Sustainable Operation of Marginal Fields in Nigeria: Opportunities, Challenges and Best Practices

Koso I. Idigbe and Kelani O. Bello

Department of Petroleum Engineering,
University of Benin, Benin City, Nigeria.

Corresponding Author: Koso I. Idigbe

Abstract
For over forty years, Nigeria has witnessed the transformation of the economy from agriculture-based to oil-based. Evolving the local content initiative in this oil-based economy, the Federal Government of Nigeria in 2003, awarded 24 marginal fields of the available 116, with over 2.8 billion barrels of crude oil reserves, to indigenous companies, for development and exploitation. This initiative has two main objectives, namely, the greater involvement of local companies in the upstream sector of the petroleum industry towards a higher level of indigenization, and growing more reserves of petroleum assets. However, by the end of June 2013, less than 30% of the awarded fields are producing petroleum assets, crude oil and/or natural gas and its derivatives. In this paper, we present opportunities to sustain corporate responsibilities – social and economic, and investigated challenges that confront the local operators of these fields. Basic roles that will improve the contribution of the operators of marginal fields in Nigeria towards value creation are suggested for optimization. We posit that proper business engineering and the monetization of natural gas assets in these fields will be major best practices for value creation. We believe these will significantly impact on the sustainable operations of the marginal fields, and thus, ensure the success of the marginal field initiative, especially, in the growing of natural gas reserves, a key component for power generation in Nigeria.

Keywords: marginal fields, indigenous companies, opportunities, challenges, value creation, monetization, natural gas assets, best practices

INTRODUCTION
Greater roles for local content in the petroleum industry, especially, the upstream sector, in Nigeria, are being put in place, by the Federal Government. We see a part of these efforts in the Petroleum Industry Bill (PIB), which is in the National Assembly, for passage into law. An earlier effort was demonstrated in 2003, when the Federal Government awarded 24 marginal fields to indigenous companies for development and exploitation. For reasons, such as:

- Very low proven and possible volumes of reserves (DPR, 2003), and thus,
- Un-economical to using the same workforce to develop and exploit these marginal reserves,

The original operators of these fields, the IOCs, found them very un-attractive to exploit, and hence, left these fields undeveloped for many years. Table 1 shows the major fields that are presently producing crude oil, with a cumulative volume of 30,600 bopd, a mere contribution to Nigeria’s daily output of 2.4 million bopd (DPR, 2013a). This figure represents less than 30% success mark on the marginal fields’ initiative. We ask the following questions, which need urgent answers, to effectively sustain the marginal fields’ program:

- Why is the marginal fields’ program not successful as anticipated?
- Thus, can the marginal fields program be depended on to drive an objective local content initiative, a plan of the Federal Government?
- What inputs are needed to help this program achieve success and sustainability?

The answers to these questions will clearly point the way and define opportunities, to optimally develop and exploit the reserves of both crude oil and natural gas assets in these fields.

Table 1: Producing Marginal Fields in Nigeria (Africa Oil and Gas, 2013; DPR, 2013a)

<table>
<thead>
<tr>
<th>Field</th>
<th>Indigenous Company</th>
</tr>
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<tbody>
<tr>
<td>Ajapa</td>
<td>Britania-U Nig. Ltd.</td>
</tr>
<tr>
<td>Umusadege</td>
<td>Mid-Western Oil &amp; Gas/Suntrust</td>
</tr>
<tr>
<td>Egbeoma</td>
<td>Platform Petroleum</td>
</tr>
<tr>
<td>Ibigwe</td>
<td>Walter Smith</td>
</tr>
<tr>
<td>Ebendo</td>
<td>Energi</td>
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</tbody>
</table>

Crude oil, accounts for over 80% of the foreign currency earnings for Nigeria. We believe the 116 marginal fields with over 2.8 billion barrels of crude oil reserves (DPR, 2003), can play significant roles in the petroleum industry in Nigeria, if and when, challenges are well defined and accepted by the local
operators; opportunities are leveraged on, and best practices are imbibed into operations.

**Facts on Ground about the Marginal Fields**

There are basic facts that indigenous companies must leverage on, to optimize the operations of marginal fields in Nigeria, namely:

- The continued willingness and indication by the Federal Government of Nigeria to assist in greater participation by indigenous companies in the upstream sector of the oil & gas business, as evidenced by:
  - The recent extension of the licences on these fields by DPR, and
  - The imminent passage of the PIB.
- The Amnesty program of the Federal Government, designed to minimize the disturbances in host communities.
- Better technologies to re-process old and newly acquired geo-physical and engineering data, thus, defining better and improved reserve volumes.
- The improved price of crude oil in the international market.
- Greater acknowledgment of natural gas as a strategic asset.

These facts are very important, and we posit that well-articulated structures should be designed and put in place by these local companies, to optimize value from each fact. There are less stresses in the communities now. This is the best time for the local companies to initiate better models for engagement in these host communities (Adetoba, 2012; Africa Oil and Gas, 2013), by properly putting in place:

- Adaptive QHSSE platforms for each company’s host community.
- An effective capacity building program for each host community (Idigbe and Onaiwu, 2011).

These are parts of corporate social and economic responsibility of each company for its host community. We believe the marginal fields when properly and fully exploited can play significant roles in the industrialization of Nigeria. How? We posit this, through the optimization of available opportunities.

**Opportunities**

Energy, specifically petroleum, is expected to drive power, agriculture, manufacturing, transportation, and other industries in Nigeria. The vision 20:2020 of the Federal Government clearly defines the roles for energy. We ask the following questions:

- Can the marginal fields contribute effectively, to vision 20:2020?
- Can the marginal fields evolve value-based structures for effective development of Nigeria?

We posit yes to each of the above questions. The answers are domiciled in effectively managing each opportunity that is available to the companies. Key opportunities are:

- Better position to effectively drive the local content initiative of the Federal Government (Idigbe and Onaiwu, 2011).
- Create better models for sustained E & E activities in communities.
- Monetization of natural gas assets in these fields.

We believe education is and will remain the key to vision 20:2020. The quality human resource will drive the industries, to create value for Nigeria. The marginal fields’ companies have a great role to play here. They can drive and sustain research in local technologies; initiate value-based skills acquisitions; help deploy local solutions to problems in the E & E activities in their fields; initiate programs to catch, develop, and sustain the young, and future quality human resource. These contribute to the local content initiative. Natural gas assets are found in each of the marginal fields. The effective exploitation and subsequent monetization will be a best practice to create value from these fields. At present, produced associated dissolved natural gas is seen as a waste in crude oil production. However, most of the marginal fields have conventional un-associated commercial natural gas reserves, a major source of income and, feedstock to key industries in Nigeria.

**Challenges**

However, in exploiting the marginal fields, the following challenges (will) face most marginal fields’ companies, namely:

- The absence of facilities in these fields to process, evacuate and store produced volumes of crude oil, etc.
- Evolving proper organizational structures, with clear responsibilities, to avoid the syndrome of one-man business, as been played out in many of the companies.
- Evolving effective master plan for proper field development, with respect for the environment, etc. – QHSSE.
- Evolving proper business engineering for operations.
  - Assembling the right personnel and work environment for effective value creation.
  - The sourcing of funds – loan vs. equity funding.
  - Out-sourcing of non-core activities.
  - Building and sustaining effective management of assets.
- Achieving and sustaining excellent relationships with host communities.
How will these and other challenges be met? In most of the fields, there are no facilities for processing, evacuation and storage of crude oil, and evacuation of natural gas. This is a major problem for these fields. At present, the companies are meeting this challenge by paying the IOC nearest to them, for these services. Proper field development plans with good business engineering, and effective synergies, will help the companies to overcome this challenge. A good example of this can be well demonstrated in OML 90, where there are three marginal fields – Ajapa, Ogedeh, and Akepo.

Figure 1 shows a simple organogram we are proposing for marginal fields. We believe this simple organogram is sufficient to drive efficiency in these companies, which are small companies that should not be burdened with un-necessary costs. This organogram optimizes personnel and activities. Effective business engineering in clearly domiciled in this simple organogram. We believe the sourcing of funds has been a key factor in delaying most marginal fields from getting first oil. Companies must evolve funding plans that suite each particular field – loan vs. equity. Meeting these challenges will define best practices in operations that will be a vanguard of these companies.

Best Practices for Sustainability of Operations

We believe four key best practices are necessary and sufficient to drive the marginal fields, and subsequently create value for the economy. These are (see Figure 2):

- Create the right relationship with host communities – “model” for sustainable development of the environment of operations. Consequences are:
  - Peace
  - Sustaining local content initiative – capacity building for host communities.
  - Wealth Creation
  - Sustainability of Operations
- Proper business engineering.
- The effective exploitation and monetization of natural gas assets – natural gas and natural gas liquids. Presently, most produced natural gas volumes are flared. The Federal Government is against this, and a new date has been worked out for gas flare down. Micro-projects can evolve from natural gas.
- Total discipline and commitment to the Federal Government initiative on indigenization in the upstream sector. We have seen cases where fields are simply handed over to technical partners after some money has been paid to the so-called local owners of fields. This practice negates the local content initiative whereby local companies are supposed to run the fields to gain experience.

Over 2.8 billion barrels of the crude oil reserves are estimated to be in the 116 marginal fields. The volumes are those reported by the IOCs, the farmers of these marginal fields. These volumes have changed over the years due to re-evaluation by the producing companies of the awarded fields. Thus, a substantial volume of crude oil and natural gas reserves are expected to be in the fields. Best practices in operations will guarantee effective exploitation of these volumes of crude oil, and reserves of natural gas assets, from these fields. Again, we ask certain key questions.

Key Questions and Roles to Sustainability of Operations

These questions are a key to the functional and sustainable development of the marginal fields – 24 awarded and 92 to be awarded (a total of 116 fields presented by DPR (DPR, 2003)), towards wealth creation for the economy:

- Are Policies of the Federal Government relevant and dynamic to successfully drive the marginal field program?
- What business models will drive this program to success?
  - Foreign Technical Partners vs. Out-sourcing certain operations to competent locals with several years’ experience in upstream activities.
  - Loan vs. equity financing of activities.
- Can host communities be trusted as partners in this program to creating and sustaining peace and economic progress?
- What lessons learned from the activities of the multinationals, can be used to direct and position the marginal field operators, to effectively develop these fields?
- Will the next marginal fields award be based on merit, or on politics and nepotism?

The fundamental role of the marginal field operators is analogous to the role of the micro-finance banks in the financial sector of Nigeria - providing the platform for the micro-development of the communities. We believe other roles may be:

- Deliver crude oil to be created micro-refineries, at market prices. At present, the four refineries in Nigeria are dysfunctional. All petroleum products are imported into the country. We believe micro-refineries will be a part of the solution to shortages of petroleum products in Nigeria.
- Setting the pace in improved and sustainable environmental management.
• Evolve dynamic and effective models for management of facilities. Will be better positioned being Nigerians, to properly and effectively police facilities with the host communities.

Putting it all together, we posit the following as greatly needed for the sustainability of operations of the marginal fields:
• Effective synergies between marginal fields in same or nearby OMLs, to sharing knowledge, talent, resources, etc., e.g.
  o OML 90 – Ajapa Field, Ogedeh Field, and Akepo Field
  o Optimize field development plans; a data base of resources common to these companies to optimize knowledge, talent, costs, operations, time.
• Effective synergies between the indigenous companies and providers of services – knowledge, technology, financial, etc.,
• Willingness of the indigenous companies to effectively develop the marginal fields, avoiding the mistakes of the some indigenous companies that were awarded major OPLs but instead are now, mere watchers.
• Effective support by the original holders of these marginal fields – Shell, ChevronTexaco, ExxonMobil, Agip, etc.
  o Provide all necessary technical data, and other information to enable proper field development.
  o Act as de-facto technical advisers
  o Help audit and ensure best practices in operation.

By properly playing the expected roles, the following benefits will be derived from the marginal fields’ initiative:
1. Peaceful host communities where proper oil & gas operations and activities can be carried out. Process facilities, pipelines, etc. will be protected and secured.

The economic implications of the continual compromise of some of the process facilities and pipelines are so enormous (Africa Oil and Gas, 2013). The facilities of the IOCs are highly compromised. By average, Nigeria loses about 250,000 barrels of crude oil every day from the compromise of the facilities of the IOCs (DPR, 2013b). In Table 2, is shown the economic losses in millions of US$, incurred in 2003.

### Table 2: Economic Losses in 2003 (DPR, 2013b; The Guardian Newspaper, 2003)

<table>
<thead>
<tr>
<th>Company</th>
<th>Loss bbls/day</th>
<th>$20/bbl millions</th>
<th>$26/bbl millions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shell</td>
<td>100,000</td>
<td>730</td>
<td>949</td>
</tr>
<tr>
<td>Others</td>
<td>150,000</td>
<td>1,095</td>
<td>1,423.5</td>
</tr>
<tr>
<td>Total</td>
<td>250,000</td>
<td>1,825</td>
<td>2,372.5</td>
</tr>
</tbody>
</table>

2. Effective development of the host communities – social and economic.
3. A contribution to rapidly achieving increases in crude oil reserves, an ambition of the Federal Government.
4. Poverty reduction through employment of relevant personnel and linkage factor.
5. The ability of Nigerians to effectively function in the oil & gas business.
6. A great contribution towards a robust economy of Nigeria.

Some results have been achieved by the marginal fields’ program, namely:
• Forums for the marginal fields’ operators to meet, discuss, and plan synergies.
• The full operation of some of these fields by local content and the desire to retain control of operations.
• The greater interest shown by foreign investors on the marginal fields program.
• The recent indications by the Federal Government to start the next round of marginal fields’ awards, due to perceived success by the few fields that are in operation.

However, we posit basic requirements for success of the program, namely:
• The long term desire and drive for quality and sustainability of operations by all parties – the Federal Government, the Farmors, the Farmees, and Host Communities.
• An effective local content contribution to the program by Banks, Insurance Companies, Maritime industry, and academia.
• The successful deployment of local technologies to certain operations in the development and exploitation of the fields.
• Effective wealth creation strategy for the economy.

**LIMITATION OF STUDY**
The present study is based mainly on our experiences and available data on the 24 awarded marginal fields. We have used this information and knowledge to include all marginal fields in Nigeria. This is the limitation of the present study. We believe the un-awarded marginal fields will have the same opportunities, and may face the same challenges, as the 24 awarded marginal fields. Best practices will remain the same, and we posit the same roles will
apply to local companies to effectively develop any of the marginal fields in future.

CONCLUSIONS
The marginal fields program is a local content initiative, designed by the Federal Government of Nigeria, to enhance local participation in the petroleum industry. The ability of the indigenous operators to effectively develop, grow and manage petroleum assets in these fields, will demonstrate to the Federal Government that right decisions were made to create this program.

We posited opportunities and best practices that are available for the sustainability of this program. Key questions for, and basic roles that should be played by the operators towards value creation and enhancement, were presented for optimization. Key challenges (will) confront the indigenous companies; however, certain results have been derived since the inception of the program. We believe the local content initiative will be greatly fulfilled by:

- Creating and enhancing better host communities’ relationships.
- A more effective micro-development of the host communities.
- Greater involvement in education, and local solutions to oil and gas operations.
- Participation in local micro-refineries, by the supply of crude oil.

Finally, key requirements for the success of the marginal fields program were identified. We believe the indigenization program of the marginal fields should continue and allowed to succeed, through the right inputs by all stakeholders, namely:

- The Federal Government.
- The Local Operators.
- The Host Communities.
- The Banks, Insurance Companies, and Maritime Industry.

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Appendix

Figure 1: Simple Organogram to Drive Marginal Fields

Board of Directors
- Out-Sourcing Services
- Chief Executive Officer
- Management Team
  - Administrative
    - 1. Personnel
    - 2. Finance
    - 3. Logistics
    - 4. QHSSE
  - Operations
    - 1. Planning
    - 2. Operations
  - Audit
    - 1. Technical
    - 2. Non-Technical

Figure 2: Best Practices will Drive Marginal Fields

Best Practices
- Governments
  - 1. Federal
  - 2. State
  - 3. Local
- Indigenous Companies
- Host Communities
- Drivers
  - 1. Transparency
  - 2. Discipline
  - 3. Commitment

Challenges
- Marginal Fields
  - Results
    - 1. Capacity Building
    - 2. Wealth Creation
    - 3. Sustainability of Operations