

CHANGE ORDER CAUSES AND CONTROL IN THE  
OIL AND GAS CONSTRUCTION PROJECTS

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*Specially Dedicated to*

*My beloved parents,*

*“For your unconditional love through the years”*

*My dearest siblings*

*“Thank you for being in my life”*

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## ABSTRACT

Despite of many articles and many discussions in practice and academic literature, there is limited information about change order in the Oil and Gas Projects. This study means to evaluate the change order causes in the Oil and Gas Projects. Study relatively will investigate proper methods and strategies to treat this problem to prevent and mitigate its consequences. Besides, proceeding on evaluating the status of the existing change management system and change order clause in the oil and gas construction contracts of Iran and Malaysia. Data gathering carried out by doing literature review, applying a questionnaire survey and making related interviews through contractor, client and consultants company's experts. According to the study three main categories of causes have been identified namely 1) design related causes 2) construction related causes and 3) poor administration related causes. Also, few change controlling strategies have been determined including detailing in design, clear project brief, contractor efficiency and keeping systematic site records.

## ABSTRAK

Banyak artikel dan perbincangan telah dibuat secara praktis mahupun akademik tetapi topik yang berkaitan perubahan kerja dalam projek carigali minyak masih sedikit dan terhad. Maka, kajian ini telah dijalankan bertujuan untuk menilai punca-punca yang menyebabkan perubahan kerja berlaku dalam projek carigali minyak. Kajian ini turut mengkaji kaedah-kaedah yang bersesuaian dan strategi-strategi bagi menghalang masalah ini daripada berlaku dan bagi mengatasi akibat daripada perubahan kerja yang timbul. Selain itu, kajian ini dilakukan bagi membuat penilaian terhadap sistem pengurusan dan klausa berkenaan perubahan kerja yang tersedia ada, meliputi kontrak pembinaan carigali minyak di Iran dan Malaysia. Pengumpulan data bagi kajian ini telah dibuat merangkumi pembacaan kajian literatur, soalselidik dan temubual yang berkaitan dengan mereka yang mahir termasuk syarikat kontraktor, klien dan konsultan. Berdasarkan hasil kajian, terdapat tiga kategori utama yang telah berjaya dikenalpasti bagi punca penyebab perubahan kerja iaitu; 1) punca berkaitan rekabentuk; 2) punca berkaitan pembinaan; dan 3) punca berkaitan pentadbiran yang lemah. Di akhir kajian, beberapa perubahan dalam strategi kawalan perubahan kerja telah dikenalpasti termasuk perincian dalam rekabentuk, penerangan projek yang jelas, kecekapan kontraktor dan rekod yang sistematik di tapak.

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**LIST OF ABBREVIATIONS**

<b>CII</b>	Construction Industry Institute
<b>CMS</b>	Change Management System
<b>DCC</b>	Defense Construction Canada's
<b>JMC</b>	Joint Management Committee
<b>MCAA</b>	Mechanical Contractors Association of America
<b>NIOC</b>	National Iranian Oil Company
<b>PEDEC</b>	Petroleum Engineering and Development Company
<b>PMBOK</b>	Project Management Body Of Knowledge

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## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Background**

Almost every project during its lifecycle encounters with evitable or inevitable changes that makes some deviations to the defined scope of work. This consequently makes relevant increase or decrease in cost and time of the project. In fact changes happen due to the uniqueness of each project and limited resources of time and money available for planning. Change order is a formal change to the contract that authorizes the contractor to execute defined changes and these are often the source of project disputes.

O'Leary (2008) categories some of the changes originated with the owner who finds that the scope of the project must be modified to reflect changes in the project's ultimate use or for important reasons. Also, owners are entitled to change their minds. Other changes are caused by the necessity of correcting errors in the contract documents or to comply with evolving code requirements. Sometimes specified materials or equipment are unavailable at the time of purchase.

Hester (1991) describes several consequences of change orders such as breaking of project momentum, increased overhead and equipment costs, scheduling conflicts, rework, and decreased labor efficiency. Some of these consequences can be relatively easy to measure while others are more difficult to quantify. Changes are not often immediately well defined, but time has to be taken by the project team to consider the full definition of the changes. Managing change is considered an integral part of project management.

Among others, mega projects including oil and gas projects are considerably important and strategic in countries development plans. So, need an accurate and strong control plan to keep their progress within the well established schedule and budget and minimize the risk of changes.

According to the parliament's report of 2007 (<http://parliament.jeffooi.com>), 11 mega projects were defined for Malaysia where the first of them was trans-peninsular oil pipeline with RM25 billion (US \$7.5 billion) over 8 years. In Iran at present, there are many mega projects in oil and gas industry such as Azadegan oil field development with 260000 barrel of oil per day that planned for 8 years execution and about US\$ 3 billion for the first phase of the development (<http://www.pedec.ir/>).

The figures show how a systematic change management system is crucial and critical for mega projects, since just a small deviation can make a huge and substantial adjustment to the contract duration and costs.

Simply put, the changes in a project become a major source of additional work, extra cost, extended time and eventually could result in claims. The old saying, "watch your pennies and the dollars will follow" might be modified in this context as "watch your change orders and the claims won't follow." So, for having a project to continue properly and successfully, it is critical to focus on change orders and claims.



## 1.2 Problem Statement

Change order is undoubtedly one of the major obstacles in projects fine and satisfactory execution. There are many factors that contribute to the changes so different strategies and treatments are expected for managing the issue. In this regard, there have been relevant studies about change orders in construction contracts but, there are rarely performed studies in oil and gas industry so, there is not enough data available about the extent and effects of change order on smooth and successful execution in this area.

Although in the oil and gas contracts, construction phase contributes as one of the most considerable parts but there are different and specialized activities that make this part of the industry particular so, required making independent and comprehensive studies related to change order in this industry.

On the other hand, since there has been limited studies on the change order risk in the oil and gas industry then there is not an in depth knowledge about this issue in this area and not many professionals are expected to be familiar with that. Therefore, it is expected for getting data in this regard, not many sources would be available.

This study means to evaluate the change order issue in oil and gas industry and investigate proper methods and strategies to treat this risk to mitigate its consequences. Also it proceeds on adequacy of change order clause in oil and gas contracts.

### **1.3 Aim and Objectives of the Study**

The aim of the study is to analyze the change order issue in oil and gas construction projects. It will be done by understanding current methods that are practiced for dealing with this problem and examining the suitability of the current change order clause in oil and gas contracts and finally, methods related to more effective change order control will be suggested. Therefore, In order to achieve the aim the following objectives have been set.

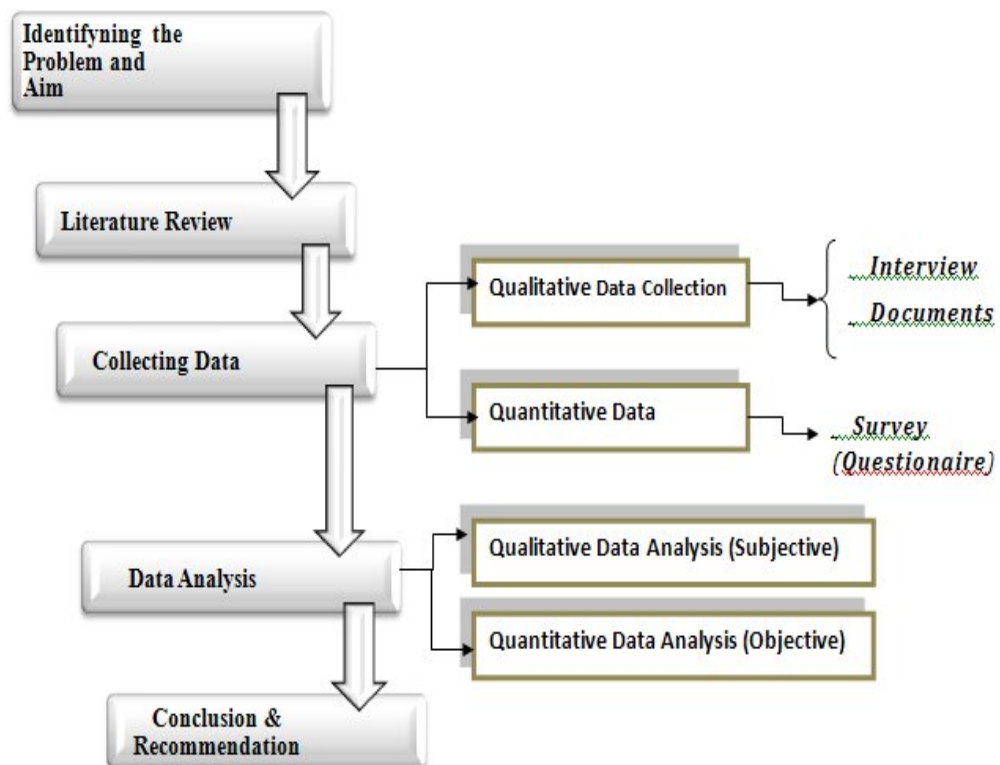
1. To study the main causes of change order in the oil and gas constructions projects of Iran and Malaysia.
2. To identify strategies to treat and minimize change orders in the oil and gas construction projects of Iran and Malaysia.
3. To evaluate the status of the existing change management system and change management clause in the oil and gas construction contracts of Iran and Malaysia.

### **1.4 Scope of the study**

1. This study is focusing on collecting data and information on change order from the client, contractor and consultant companies that are active oil and gas companies in Malaysia and Iran.
2. The interview and questionnaire will be done through professionals who are experienced and knowledgeable about change order issue in projects execution.

## 1.5 Brief Research Methodology

According to Figure 1.1 the first step of this research commenced with problem identification which done through unstructured interview and brief literature reading. Upon obtaining the identified problem, thorough literature review were conducted to provide in depth understanding on the issues of change order, focusing on the adequacy of the change order clause and also related cause and effects in oil and gas industry. The literature includes books, dissertations, magazines, journals, newspapers readings and seminar notes. Apart from the literature review, the study also will be conducted using questionnaire surveys. The objective of the survey is to obtain more extensive coverage of the scenario on the issue of change order and claims made by contractors on extra works caused by change order. Next step would be checking and analysis of the data which is the main component of the research. Finally from the data analysis acquired conclusion and recommendation will be made.



**Figure.1.1:** Flowchart of Brief Research Methodology

## 1.6 Structure of Study

The dissertation is divided into 7 Chapters.

- The first chapter discusses on the problem statement, objectives and scope of the study, and brief research methodology adopted to fulfill the objectives of the study.
- Chapter 2 deals with the literature review. The issues of change order, its causes and the effects in oil and gas industry also it deals with evaluating the change order clause in the current oil and gas construction contracts and change management system application in construction projects.
- Chapter 3 describes in detail the research methodology adopted for the study and the approach to the questionnaire design will be explained.
- The analysis and findings of questionnaire surveys will be discussed in Chapter 4.
- Chapter 5 deals with the analysis and findings of interviews.
- Chapter 7 concludes the study and makes recommendations for future researches related to change order issue and change management system in the oil and gas projects.

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