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Environmental Impact Assessment for sustainable development of the Oil and Gas industry in Trinidad and Tobago

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Abstract: Sustainable development has gained acceptance among scholars, businesses, governments and civil society. Sustainable development can be defined as the convergence between the three pillars of economic development, social equity, and environmental protection. Environmental impact assessment is just one instrument used to advance sustainable practices and advocate sound environmental management. The oil and gas industry is a carbon extensive industry. As such, sound environmental practices are paramount to its growth and success. The oil and gas industry in Trinidad and Tobago accounts for over sixty percent of the economy of the region. In spite of this, the environmental impact assessment process is relatively new to Trinidad and. This paper presents a study of the literature on this topic. A more detailed methodology, assessments and findings will be presented in a separate paper. It is hoped that by addressing the issues plaguing the environmental impact assessment process in the oil and gas industry such as a lack of baseline data, the ease of access to data, conflicting environmental policies and a greater need for enforcement, that major gains will be attained for environmental management in the country.

Keywords: Sustainability, Environment, Impact Assessment

1. Introduction

Recently, there has been a paradigm shift toward more environmentally and socially sound development. As the world transitions from non-renewable energy sources to renewable energy sources, it is important to ease that transition for countries whose primary income generator is carbon-based. Given this background, it is of great interest to research the latest trends in industry as it pertains to decision-making and sustainable practices. While there is an abundance of literature citing global best practices and methods in the EIA process, there is little research on the process of environmental impact assessment in Trinidad and Tobago; its pros and cons and ways for improvement. In addition, aside from newspaper articles surrounding a spill, there is little discussion on how to mitigate such effects, create preemptive strategies and the role impact assessment can have on environmental management in the oil and gas industry in Trinidad and Tobago. This research can have great implications on the sustainable development model for Trinidad and Tobago as an oil and gas producing, small island developing state (SID).

The oil and gas sector is a fundamental part of today's world, providing essential energy and raw materials for global development. A dynamic and innovative business, the industry constantly seeks to adapt to new situations and challenges. It invests not only in the search for new oil and gas, but also in facilities infrastructure, technology, local communities, health and safety, and the environment. The sector continually examines opportunities to meet growing energy demand around the world, while seeking to mitigate adverse impacts and address the potential risks of climate change (Case and Light, 2011).

Trinidad and Tobago attracts considerable foreign direct investment from international businesses, particularly in energy, and has one of the highest per capita incomes in Latin America. Economic growth between 2000 and 2007 averaged slightly over 8% per year, significantly above the regional average of about 3.7% for that same period; however, GDP has slowed down since then and contracted during 2009-2012 due to depressed natural gas prices and changing markets. Growth had been fueled by investments in liquefied natural gas, petrochemicals, and steel with additional upstream and downstream investment planned. Trinidad and Tobago is the leading Caribbean producer of oil and gas, and its economy is heavily dependent upon these resources. Oil and gas account for about 40% of GDP and 80% of exports, but only 5% of employment.

This strong reliance on oil and gas is a key influencer in Trinidad and Tobago's push to obtain developed world status by 2020. For 2015, Trinidad and Tobago's GDP is estimated to be $31 billion dollars (USD) and the current administration has proposed incentives to further increase investment in the oil and gas industry. The country plays host to a multitude of multinational companies particularly in the energy sector. These multinational companies are generally headquartered in countries that place a high value on environmental sustainability. However, the companies' commitments to green operations are not always upheld outside of the developed world. It is estimated that 17 percent of the population of Trinidad and Tobago live below the poverty line. The unemployment rate is 5 percent with the labor force divided by sector showing agriculture:

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3.8%, manufacturing, mining, and quarrying: 12.8%, construction and utilities: 20.4% and services: 62.9%. Trinidad and Tobago's shift from agriculture with sugar cane as the primary crop to industry occurred in isolation from the advancement of a culture of environmental protection. Developing countries such as Trinidad and Tobago trail behind in the use and development of the environmental impact assessment process. Some flaws in the process are a result of a lack of data collection and analysis, weak policy formation, poor infrastructure, and a general knowledge gap.

Sustainable development is realized when there is an effective implementation of a visionary and proactive development agenda based on integrated development of the three pillars of development - economic, social and environmental. As a Small Island Developing State (SIDS) Trinidad and Tobago has adopted this approach and is working towards attaining sustainable development that includes growth, inclusive and equitable development and the effective management of the environment. Government frames policy and facilitates the effective implementation and monitoring of policy and programs to ensure the achievement of results. Through this on-going cycle there is opportunity to measure and assess impact. Policy and legislative framework is a major challenge to environmental sustainability in this country. The main responsibility for environmental policy formation and review rests with Ministry of the Environment and Water Resources, while the Environment Management Authority (EMA) serving as the regulatory agency. The current existing laws and legislation are insufficient or outdated, and in many cases are conflicting to deal effectively with the present realities (Boeije, 2002).

Sustainability analysis, or triple bottom line analysis, is increasingly recognized as a holistic approach when all the three pillars of sustainability (environmental, economic and social aspects) are equally incorporated into the decision-making process of a project. Currently, the tools for assessing the environmental and economic impacts are well established. On the contrary, the development of a quantitative tool to assess the social impacts has been particularly challenging because a multitude of subjective factors may vary among social entities depending upon the type of project assessed.

Sustainability indicators are measurable aspects of environmental, economic, or social systems that are useful for monitoring changes in system characteristics relevant to the continuation of human and environmental well-being (e.g., greenhouse gas emissions). On the other hand, sustainability metrics are measured values to quantify the resulting impacts from specific indicators and are based on tools developed to determine each metric for a specific study (e.g., LCA). The attributes of sustainability indicators can be formal, informal, objective, or subjective, and some of the characteristics of indicators are suggested to be SMART – Simple, Measurable, Accessible, Relevant, and Timely; and SPICED – Subjective, Participatory, Interpreted and communicable, Cross-checked and compared, Empowering, and Diverse and disaggregated. The most widely used indicators by the United Nations for quantifying sustainable development are classified under 12 different categories, which include poverty, population stability, human health, living conditions, coastal protection, agricultural conditions, ecosystem stability, atmospheric impacts, generation of wastes, resource consumption, economic growth, and accessibility to information (UN, 2007). The EM Act and the Certificate of Environmental Clearance Rules, Order and Regulations guide the EIA process (Brannick and Coghlan, 2007). According to the EMA, the objectives of the EIA are:

- To ensure that environmental considerations are explicitly addressed and incorporated into the development decision-making process
- To anticipate and avoid, minimize or offset the adverse significant biophysical, social, and other relevant effects of development proposals
- To help the project proponent, the public and government regulators understand core issues of concern; to provide the opportunity for input from interested parties; to increase likelihood of public acceptance
- To protect the productivity and capacity of natural systems and their ecological processes
- To promote development that is environmentally sustainable and optimizes resource use and management opportunities.

Table 1 depicts some issues surrounding the oil and gas industry are identified and the law(s) specified as well as the agency responsible for enforcement and the associated penalty. It is evident that the oil and gas industry is policed by a number of agencies and the responsibility for enforcement has no true owner.

Table 1. Issues surrounding the oil and gas industry in Trinidad and Tobago.

ISSUE	LAW	ENFORCEMENT AGENCY	PENALTY (TTD)
Air Pollution	Petroleum Act (rev. 1980), Section 29 (l)(j)- Prevention of Air Pollution	Ministry of Energy & Energy Industries	-
Air Pollution	Environmental Management Act (2000) Sections 49-51- Authorizes EMA to develop a legal regime for management of air pollution	EMA	$100,000.00
Air Pollution	Gas Cylinders (Use, Conveyance and Storage) Act (rev.1980), Section 2- Control of gas cylinders	Ministry of Energy & Energy Industries	$750.00
Air Pollution	Drilling Regulations made pursuant to the Mines, Borings and Quarries Act (rev.1980), Regulation 18(l)- Prevention of uncontrolled flow of gas	Ministry of Energy & Energy Industries	$1,000.00 plus costs
Biological Resources	Sections 41-46 of the Environmental Management Act (2000)- Designation of sensitive species and sensitive areas	EMA	$100,000.00
Biological Resources	Section 16 of the Petroleum Act (rev.1980)- Restoration of area subject to petroleum operations. Section 29 (l)(j) making of regulations to prevent pollution of land. Regulation 42(2)© of the Petroleum Regulations (rev.1980)- Avoiding pollution of tidal areas	Ministry of Energy & Energy Industries	-
Biological Resources	Section 4(l) of the Pipelines Act (rev.1980)- Permit for laying of pipes	Chief Technical Officer	-
Biological Resources	Drilling Regulations made pursuant to the Mines, Borings and Quarries Act (rev.1980), Regulation 18l- Prevention of uncontrolled flow of oil or gas; Regulation 20(4) deals with repairing, plugging and abandoning of wells	Ministry of Energy & Energy Industries	Cancellation of license
Biological Resources	Fisheries Act (rev.1980),- Protects the fisheries of Trinidad and Tobago	Ministry, Police Service	$2,000.00
Water Protection	Section 29 (l)(j) of the Petroleum Act (rev. 1980)- The President may make any such regulations…for the prevention of pollution of…water…and for compensation thereof	Minister	Compensation
Water Protection	Drilling Regulations made pursuant to the Mines, Borings and Quarries Act (rev.1980), Regulation 20(4)- Plugging wells that could pollute water	Minister	$1,000.00 plus costs

2. Methodology

This research is a Case study analysis of the EIA process in the oil and gas industry using three projects as a multiple case design. The objectives are to conduct a preliminary qualitative analysis of the state of the environmental impact assessment process as utilized in the oil and gas industry. The main hypothesis of this research is that current guidelines and policies for EIA are not sufficient for sustainable development of the oil and gas industry in Trinidad and Tobago.

To test the hypothesis, the overall goal of this work was to analyze the EIA process in the oil and gas industry based on international best practices and to complete a case study of Trinidad and Tobago referencing three EIA executive summaries. The distinct objectives of this work were:

• To evaluate the environmental impact assessment of oil and gas projects in Trinidad and Tobago,
• To show the economic benefit to improving the process,

• To encourage greater inclusion of assessment of social impacts,
• To identify the gaps and loopholes in the environmental impact assessment process and to improve environmental management in the oil and gas industry.

The availability of a variety of source data created an important opportunity during the case study data collection: triangulation. The consistency of the findings from different as well as the same sources to establish converging lines of evidence were checked continuously, which strengthened my findings as a preliminary investigation. In collecting the data, case study protocol was developed and used, and found to be extremely helpful, if not essential. The protocol consisted of a set of questions to be addressed while collecting the case study data. These questions were related to the specific objectives of this study. Data to examine rival explanations was sought. The desired rival thinking came from a continual sense of skepticism as the study progressed. The case study evidence has been presented as a written narrative to avoid reader confusion and reduce personal assumptions about meaning. This presentation of the evidence in a clear and concise narrative will allow readers to judge independently my interpretation of the data.

The final analytic challenge was to determine whether any generalizations could be drawn from the case studies. It was decided that the most appropriate way to do so would be through an analytic as opposed to a statistical generalization. Analytic generalizations depend on using a study's theoretical framework to establish a logic that might be applicable to other situations. The first step involves a conceptual claim whereby investigators show how their study's findings have informed the relationships among a particular set of concepts, theoretical constructs, or sequence of events. The second step involves applying the same theoretical propositions to implicate other situations, outside the completed case study, where similar concepts, constructs, or sequences might be relevant. In this particular study, the theory was applied that sound environmental impact assessment processes positively impact the sustainable development of the oil and gas industry which is a high risk industry. If the gaps are closed in the process for the oil and gas industry, lower-risk industries can apply similar concepts and achieve great results. The overall outcome would be positive for the state of development in Trinidad and Tobago.

3. Results and Discussion

The EIA process should be:

- Purposive- the process should inform decision –making and result in appropriate levels of environmental protection and community well-being;
- Rigorous- the process should apply 'best practicable' science, employing methodologies and techniques appropriate to address the problems being investigated;
- Practical- the process should result in information and outputs which assist with problem solving and implementable by proponents;
- Cost-effective- the process should achieve the objectives of EIA within the limits of available information, time, resources and methodology;
- Efficient- the process should impose the minimum cost burdens in terms of time and finance on proponents and participants consistent with meeting accepted requirements and objectives of EIA;
- Focused- the process should concentrate on significant environmental effects and key issues; i.e. the matters that need to be taken into account in making decisions;
- Adaptive- the process should be adjusted to the realities, issues and circumstances of the proposals under review without compromising the integrity of the process, and be iterative, incorporating lessons learned throughout the proposal's life cycle;
- Participative- the process should provide appropriate opportunities to inform and involve the interested and affected publics, and their inputs and concerns should be addressed explicitly in the documentation and decision making;
- Interdisciplinary- the process should ensure that the appropriate techniques and experts in the relevant biophysical and socioeconomic disciplines are employed, including use of traditional knowledge as relevant;
- Credible- the process should be carried out with professionalism, rigor, fairness, objectivity, impartiality and balance, and be subject to independent checks and verification;
- Integrated- the process should address the interrelationships between social, economic and biophysical aspects;
- Transparent- the process should have clear, easily understood requirements for EIA content; ensure public access to information; identify the factors that are to be taken into account in decision making; and acknowledge the limitations and difficulties.
- Systematic- the process should result in full consideration of all relevant information on the affected environment, of proposed alternatives and their impacts, and of the measures necessary to monitor and investigate residual effects.

It is assumed that budget allocation is a testimony to governmental will and preferences of any matter of national interest. The following case study is presented in this section:

Study 1: Final Trinity Brighton/Guapo Exploration drilling project EIRA

For this drilling project, there was an examination of the socio-economic environment.

Highlights:
- EIA prepared in 2013
- 44* of T&T's GDP from O&G in 2011
- Majority of exploitation has been of land based sources
- Recently, discovery of offshore resources
- O&G requirements will need to be carefully balanced with existing marine and coastal users to avoid resource use in the future
- Fishing data from 2010
- Inclusion of recreational activities-fishing and beach visits
- 3 ports included in wider study area
- Offshore employment generating activities- mainly fishing and to a lesser degree, the O&G industry
- Area has a long history with O&G- well established response capability
- Wide range of stakeholder involvement- community members, NGOs, CBOs, private and public sector reps
- Public consultation- Surveys and public meetings
- 97% of fishermen interviewed thought that the project would have a negative impact- pollution, reduced fishing areas, oil spills and blasting
- 63% of community members interviewed thought that the project would have a negative impact- fish kills, negative effect on beaches, negative effects on fisheries, chemical spills, air pollution, sea bed destruction and oil spills
- Concerns from the 2 public meetings- loss of fertile fishing grounds, benthic disturbance, fishermen compensation, fish stock, job opportunities for fishermen, underwater oil pollution, artificial reefs, fisherfolk as patrol, HSE awareness, liaison officer, unemployment and small contractors, community relations, environment, sustainable development.

EIA practice in oil and gas in Trinidad and Tobago faces many challenges. These include the paucity of accessible data, lack of public participation, lack of post-approval enforcement and lack of quality control in EIA practice. Data is difficult to access since often it is owned by private entities, which do not wish to make this data public, or government agencies that do not have websites or do not want to share this data until they have conducted internal analyses. Information is also often outdated and cannot be used for baseline data. This often means that primary data must be collected for each EIA and cumulative impact assessment is often lacking since data is not attainable from other entities. Strategic environmental assessment is also not explicitly included in the CEC legislation and is not currently conducted for any sector.

Post-EIA approval often means that companies self-regulate, due to a lack of human and financial resources needed for enforcement, control and monitoring by the regulatory agencies, in addition to a deficiency in procedures and checks and balances. EIA practice in Trinidad and Tobago continues to experience variability in the quality of studies being undertaken and reports being produced by its EIA practitioners. There is no accreditation body or quality assurance system for EIA practitioners, which translate into varying levels of EIA reports being produced. The EIA reviewers often request large amounts of additional information for a given EIA and many EIA reports constitute "desktop EIAs" that do not contribute current information to the local knowledge and impact assessment process. It is to be noted that this study served as a preliminary investigation and a quantitative study will be conducted in the future if a grant is awarded. Furthermore, field research such as interviews and surveys can be utilized.

4. Conclusion

A lack of resources is the root of the problem facing EIA in Trinidad and Tobago. This leads to a myriad of smaller problems facing the process. Many of the penalties for offences are either nonexistent of too small, creating little or no impetus to deter transgression. In fact, individuals particularly businesses may find it more lucrative to break the law and accept the punishment, for example in situations where the penalties are small fines, when compared to the profit to be made. Many offences go unnoticed because the responsible agencies do not have adequate resources, such as the amount of qualified staff

to properly monitor actions. Furthermore, significant portions of the population are ignorant of the majority of laws governing Trinidad and Tobago, even more so the “less exciting” environmental legislation meaning that citizens may be unknowingly committing offences. On the other hand, there are those members of society who are aware of to the regulations and blatantly disregard them, usually for personal gain.

5. References

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