom line theory (Elkington, 2020) supports the idea that environmental performance is a key pillar of business sustainability, so that improving this performance is the “bridge” from risk management to sustainability.

CONCLUSION

Risk management did not have a statistically significant direct effect on business sustainability but significantly influenced environmental performance. Environmental performance, in turn, significantly affected business sustainability and mediated the relationship between risk management and business sustainability. The absence of a significant direct relationship suggests that risk management practices alone may be insufficient to enhance business sustainability without corresponding improvements in environmental performance. This finding may reflect limitations in the effectiveness of risk management practices, particularly when organizations prioritize financial and operational risks while giving

insufficient attention to environmental and social risks. Sustainable business operations require a comprehensive approach to managing long-term economic, social, and environmental risks rather than focusing exclusively on traditional risk categories. Furthermore, inadequate integration of risk management into corporate sustainability strategies and limited availability of nonfinancial risk information may constrain its contribution to long-term business sustainability.

Risk management contributes to environmental performance by enabling companies to identify, assess, and mitigate environmental risks, including pollution, waste generation, and regulatory noncompliance. Effective environmental risk management can support improvements in environmental performance through enhanced regulatory compliance, resource efficiency, waste reduction, and pollution prevention. Improved environmental performance may subsequently strengthen business sustainability by reducing environmental liabilities, minimizing operational costs, enhancing corporate reputation, and fostering stakeholder trust. The significant mediating effect identified in this study indicated that environmental performance served as a key mechanism linking risk management to business sustainability. These findings suggest that the contribution of risk management to business sustainability operates primarily through improvements in environmental performance rather than through a statistically significant direct relationship.

This study had several limitations. First, the research was conducted over a relatively short period, limiting its ability to capture long-term changes in risk management practices, environmental performance, and business sustainability. Second, the study was confined to a single energy company, which may restrict the generalizability of the findings to other organizations and industrial sectors. Future research should therefore employ longitudinal research designs and include multiple companies across different industries to provide a more comprehensive understanding of these relationships.

From a managerial perspective, the findings highlight the importance of integrating risk management with comprehensive environmental sustainability strategies. Managers and decision-makers should extend risk management practices beyond financial and operational considerations to encompass environmental and social risks that may affect long-term business continuity. Companies should prioritize improvements in environmental performance through effective environmental management systems, regulatory compliance, pollution prevention, and resource optimization. A holistic risk management framework incorporating economic, social, and environmental dimensions may strengthen organizational capacity to identify and mitigate sustainability-related risks. Furthermore, employee training and management development programs should be implemented to enhance environmental risk awareness and encourage proactive organizational practices. The adoption of environmentally responsible technologies and sustainable operational innovations may also contribute to reducing environmental risks and improving resource efficiency. Future studies should investigate these relationships across broader industrial contexts and consider additional variables, such as customer satisfaction, customer loyalty, and stakeholder engagement, to further explain the mechanisms underlying business sustainability.

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CONFLICT OF INTEREST

The authors state that there is no conflict of interest in the research, writing, or publication of this article.

AUTHOR CONTRIBUTIONS

All authors contributed to the preparation of this article. Author 1 (Maria Adeodata) played a role in the conceptualization of the research, data collection and analysis, and the interpretation of the results and the preparation of the manuscript, while the other authors contributed to the review, editing, and final approval of the manuscript.

GENERATIVE AI STATEMENT

The authors state that no generative artificial intelligence was used in the preparation of this article.

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