**A COMPARISON OF THE NIGERIAN OIL AND GAS SUPPLY CHAINS WITH THE UK: TAKING A SUSTAINABILITY PERSPECTIVE**

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**Introduction**

For the past three decades, the issue of sustainability has occupied a pivotal role both in the academic and industry. At the corporate level, organizations are moving beyond mere financial performance, to peg their survival on environmental and social performances, which have been conceptualized as the integral part of the triple bottom-line for achieving corporate sustainability (Elkington 1998). Among others, organisations foster sustainability at the supply chain level by infusing sustainability initiatives into their supply chain management (SCM) strategies. This is because SCM has been identified as a critical basis for enhancing organisational competitiveness through effective collaboration with stakeholders to reduce cost and deliver superior customer value. To this end, the infusion of sustainability strategies into SCM has birthed the emergence of the concept of sustainable supply chain management (SSCM) as a way of enhancing organisations’ ability to drive their sustainability objectives.

In consideration of the importance and the risk of the Oil and Gas (O&G) industry to human life, the environment and the society, there is no gainsaying that issue of sustainability must not be taken with levity in the industry. Indeed, the negative impacts of accidents and incidents that occurred (and still occurring) in the industry such as Piper Alpha oil spills of 1988 in the North Sea and consistent conflicts between the oil companies and the host communities in the Niger-Delta area of Nigeria, is an attestation to the above. Surprisingly, the extant literature revealed a dearth of research on sustainability issues in the supply chain of the O&G industry, especially in an important O&G producing nation like Nigeria. Although the global O&G industry is generally prone to sustainability risks, studies have suggested that adoption of sustainability measures is popular across the supply chain of the UK O&G industry, with same having a positive linkage with organisational performance (Yusuf et al. 2013).

In view of the postulation that sustainability initiatives can differ across supply chain echelons and geographic locations (Meckenstock et al. 2015; Tate et al. 2010), this study seeks to compare the sustainability initiatives in the supply chain of the UK and Nigerian O&G industry, with a view to making recommendations for the Nigerian O&G industry, based on the working initiatives adopted in the UK O&G industry. Specifically, this paper purports to provide answer to a singular overarching research question which is: ‘What are the major differences in the SSCM initiatives adopted in the UK and Nigerian O&G industry?’ To put this paper in proper perspective, the remaining parts of this paper is arranged into various sections which are literature review, methodology, SSCM strategies in the UK O&G industry, SSCM strategies in the Nigerian O&G industry, a comparison of SSCM strategies in the UK and Nigerian O&G industry, and conclusion and recommendations.

**Literature review**

The supply chain of the O&G industry is an integral part of the global supply chain. However, one of its major peculiarities is that most of its activities are highly engineering intensive, carried out in extremely environmental sensitive areas. Logistically, it involves developing and transporting highly inflammable and toxic products across countries, through various modes like barge, ships, rails, pipelines and trucks. The O&G supply chain is inbuilt with extreme complexities and dynamism with far reaching implications on the environment, health and safety. From the extant literature, scholars appear to differ on the depiction of a typical O&G supply chain. Whereas some studies adumbrate the O&G supply chain as a two-sector construct, made-up of the upstream and downstream sectors (Ahmad et al. 2016), others categorize it into a three-sector structure, consisting of the upstream, midstream and the downstream sectors (Modarress et al. 2016). Following the view of Zhao and Chen (2014) that a clear description of an O&G supply chain is necessary for an effective implementation of any supply chain concept (strategies), Figure 1 below depicts the Nigerian O&G supply chain based on the functions and activities of the Nigerian National Petroleum Corporation (NNPC).



Figure 1. Nigerian O&G Supply Chain

Irrespective of the structure of the O&G supply chain adopted by authors, one point of agreement is that the entire supply chain of the industry constitutes a risk of catastrophic health, safety, economic and environmental hazards to the society. practitioners have always adopted measures to forestall the occurrences/reoccurrences of environmental, health and safety hazards in the O&G industry. However, these measures appear to be more reactive than proactive. For example, studies have suggested that new and stricter regulations, sophisticated risks measures and protective barriers are quickly adopted only after a major accident had occurred in the industry (Mendes et al. 2014). To this end, the industry has been a subject of criticism regarding its sustainability practices. Interestingly, instead of strengthening the O&G supply chain to withstand turbulence from inception, Mohammad (2008) observes that supply chain activities in the O&G industry were initially treated as a ’soft issue’ by the practitioners until they realized that more than 80% of their expenses were ‘burnt’ on supply chain related activities. This observation is not any different in the academics where a dearth of research on SSCM in the O&G industry highlighted (Ahmad et al. 2017).

From the extant literature on O&G SSCM, key areas such as sustainability drivers (Raut et al. 2017; Yusuf et al. 2013), SSCM strategies (Lakhal et al. 2007), sustainability reporting (Ahmad et al. 2016) and sustainability-performance linkage (Ekiugbo and Papanagnou 2017) have been studied from different perspectives. However, a general overview of these studies suggests that considerable efforts have not been made to empirically compare the SSCM strategies of the O&G firms in the developed economy with those in the developing economies. For example, research by Yusuf et al. (2013) on strategy and performance is solely based on a developed country (UK). Similarly, Lakhal et al. (2007) applied data from another developed nation (Canada) to test their framework for greening refineries. In contrast, Raut et al. (2017) applied a dataset from a developing nation (India), to understand the critical success factors of the O&G SSCM. Similarly, primary data from another developing nation (Nigeria) was generated by Ekiugbo and Papanagnou (2017) to investigate the link between sustainable procurement and sustainable development in the upstream sector. As a departure from the foregoing, Ahmad et al. (2017) compared data from Europe and America with two developing nations to understand external forces that drive SSCM in the O&G industry. This study revealed how findings differ among respondents in the two regions. However, its strict focus on SSCM drivers, to the exclusion of SSCM strategies, makes the application of its findings to SSCM strategies impossible.

Since the developing nations are generally prone to weak regulations and lower stakeholders’ pressure, which are crucial to sustainability adoption (Silvestre 2017), the need to compare the extent of SSCM practices in their O&G industry with those of the developed nations, reputed for stringent environmental regulations (Holt and Ghobadian 2009), cannot be overemphasized. This will afford an opportunity to understand the factors that drive sustainability in the supply chains in the two economic regions. It will also identify the differences in the specific strategies adopted in the two regions. In recognition of the above, this research compares the extent of sustainability practices in the Nigerian (developing nation) O&G industry with the UK (developed nation) O&G industry.

**Methodology**

This research is based on two methodological approaches. The first stage focuses on the collection and analysis of secondary data from the UK O&G industry, while the second stage is based on the collection and analysis of primary data from the Nigeria O&G industry. In the first instance, the UK O&G industry is selected for this research because of the evidence of sustainability initiatives deployed in the industry (Yusuf et al. 2013), especially after the Piper Alpha spills of 1988. An example is the ‘Step Change in Safety’ initiative by the industry’s stakeholders, aimed at making the UK the safest place to work in the worldwide O&G industry in 1997. This initiative has been adjudged to be effective by the industry, leading to a reduction in incidences of major and fatal accidents by 97% (HM Government 2013). On the other hand, Nigeria is chosen for comparison because, despite its position as one of the major oil producing nations in the world, the O&G industry has been subjected to criticism in terms of its economic, environmental and social sustainability.

As a basis of the study, the data from the UK industry were sourced from the latest sustainability reports, Corporate Social Responsibility (CSR) reports, sustainability policies documents and data relating to health, safety and environment of firms operating in the upstream and downstream sectors of the UK O&G industry. A qualitative content analysis, adapted from Tate et al. (2010), focusing on a thematic analysis of the focal issues in the reports was carried out. Text-by-text reading and re-reading of the content of documents were carried out with a focus on establishing the themes and patterns as they emerge. The emerging themes were presented against the sustainability indicators of the International Petroleum Industry Environmental Conservation Association (IPIECA), as a basis of classifying them into the Triple Bottom-line dimensions of Elkington (1998).

This above process laid the foundation for the second stage of the methodology. In this wise, a semi-structured interview protocol was designed from the results of the findings from the previous process, to obtain the views of industry practitioners in Nigeria. The details of the firms in the industry (upstream, midstream and downstream sectors) were obtained from the Department of Petroleum Resources (DPR). Thereafter, a purposeful sampling method was adopted to select seven firms, covering all sectors of the industry. The selected firms were contacted and four agreed to participate in this research. Since sustainability is a strategic issue, the targeted respondents were the senior management staff of the selected firms. The findings from the interviews were later discussed within the context of the literature and compared with the previous findings from the secondary data obtained from the UK O&G industry. Areas of similarity and differences were noted, and recommendations were made to the Nigerian O&G industry based on the differences.

**SSCM Strategies in the UK O&G Industry**

Table 1 presents the findings from the UK O&G industry. Specifically, a total of ten sustainability objectives, with various sustainability initiatives, were identified in the industry. Generally, involvement of suppliers and contractors in sustainability initiatives were emphasised in all reports used for this study. Hence, an indication that intention of sustainability drive across the supply chain is intended. This agrees with the views of Russo and Fouts (1997) that organisations usually present sustainability information about supply chain to convey a positive image to stakeholders.

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| **Cat.** | **Sustainability Objectives** | **Sustainability Initiatives** | **IPIECA Guideline** | **Area** |
| Env | To achieve a low carbon future | Setting targets to reduce emission in operational activities | E1 | Both |
| Emphasis on gas production | Up |
| To achieve energy efficiency | Exploring a good mix of renewable sources in energy portfolio | E2, E3 | Both |
| To curtail spills and gas flared | Adoption of artificial intelligence to monitor pipelines | E5 | Up |
| To reduce water consumption and protect marine life | Water recycling system | E6 | Both |
| Efficient management of produce water | Up |
| Eco | To reduce long-term operational costs | Investment in technology and sustainability initiatives | SE4 | Both |
| To prevent corruption and related activities | Transparent procedures, contractors and suppliers engagement | SE11 | Both |
| Employees engagement | SE16 | Both |
| Soc | To ensure workplace safety and accident prevention | Staff training and retraining | SE17 | Both |
| Use of safety gadgets, use of drones instead of staff in high-risk tasks | HS5 | Both |
| To ensure that all employees have quality health standard | Collaborative health scheme for staff | HS2 | Both |
| Engagement with health officials | Both |
| To ensure that human rights are upheld | Consistent review of policy on human rights | SE8, SE9,SE10 | Both |
| Modern slavery reviews | Both |
| Engagement with supply chain partners | Both |
| To ensure positive impacts on community | Contribution to social investment | SE1, SE2,SE3, SE4 | Both |
| Employment opportunity for the locals | Both |
| Continuous transparent engagement with the communities | Both |

(Env: Environmental, Eco: Economic, Soc: Social, Up: Upstream, Both: Upstream & Downstream)

Table 1: Summary of Sustainability Initiatives across the UK O&G industry

Within the environmental sustainability dimension, four objectives which include achieving a low carbon future, achieving energy efficiency, curtailing oil spills and gas flares and reducing water consumed and protecting marine life were identified. To achieve each of these objectives, our findings revealed that various initiatives are adopted across the industry. For example, to achieve the objective of low carbon future, the operators in the industry are setting specific targets for the reduction of GHG emissions within products and operational frameworks. Also, the operators in the upstream are emphasising gas production to further entrench their commitments into achieving low carbon future. This initiative can be attributed to the greener nature of gas over fossil fuel.

Two objectives which include reduction of operational cost and prevention of corruption were identified within the economic sustainability dimension. The target to reduce operational costs is channelled towards investment in technology and sustainability initiatives. Whereas SCM as a management concept is credited with the advantage of cost reduction, Tate et al. (2010) suggest that investment in technology, such as cleaner and alternative energy can be adopted as a sustainability strategy to reduce operational costs in organisations. To achieve the second economic sustainability objective which focuses on prevention of corruption, various measures including transparent procedures, anti-corruption and anti-bribery policies and employee’s engagement were identified.

The results show that there are four social sustainability objectives. These include ensuring workplace safety and preventing accidents, ensuring quality health for workers, protecting human rights and making positive impacts on the communities. According to Tate et al. (2010), issues of safety is part of the risk management orientation of organisations which can be integrated as part of SSCM. Whereas the above initiatives are very basic in all safety operations, our findings further indicate that complex technology, such as drones to work at heights, is integrated into the safety measures adopted in the upstream sector. This could be attributable to the peculiarity of the sector, which is generally reputable as the riskiest sector of the industry (Ekiugbo and Papanagnou 2017).

Stemming from the highlighted, our findings on the UK O&G industry reveal that more strategies are channelled towards the environmental and social sustainability strategies of the industry, with less focus on strategies that are peculiar to the economic sustainability. A number of factors could be responsible for the above. First, the notion that profitability cannot be sustained without environmental and social sustainability at the corporate level (Dyllick and Hocketts 2002) is fast gaining attention in the industry. Second, since the contents of most sustainability reports are majorly qualitative, it is natural for organizations to focus their attention on social sustainability which is majorly qualitative in nature. This position is consistent with the findings of Ahmad et al. (2016) that organisations in the O&G industry tend to focus their reporting more on the social sustainability dimension of the TBL.

**SSCM Strategies in the Nigerian O&G Industry**

Table 2 presents the findings on the sustainability initiatives adopted in the Nigerian O&G industry based on the analysis of interviews with industry experts.

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| **Cat.** | **Sustainability Objectives** | **Sustainability Initiatives** | **IPIECA Guideline** | **Area** |
| Env | To achieve a low carbon future | Adopting stipulated law national law and emphasis on LNQ | E1 | UpMid |
| Use of Leakage detector, clean energy | Down |
| To achieve energy efficiency | Energy conserving building | E2, E3 | UpMid |
| Switching off all appliances | Down |
| To curtail spills and gas flared | Monetizing gas instead of flaring, compliance with global standards | E5 | Up |
| Use of leak detector, LPG as a cleaner gas | Down |
| To reduce water consumption and protect marine life | Minimising spills | E6 | Up |
| Use water only when necessary | Down |
| Eco | To reduce long-term operational costs | A dedicated team to manage sustainability issue | SE4 | Up |
| Budgeting | Down |
| To prevent corruption and related activities | Instilling financial control, enlightening partners, gift policy | SE11 | UpMid |
| Display of zero-tolerance policy, process audit | SE16 | Down |
| Soc | To ensure workplace safety and accident prevention | Training and safety awareness, use of PPE | SE17, HS5 | Both |
| To ensure that all employees have quality health standard | Medical facilities for employees, annual medical check-up | HS2 | Both |
| To ensure that human rights are upheld | Whistleblowing policy, dedicated team on HR issues | SE8, SE9,SE10 | UpMid |
| Staff engagement, compliance with national employment law | Down |
| To ensure positive impacts on community | Focusing on sustainable education, Local content development | SE1, SE2,SE3, SE4 | UpMid |
| Commitment to CSR | Down |

Table 2: Summary of Sustainability Initiatives in the Nigerian O&G Industry

From the above table, our findings reveal that diverse sustainability initiatives are adopted across the various sectors of the O&G supply chain in Nigeria. Also, these findings reveal that many of the initiatives are applied based on the peculiarities of the sectors. For example, while the firms in the upstream and midstream sectors rely predominantly on the extant law and global standards to reduce GHG emissions, those in the downstream sector basically rely on leakage detectors and green energy. Also, while the players in the upstream and midstream sector appear to be more creative and adaptive in their strategies on corruption elimination, those in the downstream sectors appear to focus primarily on basic control system that is based on policy framework and audit. The above may be because the firms in the upstream and the midstream sectors are bigger and more diverse than those in the downstream sector. Indeed, previous studies have suggested that organisational size influence sustainability strategies within the supply chain (Tate et al. 2010). To put the findings above in proper perspective, the results are discussed in comparison with the previous findings from the UK in the following section.

**Comparative Analysis and Recommendations**

This study compares the sustainability initiatives in the supply chain of the firms in the Nigerian O&G industry with those in the UK. The significant differences were noted in the initiatives adopted to achieve the four environmental sustainability objectives identified in the industry, as can be seen in Table 3. Although other areas of differences were noted in the economic and social dimensions, these are not as predominant as those within the environmental sustainability dimension.

The findings illuminate the need for the operators in the Nigerian O&G industry to review their strategies in the area of environmental sustainability. Specifically, operators should dedicate greater commitment to GHG emissions by setting achievable and measurable targets in line with the best practices as hinted by Kolk and Pinkse (2004). Furthermore, it is recommended that renewables should be adopted across all sectors of the industry to achieve energy efficiency. Operators can also innovate energy product base with renewables to foster diversification in line with the global trend. Moreover, it is highly recommended that the operators in the upstream sector should place more emphasis on technology to reduce cases of oil spills in the industry. Further to this, we recommend an adoption of water recycling system in the industry to reduce water consumed in operational activities and attending impacts on fresh water.

On the economic sustainability dimension, it is recommended that investment in technology is further entrenched within the strategies for reducing operational costs in the upstream sector. Similarly, it is highly recommended that the operators in the downstream sector should view the issues of sustainability beyond economic profitability, but lay credence on environmental and social elements in line with Tsai et al. (2009). In the area of social sustainability, we recommend that operators should also consider the use of complex technology, such as drones to minimise cases of accidents in the upstream sector. To strengthen the effectiveness of these recommendations, it is believed that the entire supply chain should be involved since effective competitiveness is enhanced through the supply chain involvement as highlighted in Seuring and Müller (2008).

Stemming from our findings that the operators in the Nigerian O&G industry consistently mentioned the position of the national law in achieving sustainability, it is highly recommended that the government and policy makers in the Nigerian O&G industry should review the extant regulations on sustainability practices in the Nigerian O&G industry and strengthen the enforcement of these laws regulations. Of a great importance here is the need for the President of the Federal Republic of Nigeria to assent the Petroleum Information Bill (PIB) which has lingered for so long in the nation’s legislative process. The DPR should also strengthen their capacity in monitoring, evaluating and enforcing sustainability issues across the supply chain of the industry. Beyond regulations, it is recommended further that operators should imbibe culture of sustainability in their operations, in consideration of its positive impacts on the performance outcome of firms in the O&G industry (Yusuf et al. 2013). This is in agreement with the position of Dyllick and Hockerts (2002) that socially responsible organisations are those that integrate social, environmental and ethical concerns within their operational activities beyond legal requirements.

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| **Sustainability****Objectives** | **Initiatives in the UK** | **Initiatives in Nigeria** | **Recommendations for Nigeria** |
| ***Environmental Sustainability Dimension*** |
| Achieving low carbon future | Specific targets on GHG emissions reduction | Incorporation of law at the upstream and gas monetisation | Set achievable targets and show more commitments to GHG emissions reduction at the upstream sector |
| Energy efficiency | Use of renewables | Powering-off appliances (not in use) in the downstream sector | Develop policy towards adoption of renewables in the downstream |
| Curtailment of oil spills and gas flares | Adoption of technology in the upstream | Compliance with regulations | Place more emphasis on technology. Government to also strengthen enforcement of regulations |
| Reduce water consumption and protect marine life | Water recycling in the upstream and downstream sectors and managing produce water in the upstream | Minimising spills in the upstream and reducing waste of water in the downstream | Both the upstream and downstream to place emphasis on water recycling |
| ***Economic Sustainability Dimension*** |
| Reduce operational costs | Investment in technology and sustainability initiatives in both upstream and downstream sectors | Use of sustainability team in the upstream and strict budgeting in the downstream | Emphasis on cost reduction in the upstream is necessary. Interpreting sustainability beyond profitability in the downstream is required. |
| ***Social Sustainability Dimension*** |
| Accident prevention and workplace safety | Use of drones to work in heights in the upstream | Creating safety awareness and use of PPE | Emphasis to be placed on complex technology to maintain safety |

Table 3: Core Differences and Recommendations

**Conclusions**

This study has a number of implications for academics and managers. Firstly, it has contributed to the applicability of the TBL concept in the O&G industry. It has also deepened the understanding of differences in the approaches to sustainability issues across the developed and developing nations. Furthermore, the review of the findings of the study can serve as the fundamental basis of reviewing the specifics of sustainability initiatives in the Nigerian O&G with a view to strengthening the supply chain performance. The findings are also a challenge to the policy makers in the Nigerian O&G industry to strengthen enforcement and identify the key areas of the industry that require enforcement attention across the TBL dimension.

Notwithstanding the above, this study has limitations. First, its reliance on company sustainability documents as a basis of depicting sustainability practices in the UK O&G industry might not really depict the real practices in the industry. Indeed, other studies have found that sustainability reporting in the O&G industry is prone to the risk of under-reporting and inconsistency. To this end, we believe that future research could be enhanced with a validation of the secondary data with primary data from the UK O&G industry. Second, the generalisability of the study could also be enhanced with higher number of participants in the interview conducted among practitioners from the Nigerian O&G industry. Furthermore, in line with other studies, establishing a linkage between the adopted initiatives and organisations performance in the two countries could further enhance the value of the study and create a clearer direction. The above therefore constitute grey areas to be explored in future studies.

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