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Research Paper

Strategic Analysis of International Oil and Gas Companies' Response to Global Carbon Emission Reduction Initiatives

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Abstract

This study investigates the role of oil and gas companies, particularly INDOPERTA, in mitigating global carbon emissions among rising energy demands and a shift toward coal and oil. This study highlights the urgency for strategic energy realignment and cleaner, sustainable sources, drawing from International Energy Agency (IEA) reports and various studies. The objective is to understand how companies such as INDOPERTA can integrate operations with effective carbon emission reduction strategies. A mixed-methods approach is employed, combining qualitative analysis of stakeholder perspectives with the AHP to prioritize initiatives based on identified criteria. Findings reveal compliance and regulation and leadership as critical areas needing focused resource allocation. The AHP analysis underscores the strategic importance of renewable energy investment and the pivotal role of leadership and innovation. It suggests a multifaceted approach involving regulatory adherence, international cooperation, and leadership development for effective carbon reduction. The study concludes that international oil and gas companies are at a crucial juncture. They must align their operations with global environmental goals and innovate to remain relevant in the climate agenda. It provides a roadmap for strategy realignment toward sustainability. However, this study has limitations, including its geographical focus, the dynamic nature of the industry, subjectivity in qualitative research and AHP, and reliance on secondary data. These findings highlight the need for ongoing research that adapts to industry changes and global carbon reduction efforts, ensuring that strategies remain relevant and effective.

Keywords *Global carbon emissions, Energy realignment, Sustainable energy sources, International Energy Agency (IEA)*

INTRODUCTION

In recent years, the global community has witnessed a disturbing trajectory in carbon emissions. The 2022 International Energy Agency (IEA) report indicates a slight but concerning rise in global emissions, chiefly driven by the ever-escalating global energy crisis and an increased reliance on coal and oil (IEA, 2020). Even with the rise of renewable energy sources and advancements in energy-efficient technologies, these efforts have been overshadowed by the marked increase in emissions from coal and oil. This shift, which is particularly noticeable in Asian and European regions, points toward an alarming trend of a gas-to-coal switch. Moreover, the revival of global air travel further contributed to the spike in oil emissions. Such a scenario urgently demands a strategic realignment of global energy patterns and a resounding call for oil and gas conglomerates, including INDOPERTA, to champion the transition toward cleaner, sustainable energy (Aliaga-Pacora & Luna-Nemecio, 2020).

INDOPERTA, as an influential state company in Indonesia, plays a pivotal role in the global climate discourse. Their operational activities range from upstream activities, which include exploration and drilling, to downstream endeavors, comprising refinement and distribution. The transition of INDOPERTA into an energy holding company in 2020, under the directives of the Minister of State-Owned Enterprises, marked a significant shift in its operational trajectory. Their commitment to the Sustainable Development Goals (SDGs) underscores their role not only in

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energy production but also in leading initiatives for a sustainable future. INDOPERTA has already shown active support for several SDGs, including promoting responsible consumption and production, addressing climate change, ensuring affordable and clean energy, and championing decent work and economic growth. These undertakings resonate with INDOPERTA's broader vision of marrying commercial objectives with the needs of the environment and future generations. INDOPERTA's strategies to curb greenhouse gas emissions, their endeavors in energy efficiency, and their efforts in harnessing new and renewable energies underscore a holistic approach to sustainability.

However, in the wake of the aforementioned IEA report, the stakes have never been higher (IEA, 2020). INDOPERTA, alongside other global energy giants, finds itself at the crossroads of an impending climate crisis. Their position necessitates not just acknowledgment but aggressive action, focusing on comprehensive research, innovation in clean energy, environmental conservation, and scalable solutions for sustainable energy consumption. Collaborations with global partners, integration of the latest technological advancements, and a robust commitment to the global climate agenda are vital for ensuring a healthier planet for current and future generations. The challenge lies not only in the adoption of these measures but also in their effective and timely implementation.

Over the last decade, a plethora of research has scrutinized the various determinants of global carbon emissions. Muhammad and Khan (2021) examined the relationship among globalization, energy consumption, foreign direct investment (FDI), and carbon dioxide emissions. Their study concluded that while certain exports and facets of globalization reduced GHG emissions, others such as energy use, FDI, and economic growth intensified them. Similarly, the observations by Jun et al. (2021) emphasized the role of globalization in driving CO_2 emissions, particularly in economies such as the US.

On a different front, Jiang and Green (2017) highlighted how non-OECD economies played pivotal roles in CO_2 emissions growth post-crisis, attributing the rise to increased consumption and investment. Their findings underline the complexities of international trade and their consequent carbon footprints. Further, Wang and Sueyoshi (2018) opined that independent oil and gas producers should invest more aggressively in emission mitigation measures for sustainable development, emphasizing the critical role of the industry in this context.

Moreover, studies such as those by Jiang and Ma (2021) have underscored the significance of international organizations in controlling carbon transfers to reduce global emissions. On the corporate side, Gallego-Álvarez et al. (2014) studied the interface between carbon emission reduction and corporate performance, concluding that emission reductions can indeed bolster financial performance. Meanwhile, Wang et al. (2020) illustrated how economic globalization and financial development, among other factors, can increase carbon emissions.

While previous studies have explored various determinants of carbon emissions and the roles of non-OECD economies, the corporate sector, and international organizations in managing these emissions, there is a void in specific, detailed strategies for oil and gas conglomerates. The research should aim to provide a blueprint for how these corporations can navigate the complexities of carbon emission reduction as an integral part of their strategic future, rather than just a response to global mandates. This includes leveraging technological advancements, fostering global partnerships, and committing to aggressive and timely implementation of sustainable practices. The overarching goal is to craft a coherent, forward-looking strategy that aligns with both commercial objectives and environmental stewardship, ensuring a healthier planet for current and future generations.

LITERATURE REVIEW

Energy Transition in the Upstream Sector

As discussed earlier, the upstream sector is a term used to describe the initial phases of oil and gas production, which involves exploration, drilling, and extraction of crude oil and natural gas. The upstream sector includes searching for potential underground or underwater crude oil and natural gas fields, drilling exploratory wells, and subsequently operating wells that recover and bring crude oil or raw natural gas to the surface. After the upstream sector, there is the midstream sector, which is responsible for transporting, processing, and storing crude oil and natural gas, and the downstream sector, which is responsible for converting crude oil and natural gas into finished products (Elijah et al., 2021).

When compared with other sectors, the upstream sector is the sector most affected by the pressures of energy transition. This is caused by the upstream sector, which is very dependent on fossil resources such as petroleum and natural gas. These resources are the main commodities explored and produced in this sector. The process of exploration and production of oil and natural gas often has a high impact on carbon emissions. Reducing emissions is a key goal in the energy transition; therefore, the sector is subject to more stringent review and regulation (IEA, 2020). In addition, changes in global energy demand patterns can affect demand for oil and natural gas. For example, the increased use of electric cars and renewable energy can reduce the demand for fossil fuels. With the energy transition trend toward renewable resources and clean energy, demand for oil and natural gas could decline significantly, potentially reducing the value and income from upstream sector operations (Zakeri et al., 2022).

Therefore, the energy transition in the upstream sector is an interesting topic to study. This statement is supported by Hoxha and Nair (2023), who explain that upstream oil and gas companies are transitioning to sustainable investments and carbon-neutral strategies, motivated by climate-inspired investors and the changing pace of energy transition. Another study also mentioned that the COVID-19 pandemic accelerated the energy transition trend, which prompted oil and gas companies to adjust their strategies and invest in renewable energies. The transition also creates sustainable jobs and support workers in the oil and gas sector as they move into clean energy roles (Boschee, 2023).

The energy transition in this sector involves the adoption of new technologies and strategies to reduce carbon dioxide emissions and achieve sustainability. One such approach that can be employed is the mitigation of combustion gasses. According to the IEA (2020), approximately 140 billion cubic meters (bcm) of natural gas is flared globally each year. In 2022, the volume of gas flared worldwide will reach 139 bcm. Flaring will result in 500 Mt CO_2 equivalent annual GHG emissions in 2022. Approximately 70% of gas flared goes to flares that operate on a nearly continual basis. This is a major source of CO_2 emissions, methane, and black soot and is harmful to health. Hopefully, by following the Net Zero Emissions by 2050 (NZE) Scenario, all non-emergency flaring will be eliminated globally by 2030, resulting in a 95% reduction in flared volumes and avoiding 365 Mt CO_2-eq. This illustration is depicted in Figure 1.

Therefore, companies must try to reduce the use of flaring gas. One strategy that can be implemented is the use of more efficient technology or diverting gas that will be burned for energy production or other uses (Mansoor & Tahir, 2021). Additionally, companies can intensify the recovery of flare gas to minimize its impact on the environment (Madueme, 2010). According to the IEA (2020), portable compressed natural gas (CNG) or mini-liquid natural gas (LNG) facilities have the potential to treat gas on site. The US Environmental Protection Agency estimated that up to 89% of gas flaring in the Bakken field in 2015 could have been eliminated using this technology.

In addition, the state as a regulator also plays a crucial role in reducing the use of flaring gas. The government can reduce the amount of flaring gas used by implementing targeted policies toward gas flaring reduction, increasing taxation on gas flaring, and providing reward packages to companies with the lowest flaring activities (Sinha et al., 2020). According to the IEA (2020), Norway, which was one of the first countries to introduce regulations requiring operators to meter gas and tax flaring-related CO_2 emissions, has reduced flaring emissions by more than 80% since the mid-1990s. Following that, Colombia cut its flaring intensity by around half between 2015 and 2021 and has reduced flared volumes by 70% since 2012. This stems from the country's focus on emission reductions and the creation and empowerment of the National Hydrocarbon Agency. In the United States, while further regulation and more stringent enforcement across more producer states are needed, regulators in Colorado and New Mexico have joined Alaska in introducing a ban on routine flaring. Approximately one-fifth of US oil production now occurs in states with a routine flaring ban.

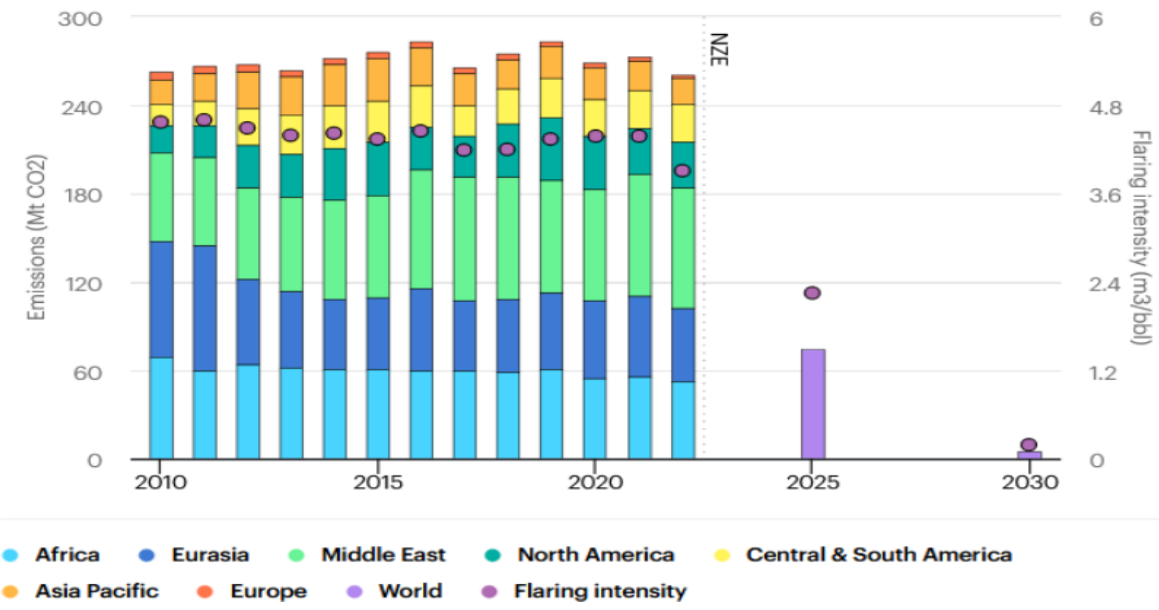

Figure 1. Direct CO_2 combustion emissions from flaring and flaring intensity in the Net Zero Scenario, 2010–2030 (IEA, 2020)

In addition to reducing the use of flaring gas, companies can also focus on improving energy efficiency in all aspects of their operations and infrastructure to reduce their overall carbon footprint. The effectiveness of current flares can be increased by technology and maintenance procedures (Abu et al., 2023). In the upstream sector of the oil and gas industry, several alternative renewable technologies can be used to support the energy transition toward cleaner and more sustainable resources, namely solar energy (Aziz et al., 2020), hydro power (Ahlers et al., 2015), and biogas or biomass (Wang et al., 2021).

Despite its high urgency, there are still several challenges in the energy transition process in the upstream sector. First, there are limitations in technology and infrastructure. Energy transition requires technologies and infrastructure different from those used in fossil energy production. This requires significant investments and a considerable amount of time to develop new technologies and infrastructure. Second, there are changes in regulations and policies. Energy transition requires changes in regulations and policies that support the development of renewable energy and reduce the use of fossil fuels. This necessitates cooperation between the government and the oil and gas industry. Third, there are resource limitations. Renewable energy resources such as solar and wind are not always consistently available and predictable. This requires the development of efficient and cost-effective energy storage technologies. Lastly, there are high costs. The development of renewable energy requires higher costs than fossil energy production. This requires support from the government and the oil and gas industry to reduce the costs of renewable energy production (Bhattacharyya, 2019; Papadis & Tsatsaronis, 2020).

To address these challenges, cooperation between the government and the oil and gas industry is needed to develop new technologies and infrastructure, reduce dependence on fossil energy, and develop regulations and policies that support energy transition. Companies must also start to adapt and experiment using novel technologies and renewable energy in the upstream sector. Additionally, significant investments and public support must accelerate a fair and sustainable energy transition.

Stakeholder Theory

Stakeholder theory, a prominent framework in organizational management and business ethics, offers valuable insights into decision-making processes within businesses by emphasizing the significance of considering several stakeholders' interests. This theory posits that organizations should not solely prioritize shareholder value but also recognize the impact of their decisions on various stakeholder groups, including employees, customers, suppliers, communities, and others (Freeman & Mcvea, 1984).

One crucial aspect of stakeholder theory is its focus on decision making that goes beyond financial considerations. Managers are tasked with evaluating and balancing the diverse needs and concerns of stakeholders to arrive at ethical and socially responsible choices. This process involves acknowledging the interconnectedness of these stakeholder groups and aiming to create value for all parties.

In the context of decision making, stakeholder theory offers two key perspectives. The first is the Normative Theory of Stakeholder Identification. This perspective involves identifying and defining the specific stakeholders that an organization should consider in its decision-making processes. By recognizing the various entities affected by the organization's actions, managers can establish a comprehensive list of stakeholders and prioritize their interests accordingly (Mitchell et al., 1997). This initial step sets the foundation for ethical decision making by encompassing a broad range of stakeholders.

The second is the Descriptive Theory of Stakeholder Salience. Once stakeholders are identified, the descriptive theory of stakeholder salience examines the conditions under which managers view certain stakeholders as more relevant or salient than others (Mitchell et al., 1997). Managers assess the power, legitimacy, and urgency of stakeholder claims to determine which interests should be prioritized in decision making. This process involves a dynamic evaluation of stakeholder relationships and organization responsibilities.

Stakeholder theory recognizes that effective decision making requires balancing the often competing and conflicting interests of various stakeholders. The concept of "balancing stakeholder interests" is a fundamental managerial task (Donaldson & Preston, 1995). It involves assessing trade-offs and making choices that consider the impacts on multiple stakeholders while aligning with the organization's values and ethical principles.

In conclusion, stakeholder theory underscores the complexity of decision-making processes within organizations. It promotes a holistic view that extends beyond shareholders to encompass a wide array of stakeholder groups. By balancing the interests of these stakeholders, organizations can make more informed and ethical decisions.

RESEARCH METHOD

This study utilizes a mixed methods research approach, starting with a qualitative research methodology aimed at analyzing the perspectives of various stakeholders. The objective is to gain a comprehensive understanding of carbon emission reduction strategies. Following the acquisition of insights from the preceding phase, it is imperative to identify and employ the criteria and sub-criteria of activities aimed at mitigating carbon emissions in the subsequent process. The next approach is the Analytic Hierarchy Process (AHP), which is a tool for Multi-Criteria Decision Making (MCDM). It is used to prioritize the implementation of initiatives based on the criteria and sub-criteria associated with their components. In this manner, the ultimate suggestion on actions aimed at reducing carbon emissions would be provided.

Qualitative research is a study approach that prioritizes the exploration and comprehension of the intricate and multifaceted aspects of human experiences, behaviors, and social phenomena. It aims to acquire comprehensive comprehension of a certain subject by collecting thoughts, opinions, and viewpoints from individuals or groups, without relying on numerical data. It is advisable to conduct a thorough analysis of the requisite elements for determining the appropriate course of action based on both urgency and objectives, while also considering many views during this deliberative process. The participants selected for this study in the context of qualitative data collection were senior managers or executives affiliated with worldwide oil and gas firms. These individuals possess valuable knowledge and understanding of strategies and decisions on efforts aimed at reducing carbon emissions. The selection of key informants holds significant importance in facilitating the decision-making process.

Multi-Criteria Decision Making (MCDM) has gained widespread utility across diverse domains (Ehrgott et al., 2010). Its significance lies in facilitating complex decision-making processes that involve intricate and difficult-to-quantify problems, thus filling a gap left by traditional decision-making approaches (Kubler et al., 2016). MCDM delves into identifying viable decisions for multiple stakeholders, considering problem structures and the influential aspects (priority scales) that guide the decision-making process (Bhole & Deshmukh, 2018).

One of the options for using MCDM is the Analytic Hierarchy Process (AHP). AHP is a widely used MCDM method that decomposes complex decision problems into a hierarchical structure, allowing decision makers to compare alternatives based on pairwise comparisons of criteria. AHP quantifies subjective judgments through eigenvector calculations to prioritize alternatives (Saaty, 1990). It is defined as a hierarchy as a multi-level representation of a complex problem, with the highest level being the objective, followed by factors, criteria, sub-criteria, and ultimately, alternatives. By employing this hierarchical structure, intricate problems can be methodically categorized, thereby enhancing their structure and organization (Lyu et al., 2020).

In data collection, semi-structured interviews will be conducted using several main questions. As the questions become important to be used further in AHP, it shall be consistent, high clarity, and neutral to obtain ideal criteria specification and rating scales. The questions are listed below.

1. What are the current strategies employed by international oil and gas companies in response to global carbon emission reduction goals?
2. What are the key drivers influencing the adoption of carbon emission reduction strategies in the oil and gas industry?
3. How effective are the implemented strategies in reducing carbon emissions and improving the sustainability performance of international oil and gas companies?
4. What technological innovations have been pivotal in advancing your company's carbon emission reduction goals?

5. How do you evaluate the potential of emerging technologies for integration into your sustainability strategy?
6. What challenges and barriers do international oil and gas companies face in implementing carbon emission reduction initiatives?
7. How do current regulations affect carbon emission reduction initiatives?
8. What recommendations and best practices can be proposed to international oil and gas companies to enhance their response to global carbon emission reduction goals while maintaining competitiveness and sustainability?

The research incorporates the analytical hierarchy process (AHP) as outlined by Saaty (2008), integrating insights from eight selected experts to enhance the study's depth and breadth. This multi-step process begins with the interviewing of experts, each chosen for their extensive knowledge of carbon emissions, energy policy, and sustainable practices. These interviews are crucial for extracting detailed criteria and sub-criteria essential for framing carbon emission reduction strategies.

After gathering the criteria, the AHP process starts with the definition of a hierarchy, establishing a structured framework of criteria and sub-criteria based on expert interviews. This hierarchy serves as the foundation for the systematic assessment and prioritization of initiatives. Subsequently, ratio values for each criterion and subcriterion are calculated using the interview data, reflecting their relative importance and influence on decision making.

The next phase involves computing eigenvectors from the pairwise comparison of criteria, providing a quantitative measure of each criterion's weight and importance. These eigenvectors are pivotal in establishing the importance of the criteria and sub-criteria within the decision-making process. With the weights established, the computation of alternative scores is the subsequent step. This is achieved by multiplying the relative weights assigned to each criterion and subcriterion by the corresponding responses from the experts regarding each potential strategy. This calculation quantifies the suitability of each alternative and provides a basis for comparison. The penultimate stage involves comparing these alternative scores to identify the most suitable strategy based on the predetermined criteria. This comparison is critical for an objective assessment of each strategy's potential effectiveness in reducing carbon emissions.

Finally, the process culminates with the analysis and interpretation of the outcomes derived from the AHP. This stage provides a clear, objective view of the priorities and preferences for carbon emission reduction strategies, offering valuable insights into the most viable pathways forward. To enhance the reliability of the results, they can be cross-verified with outcomes obtained through other methods. This methodological approach, enriched by the diverse perspectives of eight experts and the systematic structure of the AHP, ensures comprehensive, informed, and nuanced strategy development. It leads to more sustainable and effective decision-making in the context of global carbon emission reduction, offering a clear roadmap for companies like INDOPERTA to navigate the complexities of integrating sustainable practices into their operations.

FINDINGS AND DISCUSSION

Table 1. Decision Hierarchy

Level 0	Level 1	Level 2	Glb Prio.	Investment in Renewable Energy Resources	Participation in carbon offset projects	Energy Efficiency and Process Optimization	Shift to Natural Gas
Strategy for meeting global carbon emission reduction	Emission reduction initiatives 0.200	Implementation of Renewable and Low-Carbon En 0.333	6.7%	0.382	0.204	0.230	0.185
		Carbon management and reduction techniques 0.333	6.7%	0.273	0.276	0.263	0.188
		Operational efficiency and process optimization 0.333	6.7%	0.220	0.115	0.465	0.200
	Compliance and Regulation 0.200	Regulatory Adherence and Reporting 0.333	6.7%	0.550	0.206	0.151	0.093
		International Agreements and Partnerships 0.333	6.7%	0.545	0.249	0.109	0.097
		Risk Management and Strategic Compliance Plan 0.333	6.7%	0.376	0.127	0.238	0.259
	Leadership 0.200	Qualifications and experience in leadership 0.333	6.7%	0.564	0.225	0.123	0.088
		Organization Change Management 0.333	6.7%	0.460	0.224	0.153	0.163

	Capability Building Knowledge Management 0.333	6.7%	0.463	0.204	0.166	0.167
Asset and Economic Management 0.200	Responsible Asset Management 0.200	4.0%	0.369	0.240	0.233	0.158
	Investment 0.200	4.0%	0.552	0.176	0.134	0.138
	Taxation 0.200	4.0%	0.318	0.335	0.212	0.135
	Carbon Trading 0.200	4.0%	0.429	0.320	0.168	0.084
	Carbon Credit Monetization 0.200	4.0%	0.448	0.319	0.136	0.097
Technology and Innovation 0.200	Deployment of Green Technology 0.333	6.7%	0.563	0.120	0.147	0.171
	Technology Improvement 0.333	6.7%	0.563	0.127	0.158	0.151
	Research and Development Investment 0.333	6.7%	0.448	0.189	0.190	0.173
		1.0	**44.5%**	**20.7%**	**19.5%**	**15.3%**

AHP Result

Analytic Hierarchy Process (AHP) analysis, as applied to global carbon emission reduction strategies, presents a structured decision hierarchy starting from an overarching goal to specific initiatives. At the top level, the strategy focuses on reducing global carbon emissions, branching into distinct categories such as "Emission Reduction Initiatives," "Compliance and Regulation," and "Leadership." This hierarchical approach ensures a clear visualization of how each component contributes to the overall objective.

In-depth analysis within each category further refines the strategy. "Compliance and Regulation" emerges as the most critical area, commanding a 37.8% priority, indicating the necessity of a robust regulatory framework for effective emission reduction. "Leadership" follows with a 27.1% priority, highlighting the crucial role of effective leadership in implementing these initiatives. "Emission Reduction Initiatives" rank third, stressing the importance of specific projects aimed at cutting carbon emissions. "Technology and Innovation," while essential, are considered less critical than regulatory and leadership factors. The least critical but still relevant is "Asset and Economic Management." The consistency ratio of 2% reflects the reliability of the comparisons made in the AHP, providing a reliable guide for prioritizing resources and efforts.

Further insights are gained by delving into subcategories. In "Compliance and Regulation," the highest priority is "Regulatory Adherence and Reporting," emphasizing the importance of strict compliance and transparency in environmental performance. "International Agreements and Partnerships" and "Risk Management and Strategic Compliance Plan" follow, highlighting the significance of global cooperation and strategic risk management in compliance. The low consistency ratio of 0.6% in this category attests to the robustness of these prioritizations.

In "Emission Reduction Initiatives," the focus is on "Carbon Management and Reduction Techniques," "Implementation of Renewable and Low-Carbon Energy," and "Operational Efficiency and Process Optimization," each carrying a specific priority percentage. These percentages guide organizations and policymakers in determining which areas should receive the most attention and resources for maximum impact on emission reduction efforts. The consistency ratio of 1.1% in this category confirms the reliability of these findings and serves as a valuable tool for strategic decision-making in the fight against climate change.

Alternative Result

In the alternative prioritization for carbon emission reduction strategies, the hierarchy places "Investment in Renewable Energy Resources" at the forefront with a substantial weight of 44.5%. This highlights the strategic importance of directly investing in renewable energy as a key driver of sustainable transformation. Following this, "Participation in Carbon Offset Projects" is considered the second most impactful action, with a weight of 20.7%, underscoring the role of compensatory environmental initiatives in the overall strategy. "Energy Efficiency and Process Optimization" closely follows, emphasizing the need for improving operational efficiencies and conserving energy. The least prioritized action in this hierarchy is the "Shift to Natural Gas," assigned a weight of 15.3%, indicating its role as a transitional energy source in the larger scheme of carbon management.

Investing in renewable energy resources has emerged as the primary strategy, reflecting a clear preference for sustainable energy solutions. This approach is bolstered by the critical roles of leadership and technological innovation, each given significant weight, suggesting that effective management and advanced technology are pivotal in steering these investments. The focus on renewable energy investment aligns with the broader goals of sustainable energy transition, indicating a comprehensive strategy that extends beyond mere investment to encompass leadership expertise and technological advancements.

On the other hand, strategies like "Operational Efficiency and Process Optimization" and "Carbon Management and Reduction Techniques" are assigned lower weights, indicating that while valuable, they might not offer the transformative impact required for large-scale carbon reduction. Similarly, taxation as a strategy, though significant, faces potential challenges due to its contentious nature and the difficulty in setting appropriate levels. The overall prioritization reflects a nuanced approach to carbon management, emphasizing sustainable investment and acknowledging the roles of offsets, efficiency improvements, and transitional energy solutions within a complex and multifaceted strategy for emission reduction.

Table 2. Alternative strategy advantages and disadvantages

Alternative Strategy	Advantage	Disadvantage
Investment in Renewable Energy Resources	- Direct contribution to sustainable energy sources. - Strong link to leadership and technology improvements.	- Incremental improvements in operational efficiency may not be sufficient. - Complexity of carbon management techniques. - Taxation issues.
Participation in carbon offset projects	- Tax incentives for emission reduction. - Financial benefits from carbon trading and credit monetization.	- Limitations in the operational efficiency for drastic emission reductions. - High costs and resistance to green technology deployment.
Energy Efficiency and Process Optimization	- Significant operational efficiency gains. - Long-term benefits of carbon management.	- Slow gains from international agreements. - Challenges in leadership for energy initiatives. - Investment returns may not be immediate.
Shift to Natural Gas	- Aids in regulatory compliance. - Enhances operational efficiency. - Effective interim carbon reduction.	- Need for qualified leadership in energy transition. - Limitations in carbon trading. Potential tax disadvantages.

Despite urgent carbon emission reduction requirements, the company must strategically allocate its limited resources to the most critical areas. According to our analysis, "Compliance and Regulation" and "Leadership" emerge as the dominant criteria, holding priorities of 37.8% and 27.1%, respectively. While striving to grow economically from current business practices, the company should simultaneously channel a portion of its resources to enhance these two areas in every action it undertakes. For compliance and regulation, this involves establishing a dedicated team for regulatory adherence, building a robust reporting system, and actively engaging with governmental and regulatory bodies. Moreover, the company should proactively engage in international agreements and partnerships while also exploring investment opportunities for technology adoption in decarbonization. Under "Leadership," the focus should be on leadership development programs emphasizing sustainability, promoting organizational change management to align with industry sustainability trends, and fostering a culture of innovation. In addition, capability building and knowledge management through continuous research and the development of a comprehensive knowledge library are essential. This strategic approach builds a robust foundation for executing future initiatives, positioning the company strongly in the realm of sustainable business practices.

CONCLUSIONS

In the strategic analysis of international oil and gas companies' responses to global carbon emission reduction initiatives, it is evident that these entities, including INDOPERTA, are at a crucial juncture. The pressing need for a transition toward cleaner and sustainable energy sources is underscored by increasing global carbon emissions and the evolving global energy landscape. INDOPERTA's transformation into an energy holding company and its commitment to the Sustainable Development Goals (SDGs) signal a pivotal shift toward integrating environmental considerations into its core operations. However, the challenge extends beyond mere recognition of the issue to the implementation of aggressive and effective strategies that encompass comprehensive research, innovation in clean energy, and scalable solutions for sustainable energy consumption.

This study highlights the critical role of the upstream sector in the energy transition, with an emphasis on reducing emissions through technological innovations and improved efficiency. It also underscores the importance of stakeholder theory in decision-making processes, advocating for a balance between shareholder interests and broader stakeholder impact. The methodology adopted, which combines qualitative research with the Analytic Hierarchy Process (AHP), enables a structured approach to prioritizing initiatives for carbon emission reduction. The AHP analysis reveals that compliance and regulation and leadership are the most critical areas, necessitating focused resource allocation. These findings suggest that a multifaceted approach, encompassing regulatory adherence, international cooperation, leadership development, and organizational change, is essential for these companies to effectively navigate the complexities of carbon emission reduction.

In conclusion, the journey toward reducing carbon emissions and embracing sustainability is multifaceted for international oil and gas companies. It requires strategic alignment of operations with global environmental goals, proactive leadership, technological advancements, and a commitment to stakeholder inclusivity. As the global community intensifies its focus on carbon reduction, these companies must adapt and innovate to remain relevant and contribute positively to the global climate agenda. The insights from this study provide a roadmap for these companies to realign their strategies and operations toward a more sustainable and environmentally responsible future.

LIMITATION & FURTHER RESEARCH

The strategic analysis of international oil and gas companies in response to global carbon emission reduction initiatives, while comprehensive, encounters several limitations. First, the scope and geographical focus of the study are confined to specific regions and a select group of companies, which may not fully represent the diverse practices and challenges faced globally in the industry. The dynamic and rapidly evolving nature of the oil and gas sector, along with environmental policies and technologies, means that this study might not capture the latest developments or emerging trends. The qualitative component of the research, which relies on interviews with industry professionals, introduces an element of subjectivity in interpreting responses, potentially leading to biased findings. Additionally, the use of the AHP, despite its robustness, is based on subjective judgments, which could influence the prioritization outcomes. The study's focus on a particular industry sector limits the generalizability of its findings to other sectors with similar challenges. Resource and time constraints inherent in the research process may have also restricted the depth and breadth of the investigation. Finally, the reliance on secondary data sources poses a limitation, as these sources may not always offer the most current or detailed information for a thorough analysis. These limitations highlight the need for ongoing research that adapts to the changing landscape of the industry and global carbon reduction efforts.

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