ANALYSIS ON RISKS AND OPERATION RISKS HANDLING IN OIL AND GAS COMPANY

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ABSTRACT

This study provides a review of the literature on risk management and project risk management in the oil and gas industry. For deeper comprehension, an overview of oil and gas operations, including upstream and downstream activities, has been forwarded and extended. This study uses literature on risks, definitions, and types of hazards to demonstrate the relevance of risk management. Project failures are frequently caused by poor risk management, which is why this article discusses project risk management. Typically, project risk management for the oil and gas business will focus on upstream activities, where bad decisions could result in losses of trillions, billions, or millions of dollars. As a result, the purpose of this research is to highlight potential areas for oil and gas practitioners and academics to investigate in order to improve their operations and remove losses caused by poor project risk management.

Keywords: *Analysis, Project Risk Management, Operation, Gas Company, Risk Handling*

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1 INTRODUCTION

The purpose of this study is to conduct a literature evaluation on hazards and risk management in the oil and gas industry. The oil and gas industry is generally project-based, with each job being heavily structured in such a way that a single operation may require a slew of little projects to ensure that the operation runs safely and efficiently. The success or completion of a number of small initiatives is crucial to the oil and gas industry's efficiency. According to [9], the ability of management to manage risky shifting conditions inside the project's framework determines the project's success. Furthermore, project managers often try to limit uncertainty and risk, but they frequently underestimate or exaggerate risks during the process [21].

2 LITERATUREREVIEW

2.1 Overview Oil and Gas Operations

Upstream and downstream activities are frequently separated in oil and gas operations. The most important and dangerous operations are usually centered on upstream activities. Below is a more complete breakdown of oil and gas activity.

2.1.1 Upstream and Downstream Activities in Oil and Gas Industry

Upstream activities are those that take place before hydrocarbons are processed and refined. These activities include exploration, conceptual development, and production [30].

Because of reservoir finding, production and operation, drilling and completion, upstream exploration and production often requires the most investment for new product development [13]. After oil has been extracted and transmitted to crude oil terminals, downstream activities take place. Crude processing and refining, petrochemical plants, logistics, and retail transactions make up the majority of the activities. Industrial plants, pipelines, and storage facilities are commonly used in downstream activities [13], [30]. The distinction between upstream and downstream in the oil and gas industry is depicted in the table below.

TABLE 1: Upstream And Downstream Activities In Oil & Gas Industry

Upstream Activities
1. **Exploration**: consists of analyzing and interpreting seismic data in order to estimate the potential of hydrocarbon deposits, as well as drilling test wells. **2. Conceptual Development**: Screening experiments are being conducted to determine the most efficient and cost-effective method of producing new hydrocarbon sources. Facility selection (floating or moored structures), hydrocarbon transport from field to customer (pipeline, floating stora techniques, and operational safety are all part of this. 3. **Development**: construction project management, thorough engineering, optimal well site, facility transport to location, and facility commissioning. 4. **Production**: Plans for maintenance, budgeting, supply and demand studies, and retrofit work to meet new production targets
Downstream Activities
1. Refining (gas processing and transmission) 2. Gas distribution 3. Retail 4. Petrochemicals

2.2 Risks

[35] defined risk as a condition that has the potential to cause losses or undermine a project's success.

In most circumstances, "risk" in a project refers to a potential issue that could affect cost, time, or technical success, as well as product quality and employee morale [14].

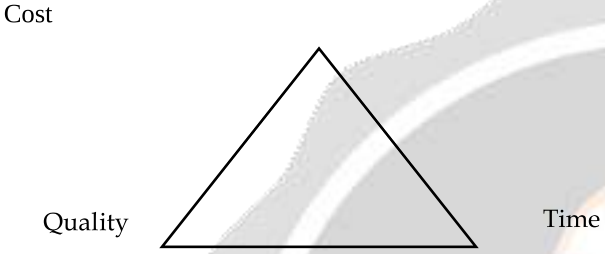
There are two forms of risk:'stake' and 'uncertainty.' When it comes to'stake,' it will be determined whether it will result in monetary gain or loss, whereas uncertainty is highly dependent on time and circumstance [15].

2.3 Risk Management

Risk management is a strategic business process in which management assesses whether the company's activities are in line with its stated strategic objectives, as well as how risk management is linked to investment and growth decisions [15]. The majority of risk management research has been on failure avoidance and understanding the causes and reasons for failures. Due to formal processes or procedures for authorizing every relevant project, risk management ensures project design reliability, as well as adding value by allowing for high performance, effective cost management, and meeting project deadlines [1], [31].

2.4 Project Management

Project management comprises activities such as project planning, implementation, and monitoring [21], [28]. According to [5,] in the 1950s, Oisen developed 'The Iron Triangle' (cost, quality, and time) for project management (see Figure 1), which was adopted by the British Standard for project management definition.



Source: [5] Figure 1: The Iron Triangle

Project management is defined as the planning, monitoring, and control of all aspects of a project, as well as the motivation of all those involved in it, to achieve the project objectives on time and within specified cost, quality, and performance, according to the British Standard for Project Management BS6079 11996 [5].

Furthermore, [5] advocated that the delivery stage (the procedure) and the post-delivery stage be included in the success criteria (systems and benefits). Table 2 shows the components of the square technique to determining success criteria.

TABLE 2: Square Route To Understanding Success Criteria

Iron Triangle	**The Information System**	**Benefits Organization**	**Benefits Stakeholder/ Community**
Cost Quality Time	Maintainability Reliability Validity Use of high-quality data	Increased productivity Increased efficiency Profits have increased. strategic objectives Waste was reduced as a result of organizational learning.	Satisfied user Social and \sEnvironmental input Contractor profits, professional learning Capital providers, the content project team, and the economic impact on the neighboring neighborhood are all factors to consider.

Source: [5]

2.5 Project Management Triangle

The project management triangle has received an appraisal of the project scope, cost, quality, and scheduling.

2.5.1 Project Scope

In a study conducted by [33], project scope was recognized as one of the factors for the largest obstacle under project description. Furthermore, a study of government ICT project failures [26] found that complexity/size was one of the factors contributing to project delay or failure.

2.5.2 Project Cost

The cost is used to assess whether the project will be finished on time and on budget. To ensure project success, [25] pushed for the use of earned readiness management (ERM) in project scheduling, monitoring, and evaluation. [7] created software for repetitive building projects with identical jobs using the Line of Balance Technique (LOB) in conjunction with the Program Evaluation and Review Technique (PERT) and the Recurrent Project Evaluation and Review Technique (RPERT). Furthermore, a study in Egypt on the factors that influence waste water construction cost variation or cost overrun found that cost variation is influenced by the lowest bidding procurement method, additional work, bidding or tendering method bureaucracy, incorrect cost estimation method, and funding issues. Inaccurate cost estimation, manner of payment and finance, unforeseen ground conditions, inflation, and variation in raw material costs are all variables that contribute to cost overruns [8].

2.5.3 Project Quality

To reduce project failures, designers and project managers must understand the causes of project failures, which could be due to poor project design, method, or external variables (users, environment) [29], [6], [31].

2.5.4 Project Scheduling

Project delays can be grouped into seven categories, according to a study conducted by [6,] consultants related factors, contractor related factors, design related factors, equipment related factors, external associated factors, labor related factors, and materials related concerns. [11] conducted another study on project scheduling, incorporating dynamic scheduling, which comprises a baseline schedule, risk analysis, and project control, as well as two additional components identified as project authenticity and tracking authenticity, using project cards.

Project management methodologies, according to [23], necessitate the use of software support systems; until the late 1980s, the majority of project management tools were software packages designed for project scheduling, such as PERT (Program evaluation and review technique), ADM (Arrow diagramming method), and PDM (Program diagramming method) (Precedence diagramming method). Those three pieces of software were capable of serving as the foundation for planning and forecasting, providing visibility and allowing management to control the program, assisting management in dealing with uncertainties, providing facts for decision-making, determining manpower, material, and capital requirements, and providing structure for information reporting. Project management, on the other hand, cannot be replaced by software packages, however it can be used as a guide for making decisions.

Furthermore, 95% of project management software focuses on planning, scheduling, and administering projects [23], therefore it should be designed for both project initiation and project conclusion.

Furthermore, in today's project management studies, the terms'soft' and 'hard' are widely used. 'Soft' usually refers to the human element, whereas 'hard' usually refers to technical performance and efficiency (Pollack, 2004). The 'soft' aspect of project management is clear because it often involves human behavior.

The 'hard' difficulties in project management, on the other hand, are difficult to generalize.

Table 3: Hard vs. Soft in Project Management

Hard	Soft
Hard end project: technical efficiency and performance [18] (in order to reduce ambiguity) (Systems Engineering, System Analysis, and System Dynamics are examples of closed system approaches.)	**Soft end project:** Relationships, culture, and purpose are valued goals [18]. (to eliminate uncertainty)
Hard Issues: Project success is measured in terms of time, money, and quality [16].	**Soft Issues:** Community perception, safety, environmental implications, legal acceptability, political, and social impact are all factors to consider [22].

Project failures, such as those caused by poor vendor or supplier selection at the expense of corporate profits, are costly to any business. In project management, there may be a mix of 'hard' and'soft' elements [8], [29].

2.5 Project Risk Management

In order to maximize project success, project risk management involves recognizing, assessing, and prioritizing risks through resource coordination and economic application in restricting, monitoring, and controlling the likely implications of unfavorable events. The five essential factors to consider in project risk management are planning hazards, risk identification, qualitative risk analysis, quantitative risk analysis, and risk monitoring [12],[32], [24].

2.6 Potential Risks in Oil and Gas Projects

2.6.1Reasons for Poor Project Results

According to [27], management problems in handling scope, time, cost, quality, productivity, tools, scaffold, equipment, materials, and leadership led to large oil and gas construction project cost overruns and worker productivity losses in Canada. Another study [19] identified 20 factors that could contribute to poor project outcomes, schedule delays, and cost overruns for Canadian oil sands projects, which are listed below:

1. Insufficient access to knowledgeable owners and contractors.
2. The owner's and contractor management's overall capacity.
3. Organizational and collaboration arrangements for megaprojects that are ineffective.
4. Inappropriate delegation of owner responsibilities to contractors.
5. The lines of authority and management responsibilities are not clearly defined.
6. Ineffective project scope control due to a lack of discipline.
7. The complexities of large-scale plant expansions.
8. Customization of the owner's specification requirements,
9. There is a lack of understanding of the project's level of definition and proximity.
10. A lack of understanding of the climate, safety requirements, environmental constraints, regulatory regulations, and construction procedures.
11. A scarcity of competent craftspeople, high labor costs, and inconsistency in output.
12. A large number of mega-projects are nearing completion, affecting labor and resource availability.
13. Contractual frameworks that are ineffective and a contracting environment that is profitable

14 Poor material management plans and hurried field deployment

15. Inappropriate managerial influence on cost predictions in order to meet financial objectives, as well as ignoring project reality.

16. Procedures for project management and development are insufficient.

17. Inadequate cost control and collection due to a lack of discipline and consistency in the application of the project code of accounts.

18. The owner's lack of front-end estimation expertise and project management personnel.

19. Insufficient risk analysis knowledge.

20. The owner's lack of previous project systems and information on the project's location and circumstances.

2.6.2 Possible Sources for Uncertainty

According to [10], there are several potential sources of uncertainty in the oil and gas industry:

1. Time and cost forecasts that are inaccurate.
2. There isn't a clear definition of the project's requirements.
3. Management process guidelines that are ambiguous.
4. A lack of understanding of the number and types of factors that affect the project.
5. A lack of awareness of how project activities are intertwined.
6. Unexpected events in the project's surroundings.
7. The design and logistics of the project are subject to change.
8. Modifications to the project's scope
9. Priorities and objectives are moving in unexpected directions.

2.6.3 Potential Risks

Table 4 shows the potential dangers for oil and gas activities in Canada and other northern nations, which are related to the environment or weather, both of which are beyond human control [3]. However, such hazards can be mitigated by using a mitigation strategy.

TABLE 4: Potential Risks in Oil & Gas Projects

Potential Risk	Items
Exploration	1. Subsidence. 2. Wave loading. 3. Loss of surface water access. 4. Delays due to species migration.
Production	Early season delays. Pad damage. Loss of surface water access. Production interruption. Ice road decreased trader’s travels.
Transport and terminals	1. Ice load variation. 2. Damage to coastal facilities. 3. Shipment interruptions. 4. Improved for reduced shipping lanes or seasons.
Pipelines	1. Thaw subsidence and frost jacking. 2. Wildfires.
Refining and processes	1. Loss of access of water. 2. Flooding. 3. Loss of peak cooling capacity.

Neighboring communities	1. Loss of species and habitat. 2. Water. 3. Storm impacts on key infrastructures.

3. DISCUSSION

3.1Methods to Avoid Project Failures

A few approaches that can be used to avoid project failures include Failure Mode and Effect Analysis (FMEA) for bottom-up analysis and Hazard and Operability Analysis (HAZAOP) and What if checklist for top-down analysis [31]. Fault Tree Analysis (FTA) for top down analysis and Failure Mode and Effect Analysis (FMEA) for bottom up analysis are two methodologies that can be used to minimize failures when designing a product or project, according to [31]. To limit or decrease failure causes, hazard and operability analysis (HAZOP) and a What if checklist are also necessary. The new TRIZ method, on the other hand, encourages users to be significantly more proactive in identifying the causes of problems, allowing them to 'make the failure' and then re-transform the created failure into a method of preventing future failures.

[7] To construct software for recurring building projects with identical tasks, the Line of Balance Technique (LOB) was combined with the Program Evaluation and Review Technique (PERT) and the Recurrent Project Evaluation and Review Technique (RPERT). Furthermore, an investigation into the factors that contribute to waste water construction cost variation or cost overrun in Egypt found that cost variation is influenced by the lowest bidding procurement method, additional work, bid-ding or tendering method bureaucracy, incorrect cost estimation method, and funding issues. Inaccurate cost estimates, payment and financing methods, and unanticipated charges are all elements that contribute to cost overruns.

A study on ballast water treatment looks at the holistic assessment, which includes the environment (manufacturing, operation, and end of life), social elements (workers, users, local community, and society), exposure assessment, and consequences assessment to remove project failures [34].

3.2 Theories Related to Project Risk Management

According to [2, the Resource Based View or Resource Based Theory got its beginnings in economics, but it's currently used in management, sociology, information management, and knowledge management. They received 73.8 percent in the field of general management and strategy from 1992 to 1994, and 57.7 percent from 1998 to 2000, according to their evaluations based on a compilation of multiple literatures on Resource Based Theory. It has transitioned from economic to management areas such as marketing, organizational studies, manufacturing operations, and management, according to the most recent theory evaluations [2].

Apart from that, resource-based theory focuses on: 1. performance differences between firms that are highly dependent on the measure of whether the firm owns unique inputs and capabilities, 2. the level of resources, whether at the reputation level or dealer loyalty, and 3. the level of resources, whether at the reputation level or dealer loyalty, according to [17]. 3. Acceptable proxy for business resources (R&D capabilities or management preferences), and 4. A new theoretical approach to the IO game (3 forces: 1. Own assets, 2. Competitors assets, 3. Constraints from broader industry and public policy environment).

Furthermore, [4] states that the Resources - based View is a strategic management theory that project managers have used extensively. It's utilized to figure out how resources might help a company obtain a competitive advantage by providing more value to customers while also generating a higher return on investment. According to [24], project management is akin to a transitory organization. They concluded that 'activity' is not always the outcome of a decision, and that a decision may be formed after the action to explain the earlier action based on their findings. In some circumstances, action may take precedence over choice when 1. time is of the essence, 2. the task, 3. the team, and 4. the transition [24].

[32] Investigated how to use integrated reliability theory to Logistics Park building project risk control in order to avoid risk and maximize project dependability while spending the least amount of money possible. Function orientation, location, and investment decision are the elements identified at the choice stage. Land acquisition, survey and design, tendering and bidding, as well as funding and preparation, are all important risk factors in the construction process. The factors highlighted during the construction phase are construction, facility installation and commissioning, contract management, equipment and material management, security management, and supervision.

The third phase, which is the handout and operation, included acceptance and handover, merchant and operation management.

Both of these concepts have a lot of potential in project risk management.

4. IMPLICATIONS

4.1 Industry

Controllable vs. non-controllable risk, or hard risk vs. soft risk, are two types of risk identified by the oil and gas industry. To minimize as many risks as feasible, potential mitigation methods could be started by clustering particular hazards or difficulties.

4.2 Future Research

More extensive theories, models, and management procedures should be used or approved because of the complicated hazards factor and business nature of oil and gas research. As a result, more contributions to the industry in terms of increasing efficiency, enhancing quality, and reducing cost and time could be made.

5. CONCLUSION

As a result, this analysis covers risk considerations for Oil and Gas projects. Project risk management has yet to be thoroughly explored, and little study has been conducted in the Oil and Gas Sector; as a result, this analysis includes risk concerns for Oil and Gas projects.

Furthermore, project risk management allows for the identification, assessment, and prioritization of risks through resource coordination and economic application in limiting, monitoring, and managing the likely effects of unfavorable events, resulting in project success.

ACKNOWLEDGEMENT

This work is financially supported by Engr. Nnadikwe Johnson, trust under Ikputu Woyengikuro. We are grateful for this assistance. The technical and administrative backup given by the Society of Petroleum Engineers (SPE), Nigeria Gas Association (NGA), and Department of Petroleum and Gas Engineering, Imo State University, Owerri, is highly valuable and appreciated.

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