

Corporate Social Responsibility and Enhanced Oil Recovery Process: A Conceptual Review

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Abstract: In recent years, Corporate Social Responsibility (CSR) is considered as a crucial approach for addressing the socio-environmental impacts of the company's activities, particularly in the oil and gas industry. The oil and gas industry is considered to be a leading sector of business and has to continuously engage with CSR practices in terms of political, economic, social, legal, technological and environmental areas. With the drop in the oil price over the past few years, many companies are looking to maximize the production from the current existing fields which has led to the emergence of advanced chemical enhanced oil recovery (CEOR) techniques in oil recovery vs. conventional method of waterflooding, which to some extent supports companies to address the key challenges of CSR. This paper examines the potential CSR to address the environment and development challenges of oil industry looking into the benefits from low salinity water (LSW) injection together with the CEOR floods. The electronic databases were researched to critical review the significant contribution of EOR processes with LSW towards CSR activities and how it supports in addressing the goal no. 7 of Sustainable Development Goals (SDGs). The literature study indicated that simulation process with LSW benefits the oil fields in terms of high recovery of oil and at the same time reduce the amount of chemicals adsorption in the reservoir, which in turns supports to develop production system which is environmental-friendly. However, the benefit gained from this EOR technique depends on the oil field characteristics like mineralogy, its brine as well as the composition of the crude. The study results may add to the existing CSR in oil industry literature review, as we provide examination on the benefits and effectiveness of using EOR with low-saline water that may contribute to addressing CSR and Sustainable Development Goals (SDG), particularly goal no.7.

Keywords: *Corporate Social Responsibility, Oil Industry, Enhanced Oil Recovery, Sustainable Development Goals, Low Salinity water-flooding.*

I. INTRODUCTION

Corporate Social Responsibility (CSR) indicates the responsibility of companies/firms to behave and contribute to sustainable development of stakeholders. Moreover, the well-being of society as a whole is a crucial aspect for a company's reputation and legislative demands, particularly for the oil and gas companies. Studies have conversed that CSR activities and programs support the company to successfully integrate value and success factor [1]. According to a study, the topic related to CSR is of greater interest for research as well as commercial practices [2]. Despite the mounting interest in CSR, there is still no generally agreed definition [3]. However, generically CSR encompasses overlapping areas like corporate citizenship, stakeholder theory, ethics, and sustainable development, which largely contributes to societal and economic development [4] This reflects that the close interest of the company towards CSR practices are good for the society as a whole and 'doing good' for the oil and gas sector is

usually referred to as common creed in conducting research and commercial practices mainly related to oil and gas production system that contributes to economic development while at same time protect the environment. Studies have shown that CSR develops a platform to contribute towards useful interaction between companies and society as well as provide opportunities for companies to develop a reputation. This paper examines the concept of CSR and discusses the CSR in the oil and gas sector with a particular indication of chemical enhanced oil recovery (CEOR) process. Moreover, covers discussions on the potential CSR to address the environment and development challenges of oil industry looking into the benefits from low salinity water (LSW) injection together with the CEOR floods.

II. CORPORATE SOCIAL RESPONSIBILITY: DEFINITION AND CONCEPT

Corporate Social Responsibility (CSR) is also known as corporate with suffix words like “responsibility, ethics, citizenship, governance” and sometimes referred to as responsible entrepreneurship, sustainable environment, and development [5]. In modern business practices, CSR issues are often embedded with terms like “responsible competitiveness” or “sustainable development” and this is more specifically applicable to the oil and gas sector [6]. The CSR concept generally refers to the means via which companies integrate with socio-environmental and economic concerns alongside factors like value, culture, strategy, and decision-making, which enables them to establish to better practices for creating business wealth and improve the society [7].

The literature study has indicated that there is no single definition that describes CSR. For instance, CSR in the US is much defined in terms of a “philanthropic model” whereas in European business model, the company focuses on operating their core business activity in a socially responsible manner and this complements their investment in communities which exhibits a solid business case with reasons [8]. CSR activities are often associated with human and/or workers rights, measures associated with anti-bribery and anti-corruption, transparency and accountability actions. CSR is beneficial for the companies as it attracts investors, shareholder and other stakeholders. Studies have indicated that year after year the company’s focus on education, sports and health aspects as part of their CSR activities [5]. The concept and approach of CSR should be viewed in wider aspects. For instance, CSR activities should be associated with ethical and governance matter alongside the working environment and human rights.

As cited by Renouard, & Ezvan (2018), CSR can be defined as a concept wherein companies/corporations take initiatives “to contribute to a better society with a cleaner environment” [9]. Furthermore, it refers to a concept by which corporations can “integrate social and environmental concerns in their business operations and in their interaction with their stakeholders”. Researchers in their study on CSR and public relations results indicated that around 33% of the respondents perceived that creating and implementing CSR activities is part of a management role, around 20% perceived that is the philanthropic role and around 10.5% conferred as a value-based role [10]-[3].

From this, it can be implied that views on the concept of CSR may differ among employees and can be ascertained that CSR activities/practices are not systematically adopted across industry, countries and globally. However, studies on CSR particularly in the context of the Oil and Gas industry have conferred that message and disclosure regarding ethical and social responsibilities are initiated to evoke strong positive responses among stakeholders [11]. As

results, it can be seen that oil companies are progressively concerned with communicating about their ethical and social responsibilities through various means of communication like sustainability reports, various advertisement platforms, and annual reports.

III. RESEARCH METHODOLOGY

The electronic databases like Onepetro, ScienceDirect and other journals were researched to critical review the significant contribution of EOR processes with LSW towards CSR activities and how it supports in addressing the goal no. 7 of Sustainable Development Goals (SDGs). The reports published by oil and gas companies regarding their practices and activities were also analyzed. The conceptual review was carried out by analysis the studies and reports published from the late 1990s to the present.

IV. OIL & GAS INDUSTRY: CSR

The oil and gas industry is always in the spotlight due to its activities which have a severe impact on the community and also the environment. As cited by Kraal (2019), the oil and gas journal [Ref. 12 November 2016] highlighted the dark side of the oil and gas industry, which involve issues such as secrecy in the payments made to government, the revenues being kept under wraps, embezzlement, and bribery which arise [12]. There have also been speculations that the companies hide the oil discoveries and its equity holders. Other issues surrounding the industry involve the lack of financial statements and unpublished information by countries on the royalties, taxes imposed on the companies [13]. Oil spills are often regarded as a catastrophic disaster which has a very high impact on lives and environment and is one of the main reasons which encouraged oil and gas companies to practice CSR. For instance, the oil spill in the Gulf of Mexico is regarded as one the largest oil spill incident in the US history, other oil spills included the Valdex spill in Alaska [14]. The other controversies included the association of BP in human rights abuses in Columbia and protests against Shell in Nigeria [15]. These events which grab a lot of attention amongst the public, media and government have a negative impact on the brand image on the oil and gas companies. There is a constant buzz around the activities of the multinational oil and gas companies which put them under pressure, and the companies find it hard to maintain a stable relationship with the broader society [15]. The oil and gas industry is often associated with causing some pollution to the environment and the obstacles faced by the companies include attaining land clearances and licenses for natural gas emission. In some countries, the oil and gas resources are located near the areas of rain forests, mangroves, etc. which lead to higher environmental risks [15]. However, with fast-growing economies across the globe, the CSR challenges are huge. Due to which the corporations are now needed to focus on engaging those kinds of activities which are

beneficial to the society at large and also create quality CSR programs [6].

The oil and gas companies over the years have put their focus on establishing a more concrete code of conducts and on social reporting. They have also been more involved in CSR practices which have a positive effect on their brand image. For instance, the CSR initiatives involve the Extractive Industries Transparency which was established by the UK government and the United Nations Global Compact [16]. The growth of CSR practices in oil and gas companies is also seen in countries like Brazil and South Africa where Petrobras and Sasol have been taking initiatives to publish reports [17]. The national oil companies have not been extensively involved in CSR when compared to the multinational companies as they face comparatively lesser pressure from the media and public [17].

Furthermore, the collaboration with organizations and NGOs has helped companies to carry out CSR and aid in developing the community around them by setting up hospitals, schools, etc. Some oil and gas companies have been able to successfully launch programs and schemes like employment programs have had a positive impact on the development of society [15]. Over the years, the adoption of CSR has reduced the environmental impacts of the oil and gas industry. For instance, the number of oil spills reduced from 25.2 spills a year in the 1970s to 3.4 spills in 2000s [17]. The prospect of renewable energy is attracting some of the multinational oil companies to venture into this field to attain an alternative source of income.

V. ENHANCED OIL RECOVERY (EOR): ENVIRONMENT RISK

Enhanced Oil Recovery (EOR) is a tertiary method of recovering oil which is used to maximize the oil recovery from the field. It accounts for around 60% of the total oil produced in the US [17]. The EOR method increases the flow of oil or gas via the injection of fluid into the reservoir. There are two broad categories of EOR which is thermal and non-thermal. Thermal EOR involves injecting steam/gas into the reservoir to improve the recovery whereas non-thermal EOR involves the injection of fluids like chemical, water, etc. to increase recovery. Waterflooding and CO₂ account for around 50% and 5% of total oil produced in US respectively whereas thermal EOR and Chemical EOR only account for 4% and 1% of total oil produced in the US [17]. However, EOR is not widely known to people and is known to affect the groundwater [18]. CEOR involves the injection of chemicals which alter the properties of the reservoir in order to increase oil production. Often, companies use chemical additives to boost the efficiency of other EOR methods [19]. The common chemicals used in CEOR method include polymer,

surfactant, alkaline and at times they are used in combination to improve recovery.

CEOR pose a major threat to the groundwater which is contaminated upon the use of chemicals. However, there aren't many regulations which are present to curb this issue, but over the years of regulations are being developed to regulate the injection practices. For instance, Underground Injection Control (UIC) in the US is implemented to protect the groundwater which is a source for drinking water [17]. The oil and gas companies fail to present the data and basic information of EOR like the environmental impacts and the chemical compositions to the public and government bodies adding to this there aren't any regulations which require companies to monitor the quality of groundwater which fails to detect the contaminations [15]. The chemicals used in CEOR have a high potential to contaminate the groundwater which can occur through leakages in wells, incorrect plugging of oil and gas well or even direct injection into the groundwater sources [17]. An EOR process is accompanied by a high volume of wastewater which comes with potential risks of spills during transportation or disposal phases [13]. Studies have shown that corrosion and leakage risk normally present in each EOR techniques and the impact of chemically enhanced oil recovery method may have environmental and development impact as a large amount of water is used during the process [6]-[20]. But smart-water flooding may exhibit a favorable synergy during the EOR process that reduces chemical consumption and improves sweep [21].

VI. CEOR WITH LSW: ENVIRONMENTAL AND DEVELOPMENT

Studies have conferred that primarily the impact of chemically enhanced oil recovery (CEOR) on the environment may appear to be negative, as a huge amount of treated water is used during conventional recovery method, particularly with high salinity water. This is because the quantity of water presents during CEOR create an opportunity to contaminate the water, particularly at the surface level. Nevertheless, studies have shown that there are fewer options where the oil companies can carefully manage the non-recycled water which is disposed into the wells and this is often expensive as the companies need to spend on water treatment and management. Consequently, the company can transform from high salinity water to low salinity water, this will enable the companies to conduct the CEOR process by injecting improved water quality for waterflooding [21]. By this, it gives an opportunity for oil companies to gain high recovery of oil and minimize the damage to the environment. Studies have shown that CEOR with LSW has enabled companies to improve recovery of oil by more than 10 to 20% and with improved techniques, the viscoelasticity aspects of the reservoir are protected from depletion of resources [22]. For instance, in New York oil fields fresh water is injected for waterflooding, the water

quality is improved based on EOR regulations provided by the US. However, the used of low saline water along with CEOR flood is an area yet to be fully implemented by the oil and gas companies. In the US, the UIC program implemented at national level and annual inspections are conducted to protect the environment [23]. Studies have indicated that the companies need to invest more in establishing separate CSR department/unit which is dedicated to endeavor CSR activities and environmental development programs. This is because there is a lack of research and strategic planning in the context of CSR [21]-[19].

VII. CEOR WITH LSW: SUSTAINABLE DEVELOPMENT GOAL

Sustainable Development Goal (SDG) is a set of goals which are collectively come up by the united nations (UN) to tackle the challenges faced globally [24]. There are seventeen SDGs which tackle different challenges and each of these goals are defined with specific targets which are aimed to be achieved by the year 2030. They provide a global focus and a holistic approach to tackle the challenges faced globally [25]. The SDG No. 7 Affordable and Clean Energy focuses on providing access to affordable and reliable energy sources [24]. The SDG 7 is built around the aspects of renewable energy, energy efficiency and electrical accessibility [26]. The goal is important as it reduces the dependency on natural resources which are declining at a rapid rate, by achieving this goal there can be newer proposed alternatives to utilize energy in a more efficient and sustainable manner. In CEOR with LSW method, the use of LSW reduces the concentration or amount of chemical needed to maximize recovery and a lower quantity of chemical provides better efficiency which also makes the flooding more economical. The reduction in the chemical will eventually reduce the environmental risk associated with EOR method. The process optimizes the consumption of chemicals and energy while providing higher returns than the traditional method of using high saline water. CEOR with LSW supports the target 7.1 "By 2030, ensure universal access to affordable, reliable and modern energy services" as it is proven to be more environmentally friendly compared to traditional method. It also paves the way to a more affordable and reliable method of recovering oil through CEOR as it reduces the amount of chemical needed, provides better efficiency with lower chemical and is more affordable when compared to the traditional method. Ultimately, the proposed method can be implemented in real fields to recover oil and can act as a modern CEOR method.

VIII. CONCLUSIONS

It can be summarized that the need for reporting CSR is becoming an essential component to oil and gas companies which show their obligation to transparency and economic,

social and environmental sustainability. There is a need arising for the companies to have proper reporting of their finances and their stakeholders, along with this the companies need to have a plan or strategy which can prevent corruptions. International accounting standards can be applied to the companies to present their profits and royalties. The oil and gas industry is one of the sectors where the need for third-party authentication for environmental reports is high. The companies which are intensively involved in CSR practices are the multinational oil companies which are highly reliant on their reputations in the international markets. The impact of EOR to the environment is not known to the public across and there is a need for the development of more regulations which monitor this process. The use of LSW with CEOR is seen to be more beneficial in improving the recovery of oil and has a lower environmental impact compared to the traditional CEOR method. The use of LSW with CEOR is also expected to give higher revenues when compared to the traditional methods. However, the use of LSW with CEOR is still an aspect of EOR which hasn't been applied across the field to commercially produce more oil.

IX. FUTURE DIRECTION

The study results may add to the existing literature review on CSR in the oil industry, as we provide examination on the benefits and effectiveness of using CEOR with LSW that may contribute to addressing CSR and Sustainable Development Goals (SDG), particularly the goal no 7. The inferences from this study which can be a future direction are as follows

- The government should improve the state and global regulations on operating and disclosure policies in order to monitor the EOR process and its environmental impact.
- CSR should be imposed by law via certain regulations. The CSR criterion and professional standards should be strength at the international level, this not only supports to improve the performance but also enable to meet the local and international urge for better quality work and family life.
- The companies need to adopt better data management principles in order to be more transparent about their activities to the public.
- Involve in research and development activities to increase the effectiveness of CEOR that minimize environmental risk.

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