

Midocean University

Faculty of Management

Bachelor of Project Management



The Impact of Optimization on Reducing Construction Costs In The Oil And Gas Sector In Dhahran, Saudi Arabia: A Case Study of Saudi Aramco's Projects

**Haitham Al-Haj
2021202510**

Graduation Project – 1

Faculty of Management - Midocean University

Supervisor

Dr. Mona Moustafa Elashry

Faculty member- Faculty of management- Midocean University

1st Semester- 2024

Table of Contents:

Acknowledgement	3
Dedication	4
1 Abstract	5
2 Introduction	5
3 Research Problem	6
3.1 Theoretical Gaps	6
3.2 Empirical Gaps	6
4 Research Significant	7
4.1 Theoretical Significant	7
4.2 Empirical Significant	7
5 Main Research Question	7
6 References & Appendices	8

Acknowledgement

I would like to express my gratitude and thanks to Almighty Allah, the most Gracious and the most Merciful. I also extend peace and mercy to His Prophet. I am deeply grateful to Midocean University for providing me with an exceptional environment to learn and grow, and to Saudi Aramco for supporting my research. I owe a debt of gratitude to my advisor, Dr. Mona Elashry, who has been a constant source of support and guidance throughout my research project. Her patience, knowledge, and encouragement have been invaluable, and without her, this research would not have been possible. Finally, I would like to thank my family for their unwavering support and encouragement. Their love and words of encouragement have been a source of strength and motivation for me.

Dedication

I dedicate this research to my late father, my mother, and my true friends.

1 Abstract

Completion of well technology is one of the most important steps in oil and gas well production. Saudi Aramco has given significant attention to this field development scheme. Initially, directional drilling tools are used to drill the well and build the necessary curve to land on the right reservoir, where oil or gas is the main production component. During this process, while running the completion assembly, an additional step is taken to check that the tubular is free of damage to avoid any issues, which could fail the whole project and result in paying additional tangible and intangible costs, which could be avoided.

2 Introduction

Generally, well construction involves a series of operations that are directed by the lease operator, who employs the drilling contractor and third-party equipment and personnel. The process of estimating and analyzing the overall cost of drilling presents new challenges and responsibilities for industry professionals. Furthermore, achieving cost-effective drilling is a key objective for the industry as it is essential for successful and sustainable drilling. By definition, sustainability includes cost as a critical factor (Agbon, 2002).

The oil industry has significantly increased worldwide drilling activities in response to the growing global demand for hydrocarbon. However, the addition of new and advanced equipment, tools, and technologies in drilling a well has led to higher costs. On the other hand, these facilities have reduced drilling time, which has contributed to lower drilling costs. Consequently, the drilling industry is faced with a cost analysis dilemma (Dupriest, 2006).

Cost-effective drilling is a significant concern for the drilling industry to achieve success and sustainability. Sustainability encompasses cost as one of its parameters. However, the current energy management sector is facing significant challenges due to the lack of proper training in managing financial sustainability. This has led to immense frustration in the industry (Oag. & Williams, 2000).

The energy management sector is facing a major problem due to the lack of appropriate training in handling financial sustainability. Despite numerous solutions being proposed, it is becoming increasingly evident that these options are not leading to a sustainable state in our drilling environment. This has caused significant frustration among stakeholders (Hossain & Al-Majed, 2015).

The main challenge was to implement the preferred optimization solution without a global track record. Additionally, we needed a full agreement from Aramco to trial test our new solution on their active projects, without incurring any additional costs or failures during the trial phase.

This research aims to analyze the impact of optimization on reducing the cost of constructing wells in the oil and gas industry. It will provide a real-life example of full implementation in wells completed for Saudi Aramco, both onshore and offshore fields.

3 Research Problem

While constructing the well, not doing the job right the first time can increase costs, which might end up suspending the whole project as it exceeds the original planned and estimated project costs and timeline. The research problem will address theoretical and empirical gaps.

3.1 Theoretical Gaps

The lack of understanding of the importance of fully applying optimization in drilling and completion projects on both types of projects for oil and gas resulted in blindly repeating the same process and making the same mistakes while not considering any other solution that could reduce the risk and faults of resolving the main issue, which is the integrity of the casing or tubular, while doing conventional drift operations.

3.2 Empirical Gaps

The shortage of research shows the time and cost savings of applying new techniques to consider and recognize operational problems without waiting to run the checkout equipment at the end of the job, which can result in double the cost of the whole project once repeated due to the late discovery of problems in casing or tubulars, and which can affect the next phase of drilling or completion for the same project.

4 Research Significant

The importance of the theoretical and empirical aspects of this research is to close the gaps as well as improve the use of optimization in drilling and completion projects in both the oil and gas industries.

This search aims to conclude the following:

4.1 Theoretical Significant

This research will result in the development of a new operational plan and procedure that will help to improve the total process of doing the planned jobs and applications for Saudi Aramco by helping to identify any bad joints in either casing or tubulars before it is too late by applying an immediate inspection to all the joints without interrupting the normal operations of running in holes.

4.2 Empirical Significant

By applying a single example of optimization, the drilling and completion operations can run smoothly while meeting both the cost and timelines of the oil and gas drilling program, which results in significant time and cost savings by discovering any problems ahead of time and with no additional risk at all. Additionally, to complete all the needed and planned steps in a total health- and safety-risk-free working environment.

5 Main Research Question

Based on all the above, this research will answer the below question:

“How can we reduce the cost of well construction for both oil and gas projects by implementing an optimization technique that can discover any problem at the early stage while ensuring successful operation without additional risk or cost beyond budget?”

6 References & Appendices

1. I.S. Agbon, Project Economics and Permissible Environmental Cost, SPE 73965, paper presented at the *SPE International Conference on Health, Safety and Environment in Oil and Gas Exploration and Production*, Kuala Lumpur, Malaysia, March 20–22, (2002).
2. J.C. Cunha, Effective prevention and mitigation of drilling problems, *World Oil & Gas Technologies*, **2**, 28–34 (September, 2002).
3. F.E. Dupriest, Comprehensive Drill-Rate Management Process to Maximize Rate of Penetration, Paper SPE 102210, presented at the *SPE Annual Technical Conference and Exhibition*, San Antonio, Texas, 24–27 September DOI: 10.2118/102210-MS. (2006).
4. M.E. Hossain, and A.A. Al-Majed, *Fundamentals of Sustainable Drilling Engineering*, p.786, Wiley and Scrivener Publishing Company, Austin, TX 78702. (2015).
5. A.W. Oag, and M. Williams, The Directional Difficulty Index—A New Approach to Performance Benchmarking, Paper SPE 59196, presented at the *IADC/SPE Drilling Conference*, New Orleans, pp. 23–25 February. DOI: 10.2118/59196-MS, (2000).