

Recommendations

In other to drastically improve the management of oil in Nigeria, the government should enforce laws regarding safe oil production practices and companies who do not comply with these rules should be heavily fined and banned if they refuse to pay fines. Profits from oil production should be used to improve the standard of living of citizens of the Niger delta area. This will greatly reduce the frequency of oil theft and pipeline vandalism. Existing refineries should be rehabilitated and brought back into operation to least at 80–90% capacity utilization. Government should create an enabling environment with fiscal incentives to attract investments into refining in Nigeria such as Dangote’s refinery. Improved relationship with Russia will certainly be beneficial to both countries.

Conclusion

This article covers the structure of oil and gas industry, upstream and downstream sector, obstacles in the oil and gas industry, pipeline vandalism, crude oil theft, pollution, inadequate pipeline infrastructure, effects of poor management among others stating the negative effects of excessive degradation due to oil exploration and conflicts in Nigeria. With a complete discussion of the history, production and issues associated with the petroleum industry in Nigeria, our future discussions will be a comprehensive work on its old refineries, cost of repairs of old refineries, introduction of foreign investors to its downstream sector especially the refineries, cost production of new refineries, benefits and economic advantages both to Nigeria and its foreign investors - specially Russia

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CHALLENGES OF OIL AND GAS TRANSPORTATION STRATEGY DEVELOPMENT IN SONATRACH COMPANY, ALGERIA

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Sonatrach is an integrated oil and gas company based in Algeria. It operates in various sectors, including upstream exploration and production, downstream refining and marketing, pipeline transportation, and more. As the national oil company of Algeria, Sonatrach plays a crucial role in the country's oil and gas industry [1].

Including all the processes that this company covers in the sector of energy, pipeline transportation is one of the aims that is really important for the company to transport the crude oil and gas to different destinations, and to ensure the safety of the transportation, the company uses classical methods for the safety of the pipelines, this research will be based on implementing the new technology of auto drones and their advantage for the company, that is highly required to install such new generation of technology to this sector as many other large energy companies around the world.

Pipeline transport activity In Sonatrach

Transport Pipeline Activity is in charge of the operation of facilities and equipment for the transport of liquid and gaseous hydrocarbons, the maintenance and development of the transport network, and this in accordance with the rules of the art in terms of safety, cost and quality [1].

The pipeline transport activity has the strategic objective of ensuring the availability and integrity of the pipeline transport network in order to evacuate and deliver all planned production under optimal safety, quality and cost conditions.

The pipeline transport network consists mainly of 2 parts:

- The Gas pipe Enrico Mattei (GEM), linking Algeria to Italy via Tunisia.
- The MEDGAZ gas pipeline, linking Algeria directly to Spain from Béni Saf [1].

Overall it has the following characteristics.

1. 21,189 km total length of the network.
2. 43 pipelines (23 gas pipelines and 20 oil pipelines).
3. 85 pumping and compression stations and 387 machines installed along the network.
4. 128 liquid hydrocarbon storage tanks with a useful capacity of 4.3 million TOE.
5. Three oil ports in Arzew, Skikda and Bejaïa, with a loading capacity of 1.3 million tons. The oil ports have 05 loading buoys on the high seas [1].
6. Two international gas pipelines linking Algeria and Europe, with a transport capacity of more than 43 billion m³ per year.

Transportation Activity by Pipeline covers a network of oil and gas pipelines with a total length of more than 21,000 km, enabling hydrocarbon products from deposits in the South to be evacuated to storage and distribution centers in the North.

Table 1. Quantities of hydrocarbons transported by pipeline [1].

Quantity of hydrocarbons transported (in millions of toe)	2020	2021
North network	136.3	155.1
South network	72.7	80.3

The implementation of quadcopters

Having shown the importance of this company, especially the role it plays in the country's economy, ensuring the safety of its pipelines often requires a combination of preventive measures, regular inspections, maintenance protocols, etc. In contingency planning, it remains in place that traditional methods are somewhat less efficient and more extensive, in this case other energy companies in developed countries such as British oil giant BP [2], Exxon Mobil (in North America, UK, and Australia), Russian oil and gas giant Gazprom [3] and others rely on the latest drone and quadcopter technology to inspect and protect the transportation of energy products. The benefit of this technology to these companies is that:

%2. **Enhanced Inspection Capabilities:** Quadcopters equipped with cameras and sensors can provide a detailed and comprehensive view of pipeline infrastructure, allowing for more accurate inspections and identification of potential issues or vulnerabilities.

%2. **Improved Safety:** By using quadcopters for pipeline inspections, these companies can reduce the need for manual inspections in hazardous or hard-to-reach areas, thereby minimizing the risk to human inspectors.

%2. **Efficiency and Cost Savings:** quadcopters can cover large areas quickly and efficiently, reducing the time and resources required for pipeline inspections. This can result in cost savings for Sonatrach Company also if they adapt it.

%2. **Real-Time Monitoring:** quadcopters can provide real-time data and video feeds, allowing for immediate identification of any anomalies or safety concerns. This enables prompt action to be taken to address potential issues also about the emergency response, that this last one is crucial for time benefit [4].

The idea of implementing the Quadro copters in the pipeline sector has become more efficient through years of development and experience that is gained, now the control of the

quadcopters and drones is highly efficient and crucial also independent for the safety of the pipelines, currently, if Sonatrach will use such technology, at the long term it will be effective, but as first time for monitoring this technology can face some issues, such as:

1. **Regulatory and Legal Considerations:** Implementing quadcopters in pipeline safety management may require compliance with specific regulations and guidelines set by aviation and regulatory authorities. Sonatrach Company would need to ensure that all necessary permits and licenses are obtained.

2. **Technical Challenges:**quadcopters require skilled operators and maintenance personnel. Sonatrach Company would need to invest in training and resources to ensure the proper operation and maintenance of the quadcopters[5].

3. **Data Management and Security:**the use of quadcopters generates a significant amount of data, including images, videos, and sensor readings. Sonatrach Company would need to establish robust data management and security protocols to protect sensitive information and ensure compliance with data privacy regulations [5].

It is important for Sonatrach company to conduct a thorough assessment of the specific benefits and challenges associated with implementing quadcopters in pipeline safety management. This assessment should consider the company's unique operational requirements, regulatory landscape, and available resource.

Best drone model for Sonatrach company

One of the most effective brands of Quadro copters that different companies use is JOUAV drone [6],they are designed especially for the oil and gas industry, which can take payloads with different functions and weights.

1. **Vertical take-off and landing (VTOL).**
2. **61.0 megapixels/down to 1cm (0.4").**
3. **200km coverage with one flight/Max Payload 20KG [6].**
4. **Good performance in harsh environments and extreme weather [6].**

JOUAV drones perform well at high altitudes of 4500m and have a practical lift of no less than 6500m. The drones offer class 6 wind resistance and remain stable in winds of 25 to 31 mph. In other harsh environments, such as coastal areas with high salt and humidity, hot and dry deserts, and cold polar regions, JOUAV UAVs can cope with them all excellently [7].

As for the prices of this drones it starts from 8000\$, the basic one, plus the different details that needed to be installed in it, can reach to 20,000\$, but the prices differ from the need of each region climate and needs for it [6].



Figure 1 - JOUAV drone C20 model [8]

Conclusion

Overall, the use of quadcopters in the oil and gas sectors offers significant benefits, including faster inspections, reduced costs, improved safety, and the ability to address issues more efficiently. As the technology continues to evolve, it is likely that if Sonatrach company and its industries will embrace the use of drones for various applications in the oil and gas sector as soon as possible, due to their high impact on the results of other companies who have already used it and maintain it.

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PRICE INDICES AS AN INDICATOR OF INFLATION IN NIGERIA

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Inflation is considered in the scientific literature as a general increase in the price level. In terms of the purchasing power of money, inflation is an indicator of how much a consumer can buy with his available income. When measuring inflation, it is advisable to take into account changes in price indices; we can also calculate inflation using the gross national product (GNP) deflator; consumer price index (CPI); and producer price index (WPI or PPI) [4].

Inasmuch as is consider, its risk permeates into the nation's life, Inflation has become a paramount discussion of argument in Nigeria. There has been ongoing increment in prices which has affect the citizen, devaluation, increment of money supply and high wages, this has course Nigeria a serious economic difficulty an Africa generally; the purchasing power of the currency has rapidly declined, and the Nigerian Government's efforts to monitor and address trends and deviations in gross domestic product (GDP) have not yielded the expected results. In this regard, the main objective of the Central Bank of Nigeria (CBN) is to ensure a sustainable level of inflation, which corresponds to the so-called "natural" rate necessary to maintain the volume of aggregate supply in the country [1].

This a popular topic of discussion among central banks, governments, economists, and other stakeholders. Policy choices in Nigeria have been greatly impacted by the direction of inflation rates, especially in 2023. The approval of a low and steady inflation rate is because it authorize faster in labor market trade during downturns and lowers the cost of lending for manufacturers because of the majority of economist and monetary lawgiver make a decision, which increases growth and curativeness. In turn, this increases investments, lowers unemployment, and raises economic production.[2] Refinancing transformed short-term debts into long-term ones, while rescheduling renegotiated terms for outstanding debts. However, these practices contributed to fiscal irresponsibility and inflationary pressures, contrary to the intended goal of reducing external debt. The acquisition of new loans further fueled inflation and perpetuated a cycle of indebtedness, leading to a significant escalation of Nigeria's external debt.