

SUMMARY OF CONTENT

This issue of the journal contains seven articles. The first article is on *Hydrocarbon Exploration Phase and The Nigerian Petroleum Industry Act 2021*.¹ The authors assert that the Petroleum Industry Act 2021 (the PIA), enacted after years of strenuous drafting effort, is an amalgam of several earlier laws and memoranda of understanding (MOU's) with important new updates reflecting modern realities of the industry. To them, the PIA is an elaborate document embodying comprehensive management instruments for tighter control and watchful governance of the major economic enabler of the country. They explain that the upstream, midstream, and downstream sectors of the industry have now been structured into entities that would prove easier to govern in management, administrative and fiscal respects. They state that the upstream sector has exploration as its key phase and includes all office and field activities that lead up to hydrocarbon discovery (or otherwise). For an intending operator/entrepreneur, the initial activity is an assessment of easily available geological information to support any major decisions such as fresh acreage acquisition, firm-in or buy-out they further state. They explain that prior to acreage acquisition the prospective operator examines the business climate by assessing the technical, socio-political, and fiscal factors as well as the potential upsides. Regarding the process, they state that acreage acquisition, as stipulated by PIA, follows, and is succeeded by, geophysical subsurface activities now mainly by 3D seismic survey that yields data subjected to processing and interpretation, preceding leads identification, prospect evaluation and well proposal. A successful wild cat, they say, heralds the next phase – appraisal.

A major determinant of a successful exploration phase, which PIA has granted a maximum of six- year enterprise by an operator, is the strict observance of a set of PIA provisions that may be termed nontechnical essentials, namely community affairs, health, safety, security, and environment (HSSE), and Nigerian content. These the authors say are governed by strict rules, some of them involving international protocols, as well as separate National Assembly enactments.

In the second paper titled *Challenges and Prospects of The Petroleum Industry Act and National Development in Nigeria* the authors² examine the prospects and challenges of the Petroleum Industry Act with respect to national development in and how this has been outlined using descriptive mechanism. The observe that as a nation, the prospects of the PIA for its development cannot be over emphasize, noting that aspects which can hinder the realization of the objectives of the Act have been identified and outlined. The examples given include clear definition of Host Communities, and fiscal policies amongst other. Based on these challenges, they recommend that institutionalization of fiscal and financial discipline and transparency particularly to the public arena will go a long way in ensuring that the objectives of the Act are achieved.

In the third paper titled *The Petroleum Industry Act 2021: Implications in Environmental Regulations and Petroleum Operation Activities in Nigeria*³, the author observes that the petroleum industry in Nigeria has remained pivotal and critical as a major source of national revenue since the discovery of oil in commercial quantity in 1956. The note that given the severity of the impact of oil industry operations and activities on the environment, human health, livelihood of people in the host communities and sustainable development over the years in Nigeria, the Petroleum Industry Act 2021 (PIA) is expected to effectively regulate the

¹ C. S. Nwajide and B. M. Ozumba

² Kessington Obahiagbon, Osarieme Uyi Osazuwa, and Andrew Nosakhare Amenaghawon

³ By Paul A. Akporowho

operations of petroleum companies and other entities in the Nigerian oil and gas industry in line with global best practices. The paper reviews the PIA and analyses its objectives, and benefits of its implementation and enforcement. The paper recommends that host community development framework as envisaged by the PIA should be seen as complimentary to government obligations and other public development agencies in the Niger Delta region, including Niger Delta Development Commission (NDDC) and the respective States' Oil Producing Areas Development Commissions. The paper also recommends that there should be synergy between both regulatory agencies to avert unnecessary duplications of functions, accreditations for facilities/assets, equipment, consultants, contractors, and other support service providers. In addition, they suggest that agencies like Nigerian Content Development and Monitoring Board (NCDMB) should focus on building the capacities of local consultants, project executors and other critical stakeholders in the oil and gas sector, to enhance transparent, accountable, and effective management and leadership for sustainable development and full compliance with the PIA.

The fourth paper⁴ deals with the *Petroleum Industry Act 2021 and SDGs: Prospects for a Greener Petroleum Industry in Post-Covid Nigeria*. In the opinion of the author, the petroleum industry of most developing countries, especially Petro-states like Nigeria have been seriously impacted by COVID-19 pandemic. The industry according to the author wrestles with a dual-clefted and unprecedented dilemma, that of an oil price war and a devastatingly acute Covid-19 impact. Moreover, other underlying issues, such as an abrupt decline in oil prices, OPEC/Russia divergent views on oil prices and cuts as OPEC and allied countries, often in the quest for stabilised oil prices, moved to cut down combined output by 9.7 million bpd. This the author says was inevitable due to the fact of oil demand/supply imbalance occurring simultaneously with the declination and rapid drop in biochemicals, chemicals and fossil fuels use. The author also notes the impact of global lockdowns, industrial bottlenecks or slowdowns, travel bans, including other restrictions and interruptions accruing from COVID-19 implementation protocols. She also notes that the industry is undeniably confronted with irrefutable challenges traversing: environmental, economic, political or technological demands to tailor oil exploration and production activities in accordance with wide-ranging issues tied to the sustainable development paradigm. Moreover, the core of these demands according to the author includes environmental protection, (expressed via biodiversity preservation, GHG and CO₂ mitigations), energy security, typified by reliability of products supplies, their affordability and economic growth. Post the Paris Agreement in 2015, which reiterates the imperative of the transition into a low carbon economy, the industry is placed in the peculiar position of bracing up to current signals regarding divestments of funds from the sector and tackling the relentless plunge in oil prices the author further explains. Due to these daunting challenges, creating a nexus between oil exploitation and sustainable development becomes an inescapable exigency for a Petro-state like Nigeria the author asserts. The paper delineates the points of commonality and divergence between the SDGs and the Nigerian petroleum industry regulations by assessing their competence to deliver on the goal targets across the sustainable development paradigm. It examines Nigeria's recent omnibus petroleum legislation, the Petroleum Industry Act (PIA) 2021. Also, the paper conducts an appraisal of this statute to determine its utility in ensuring a green economy in Nigeria via the forging of synergies across the SDGs whilst eliminating potential tensions and trade-offs across divergent goals to achieve a greener oil industry in a post-Covid Nigeria.

⁴ By Onome Lisa Ejenavi

The fifth paper by Auduson et al⁵ is on Multi-Sensor Logging and Conductivity Scanning Laboratory Measurements: Analysis of Spatial Variability in Petrophysical Properties. The authors explain that two laboratory petrophysical measurements techniques including the Multi-sensor core logging (MSCL) and thermal conductivity scanning (TCS) methods were integrated in order to determine petrophysical properties and their spatial variations in a laboratory experiment. The objective, they say, was to investigate how the two techniques vary in the determination of the petrophysical properties and to study their spatial variation. Two core samples (BS; sandstone and B6; metamorphic conglomerate), each cut in half, one fully saturated and one fully dried were used. Sensor-based devices of the MSCL equipment were used to determine the density, P-wave velocity, magnetic susceptibility and porosity, while the TCS technique estimated thermal conductivity and porosity. Results based on the MSCL for the BS, they report, shows change in the bulk density due to porosity and homogeneous factor, while B6 keeps nearly constant bulk density. P-wave velocity in the BS dry sample shows higher velocity than the saturated sample, while in the B6 sample velocity curves depict irregular trend. Magnetic susceptibility for the BS sample shows zero magnetism, while for the B6 sample, curves indicate it is magnetic. The porosity values in the BS sandstone shows realistic and expected values from about 7 % to 11 %, confirming very homogeneous sandstone, while B6 sample has close to zero porosity, expected in hard rock specimen. Thermal conductivity for the BS sample show very straight curves, confirming homogeneous sandstone. For the B6 sample, there is deviation, showing the effects of the rock inhomogeneity. They conclude that, MSCL and TCS laboratory techniques are reliable in the estimation of petrophysical properties and evaluation of their spatial variations.

The sixth paper⁶ is on Nuclear Energy: The Best Energy Mix for Sustainable Industrial Development and Economic Growth of Nigeria the authors submit that one of the factors that favor industrialization is the steady and adequate supply of electricity, which could be generated from oil, gas water, wind, and nuclear. They observe that in Nigeria, electricity is generated from hydro and thermal stations, but not enough to meet the demands of the nation. The paper assesses the energy demand, available energy sources, potential energy sources in Nigeria and the need to add nuclear energy to the nation's energy mix. Among the various energy sources for electricity generation, nuclear energy, they claim has proven to be the best alternative energy source. They state that the use of nuclear energy in place of other energy source produces large amount of electricity in a relatively small space, and helps to keep air clean, preserves the earth's climate, avoids ground-level ozone formation and prevents acid rain which creates anxieties among the public. They identify other peaceful uses of nuclear energy that will accelerate industrial development and promote economic growth in Nigeria.

The seventh paper⁷ is titled Mercury Problems and Presidential Artisanal Gold Mining Development Initiative (PAGMI): Challenges, Opportunities And Future Directions of the Mining Industry in Nigeria. Although material content of this paper deviates from the ambit of the Journal (oil and gas matters), a commonality justifying acceptability of the paper is the issue of Safety and Environmental concerns for which there are Nigerian federal government enactments (analogous and complementary to PIA) generously referred to in the paper. The authors explain that Artisanal and Small-Scale Mining (ASM) describes informal mining activities using low technology or minimal machinery. They observe that of the 186 million people in Nigeria, 64% live in the rural area – where ASM is generally standard and thus, if

⁵ Aaron Auduson, Aaron Girard and Amir Shafizadeh

⁶ By Rasaq Ibrahim: Emmanuel Ayobami Adedoye

⁷ By Auwal M. Musa, Sani Muazu and Bashar Y. Sani

handled properly, it will be a source of job for the local populace and will go a long way to alleviate Nigeria's unemployment rate and lead to economic growth. The abandonment of the mining sector the authors claim, leaves the industry in the hands of ASM, which mines with crude equipment leading to low output in terms of quality and quantity. The mining sector in Nigeria they further claim is characterised by certain pitfalls that impair its growth and development. They identify some of these challenges as low metal prices, depleted alluvial reserves, typical in tin and columbite, and inefficient state-owned corporations.

Furthermore, mercury and lead, they say are by-products of gold mining, and both elements cause severe environmental pollution when not properly maintained. The mercury and lead pollution level exceed the combined emissions of coal combustion, cement production, Chlor-alkali plant operation, and large-scale industrial mining and metallurgy, according to the authors. The authors commend the government for acknowledging the danger of mercury emission and the high health risks associated with the chemical substances such as mercury and lead as a result of the operations of ASM, by signing and ratifying the Minamata Convention on Mercury meant to protect human health and the environment from the adverse effects of mercury exposure

The paper discusses the various reforms in the mining industry, health, environmental, and gender impacts of the activities of ASM, the safer mining technologies, standardisations related to mining technology, characteristics, and challenges of current mining systems. It addresses mercury exposure prevention using a formalisation approach. The author assert that the formalisation policy takes care of two significant constraints: environmental consciousness through monitoring the Presidential Artisanal Gold Mining Development Initiative (PAGMI) activities, and the necessity to improve the sector to attract more investors. The paper concludes that the industry has opportunities to generate countless job opportunities for Nigerian youth, thereby contributing to poverty alleviation.

We trust that reader and researchers will find all the papers in this issue of the journal interesting and useful.