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Strategic Value Analysis of Nigeria's Refinery sector

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ABSTRACT

The work applied digital competitive strategies applied to countries like the United States oil and gas sector to forge a pathway for Nigeria's Petroleum sector. An application of Strategic Value Analysis(SVA) was done on the Petroleum value chain with a view to define the current behavior of the market. The following four basic questions of SVA analysis were applied in the course of the study: 1. Are there new or emerging players in my industry (within any portion of the value chain) that may be more successful than existing players?; 2. Are these companies positioned in the value chain differently from current players?, 3. Are new market prices emerging across segments of the value chain?, 4. Are these markets sufficiently deep to reflect arm's-length trading?. If i used these market prices as transfer prices in my company, would it fundamentally change the way that my major operating units behave? .The outcome was a complete disintegration of the entire Petroleum sector of Nigeria's oil and gas value chain. The emergence of new players was discovered and the patterns of these players completely different from the majors were emphasized as the future pathway for the sector. New strategies for the downstream sector were also recommended in the work.

1. Introduction.

A move from an integrated approach to specializations in the Petroleum sector has been the focus of the Petroleum value chain in Nigeria today. A decoupling of operations from between upstream and downstream operations and further decoupling in the downstream sector which favour specializations is the pathway for the sector today. This is evidenced by the emergence of new refining technologies such as modular refineries in Nigeria's petroleum refining sector.

2. Objetive.

The objective of this work is to invent digital competitive strategies that will revolutionize Nigeria's refinery sector applying strategic value analysis.

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3. Literature Review.

Agnihotri, R.(2018) has pinpointed the digital leanings of future refineries with the following attributes;

- **An intelligent, predictive and near-real-time business,** where near-real-time data and models drive optimization across the entire hydrocarbon value chain and provide new, actionable, role-based insights, with personalized delivery, to maximize margins, safety and compliance.
- **Proactive intelligence** that discovers and defines impending disruptive or abnormal events (price changes, asset failure, weather, etc.) and mitigates their impact.
- **Concurrent real-time supply chain management and optimization** in planning, scheduling and execution across supply, manufacturing, distribution and retail to maximize profits and reduce costs, inventory and working capital.
- **A focus on production excellence** to manufacture at or above capacity, reduce feed costs and energy consumption, produce higher-value products, reduce or eliminate

losses, maximize profits from blending products and reduce off-grade product in transitions, among others.

Continuous improvement in asset availability, reliability and integrity through increased preventive, predictive and prescriptive maintenance and reduced turnaround (TA) time, providing specific, complete, multi-modal information for the task at hand.

- In existence also should be **a digital twin** of physical assets that serves as an information source (e.g., business and process models, data, documents, drawings, 2D/3D models) and can provide **asset lifecycle management,** a cloud-based, integrated asset data solution through the life of an asset.

- Again there must be **sustainability and compliance** with environmental and other regulations to conduct business in a social and environmentally responsible manner for the betterment of the community.

- Also to be put in place is a system that must insist on **risk reduction to personnel safety and health** through use of technology and automation such as drones, safety applications, intelligent inspection and emergency response in hazardous situations.

- There must be **product lifecycle management** for innovation to increase market share, meet customer requirements and track, diagnose and correct any potential problems.

- **Lastly new business models should be put in place** to continually reinvent the enterprise by taking advantage of new technologies and artificial intelligence (AI) that are disrupting the HPI.

4. Methodology.

The work applied the method of strategic value analysis to re-evaluate the downstream sector of

Nigeria's refinery market, taking cognizance of current emerging challenges facing the sector.

Relevant questions in the SV A method includes:

1. Are there new or emerging players in my industry (within any portion of the value chain) that may be more successful than existing players?
2. Are these companies positioned in the value chain differently from current players?
3. Are new market prices emerging across segments of the value chain?
4. Are these markets sufficiently deep to reflect arm's-length trading?

5. Research Findings.

1. Are there new or emerging players in my industry (within any portion of the value chain) that may be more successful than existing players?

The oil and Gas industry value chain in Nigeria's downstream sector is quite an active one. In recent years a good number of independent private operators have emerged building AGO and PMS station outlets in different cities at strategic points . Large companies have also separated themselves from the upstream sector based on different operating environment. Are these markets sufficiently deep to reflect arm's-length trading?

Also in the gas downstream sector often co-located with petrol stations a new specialization is emerging. Special gas operating industries are now building their gas stations in cities applying digital methods to take over business from older ones thus emphasizing the advantage of digital technologies.

These are a new set of emerging refinery sector designed to produce small quantities of refined petroleum products for the country. The first is WalterSmiths Refinery being built in Ibigwe Owerri, Imo state set to commence production early 2020. The refinery may have to adopt digital methods to out perform its predecessors. The continual build up of tankers at loading bays constitutes a non digital attitude which must be overcome by the emerging refinery sector. Two more are billed for Bayelsa and Cross River states.

The introduction of LNG in trucks by Greenville LNG Nigeria is also another case of a new emerging technology in Nigeria's downstream sector. Full truck loads of gas are now borne in truck loads across regions in Nigeria and beyond the border to supply gas in large quantities to areas of need. This action forms a serious challenge to the pipeline sector and the pressurized tanker sector which till date has ruled the sector. The implication is that larger volume gas is now made available at competitive price at any distance.

IMO de-sulphurisation regulation prescribes that 10% of the fuels will have to contain biofuels by 2020.

Beginning from January,1, 2020, the **IMO** Marpol Annex VI **regulation** on limiting sulphur content of **bunker fuel** to a maximum of 0.5% will go into force. Presently, the global sulphur content cap on **bunker fuel** is at 3.5%, a level considered easy to comply with for vessel operators. Shippers are considering converting to LNG or methanol as a way of complying while refineries are considering turning to biofuel refineries. Refinery facility upgrading by the year 2020 will be the other alternative.

Another likely fall out from the IMO regulation would be a likely partnership between refining and shipping industries. Refineries may choose to invest in scrubbers used in the ships to meet the IMO regulation, thus allowing the refineries to avoid investing in desulphurisation capacity, or refinery upgrading.

The refiners will thus continue producing HSFO while the shipping industry continue using the same. Scrubbers will reduce the sulphur outflow at the point of exit to the atmosphere. Alternative investment of $900mn in de sulphurisation capacity, will be the opportunity cost to refiners. Partnering shipping

vessels will have to spend $1-3mn each in the scrubber unit to achieve regulatory requirement .

BPCL has devised a strategy of implementing adaptive process control (namely the Aspen DMC3^{TM} multivariate control technology) on their sulfur units attached to and driven by a predictive rigorous model of the sulfur process visible online (referred to as the SULSIM technology within Aspen HYSYS®).

According to Aswari Kelkar several important conceptual elements of this digital solution, includes:

1. the driving of the predictive model from sulfur unit plant data streams, visible online. This turns the predictive model into an *as-operating digital twin* that can provide real-time advice and analysis to operations.
2. the integration of this predictive model with the advanced control model within one easy-to-use and actionable dashboard, allows operators interpret information coming from complex systems.
3. the open-loop integration of the two, permits the rigorous model to drive the advanced control system to achieve more aggressive operation targets.

The resulting operational data from this system had impact on: Reduced SOX emissions, Increased sulfur recovery (which has economic value) as well as Energy efficiency

Carnival Corporation has created an 'Advanced Air Quality Systems' website to highlight the benefit of using scrubbers to meet the IMO's 0.5% 2020 sulphur limit as well as support sustainable operations in ports and the global shipping industry.

5.1. Like Digital Solution Expected from Nigerian Refineries.

Nigeria's three big refineries; Warri Refining and Petrochemical Company Ltd, Port harcourt Refinery Eleme and Kaduna Refinery are thus expected to come up with digital solutions of like nature to face the IMO 2020 Desulphurization rule. Alternative solutions include: 10% Biofuel option: Scrubber alignment with shipping companies; digital solutions in her distillation units.

Are these companies positioned in the value chain differently from current players?

Current players in Nigeria's Refinery sector constitutes of old players who depend on government subsidies to survive. With the current international drive against subsidies and likely emergence of digital modular refineries the game is likely to change very soon. New entrants into the sector are completely different even in the LNG Gas supply sector who will throw the pipelines out of competition. The applied technology is quite different thus leading to a different cost structure.

Value chain positioning of emerging refineries in Nigeria has changed due to different operating strategies of modular refineries, eg Walter-smith Owerri, traditional refineries eg Warri Refining and Petrochemical ltd, and emerging export refineries (eg, Dangote refineries.)

Are new market prices emerging across segments of the value chain?

Some new AGO and PMS stations sell their fuel below the government price of N145 per litre. Most sell with POS as well as applying other digital techniques.

Moreover, the LNG trucks sell at entirely different price from pressurized tankers confirming variant market price along the value chain. Likely price distortion in the market is envisaged as people become more aware of the advantages of this new technology.

New pricing mechanisms are likely to emerge in Nigeria once Nigeria's refining capacity is improved.

The local refineries will then have advantage over fuel import dependent companies based on competition. As the export refineries emerge, Nigeria will become a competitive market with foreign countries and as such will have lower prices based on closeness to source of production.

Are these markets sufficiently deep to reflect arm's-length trading?

The emerging modular refineries are private investments and are likely to adopt digital strategies that will enable them compete with government refineries. They are thus sufficiently distantly positioned to evolve a separate trading rule.

According to Reuters; Nigeria has a nameplate capacity of 445,000 bpd, largest in West Africa and fourth largest in Africa. Her refining facilities are very old; suffer from lack of maintenance and inconsistent feedstock. As a result, country's 80% of the downstream product requirement is fulfilled by the imports. The government of Nigeria plans to process all the domestic refined product consumption locally by 2019. In order to improve the downstream industry production, and reduce the dependence on imports, Nigeria's Department of Petroleum Resources (DPR) and state-owned Nigerian National Petroleum Corporation (NNPC) have opened their door to private international and local investors. The result is, Dangote group is building the largest oil refinery with the nameplate capacity of 650,000 bpd of oil, which is not only expected to meet Nigeria's consumption but also, allows the country to become an exporter of the refined products.

Reuters also states that the demand for energy is growing in the emerging countries. These countries are also heavily dependent on oil. Therefore, the growing energy demand in emerging countries is expected to drive the market, while the global trend towards increased natural gas and renewable energy consumption is expected to restrain the market during the forecast period .

Reuters also posit emerging economies as drivers of refinery investment in the coming years. According to her energy demand in emerging countries, like India and China is growing at a substantial rate owing to industrialization, growing population, and urbanization. These countries do not have enough infrastructures for distribution of gas and generating renewable energy to meet the growing demands. As such emerging countries are expected to remain heavily dependent on oil to meet the demands. Concurrently, growing demand, particularly in emerging countries, is expected to drive the oil demand, in turn driving the refining market.

Conclusions.

The export refinery orientation remains the best strategy for Nigeria as this will make her a hub for refined product supply

to the emerging economies.

The European refineries are already operating at low margins or below average sales margin due to emerging shift to LNG. The emerging economies thus remains a viable hope for refined products in the near future.

Nigerian refineries as such must go digital to become a global leader in this sector. BPCL India has gone digital, Nigeria should follow suit by insisting on overall digital approach across the value chain of both the port and the refinery sub sector. Going digital remains the future pathway.

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