Determinants of Non-Financial Disclosure in Energy Giants: A Comparative Study of CSR Practices

Kantaoui Amina [1] ♦, Lamraoui Roumaissa [2], Sultan Abdulrahman Fathi [3]

[1] Kasdi Merbah University (algeria), aminastrategie@gmail.com

ORCID: https://orcid.org/ 0009-0005-3634-6964

[2] Kasdi Merbah University (algeria), Lamraouiroumaissa@gmail.com

ORCID: https://orcid.org/0009-0008-9090-7998

[3] Alnoor University (irak), Sultan.abdulrahman@alnoor.edu.iq

ORCID: https://orcid.org/0000-0002-4535-6487

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Abstract:

In response to growing environmental awareness, this study explores Corporate Social Responsibility (CSR) practices in the oil and gas sector through a comparative analysis of Sonatrach, Aramco, and TotalEnergies. Using a descriptive–analytical approach, the research identifies significant variations in CSR implementation. The findings indicate that Aramco and TotalEnergies maintain a balanced approach across economic, social, and environmental dimensions, while Sonatrach's initiatives remain primarily focused on the economic aspect, with limited transparency and stakeholder engagement. The study concludes that Sonatrach should enhance its CSR strategy by integrating governance principles, promoting environmental responsibility, and strengthening social involvement to align with international standards and leading industry practices.

Keywords : Corporate Social Responsibility; Economic Dimension; Environmental Dimension; Social Dimension; Ethical Dimension.

♦ **Corresponding author.**

I- Introduction:

In recent years, global interest in Corporate Social Responsibility (CSR) has increased markedly. This growing attention is primarily driven by two key factors: the rising awareness of environmental and social issues, and the heightened scrutiny following corporate scandals that have affected several major companies worldwide. The oil and gas industry has become a focal point of this scrutiny, given the significant environmental and social implications of its operations on host communities.

As a result, it has become essential for leading corporations in this sector to adopt a comprehensive and integrated approach to CSR. Such adoption extends beyond mere legal compliance, representing instead a strategic investment in building corporate credibility, strengthening stakeholder trust, and securing the social license to operate. This strategic orientation contributes to the long-term sustainability and positive reputation of these companies in an increasingly demanding global market.

Based on this context, the central research question is formulated as follows: **What is the extent of CSR adoption by Sonatrach, TotalEnergies, and Aramco, and in what ways do their approaches diverge across the dimensions of this responsibility?**

Based on the comparative analysis of CSR dimensions disclosed in the annual and sustainability reports of Sonatrach, Aramco, and TotalEnergies, the study proposes the following hypotheses:

H1: There are significant differences in CSR disclosure practices among the selected oil and gas companies across economic, social, and environmental dimensions.

H2: The level of CSR disclosure varies according to the governance and reporting frameworks adopted by each company.

H3: Differences in environmental and health & safety disclosure levels reflect variations in transparency and reporting practices among the selected companies.

To examine these hypotheses, the study adopts a comparative analytical approach based on CSR dimensions extracted from the annual and sustainability reports of the selected companies.

1. The theoretical framework of the study

CSR in the oil and gas sector represents a pivotal theoretical and practical focal point, characterized by its profound significance and increasing complexity. As a cornerstone of the global economy, this sector inherently leaves deep and lasting imprints on the environment and surrounding communities. The transition from mere legal compliance to the adoption of a strategic, voluntary approach to CSR is no longer a peripheral option; it is an existential imperative dictated by global shifts and the escalating awareness of diverse stakeholders, ranging from governmental bodies to local communities.

1.1. Definition of corporate social responsibility

The growing negative repercussions of corporate activities on environment have heightened the focus on the concept of (CSR), which serves as a framework guiding organizations toward mitigating these impacts. As a result, several definitions have been developed to clarify the various aspects of this concept.

According to Bowen (1953), CSR is defined as the obligations of businessmen to pursue those policies, to make those decisions, or to follow those lines of action that are desirable in terms of the objectives and values of our society (Bowen, 1953, p. 06). In a similar vein, Carroll (1991) views CSR as CSR, including the idea that the corporation has not only economic and legal obligations but also ethical and discretionary (philanthropic) responsibilities. (Carroll, 1991). Furthermore, the Commission has defined CSR as the responsibility of enterprises for their impact on society, and, therefore, it should be company-led. Companies can become socially responsible by integrating social, environmental, ethical, consumer, and human rights concerns into their business strategy and operations, following the law (Corporate sustainability and responsibility, n.d.). Likewise, Unido highlights CSR as a management concept whereby companies integrate social and environmental concerns in their business operations and interactions with their stakeholders. CSR is generally understood as being the way through which a company achieves a balance of economic, environmental, and social imperatives (Unido, s.d.).

Bowen's definition stands as a classic articulation of CSR, having laid the foundation for the concept by viewing it as a set of obligations. However, this definition lacked a clear classification of these obligations, making it a general starting point that required further detail. Subsequently, Carroll's definition provided a more comprehensive structure to the concept, classifying these practices into four main types: economic, legal, ethical, and philanthropic responsibilities. The most recent definitions, such as those from the European Commission and the UNIDO, have added a crucial environmental dimension, which reflects the evolving global awareness of the need to integrate environmental issues into corporate responsibilities. Based on the preceding discussion, CSR can be defined as a corporate commitment to the society in which it operates. This commitment necessitates the integration of a comprehensive set of economic, legal, ethical, philanthropic, and environmental responsibilities into the company's strategy and objectives.

1.2. The Importance of corporate social responsibility

The oil and gas sector is considered a pioneer in the adoption of (CSR), that is attributable to several key factors, including:

In previous decades, investments directed toward corporate social responsibility were regarded as a burden on companies. However, in recent years, they have come to be used as an effective managerial tool for building relationships with various stakeholders, thereby making the company’s presence more tangible to these parties and ultimately fostering a sense of belonging toward it. This shift in thinking and practice represents a corporate strategy aimed at gaining the trust and goodwill of stakeholders, while also constituting a long-term investment that yields mutual benefits (MH, Adwani, Sanusi, & Azhari, 2025, p. 54).

The energy sector is accountable for over a third of total methane emissions, with a significant portion of this being attributed to oil and gas companies. Their share is estimated at 78 million metric tons (IEA, 2024).

The oil and gas sector has faced several environmental disasters, including spills in the Niger Delta, the explosion of a British Petroleum (BP) oil rig in the Gulf of Mexico, and damage from oil waste in the Amazon rainforest (CFR, s.d.). These incidents have significantly harmed the reputation of multinational corporations in the sector, as energy companies are consistently ranked among the least trusted in the business world. According to the Edelman Trust Barometer, which surveyed 33,000 people across 28 countries, the energy sector lagged behind industries such as technology and food and beverage (Kolaczkowski, 2016).

2. Literature Review

The oil and gas industry has received considerable attention from CSR scholars due to its significant environmental impacts and its importance in the global economy and geopolitics. This section reviews the literature on the oil and gas industry in relation to CSR issues.

(Raufflet, Cruz, & Bres, 2014) conducted a study to evaluate the effectiveness of Corporate Social Responsibility (CSR) programs in mining, oil, and gas (MOG) companies and to compare the environmental outcomes reported in sustainability reports with the indicators required by international CSR standards. The researchers adopted a case study approach and collected data through interviews with experts and specialists, as well as through an analysis of seven international CSR standards and sustainability reports from twenty global companies.

The findings revealed that the companies demonstrated strong performance in the areas of ethics and governance through the adoption of clear CSR strategies and the regular disclosure of social and environmental performance. However, the precautionary principle was not fully implemented, and shortcomings were identified in the integration of CSR practices within supply chains and among contractors. Environmental management emerged as the strongest dimension, with all companies measuring and reporting greenhouse gas emissions and implementing water management and biodiversity protection programs. Nevertheless, significant deficiencies remained in the management of transportation-related environmental impacts.

Regarding community relations, the companies supported local economic development, implemented various social initiatives aimed at improving living standards, and paid considerable attention to the safety of surrounding communities. However, human rights issues received comparatively less attention. In the area of social issues and occupational health and safety, the results indicated that all companies had established occupational health and safety programs, risk management systems, and mechanisms for environmental performance disclosure. In addition, most companies provided employee training programs and maintained satisfactory working conditions.

Overall, the study concluded that mining, oil, and gas companies had made substantial progress in implementing CSR practices. However, further efforts were required to strengthen the application of the precautionary principle, human rights policies, supply chain responsibility, and transportation-related environmental management in accordance with international standards.

(Berkowitz, Bucheli, & Dumez, 2017) examines how Corporate Social Responsibility (CSR) is collectively constructed within the oil and gas industry through Meta-Organizations. The study adopts a qualitative case study approach following Yin's methodology, analyzing CSR reports of major oil and gas companies over a ten-year period. It also builds a database of 93 meta-organizations and includes interviews with experts and representatives from these organizations.

These meta-organizations are classified into four levels according to their scope: infra-sectoral, sectoral, supra-sectoral, and cross-sectoral. The findings show that the environmental dimension is dominant at the sectoral and infra-sectoral levels, where issues such as pollution, emissions, and environmental risk management are prioritized. The social dimension is more prominent at the supra-sectoral and cross-sectoral levels, particularly in relation to human rights, working conditions, and equality. The economic/governance dimension appears across all levels, mainly through transparency mechanisms, reporting systems, and anti-corruption practices.

The study concludes that CSR is not solely constructed at the firm level, but rather through multi-level collaboration among diverse actors within meta-organizations. These structures play a central role in setting standards, facilitating knowledge exchange, and building organizational capacities. Overall, the different CSR dimensions vary in their degree of presence across levels, but together they form an integrated system of governance and responsibility.

(Chowdhury, Ennis, Choi, & Chung, 2018)aimed to examine the importance of corporate social responsibility (CSR) and the independent effects of the social, environmental, and economic dimensions on the market value of oil and gas companies listed in the S&P/TSX Capped Energy Index during the period 2007–2013. The study employed content analysis of corporate reports to collect the required data.

The findings revealed substantial variation in the level of social activities undertaken by the companies. The results further indicated that CSR serves as a value-enhancing initiative in the oil and gas sector, with sustainable social activities constituting a key driver of firm value. Moreover, sustainable environmental and economic activities were found not to diminish the market value of oil and gas companies.

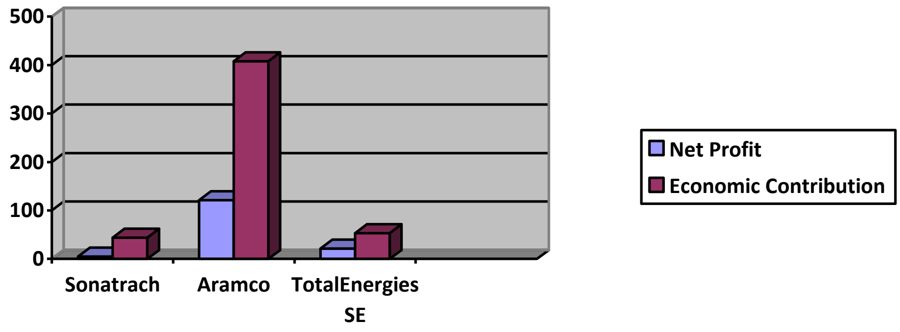
3. The experimental framework for the study

Sonatrach, TotalEnergies, and Aramco are giant entities within the oil and gas sector. These corporations continuously strive to enhance their performance and CSR, which is expressed and measured through the following indicators:

Economic Dimension:

The economic CSR remains a cornerstone in academic inquiries concerning the energy sector, particularly among industry titans such as TotalEnergies, Sonatrach, and Saudi Aramco. By virtue of their central position within global value chains and their enormous contribution to national and international revenues, these corporations' responsibilities transcend mere profitability.

Figure No. 1 Comparison of Net Profit and Economic Contribution among Sonatrach, Aramco, and TotalEnergies (in Billion U.S. Dollars)



Source: Authors' compilation based on company reports

The figure shows significant differences among the three companies in terms of net profit and economic contribution. Aramco recorded the highest net profit and the largest economic contribution through the "Iktva" program, which contributed $202.9 billion to GDP, in addition to $205 billion paid to governments in the various countries where it operates (Aramco, 2024, p.95). TotalEnergies ranked second, contributing more than $24.7 billion in income and production taxes across its operations, along with $28.3 billion paid by its extractive subsidiaries (TotalEnergies, 2024, p. 95). Sonatrach recorded the lowest values among the companies under study, with a local economic contribution of $43.86 billion (Sonatrach, 2023, p.21). Overall, the results indicate that the three companies make a substantial contribution to the economies in which they operate.

Table No. 1 Comparison of the Economic Dimension of the Studied Companies

	Sonatrach	Aramco	TotalEnergies SE
Development Projects	Sonatrach affirms its presence through development projects across various parts of Algeria, particularly in the regions where it operates.	It allocated $475 million U.S. dollars to support local communities.	Total works to integrate local development projects into its comprehensive strategy for the transition towards sustainable energy.
Employee Costs	Employee costs amounted to $ 1.86 billion U.S. dollars.	Employee Benefits Expenses amounted 16.1 million USD.	Wages and Payroll Taxes: amounted to $9.2 billion

Source: Authors' compilation based on company reports

Based on the comparison in the table, it is evident that all three companies—Aramco, Total, and Sonatrach—integrate the economic dimension as a core component of their social responsibility. However, a notable difference exists in the level of information disclosure. While the contributions of Aramco and Total extend beyond their home countries' borders, given their nature as global corporations, Sonatrach's role is largely confined to the Algerian economy. Furthermore, although all companies undertake development projects, only Aramco disclosed their specific financial value. It also provided detailed information on employee costs by stating the average benefits per employees, in contrast to the other two companies, which only reported the aggregate cost.

Social Dimension:

The evaluation of CSR within the oil and gas sector extends beyond merely financial and environmental performance; it critically encompasses the social dimension, which has become a decisive factor for the continued operation and the preservation of social legitimacy for major corporations.

Table No. 2 Comparison of the Social Dimension of the Studied Companies

Dimension	Sonatrach	Aramco	TotalEnergies SE
Training & Competency Development	43% of workforce received training.	95 training hours per employee; support for postgraduate studies (900 Master's graduates); communication and well-being initiatives.	Global training system; ~5 training days per employee/year; 23 training courses; psychosocial risk prevention; well-being score 81.5%.
Health & Safety	426 work-related accidents; implementation of process safety management and road safety measures.	3 fatalities; very low TRIR (0.042); ISO 45001:2018 compliance; digital safety tools ("Safe Life").	2 fatalities; TRIR 0.63 per million hours; 11 serious road incidents; FIA 3-star safety rating; prevention technologies and safety rules.
Community Contribution	Projects in education and health sectors.	National training centers; 7,037 volunteers; $95M school maintenance and $60M reconstruction; support for NGOs and infrastructure.	1,500+ initiatives; employee volunteering program ("Action!"); 10,000 employees involved; long-term education partnerships and production schools.

Source: Authors' compilation based on company reports

The analysis highlights a clear strategic divergence in Social Dimension practices among Sonatrach, Aramco, and TotalEnergies SE, particularly in terms of scope, maturity, and disclosure transparency.

In Human Capital Management, TotalEnergies adopts the most comprehensive and advanced approach through the implementation of global psychosocial risk prevention policies, systematic employee well-being measurement (81.5%), and structured international skill development programs (TotalEnergies, 2024, p. 67-68). Aramco, by contrast, demonstrates strong qualitative investment in workforce development, reflected in 95 training hours per employee, extensive academic capacity building, and initiatives that have led to 900 Master's graduates (Aramco, 2024, p.59). Sonatrach, however, reports comparatively limited disclosure, with training coverage restricted to 43% of its workforce (Sonatrach, 2023, p.52), a level below international benchmarks for leading firms, limiting a full assessment of its human capital strategy.

With respect to Occupational Health and Safety, both Aramco and TotalEnergies exhibit relatively high managerial maturity and advanced reporting systems, including distinctions between process and work-related safety indicators, alignment with international standards such as ISO 45001:2018, and the deployment of digital safety tools. Nevertheless, the occurrence of fatalities in both companies indicates persistent challenges in achieving zero-harm objectives. In contrast, Sonatrach reports 426 work-related accidents but provides less standardized and less comparable safety metrics, particularly due to the absence of normalization by man-hours worked, which reduces transparency and cross-company comparability (Sonatrach, 2023, p.55).

In terms of CSR and community contribution, Aramco's approach is characterized by large-scale, nationally oriented investments in education, infrastructure, and volunteering initiatives, including over 7,000 volunteers and substantial financial commitments to social development (Aramco, 2024, p.95). TotalEnergies adopts a more global and structured CSR framework, linking its initiatives to broader sustainable development objectives, supporting more than 1,500 projects worldwide, and promoting extensive employee engagement through its "Action!" volunteering program (TotalEnergies, 2024, p. 89). In contrast, Sonatrach's reporting remains relatively limited in terms of quantitative disclosure and methodological detail, which constrains a comprehensive evaluation of its social impact according to international reporting standards.

Overall, while all three companies emphasize human capital development, health and safety, and community contribution, they differ significantly in strategic orientation, implementation depth, and transparency levels, with TotalEnergies demonstrating the most integrated global model, Aramco reflecting strong large-scale national investment, and Sonatrach showing comparatively limited disclosure and standardization.

Ethical Dimension :

The ethical dimension of CSR is inseparable from the operational framework of energy giants such as Sonatrach, TotalEnergies, and Saudi Aramco. Beyond economic and legal obligations, this ethical commitment serves as the internal compass guiding the conduct of these immense entities in addressing complex and sensitive issues.

Table No. 3 Comparison of the Ethical Dimension of the Studied Companies

Category	Sonatrach	Aramco	TotalEnergies SE
Human Rights	Code of Conduct in place; Hotline available; 230 grievances raised	Code of Conduct in place; multiple stakeholder communication channels; 170+ reports; 80% grievance resolution	Code of Conduct implemented; 900+ people trained in Human Rights & Security; 638 grievances recorded
Diversity, Equity &	Data not available	4.8% women in leadership; workforce	25.1% women in senior management; 28.3% in

Inclusion (DEI)		includes 94+ nationalities; 92% employees attend performance reviews	senior executive roles; workforce from 170+ nationalities; anti-discrimination policies enforced
Anti-Corruption & Compliance	No detailed data provided	"SpeakUp" reporting platform; ISO 37001-aligned anti-bribery policy; governance committees; 27,674 training hours	Uses GRI & SASB reporting standards; external audits via Good Corporation; 4 assessments conducted

Source: Authors' compilation based on company reports

The table provides a comparative analysis of Sonatrach, Aramco, and TotalEnergies SE across key Environmental, Social, and Governance (ESG) dimensions, namely Human Rights, Diversity, Equity and Inclusion (DEI), and Anti-Corruption and Transparency. Overall, all three companies demonstrate the existence of Codes of Conduct and grievance or reporting mechanisms in the area of Human Rights; however, their approaches differ in scope and maturity. Sonatrach relies on a hotline system with 230 recorded grievances, Aramco reports over 170 cases with an 80% resolution rate and emphasizes stakeholder communication channels, while TotalEnergies combines grievance reporting (638 cases) with extensive training programs involving more than 900 employees in Human Rights and Security.

In terms of DEI, significant disparities emerge between the companies. Sonatrach does not provide publicly available data, whereas Aramco reports a relatively low representation of women in leadership (4.8%) but highlights workforce diversity across more than 94 nationalities and high employee engagement in performance reviews (92%) (Aramco, 2024, p.124). TotalEnergies demonstrates more advanced DEI performance, with women representing 25.1% of senior management and 28.3% of senior executives, a workforce spanning over 170 nationalities, and explicit commitments to non-discrimination and labor rights protection (TotalEnergies, 2024, p. 103). Similarly, in Anti-Corruption and Transparency practices, Sonatrach shows limited publicly disclosed information despite recent adoption of digital reporting mechanisms and alignment with ISO 37001 standards. Aramco has implemented the "SpeakUp" reporting platform, maintains ISO 37001-aligned anti-bribery policies, governance committees, and extensive training exceeding 27,000 hours (Aramco, 2024, p.116). TotalEnergies, meanwhile, follows internationally recognized reporting frameworks such as GRI and SASB, undergoes external audits through Good Corporation, and has completed multiple assessments.

Overall, the comparison indicates varying levels of ESG maturity, with TotalEnergies SE demonstrating the most advanced and transparent governance framework, followed by Aramco with strong compliance and operational reporting systems, while Sonatrach appears to be in a relatively earlier stage of ESG disclosure and implementation.

Environmental Dimension:

The environmental dimension of Corporate Social Responsibility (CSR) represents the most urgent and sensitive aspect in evaluating the performance of global oil and gas companies. With the escalating awareness of the climate crisis and the radical shift toward a low-carbon economy, the commitment of these corporations is not limited to mere compliance with environmental regulations; rather, it extends to an existential imperative for managing their massive carbon footprint.

Table No. 4 Comparison of the Environmental Dimension of the Studied Companies

Category	Sonatrach	Aramco	TotalEnergies SE
Environmental Impacts	MRV system implemented; 2.72 Bm^3 gas flared; leak detection & repair program; partial ISO 14001 adoption	Scope 1 & 2 emissions: 67.3 $MMtCO_2$ e; flaring intensity 5.64 scf/boe; 12 oil spills; 85.6% net positive biodiversity impact; full ISO 14001 certification	SO_2 emissions: 12 kt; particulate matter: 4.1 kt; net deforestation: 22 ha; 27 spills; full ISO 14001 certification; advanced spill crisis management system
Water Management	84% wastewater treatment plant readiness	Freshwater use: 89.9 Mm^3; intensity 0.02 m^3/boe; follows water efficiency standards	Water withdrawals: 102 Mm^3 (50 Mm^3 in water-stressed areas); consumption: 76 Mm^3; member of CEO Water Mandate
Waste Management	No data available	481,561 t industrial waste; 35.7% recycled; 2,800+ employees trained in circular economy	521 kt processed waste; 61% reuse rate; $4.5B circular product sales; strong waste management partnerships

Source: Authors' compilation based on company reports

From the table above, the three companies—Sonatrach, Aramco, and TotalEnergies SE—demonstrate a general commitment to environmental responsibility within the ESG framework; however, they differ significantly in terms of transparency, depth of disclosure, and overall maturity of environmental management practices. In terms of environmental impacts, Sonatrach has implemented a Measurement, Reporting, and Verification (MRV) system and launched leak detection and repair programs, while recording 2.72 billion cubic meters of flared gas, alongside a partial adoption of ISO 14001 standards (Sonatrach, 2023, p.56). Aramco, by comparison, reports more comprehensive quantitative indicators, including 67.3 $MtCO_2$ e of Scope 1 and 2 emissions, a flaring intensity of 5.64 scf/boe, 12 recorded oil spills, and full ISO 14001 certification across all sites, in addition to reporting an 85.6% net positive impact on biodiversity (Aramco, 2024, p.20). TotalEnergies SE provides similarly detailed disclosures, including 12 kt of SO_2 emissions, 4.1 kt of particulate matter, 22 hectares of net deforestation, and 27 spill incidents, while also maintaining ISO 14001 certification across all operations and implementing advanced crisis management systems for marine spills(TotalEnergies, 2024, p. 74).

In water management, Sonatrach reports an 84% readiness rate for wastewater treatment facilities(Sonatrach, 2023, p.56). whereas Aramco demonstrates efficiency through freshwater consumption of 89.9 million m³ with an intensity of 0.02 m³/boe, aligned with industry standards for resource optimization (Aramco, 2024, p.59). TotalEnergies SE reports broader water exposure metrics, including 102 million m³ of freshwater withdrawals (with 50 million m³ in water-stressed regions) and 76 million m³ of consumption, alongside its commitment to the CEO Water Mandate, reflecting active engagement in global water stewardship initiatives (TotalEnergies, 2024, p. 75). Regarding waste management, Sonatrach does not provide available data, while Aramco manages 481,561 metric tons of industrial waste with a recycling rate of 35.7% and has trained over 2,800 employees in circular economy practices (Aramco, 2024, p.90). TotalEnergies SE, meanwhile, processes 521 kt of waste with a 61% reuse rate, generates $4.5 billion in revenue from circular products, and maintains extensive international partnerships in waste management and recycling (TotalEnergies, 2024, p. 77).

Overall, TotalEnergies SE appears to demonstrate the most advanced and comprehensive environmental performance, particularly in water stewardship and circular economy integration. Aramco follows with strong quantitative reporting, standardized environmental systems, and full ISO 14001 coverage across its operations. Sonatrach, while showing clear initiatives such as MRV implementation and emissions reduction programs, remains comparatively limited in the scope and depth of its environmental disclosures.

CSR Benchmark Matrix

Based on the detailed analysis of CSR dimensions presented above, a comparative benchmarking matrix is developed to synthesize the relative performance of the three companies.

Table No. 5 CSR Benchmark matrix

Dimension	Sonatrach	Aramco	TotalEnergies
Economic	Medium	Advanced	Advanced
Social	Medium	Advanced	Advanced
Ethical	Medium	Advanced	Advanced
Environmental	Lagging	Advanced	Advanced

Source: Authored by the Researchers.

The benchmarking analysis reveals a clear gradient in CSR maturity among the selected oil and gas companies. Overall, TotalEnergies and Aramco consistently demonstrate higher levels of CSR disclosure and reporting sophistication across environmental, social, ethical, and economic dimensions. Their reporting practices are characterized by greater standardization, the use of internationally recognized frameworks, and more detailed quantitative indicators. In contrast, Sonatrach exhibits a comparatively lower level of disclosure, particularly in environmental and health & safety indicators, where data availability and normalization remain limited. These differences reflect variations in institutional environments, regulatory pressures, and the degree of international market exposure, rather than purely differences in operational performance.

3. Results

Based on the comparative analysis of CSR disclosure practices among Sonatrach, Aramco, and TotalEnergies SE, the findings of this study can be interpreted in relation to the broader literature on corporate social responsibility in the oil and gas industry. Overall, the results indicate significant variations in CSR disclosure across economic, social, and environmental dimensions (H1), differences in reporting practices depending on governance structures and adopted frameworks (H2), as well as noticeable disparities in environmental, health, and safety transparency among the three companies (H3). These variations reflect differences in the maturity of sustainability reporting systems, the extent of alignment with international standards, and the institutional contexts in which each company operates.

In this regard, the findings are consistent with those of **(Raufflet, Cruz, & Bres, 2014),** who highlight that oil and gas companies generally demonstrate strong performance in environmental management and governance through the measurement and disclosure of emissions, water use, and biodiversity indicators. This aligns with the present study, particularly in the cases of Aramco and TotalEnergies, which show advanced environmental reporting systems and structured ISO-based management frameworks. However, the same study also emphasizes persistent gaps in areas such as the precautionary principle, supply chain integration, and certain environmental impacts, which is similarly reflected in the current findings where Sonatrach exhibits comparatively limited disclosure and lower alignment with international reporting practices.

Furthermore, the results support the argument advanced by **(Berkowitz, Bucheli, & Dumez, 2017),** who conceptualize CSR in the oil and gas sector as a multi-level construct shaped by meta-organizations rather than firm-level initiatives alone. This perspective is evident in the present study through the clear variation in governance and reporting frameworks: TotalEnergies relies extensively on global standards such as GRI and SASB, Aramco applies structured compliance and ISO-based systems (including ISO 37001 and “SpeakUp” mechanisms), while Sonatrach demonstrates only partial alignment with international frameworks. Such differences reinforce the idea that CSR disclosure is largely influenced by broader institutional and regulatory environments that shape corporate reporting practices across the industry.

In addition, the findings are consistent with **(Chowdhury, Ennis, Choi, & Chung, 2018),** who demonstrate that CSR activities, particularly in environmental and social dimensions, contribute positively to firm value in the oil and gas sector and do not negatively affect financial performance. In the present study, companies with more advanced CSR disclosure practices—especially TotalEnergies and Aramco—also exhibit more developed sustainability strategies, including circular economy initiatives, emissions control, and water stewardship. This further supports the view that higher levels of CSR transparency are associated with stronger sustainability performance and enhanced corporate legitimacy.

Overall, the synthesis of findings with prior literature indicates that CSR practices in the oil and gas sector have evolved considerably, yet remain uneven across companies. Differences are particularly evident in the depth of disclosure, the adoption of international standards, and the integration of sustainability into core business strategies. These disparities reflect variations in CSR maturity, influenced by both internal governance systems and external institutional environments.

Based on the comparative analysis of the three companies, the following key findings summarize the main outcomes across economic, social, environmental, and governance dimensions:

- **CSR and Sustainability Integration:** TotalEnergies SE and Aramco demonstrate a more advanced integration of CSR and sustainability principles compared to Sonatrach, as evidenced by the publication of comprehensive sustainability reports, which are not yet fully developed in the case of Sonatrach.
- **Investment Scale and Scope:** Sustainability and community investment programs are significantly more extensive in TotalEnergies and Aramco. This difference can be partly explained by their larger financial capacity and broader international operations.
- **Transparency and Disclosure Practices:** There is a clear variation in disclosure quality. TotalEnergies provides the most detailed and quantitative reporting, followed by Aramco, while Sonatrach shows relatively limited disclosure of key performance indicators.
- **Economic Role:** All three companies recognize their economic contribution as a central element of their social responsibility, particularly in supporting national and local economic development.
- **Human Resource Management:** TotalEnergies and Aramco adopt more comprehensive HR strategies that emphasize employee well-being, skills development, and innovation. In contrast, Sonatrach appears to place greater emphasis on training indicators, with less evidence of broader HR development practices.
- **Occupational Health and Safety:** Although TotalEnergies and Aramco have implemented advanced safety management systems aligned with standards such as ISO 45001, incidents such as fatalities indicate that operational risks remain significant across the sector. Sonatrach is progressively aligning its safety practices with international frameworks.
- **Anti-Corruption and Governance:** All three companies demonstrate formal commitments to anti-corruption through internal policies and compliance mechanisms, reflecting increasing attention to governance and ethical conduct.
- **Environmental Strategy:** TotalEnergies and Aramco exhibit more structured and strategic approaches to environmental management, supported by detailed reporting and certification systems, whereas Sonatrach shows a comparatively less integrated environmental framework.
- **Community Engagement:** Each company invests in community development initiatives, although the scale, structure, and reporting of these contributions vary considerably.

4. Study Limitations

This study faces several limitations related to the comparative analysis of CSR practices in the oil and gas sector. The primary limitation concerns the asymmetry of non-financial disclosure among the selected companies, particularly between internationally listed corporations and nationally owned enterprises. While TotalEnergies and Aramco provide relatively detailed sustainability and ESG disclosures aligned with international reporting frameworks, some CSR indicators in Sonatrach’s reports remain limited or insufficiently standardized.

In addition, certain environmental and health & safety indicators were not consistently normalized across the three companies, making direct comparison more challenging. The absence of some data, particularly regarding waste management, diversity indicators, and normalized accident rates, may reflect differences in reporting practices, transparency levels, or regulatory requirements rather than actual CSR performance disparities.

Despite these limitations, the study provides a comparative analytical overview of CSR dimensions in major oil and gas companies based on publicly available annual and sustainability reports.

Conclusion

In conclusion, the comparative analysis of Corporate Social Responsibility (CSR) across the three major energy companies (Aramco, TotalEnergies SE, and Sonatrach) reveals profound variations in operational methodologies, performance levels, and the maturity of their sustainability strategies. While Aramco and TotalEnergies SE demonstrate noticeable advancement in transparency, providing detailed quantitative disclosures and adopting sophisticated frameworks for environmental and human resources management, Sonatrach still needs to address gaps in reporting non-financial performance indicators and develop a comprehensive strategy for well-being and the environmental dimension. These findings underscore the critical need for standardizing reporting metrics within the energy sector to enable fair comparison and enhance accountability, thereby reinforcing the pivotal role of these three companies in achieving sustainable development within their respective communities.

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