

# Sustainability Production: Issues and Challenges Evaluation in Nigerian Oil and Gas Sector Using Key Performance Indicators

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## ABSTRACT

The oil and gas industry have a direct effect on long-term growth, making it critical for the industry to make significant changes in its operations. Upstream and downstream activities are also involved in oil and gas projects. Because of the essence of these high-risk practices, businesses are constantly working to reduce the severity of their negative effects on the environment and people. As a result, assessing the sector's long-term output sustainability has become a requirement. Centered on the triple bottom line of sustainability, this paper proposes a collection of Key Performance Indicators (KPIs) for assessing the sustainability output believed to be acceptable for the oil and gas sector. A total of 30 people was asked to rate the value of each KPI for sustainability development, including managers, accountants, and senior engineers from various departments. Respondents' perspectives on the significance level of the KPIs were rated using a five-point Likert scale ranging from 1 (not at all important) to 5 (extremely important). By aggregating expert views, the Analytical Hierarchy Process (AHP) approach is used to prioritize performance metrics. It is hoped that the proposed KPIs would encourage and assist this sector in achieving higher levels of performance in sustainable production, thereby ensuring business viability. It is suggested that companies in the Nigerian oil and gas sector provide suggestions and guidance for companies to take appropriate actions in improving their long-term production efficiency, especially in terms of environmental and socially sustainability. It is also suggested that the model assist companies in the Nigerian oil and gas sector in achieving higher output in their

sustainability activities, as well as rising competitiveness in their market climate.

**Key words:** Sustainability Production, Oil and Gas Sector, Key Performance Indicator, Analytical Hierarchy Process.

## I. INTRODUCTION

The oil and gas industry have experienced significant growth over the last decade, necessitating significant changes in the way it operates. This industry is one of the largest in the world, with rising revenues and costs to provide clients with the energy they need to maintain their way of life. Oil and gas operations include both upstream and downstream activities, which include all that happens before the raw material is refined, such as mining, drilling, extraction, storage, and shipping, as well as manufacturing, selling, and distributing the commodity. Because of the high-risk existence of these operations, companies in the oil and gas sector are constantly working to reduce the consequences of their negative effects on the environment and people (Schneider et al., 2011).

High-profile incidents such as the Santa Barbara oil spill in 1969 in California and the Deep-Water Horizon tragedy in the Gulf of Mexico in 2010 show the industry's unpredictability. Furthermore, businesses in the sector were at the root of significant environmental and human rights disputes in a number of different parts of the world. Shell Company's activities in Nigeria's Niger Delta culminated in river pollution and conflicts with local residents in the Ogoni area in the early 1990s. Indigenous Ecuadorians filed a lawsuit against Chevron in 2003, accusing the company of polluting the Amazon rainforest and harming their health. In recent years, the sector has taken steps

toward greater sustainability (Martyniuk et al., 2013).

Companies in the Oil and Gas sector have been reporting their sustainability activities, also known as "corporate citizenship or environmental, social, and governance (ESG) reporting," according to IPIECA, API, and IAOGP (2010). This creativity has become an important part of how businesses want to communicate with stakeholders and promote informed dialogue and understanding.

Even in the Nigerian oil and gas sector, operations oil and gas companies have the potential to have negative environmental, health, safety, social, and/or economic consequences. In general, companies in the sector use systemic methods to control and reduce environmental impacts. Companies should explain their overarching social contribution plan from a social standpoint. This may include definitions of organizational goals, social investment participation strategies, decision-making requirements, and community development spending. Companies may specify whether programs are community-driven, third-party-facilitated, or company-facilitated.

### 1.2 Statement of Research Problem

Since there are so many different ways to identify sustainability, there is a broad range of opinions on which elements of key performance metrics should be measured and reported on. As a performance assessment, primary performance metrics can be used as a starting point for incorporating economic, environmental, and social factors into the main management structure, as well as for effectively supporting strategic decision-making and control (Groot & Selto, 2013:9; Figue et al., 2002:269). The oil and gas industry's greatest challenge are to continue to discover and provide environmentally and socially responsible goods while also contributing to global economic and social growth (IPIECA, 2013). The enhancement of efficiency and the focus on environmental performance are two of the most important success factors for these businesses (Jung et al., 2001).

The oil and gas industry were the second-highest contributor to the Global Reporting Initiative in 2010. (GRI). This number would rise as the GRI announced that all GRI reports issued by organizations in the oil and gas sector would be forced to use the oil and gas sector supplement beginning December 31, 2012. The climate, human rights, labor standards and fair jobs, culture, product accountability, and economic concerns are all addressed in this sector supplement (GRI, 2013). Oil and gas companies create strategic strategies to ensure their long-term viability, but

they lack the capabilities to plan and monitor their progress. The main goal of this study is to use Key Performance Indicators to assess the sustainability of Nigerian oil and gas production in light of the aforementioned challenges. The research's basic goals are as follows:

Restructures their business models to meet evolving market demands, reports on particular business results, and shows the connections between an organization's strategy, governance, and financial performance, as well as the fiscal, environmental, and social context in which they work.

## II. LITERATURE REVIEW

Organizations function in a global, dynamic market climate that has become increasingly unsettled and unpredictable, making timely and successful adaptation more important than ever before (Groot & Selto, 2013). This involves the rapidly evolving definition of sustainability and environmental consciousness, which allows businesses to use KPIs that embody corporate responsibility and sound business practices (Barrows, 2012:34, Tilley, 2012:65).

In this fast-changing market world, sustainability is one of the most critical success indicators, as climate change and customer loyalty are becoming real problems that managers must address. It not only reflects the company's economic, environmental, and societal effect, but it also communicates corporate responsibility and smart business practices to the related shareholders. Ramalho, Ramalho (2010) Companies in the oil and gas industry are reorganizing their business models to meet changing consumer demands for specific business performance reporting. 2011 (Wadee) Integrated reporting is a method of demonstrating the connections between a company's policy, governance, and financial results, as well as the social, cultural, and economic world in which it operates (Holmes, 2012a:30). It allows businesses to evaluate their ability to build and maintain profitability in the short, medium, and long term. It also enables managers and stakeholders to assess their company holistically in order to reflect on how it generates value for their shareholders and customers (Leuner, 2012). Because of the many ways to describe sustainability, there is a wide range of opinions on which elements of key performance metrics should be measured and reported on. Key performance metrics can be used as a starting point for incorporating economic, environmental, and social factors into the main management framework and effectively supporting strategic planning.

## 2.1 Oil and Gas Industry and its Impact on Economic, Social and Environment

Oil and gas are a multifaceted, multinational industry that has an impact on the economy, the environment, society, and our everyday lives. This industry facilitates and propels economic growth on a national and international scale. Despite the volatility surrounding the oil market's rapid changes, the sector continues to attract the attention of stakeholders and shareholders – not only for its economic growth, but also for its fundamental effects on protection, health, the environment, and social issues (IPIECA, 2013).

Exploration, extraction, refining, transportation, and marketing of petroleum products are all part of the oil and gas industry. In terms of dollar value, this sector is the biggest in the world (Trencombe (2013).

Producing petroleum products carries a high risk of polluting the atmosphere, which has an impact on how stakeholders view a company's environmental success. One of the reasons why businesses must concentrate their efforts on improving their operational processes in order to increase profitability while reducing their negative environmental impact is that it is one of the most cost-effective ways to do so (Jung et al., 2001). Stakeholder participation is a critical part of ensuring that the sustainability report is meaningful and available, according to the International Petroleum Industry Environmental Conservation Association (IPIECA), and a KPIs approach would help to achieve this aim (IPIECA, 2013).

The oil and gas industry's greatest challenge are to continue to discover and provide environmentally and socially responsible goods while also contributing to global economic and social growth (IPIECA, 2013). The enhancement of efficiency and the focus on environmental performance are two of the most important success factors for these businesses (Jung et al., 2).

The oil and gas industry were the second-highest contributor to the Global Reporting Initiative in 2010. (GRI). This number would rise as the GRI announced that all GRI reports issued by organizations in the oil and gas sector would be forced to use the oil and gas sector supplement beginning December 31, 2012. The climate, human rights, labor standards and fair jobs, culture, product accountability, and economic concerns are all addressed in this sector supplement (GRI, 2013). Oil and gas companies create strategic initiatives to ensure their long-term viability, but

they lack the capabilities to plan and monitor their progress. To connect the goals and these objectives, key performance metrics can be used.

## 2.2 Sustainability

A contemporary interpretation of the (corporate) sustainability concept is that it identifies and manages fiscal, environmental, and social opportunities and risks to generate long-term shareholder value (Anon, 2011). The phrases sustainability and CSR are often used interchangeably in today's business world (Rohm & Montgomery, 2011; Kiewa, 2011). For the related groups, stakeholders, and practitioners, a sustainability report offers a format for managers to enhance the efficiency of the organization's interconnected economic, social, and environmental goals (Caraianni et al., 2012). The ability to measure the importance of sustainability to the business and, as a result, the business's contribution to the wider world, is a critical component of sustainable reporting (Holmes, 2013). Governance, policy, and sustainability, according to Mervyn King, former chairman of the GRI and current chairman of the International Integrated Reporting Council (IIRC), are inextricably linked (Gibbons et al., 2010). These principles cannot be addressed separately since they would enhance transparency and materiality. An efficient performance management strategy must be introduced and managed in order to achieve long-term market success (Babber, 2013). Managers and accountants can make a difference in the business climate, according to Peter Bakker, president of the World Business Council for Sustainable Development, by ensuring that sustainability becomes more visible and tangible through integrated reports (Babber, 2013).

## 2.3 Oil and Gas industry and sustainability

The oil and gas sector have been called to consider environmental conservation in recent years. The scale of environmental crises and climatic change caused by oil and gas production has had serious consequences for many societies. Major oil firms have been accused of causing global environmental chaos, and policymakers and the general public around the world have questioned their efficiency. People all over the world are rethinking how they use fossil fuels in their daily lives (WEF, 2016).

This pessimism stems from a number of incidents, including the 1969 Santa Barbara oil spill in California and the 2010 Deepwater Horizon disaster in the Gulf of Mexico. These environmental disasters have prompted the public

to demand measurable improvements in performance as well as greater transparency and operational efficiency in the oil and gas industries in order to ensure their long-term viability. As a result, the oil and gas industries, like other industries, have redefined their business growth strategies to focus on long-term sustainability, although some have responded to operational criticisms (Weaver, 2003). Oil companies are implementing environmentally friendly strategies to ensure that exploration and production operations are clean. This is how the word "sustainable growth" entered the oil and gas industry literature, and words like "green economy," "sustainable development," "social responsibility," and "risk management" have become commonplace in oil company lectures and seminars (Schweitzer, 2010a). Similarly, top executives at oil companies are also advocating for smart solution implementations and technologies, such as Performance Assurance and Operation Risk Management, Contaminated Site Management, and Air Quality and Climate Change. However, there is still a gap between what oil companies say about sustainability and what they actually do. As a result, numerous studies have been conducted, with the overall conclusion indicating that sustainable development has made inroads into major oil and gas producing companies' decision-making levels, despite the fact that the oil industry remains one of the primary causes of environmental degradation and climate change (Schweitzer, 2010a).

As a result, organizations like IPIECA, API, and OGP are very involved in coordinating sustainable development management standards in the oil and gas industry, as well as promoting oil and gas companies and their shareholders to provide voluntary reports as one of their top priorities, thereby consolidating and adhering to sustainable development strategies (Schneider et al., 2013). Despite the fact that clear and effective definitions of sustainability have been established in recent decades, there are still many ambiguities surrounding this term, and in practice, this concept has shown conflicting interpretations.

#### **2.4 Issues in Oil and Gas Sector**

As the world's population grows, so does the need for more sustainable and usable resources (Pérez-Lombard, Ortiz, & Pout, 2008). The fluctuation in pricing has resulted in intense competition in the energy supply industry, resulting in price reductions. Regional, cultural, and security conflicts have gradually risen over the last few decades, hitting new highs in recent years. The availability of renewable energy has significantly

increased the risk prospects in business operations, resulting in higher investment costs, in certain crucial circumstances. Every year, climate change becomes more serious. Global climate change is having disastrous consequences for the planet. The sea level is rising, putting more villages and towns at risk of flooding and storms. This is one of the aspects of the issues that will take long-term efforts to overcome. Meanwhile, as production costs continue to grow, shareholders and business owners' aspirations have risen as well. Shareholders prioritize financial benefit in their operations and anticipate executives of business companies to maintain a steady rise in profitability. Several factors, such as rising population, escalating competition, global climate change, and shareholder aspirations, as well as regional trade trends (Miron et al., 2010), are Sustainable Drivers that have created a risky and tense market setting. For oil and gas companies, identifying and solving problems is a never-ending struggle, and they are constantly improving their business plan to be as comprehensive and consistent as possible. This paper presents the statistical findings of a survey on some of the sustainability metrics and offers insights into some of the current challenges.

Furthermore, lobbying by some oil industry executives and local governments continues (Schweitzer, 2010b), and environmental activists are concerned about the recurrence of painful memories such as the fire that destroyed the Alpha Piper oil rig in 1988, killing 167 people, and so on. Meanwhile, a number of oil and gas firms have made substantial progress in the area of social corporate responsibility (SCR), and they are well positioned to support the SDGs and the 2030 Agenda (UNDP, 2016). Such businesses cannot guarantee a planet free of environmental disasters, but they have made substantial efforts to prevent such occurrences. However, the existing circumstances demonstrated that they are capable of far more than they say.

#### **2.5 Challenges of sustainability in oil and gas industry**

The petroleum industry has faced a number of difficult challenges in recent years. On the one hand, in light of the more competitive activities in these industries, the oil industry should invest proportionally to the rising global demand for energy, and on the other hand, this industry should reduce the overall cost of production of hydrocarbon resources while simultaneously adhering to environmental laws and regulations. Some significant challenges for oil and gas industry include:

- Price volatility (Regnier, 2007);
- Because of low returns on investments, shareholders are putting more pressure on managers to concentrate on value development rather than production (Ramos, Taamouti, Veiga, & Wang, 2017).
- Drilling and production process complexity (Gupta & Grossmann, 2017);
- In most countries, there is an increase in demand for oil and gas (BP, 2017a);
- HSE compliance is still important, particularly in the current environment of fluctuating prices and cost savings (Neill, 2017).
- Security of a company's social license to operate (Tomlinson, 2017) and its corporate social responsibility (Banerjee, 2017);
- monetary regimes that change; monetary regimes that change; monetary regimes that change; monetary regimes that change; monetary regime
- R&D and innovation (Hall & Vredenburg, 2003); R&D and innovation (Hall & Vredenburg, 2003); R&D and innovation (Hall & V
- Managing ever-increasing data volumes and information management (Bratianu & Bolisani, 2015).
- NOC-IOC relationship is shaky: (Whitson, 2009).

The aforementioned obstacles are a set of significant factors that have hampered major oil and gas companies' efforts to enforce sustainable development policies. As previously stated, due to the high pressure-high temperature conditions of underground reservoirs and the use of a variety of chemicals to safely drill and extract hydrocarbons, the extraction of any barrel of crude oil, refining, and transportation of petroleum products to the consumer is an industry that causes contamination and pollution. In general, the challenges of long-term growth in the oil and gas industry can be divided into the following categories:

- Flaring and venting;
- Decommissioning of oil and gas installations;
- Oil storage tank disposal;
- Managing drill cuttings;
- Produced water disposal/treatment;
- Managing drilling muds and fluids;

- Estimating and validating greenhouse gas emissions;
- Subsidence;
- Oil Spills;
- Safety;
- Enhanced profitability.

Each of the above issues has in the past caused numerous environmental problems and, on rare occasions, environmental crises. Of course, some of the world's largest oil firms have made decisions on both of these issues, and billions of dollars have been spent on developing methods and technology, as well as working with indigenous communities around oil and gas facilities. In addition, national oil companies under government pressure and multinational oil and gas companies under public and legislative pressure have taken a range of steps in recent years to resolve the challenges of long-term growth in the oil and gas sector.

### III. METHODOLOGY

The World Business Council for Sustainable Development refers to the most widely used metrics for evaluating sustainable production in the oil industry (WBCSD). The 'Triple Bottom Line' (TBL) KPIs were defined for this study using the Global Reporting Initiatives GRI G3 guidelines (launched in 2006) and best-practice oil companies.

The technique is divided into three stages. The first set of KPIs for evaluating sustainable output were defined and extracted from the literature. The initial KPIs were then validated against industry standards. Finally, Analytic Hierarchy Process (AHP) methodology was used to construct a long-term output performance assessment based on the KPIs. The following sections provide more details.

#### 3.1 Identification of Key Performance Indicators (KPIs)

The creation of Key Performance Indicators for the oil and gas industry's sustainability output assessment begins with a literature review. The initial KPIs were developed using the triple bottom line of sustainability, which includes factors such as economic, environmental, and social success. As a result, the initial KPIs for the Oil and Gas Sector were defined as follows: three variables divided into nineteen indicators.

**Table 1: Initial Key Performance Indicators of sustainability production evaluation**

Factors	Indicators
Economic Factors	1 Net profits
	2 Revenue growth
	3 Return on assets

	4 Profit to revenue ratio
	5 Cost reduction
	6 Adherence to production plan %
	7 Improving delivery performance
<b>Environmental Factors</b>	8 Greenhouse gas (GHG)
	9 Flaring gas
	10 Fresh water used
	11 Oil spills
	12 Waste reduction
<b>Social Factors</b>	13 Accident Incidence Rates
	14 Social investment
	15 Local procurement and supplier development
	16 Avoiding Corruption
	17 Workforce diversity and inclusion
	18 Workforce engagement
	19 Workforce training and development

Source: Field Survey, 2021

### 3.2 Conducting industry survey

Large oil companies were chosen because of their current level of economic, environmental, and social responsibilities, their 40 percent market share in the Nigerian oil and gas industry, and their more than five areas of activity with total employees of more than 7,300, engaged in crude oil and natural gas exploration, development, and refining (fully incorporated).

A total of 30 people, including managers, accountants, and senior engineers from various departments, were asked to rate the value of each KPI in the oil industry's sustainability production assessment. Respondents' perspectives on the significance level of the KPIs were rated using a five-point Likert scale ranging from 1 (not at all important) to 5 (extremely important). As shown in the table below, the mean importance values ranged from (3.147-5.173).

**Table 2. Mean importance values of the initial Key Performance Indicators (KPIs).**

Indicators	Mean
Revenue growth	5.173
Net profit	5.069
Return on assets	5.028
Profit to revenue ratio	4.872
Avoiding corruption	4.715
Accident Incidence Rate	4.651
Greenhouse gas (GHG)	4.621
Flaring gas	4.621
Oil spills	4.621
Adherence to production plan %	4.171
Workforce training and development	4.081
Improving delivery performance	3.966
Waste reduction	3.910
Fresh water used	3.862
Local procurement and supplier development	3.434
Cost reduction	3.402
Workforce engagement	3.307

Workforce diversity and inclusion	3.191
Social investment	3.147

Source: Field Survey, 2021

Revenue growth is the most important KPI, according to the findings, with a mean importance value of 5.173, indicating a 95 percent importance. The following values are (5.069, 5.028, 4.872, 4.715, 4.651) for net profit, return on assets, profit to revenue ratio, avoiding corruption, and accident incidence rate, respectively. The least important indicators, on the other hand, were local procurement and supplier growth, cost reduction, employee participation, workforce engagement, workforce diversity and inclusion, and social investment. The initial KPIs for evaluating sustainability performance in the oil and gas industry have been updated as a result of the findings. Five indicators were omitted from the initial KPIs due to their low value. Finally, three variables with a total of fourteen indicators have been proposed as KPIs for evaluating the oil and gas sector's sustainability production.

### 3.3 Developing AHP-based evaluation model

Based on the established KPIs, an assessment model for long-term production success in the oil and Gas industry was created. The Analytic Hierarchy Process (AHP) methodology was used to create the model, which included building the hierarchy, weighting the KPIs, rating the KPIs, calculating company scores, and ranking the companies. The following section contains more details.

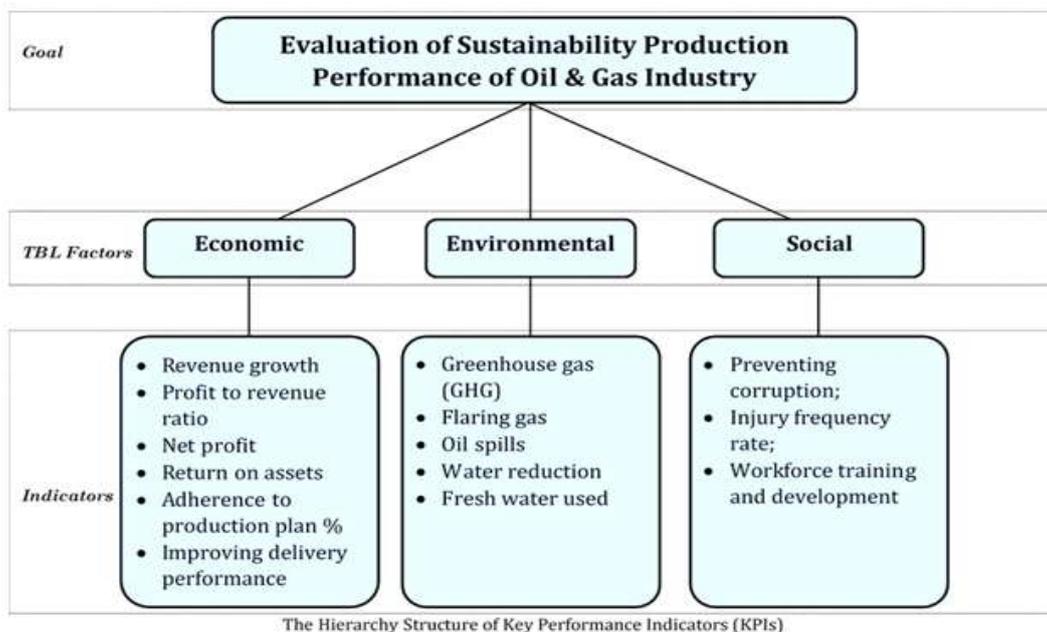
### 3.4 Sustainability Production Evaluation Model for the Oil and Gas Sector

For multiple criteria decision making (MCDM) problems, the Analytic Hierarchy

Process (AHP) has become one of the most commonly used approaches. It's a decision-making technique that can be applied to a variety of application domains to help solve complex multiple-criteria problems. T.L. Saaty, T.L. Saaty, T.L. Saaty (2008). There are some advantages of using the AHP technique. L. Cheng and colleagues (2002). To begin with, it aids in the decomposition of an unstructured problem into a logical decision hierarchy. Second, by using pair-wise comparisons of individual groups of components, it can obtain more knowledge from experts or decision makers. It also determines the computations that will be used to assign weights to the elements. Fourth, it employs the accuracy metric to ensure that the expert's rating is consistent. The steps below illustrate how to create an AHP-based model for evaluating long-term production output in the oil and gas industry.

### 3.5 Construct the hierarchy

The defined KPIs for evaluating sustainable production in the oil and Gas industry are used to construct a hierarchy. The three classes, which included the target, factors, and indicators, were described and constructed in a hierarchy. The aim of the hierarchy is to evaluate the oil industry's long-term output efficiency. TBL environmental, economic, and social factors make up the next step. The indicators that represented each of the fourteen factors comprise the third level. The following is the hierarchy:



### 3.6 Weighting the KPIs

The value weight of the KPIs should be determined after the hierarchy has been established. After that, a pairwise comparison questionnaire was developed. To determine their priorities on the KPIs, ten (10) senior managers and accountants from oil and gas companies were consulted. Those executives and accountants were hand-picked for their oil and gas expertise. The pairwise comparisons between factors and indicators within each factor of the KPIs were calculated.

These preferences were expressed on a scale of 1-9 (1=equally, 3=moderate, 5=solid, 7=very strong, 9=extreme). The Consistency Ratio (CR) was used to assess the consistency of each expert's pairwise comparisons. Since the CR values

are less than 0.1, it passes the accuracy test. The relation must be replicated if it is not yet consistent.

Before determining the value weights, the answers to each question were geometrically averaged. Following that, a pairwise comparison matrix was established. All of the combined pairwise comparison matrixes were subjected to a consistency evaluation.

The results show that the Consistency Ratio (CR) values ranged from 0.0110 to 0.0207, indicating that all pairwise comparisons are compatible since the values are within T. L. Saaty's acceptable level (2008). It shows that experts have regularly allocated their priorities in deciding the value weights of the KPIs of oil and gas industry sustainability production evaluation.

**Table 3. The importance weights of KPIs**

Factors	Weight	Indicators	Weight
<b>1. Economic</b>	<b>0.4775</b>	1 Revenue growth	<b>0.0908</b>
		2 Net profit	<b>0.1026</b>
		3 Return on assets	<b>0.0632</b>
		4 Profit to revenue ratio	<b>0.0758</b>
		5 Adherence to production plan %	<b>0.0723</b>
		6 Improving delivery performance	<b>0.0693</b>
<b>2. Environmental</b>	<b>0.3024</b>	7 Greenhouse gas (GHG)	<b>0.0667</b>
		8 Flaring gas	<b>0.0878</b>
		9 Oil spills	<b>0.0794</b>
		10 Waste reduction	<b>0.0201</b>
		11 Fresh water used	<b>0.0354</b>

<b>3. Social</b>	<b>0.2651</b>	12 Preventing corruption	<b>0.0913</b>
		13 Injury frequency rates	<b>0.0939</b>
		14 Workforce training and development	<b>0.0834</b>

Source: Field Survey,2021

### 3.7 Rating the KPIs

The performance of each of the KPIs was evaluated using a scale ranging from 1 to 7, with 1 indicating highly bad, 2 indicating lowly poor, 3 indicating lowly fair, 4 indicating highly fair, 5 indicating lowly fine, 6 indicating highly good, and 7 indicating excellent.

### 3.8 Computing the company scores

To obtain the company scores, the values produced from the performance rating are combined with the corresponding importance weights of the KPIs. The company score is determined as a combination of the overall total score and the individual score for each factor. Companies are then grouped into four performance categories based on their overall total score and individual score for each factor.

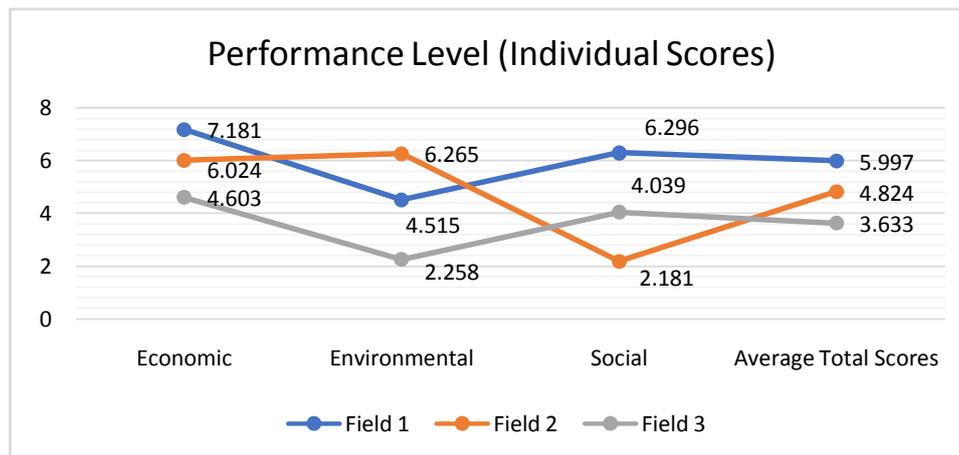
- If  $1 \leq \text{scores} \leq 3$  then performance level is poor
- If  $3 < \text{scores} \leq 5$  then performance level is fair
- If  $5 < \text{scores} \leq 7$  then performance level is good
- If  $\text{scores} > 7$  then performance level is excellent

After that, the companies' overall total score and individual factor scores are ranked in descending order. The company with the highest score is said to have achieved best practice, while the company with the lowest score is said to have failed to do so.

## IV. RESULTS AND DISCUSSION

### 4.1 Case study results

The evaluation model was tested on a case study of a Nigerian oil company that specializes in exploration, production, and refining. On the KPIs of sustainable production evaluation, the production managers were asked to rate their three oil fields on a scale of 1 to 7. The company score is calculated using the rating values, which includes the average total score as well as the individual scores for each factor. A final result is presented that includes the average total score and individual score for each factor of the companies compared. The following table compares the performance level (individual score) and average total score of three oil fields:



### 4.2 The Performance Level (Individual Scores) and Average Total Scores Comparison

Field-1 has the highest average total score with a performance level of good, as can be seen. Filled-3, on the other hand, has the lowest average

total score and a poor performance level. Individual scores for each factor of KPIs are also computed to provide a detail of the overall score, as shown in Table 4.

**Table 4. The individual scores of fields comparison.**

Field Compared	Performance Level (Individual Scores)				Average Scores	Total
	Economic	Environmental	Social			
Field 1	7.181 (Excellent)	4.515 (Fair)	6.296 (Good)		5.997 (Good)	
Field 2	6.024 (Good)	6.265 (Good)	2.181 (Poor)		4.824 (Fair)	
Field 3	4.603 (Fair)	2.258 (Poor)	4.039 (Fair)		3.633 (Fair)	

Source: Field Survey, 2021

The table shows the average total performance score of each oil field in the sector, as well as the average total score of each oil field compared to ascertain their pattern of sustainability. The table shows the performance level of three oil wells in three different oil companies to assess or quantify their sustainability output in the Nigerian Oil and Gas Sector using Economic, Environmental, and Social as Key Performance Indicators (KPIs) and their average total performance score of each oil field in the sector. In contrast, the economic indicator has an individual score of 7.181 (Excellent), the environmental indicator has an individual score of 4.515 (Fair), the social indicator has an individual score of 6.296 (Good), and their overall total score is 5.997 (also Excellent) (Good). In Field 2, the Economic indicator has a performance level score of 6.024 (Good), the Environmental indicator has an individual performance score of 6.265 (Good), the Social indicator has a performance score level of 2.181 (Poor), and the overall total score level is 4.824 (Good) (Fair). In Field 3, the Economic indicator has an individual performance level of 4.603, which is (Fair), the Environmental indicator has an individual performance level of 2.258, which is (Poor), and the Social indicator has an individual performance level of 3.633, which is also (Fair), with an overall total score of 3.633.

The fields' rankings and success levels are very diverse. Field-1 should be at the top of the list for all variables with a ranking (5.997). The individual score of environmental variables in Field-2 is higher than in Field-1. It can be deduced that the Field with the lowest average total score is not necessarily the worst in all factors. These factors must be examined in depth in order to prioritize the company's performance metrics when measuring sustainability efficiency in order to make good decisions.

## V. CONCLUSION AND RECOMMENDATION

### 5.1 Conclusion

Multiple activities are involved in oil and gas operations. Because of the essence of these high-risk practices, businesses are constantly working to reduce the severity of their negative effects on the environment and people. As a result, assessing the industry's long-term production is critical.

Based on the findings, three variables are proposed as KPIs for evaluating sustainable production in the oil and gas sector, with a total of fourteen indicators. The Analytic Hierarchy Process (AHP) approach was then used to build an assessment model. The hierarchy structure is based on the proposed KPIs for evaluating sustainable output in the oil and gas industry. The value weights of the KPIs are then determined using AHP technique using pairwise comparisons. The KPI is scored on a scale of 1 (extremely poor) to 7 (excellent) to assess the results (excellent). The company's scores and rank are then calculated to evaluate long-term output success against the KPIs. A case study of a Nigerian oil and gas company was performed. The findings demonstrate the current success standard in terms of the company's strengths and weaknesses.

### 5.2 Recommendation

Based on the foregoing findings, it is suggested that companies in the Nigerian oil and gas sector provide suggestions and directions for companies to take appropriate actions in improving their sustainability production efficiency, especially in terms of environmental and social factors. The model is also suggested for assisting companies in the Nigerian oil and gas sector in achieving higher output in their sustainability efforts and thus rising competitiveness.

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