FACTORS INFLUENCING TIMELY COMPLETION OF CONSTRUCTION PROJECTS IN THE OIL INDUSTRY IN THE UNITED ARAB EMIRATES- AN EXPLORATORY STUDY

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ABSTRACT

Purpose: Since discovering oil in the United Arab Emirates (UAE), the critical oil-producing and exporting companies have been operating their project activities within the Abu Dhabi Emirate territory. These companies invest in construction projects as an integral infrastructure part of oil production and processing industries. The author is associated with a company with several factors causing delays in its construction projects. However, we determined five factors that commonly cause these delays to analyse their influence on the projected timeline of the construction projects in the oil industries and their potential consequences. A broad review of the relevant research literature helped formulate the research questions and hypotheses.

Design/Methodology/Approach: Quantitative data were collected using an online questionnaire based on Monkey-Survey. The survey sample consisted of construction project managers who shared information about the negative consequences of the five factors reported as causing delays associated with construction projects in the oil industry.

As a result, the quantitative data analysis included 258 completed and usable questionnaires (34.4%) using SPSS. The analysed data

aimed to validate the proposed research framework for providing relevant practical solutions to avert the consequences of the five selected delay-causing factors. The methodology used to conduct this research is based on descriptive and inferential statistical techniques. Percentages, averages, and standard deviations are used to explain the characteristics and the demographic profile of the participants in the study. Correlation and regression analysis are used to validate the hypotheses of the researcher.

Findings and Discussion

The inferential statistical analysis revealed that only two independent variables, i.e., resources allocation, and contractor's performance variables, were included within the fitted model developed through the multiple regression modeling. The other three variables under investigation, i.e., project planning, project monitoring, and project leadership were not significant and should be excluded from the regression model as the P-values of these variables were more than 0.05. Hence, the resources allocation and contractor's performance play a good job in predicting the timely project completion. The findings of the correlation analysis imply

that resource allocation and contractor's performance have the strongest and most positive implications on a timely project completion. While the other factors having weaker positive relationships with the timely project completion.

Research Limitations/Implications: Limitations faced in this research study were related to geographical coverage, case study, and adoption of research methodology and data analysis. The theoretical implications for project leaders are providing relevant guidelines and strategies that can be considered to meet project execution challenges.

Originality/Contributions/Value: Investigation on identifying the factors causing a delay in timely construction projects in oil and gas industries is the first scholarly research conducted in the UAE context and rarely in the oil-producing countries. The generated findings from this study could be a reference to support the successful execution of construction projects in the oil and gas industry with minimal delays across other oil-producing states in the Gulf region.

Keywords: Oil and Gas Industry, Construction Project, Timely Completion, Contractors Performance, Delay-causing Factors, Delay Consequences, Abu Dhabi Emirate, United Arab Emirates.

DECLARATION OF ORIGINAL CONTENT

I, Mohammed Saif Hamad Al-Kaabi, declare that, except where noted and credited, the content of this dissertation is my research work. I further declare that this dissertation was created by the regulations and guidelines of Aberystwyth University. No part of the dissertation has been submitted as part of any other academic award. The dissertation has not been presented to any other educational institution in the United Kingdom or overseas. Any views and opinions expressed in this dissertation are those of the researcher himself and in no way represent those of Aberystwyth University.

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ABBREVIATIONS

ADMA	Abu Dhabi Marine Areas
ADNOC	Abu Dhabi National Oil Company
ADPC	Abu Dhabi Petroleum Company
CP	Contractors' Performance
GCC	The Gulf Cooperation Council
GDP	Gross Domestic Production
KMO	Kaiser-Meyer-Olkin
MRA	Multiple Regression Analysis
OPEC	Oil-Producing and Exporting Country
PL	Project Leadership
PMBOK	Project Management
PM	Project Monitoring
PP	Project Planning
RA	Resources Allocation
SPSS	Statistical Package for Social Science
TPC	Timely Project Completion
UAE	United Arab Emirates
UK	United Kingdom
USA	United States of America
ZADCO	Zakum Development Company

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CHAPTER 1: INTRODUCTION

1.1 Overview

This chapter sets about a background to the research, with a brief overview of the construction and oil and gas industry. The research problem is introduced and the need for the current study is emphasised. This is followed by the main aims and objectives of the study. The contextual impact of this study is supported by the United Arab Emirates (UAE) being among the world's top 10 oil producers and is a member of the Organization of the Petroleum Exporting Countries (OPEC) and the Gas Exporting Countries Forum (GECF) according to the U.S. Energy Information Administration (EIA) Report entitled "Country Analysis Brief: United Arab Emirates "published on March 27, 2017 (EIA, 2013).

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1.1.1 Background and Context

Global energy production and energy markets consist of renewable sources (e.g., river water, solar, wind, and biomass), nuclear power plants, and natural hydrocarbon resources (e.g., oil, gas, and coal). Hydrocarbons are the energy resources of economic importance and account for a high percentage of the gross domestic production (GDP) of many oil-producing and exporting countries (OPEC), especially in the Arab world. In this context, the United Arab Emirates (UAE) economy is so far dependent on oil. However, the contribution of non-oil sectors in the UAE has been steadily growing due to the recently imposed strategy of economic diversity as proposed in the UAE Vision 2030. Such undesirable dependence on petroleum resources is associated with several potential risks and negative consequences, such as instability in the global petroleum market and regional tensions, as well as impacts

of economic conditions on petroleum consumption, e.g., the decline in gross national production, and more recently the consequences of the Covid 19 pandemic.

The main oil-producing and exporting companies in the UAE have been operating in the territory of the Emirate of Abu Dhabi since the discovery of oil in the 1950s, both in terms of area and oil production. Therefore, the Emirate of Abu Dhabi accounts for 87% of the territory of the UAE and has 80% of the total oil proven reserves of the federation, representing 94% of oil production and 93% of gas reserves (Hvidt, 2018). In this context, the Emirate of Abu Dhabi is considered to have the seventh-largest proven oil reserves in the world and plays a crucial role in maintaining the stability of the global oil market (Shqairat & Sundarakani, 2018). Therefore, the national and cooperating oil companies in the UAE contribute significantly to the GNP and also promote other industries related to oil production, especially construction projects as an integral part of the infrastructure.

Globally, construction projects have witnessed leading structural improvements due to the incorporation of advanced technological tools and new business models into project execution and timely delivery. Consequently, projects have gained significant economic importance in the business domain with different organisational structures. Thus, the advent of new management technology, implementation methods, organisational restructuring, and market competition with similar products represents potential challenges to project-driven organisations whose core business components are project-related activities (Al Ameri, 2016).

The execution of construction projects becomes more complex over time, as many partners are involved in the execution. Existing academic literature on construction projects in the oil production industry reports that many indigenous and exogenous

factors play a negative role and cause delays in the completion of the construction project within the schedule. However, the main common challenge in project completion is several factors that cause poor performance at different stages of the execution schedule, i.e., from initial design to final delivery (Shqairat & Sundarakani, 2018). Al Sabah (2016) has extracted 1056 factors from relevant academic works that cause certain types of delays in the proposed project execution schedule. In contrast, Anantatmula (2010) found that people-related factors affect project performance, i.e., the execution schedule could be disrupted if the partners do not work together harmoniously.

In this context, oil companies place great emphasis on the sound execution of construction projects to minimise unforeseen risks or avoid poor performance. This situation has triggered many scientific and technical studies that seek to identify the causal factors that lead to disruption in the completion of the project and determine better ways to control these disruption factors for future construction projects in the oil and gas industry. Jernigan (2014) argued that robust improvement for successful and timely completion of construction projects would be possible if success enhancing factors are observed with the various management tools to rethink the adoption of innovative strategies to improve project partner collaboration and problem-solving approaches and discard old methods that are no longer helpful.

Oil producers consider the related construction projects as a fundamental part of strengthening their competition in the market. Thus, despite their association with different industries, construction projects face similar challenges. Several challenges have been considered as delay-triggering factors affecting the timelines for the proposed design, execution, implementation, and timely completion of oil-related

construction projects. As a result, there is a growing awareness of the need to pay more attention to these challenges, which in turn has raised several thorny issues related to avoiding project failure by finding appropriate solutions.

The USA Project Management Institute (PMI) defines the *project* as "a temporary-created activity, which purposely undertaken to produce a unique product, service, or result", and *project management* as "the application of appropriate knowledge, skills, tools, and techniques to various project-related activities to meet the requirements of the project execution and implementation.*"* (PMI, 2013; Heagney, 2016).

The oil industry is one of the most important sources of revenue for the UAE economy, with which many large infrastructure industries, especially construction projects, are associated. Therefore, construction projects in the oil industry play a critical role in efficiently supporting oil production, processing, and export. Accordingly, these oil industry-related construction projects have witnessed unprecedented development over the past three decades and have occupied a significant share of oil industry investment. Nevertheless, such delays have immense negative consequences from economic, financial, and engineering perspectives. This dissertation focuses on investigating the negative impact of certain selected factors that lead to delays in the timely completion of construction projects in the context the of Abu Dhabi oil industry.

1.1.2 Delay-Causing Factors- Operational Definition

Orangi et al. (2011) defined some delay-causing factors to disturb the timely completion of a construction project in the oil and gas industry; among these are the chain of the project plan and design, inefficient contract, poor communication between project stakeholders, procurement delay, and the like. In contrast, Walker

(2015) defined project delays in the context of project execution as plan and planning failure, improper resource allocation, unqualified contractor, weak project supervision, or project leadership that can lead to failure of meeting standards or reaching the set target on time or time and cost overrun.

In the infrastructure business, projects have become widely used organisational structures. Therefore, the emergence of new management technologies, implementation methods, organisational restructuring, and competition with similar products in the market pose potential challenges for project-oriented organisations whose core business is project-related activities (Al Ameri, 2016). In project construction associated with the oil industry, inefficiencies built into the project execution plan are considered one of the highest costs affecting project completion, ahead of the cost of construction materials such as steel and concrete, and the cost of labour and the skills of project management teams **(**Al Subaih, 2016).

The author of this dissertation has accumulated a sufficient professional experience in the field of the UAE-based oil industry to enable him to observe and identify the most common and frequent factors causing typical delays interrupting the processes of the timely completion of construction projects. The identified delay-causing factors from the observations and field records are i) project plan and planning, ii) resources allocation, iii) contractor performance, iv) project monitoring, and v) project leadership styles. Moreover, the technical definition of the observed factors had been tackled by many authors with different perspectives and construction project contexts. Thus, the definitions of the selected factors are supported by relevant literature, including, first of all, Project Planning, which according to the studies of Burke (2013) is defined as "*a procedural step of project management*

where certain activities such as looking ahead and development of objectives, schedule, programmes, budget for the project and its procedure, which help in the successful project completion," second of all, resource allocation, kosta et al. (2012) described it as "a process that involves allocating as well as planning available resources in an optimal, economical, and effective manner." However, resource scarcity puts pressure on the project planners to make allocation as efficient as possible. Similarly, Hwang and Ng (2013) define that resource allocation helps to select the best available resources for the project through the best management of these resources throughout the project lifespan. Third of all, Contractor's Performance, around the world, the construction industry has proposed prequalification criteria to be used in selecting competent contractors. These criteria are being modified in response to the introduction of new technologies in the construction industry. Thus, "*the contractor's performance will be demonstrated based on his management skills, technical skills, risk assessment experience, financial performance, and occupational safety and health experience*" (Deep et al., 2017). Fourth of all, Project Monitoring, Aliverdi, Naeni, and Salehipour (2013) defined project monitoring as "*a process of capturing all project-related statistics and metrics, including team performance and task duration, analysing potential problems, and taking corrective actions to ensure that the project's budget and scope meet the established deadline*." Similarly, Genersch et al. (2010) stated that monitoring the project is "*the action the team leader takes to ensure that the standard deliverable matches the actual project deliverables*". Thus, the project manager wants to ensure that the construction project plan for the oil industry is successfully implemented and that the challenges that arise during completion are adequately addressed. Last but not least, Project Leadership, Shenhar (2015) defined

project leadership as "*the act of leading a project management team effectively for accomplishing the project*". A project leader requires both leadership and management skills for the effective completion of the project. Bull (2010) further defined project leadership in the context of project organisation and its competence in terms of project control.

1.2 Research Issues

~~In this research study, the nominated delay-causing factors are employed as research variables of potential effects on the timely completion of construction projects.~~

This research study focuses on the potential effects on the timely completion of construction projects. The nominated delay-causing factors are employed as research variables of the effect mentioned.

1.2.1 Statement of the Research Problem

The size, scope, and length of completion of construction projects in the petroleum industry range greatly, from small units to megaprojects. The nature and purpose of each project varies, though, and they all involve a variety of tasks like building pipelines, power plants, and pumping stations. Despite being different in nature and type, they have some things in common: Each project is short-lived, has distinct deliverables and incremental elaboration, and is plagued by several delays. Oil and gas companies have learned from previous projects to better deal with the factors that occur at different stages and cause delays in the execution of construction projects by emphasizing the technical lessons.

In this dissertation, the research problem is defined as "discussing the relationship between the nature of construction projects and the occurrence of the selected factors reported to cause undesirable delays in construction projects in the UAE oil

industry." These factors typically arise during project execution, whether from internal or external sources, disrupting their schedule and leading to annoyance delays in project completion. Therefore, going over the projected project schedule increases the likelihood of cost growth, negative financial effects, and a subsequent decline in stakeholder confidence.

1.2.2 Research Aim

This study aims to critically evaluate the potential role of the factors leading to delays in the timely completion of construction projects in the context of the Abu Dhabi oil and gas industry. The identified factors were used in the development of a functional conceptual framework to help project stakeholders make the right decisions at different stages of project implementation.

1.2.3 Research Questions (RQ)

In all industries most projects are assumed to be completed on time. However, it is quite common that Oil and Gas projects are subject to delay in the completion date. The focus in our study is on those projects that do face these delays; therefore, this study proposes three research questions to guide the successive steps of the investigation, methodology, data collection, analysis and interpretation of the factors causing the delay in the UAE Oil Industry.

RQ1: *What role does each of the selected factors play in delaying the planned completion of the oil construction project*?

RQ2: *Which of the selected factors contributes most to delays in construction projects in the oil industry?*?

RQ3: *What framework should be used to prevent delays in oil construction projects*?

1.2.4 Research Objectives (RO)

The following objectives represent the dissertation's central focus, based on its research problem:

RO1: State the potential impact of factors selected that may cause construction project delays in the oil industry.

RO2: Determine which factors are the most likely causes of construction project delays in the oil industry.

RO3: Create a conceptual framework to improve the efficiency and potential application in managing the execution of oil construction projects successfully.

Table 1: Meeting Research Questions with Addressed Research Objectives

Proposed Research Questions		**Addressed Research Objectives**	
RQ1	*What role does each of the selected factors play in delaying the planned completion of the oil construction project?*	**RO1**	State the potential impact of factors selected that may cause construction project delays in the oil industry
RQ2	*Which of the selected factors contributes most to delays in construction projects in the oil industry?*	**RO2**	Determine which factors are the most likely causes of construction project delays in the oil industry
RQ3	*What framework should be used to prevent delay in oil construction projects*	**RO3**	Test and validate the conceptual framework functionality in terms of efficiency and potential application in managing the execution of oil construction projects successfully.

1.3 Dissertation Structure

The body of this dissertation consists of seven chapters; each chapter deals with specific coverage of research approaches.

- **Chapter-1** provides an introductory overview of the overall research project and provides important background information on the significance of the current topic and the research question. The chapter also outlines the overall goal of the research and presents the proposed research questions and the objectives to be achieved. The research methodology and methods are also highlighted.

- **Chapter-2** discusses the context in which this research study was conducted. It provides a historical overview of oil exploration, industry, and contribution to the economic development of the UAE. It also highlights the importance of the subject to construction projects in the oil industry, with the author of this study justifying the selection and definition of specific factors causing delays.

- **Chapter-3** discusses several opinions and findings of many previous relevant and related studies on the subject of delays in construction projects in the oil and gas industry and the factors that lead to such delays. It also discusses the construction project industry in the UAE and the critical factors that lead to delays in the context of ADNOC. The challenges faced in the timely execution and delivery of construction projects are explained. The scientific research that supports the definition of delay-causing factors and is considered as research variables is included in the proposed conceptual framework for quantitative analysis.

- **Chapter-4** presents the research methodology and methods used to solve the research problem by meeting the proposed research objectives and answering the research questions to achieve the goal of this empirical study. It also highlights the quantitative research paradigm chosen and justifies the suitability of this paradigm for the research design, collection of the required data, appropriate data analysis and presentation to investigate the research problem.

- **Chapter-5** provides a comprehensive overview of how survey-based research was conducted, the design and content of the questionnaire, the demographic characteristics of the sample, the online distribution of the electronic questionnaire to target participants, and the receipt of completed electronic questionnaires before conducting data analysis.

- **Chapter-6** discusses the results obtained in terms of the research goal, objectives, proposed questions, hypotheses, variables, and designed research framework, as well as the relevant literature cited, and the context of the research setting presented with the industry-specific data provided in Chapter two.

- **Chapter-7** explains the contributions of this study to theory, knowledge, methodology, policy, and practice. Based on the results of this applied research, the study proposes some recommendations that should be considered by project professionals, decision-makers, policy planners, industry experts, and contractors in oil construction projects. The strengths and limitations of the study are outlined, and suggestions are made for future research on the current topic of this study.

- **References**- The study researched and included related research papers that contain a variety of opinions, research approaches, findings on various factors that lead to delays, and suggestions for dealing with these factors. In this way, the literature review helped to find knowledge gaps related to the research problem of this study. The appendix contains the content of the questionnaire and other further literature and information.

1.4 Chapter Conclusion

The UAE oil production and related industry-based are fast-growing with significant economic importance among the OPEC members. Nevertheless, oil companies consider construction projects as one of the crucial integral business activities. However, globally, construction projects in all industrial settings suffer from internal and external factors that directly or indirectly exceed the proposed time and date that the parties have agreed upon for the completion and final delivery of the project (Marzouk & El-Rasas, 2014).

This dissertation focuses on investigating the impact of the ordinary occurred reasons behind causing construction project delays, as observed by the author of this study and extracted from the project records from one of Abu Dhabi's oil subsidiary companies. The author of the research study is a member of the concerned company staff and assumes a leading position at the management level. Therefore, tackling delay problems is diagnosed by experts who are well-acquainted with the actual causes confronting the scheduled project completion plan.

The relevant literature identified many delay-causing factors; among these factors of interest-poor site management, improper planning, shortage of necessary resources, inefficient leadership, the inadequate experience of the project contractors, late

procurement and delay at the construction site, financial difficulties, changes in design priorities and the like (Pall et al., 2020). This study addresses five factors selected by the author of this study that can cause a typical delay in executing construction projects in the Abu Dhabi oil industry within the desired time frame. Project planning, resource allocation, contractor performance, project supervision, and project management factors. These factors were used as independent variables versus timely project completion as the dependent variable.

The Introductory Chapter defines the delay-causing factors held accountable for the timely completion of the construction project in this industry. Further, the Chapter also sets up an aim, which thrives the researcher to search for the data that helps achieve that aim by defining the causative factor involved in interrupting the timely completion of construction projects in the oil and gas-based industry. For achieving the aim, the researcher has defined thorough research problem-related issues (e.g., objectives, research questions, hypotheses, and method).

The research hypotheses and questions are employed to find an appropriate solution to the problem subject to close investigation. Furthermore, the study adopted a quantitative research method incorporating a questionnaire survey in collecting and analysing the required research data appropriately before designing a conceptual research framework. This framework highlights the essential roles of each selected factor in causing an unwelcome delay in the scheduled completion time and sheds light on potential interrelationships among the delay-causing factors.

The validated conceptual research framework would have many implications for project teamwork. For the project leader, it gives a clear scope of managing a whole project through well-preparation of necessary physical and financial resources,

skilled human resources, and tools and methodology, while for the project designers and planners would help in creating a robust project plan and efficient planning from the initial stage to timely completion.

As the investigation of the causes for the insufficient completion of the project, where the planned completion time is the central concern of this dissertation, the generated results and outputs from this dissertation could be potentially valuable for:

(1) Confirmation of the underperformance of the professional practices and policies that could negatively impact the anticipated completion of the oil and gas construction project.

(2) Identifying the factors in the oil industry that can lead to inadequate completion of the construction project at the desired time.

(3) Encouraging project managers to adopt and apply appropriate approaches, practices, and strategies for completing construction projects within the project schedule.

(4) Measuring the performance of project stakeholders in addressing the factors that cause delays to improve the plan for timely project completion.

(5) Promoting project culture among other related professions (e.g., architects, designers, construction managers, and surveyors) by making the most of the knowledge and experience gained.

CHAPTER 2: THE CONTEXT

2.1 Introduction

The economic importance of construction projects and industries in both developed and developing countries has drastically enhanced and witnessed leading structural changes recently, such as globalisation, technological evolution, and imposed regulation to manage and promote fair competition among construction companies. The vast and accumulated revenues from oil production and exports have been playing crucial roles in boosting the prosperity of the UAE, parallel with rapid apparent socioeconomic transformations and continuing to support the UAE GDP for many more years. So, the UAE 2030 vision looks forward to promoting diversity of economic portfolio and production activities and investing in renewable energy development to minimise the risks of oil dependence (Binlootah & Sundarakani, 2012).

On the other hand, the construction industry is truly the development-driven force of development and sustaining the steady economic growth of most countries. The construction broadly consists of three sub-sectors: infrastructure (heavy), industrial, and building (residential and non-residential). Construction activities are considered among the fastest-growing business in the global economy due to the advent of new technologies and intelligent building materials to construction design and enhanced project management approaches. Infrastructure construction has been an essential part of other industries. The construction projects in global oil and gas industries are one of the essential construction activities since projects in this industry are typically mega-scale that impact the national economies.

Recently, many countries have considered the environmental concern to have yielded what is known as "*green building*" Because of environmental-friendly construction projects. On the other hand, construction delay is broadly recognised as the most common, costly, complex, and risky problem upon the timely completion of construction projects. Delays are not always the results of a single obstacle; however, they develop during project execution. Due to the predominant importance of time for both the project owner and the contractors, delays are often the source of disputes between the two parties.

Undoubtedly, the success of construction projects execution and keeping within the estimated budget and prescribed scheduled timeline mainly depends upon implementing a suitable and robust methodology that requires sound management judgment; consequently, several scholarly research studies have investigated and assessed the causes behind causing delays in construction projects. These studies have agreed upon three major and ubiquitous factors as umbrellas under which other causes come; these factors are (i) ill-defined policy of the project owners in either public or private sectors, (ii) lack of appropriate project design, and (iii) lack of institutional capabilities (Acharya et al., 2004).

At the turn of the twenty-first century, the UAE proposed imposing a national socio-economic vision for 2030 that recognised the significant value of diversifying the economic activities and energy resources since the non-renewable hydrocarbon resources are being consumed at high rates. The construction industry sector is one of those significant productive sectors of the Vision 2030, which represents the driving force trailing other sectors for further economic growth and social development. However, the sector of the construction projects in the UAE is still meeting

numerous crucial challenges regarding keeping the plan of project execution within the assigned timeline. Nevertheless, several internal and external factors might induce unwelcome delays in completing the project plan and postponing the delivery. Thus, the causes of project delay and their consequences have received globally much attention from the research engineers in the concerned field.

This chapter sheds light on the current trends in the construction project industry in the UAE and Abu Dhabi Emirate, along with practised management approaches to the timely completion of construction projects. It also highlights the fundamental concepts of the research problem and topical theme concerning exploring and investigating the critical delay-causing factors and their consequences from the professionals and managers of the construction projects in the oil and gas industry in the UAE context.

2.2 Oil and Related Industries in the UAE

2.2.1 Historical Remarks

It is worth highlighting some historical hallmarks of oil discovery and production, particularly in the Abu Dhabi Emirate. Butt (2001) reported that in 1939, the British owned oil company signed an agreement with Abu Dhabi for a 75-year oil exploration concession. In 1953, the D'Arcy Oil Company procured Abu Dhabi's offshore concession for two years, later renamed the Abu Dhabi Marine Areas (ADMA), owned initially by British Petroleum (BP) and Total. In 1958, the discovery and oil production occurred in Um Al-Shaif and onshore Bab oilfields and followed by Bu Hasa in 1962 witnessed the establishment of the Abu Dhabi Petroleum Company (ADPC).

In 1965, ADMA's success continued with discovering the offshore Zakum oilfield to start oil export two years later. Successively, ADMA attained only a partnership in the Lower Zakum field with the Zakum Development Company (ZADCO). In 1968, a consortium of Maruzen Oil Company, Daikyo Oil Company and Nippon Oil and Gas Mining Company formed a third concessionary company, the Abu Dhabi Oil Company (ADOC). After the Union in 1971, Abu Dhabi established its own company, the National Oil Company (ADNOC), to manage and operate all aspects of the Emirate's oil and gas industry. However, the Abu Dhabi Emirate is still the only Gulf oil producer and Exporter keeping international oil companies as partners on a production-sharing basis. In contrast, other Gulf OPEC attained the entire stake (100%) of the various oil operations for their national oil company.

Currently, oil companies, notably from the UK, the USA, Japan, and France, have about 40% of the oil and gas production sharing in the Abu Dhabi Emirate. Al-Damen (2017) indicated that the degree of the performance of the oil industry is generally made possible by evaluating to what extent the development in some core activities is achieved, particularly in the revenue-generating industries, to contribute to the national economy, applying a practical plan for significant reduction of costs through improving activities related to the operations and geo-exploration, and spreading out to new markets. Besides the Abu Dhabi Emirates, other emirates share oil and gas production and petrochemical industries. Figure 1 illustrates the leading oil and gas drilling sites in the UAE.

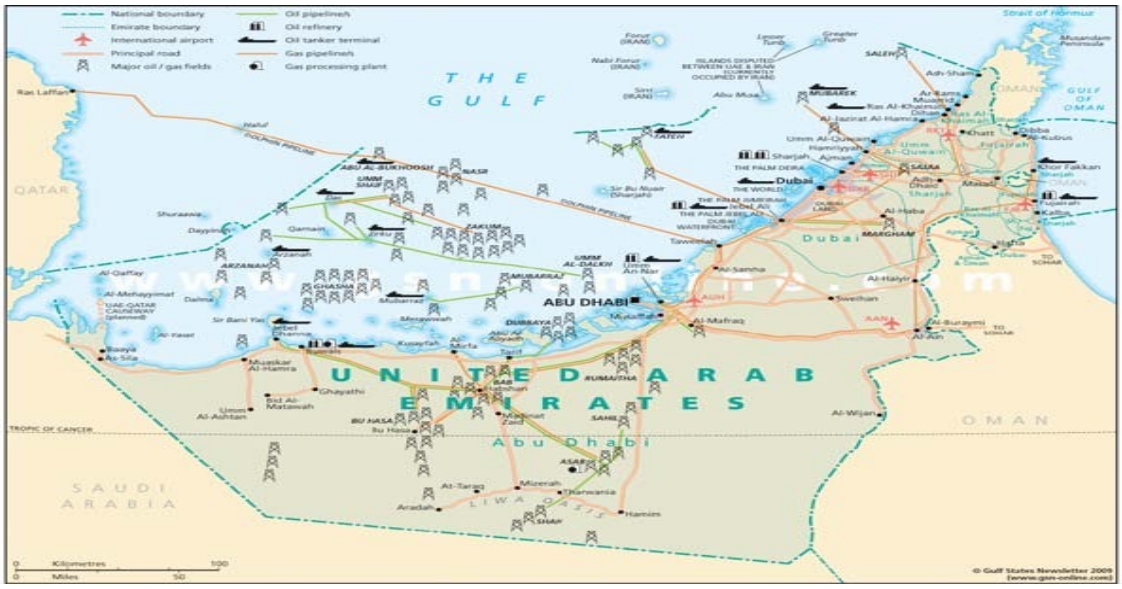

Figure 1: Sites of oil and gas exploration across the UAE territory

(Source: Binlootah & Sundarakani, 2012)

Dubai is the next most significant oil producer in the UAE after Abu Dhabi, where the first explored well-started production in 1966. In contrast, production has decreased over time due to the failure of discoveries. The major player in Dubai oil is the Dubai Petroleum Company (DPC), an owned subsidiary of Conoco of the USA. The consortium consisting of DPC operates 32.5% of oil production. -, whereas Total Fina-Elf of France (27.5%), Repsol of Spain (25.0%), RWE-DEA of Germany (10.0%), and *Wintershall* of Norway (5.0%). In June 1997, Dubai established its government-owned oil company, namely Emirates National Oil Company (ENOC) and was involved in technical cooperation with *Technipetrol*, the Italian subsidiary of France's Technip. In addition, ENOC expanded its oil production with petrochemical industries through Emirates Petroleum Products Company (EPPCO), competing with ADNOC in local petrochemical products as lubricants (Butt, 2001).

Sharjah Emirate is the third largest hydrocarbon producer in the UAE, with oil production centred on the offshore Mubarak field., which lies close to the boundaries

of south Iran and neighbouring Emirates of Ajman and Um-al-Qaiwain. Therefore, the Sharjah emirate shares 40% of oil production with Iran, 20% with Um-al-Qaiwain, and 10% with Ajman. However, natural gas represents the primary production of hydrocarbon resources in Sharjah. In 1999, Sharjah Emirate established the Sharjah Petroleum Council to superintend oil and gas-related operations.

Oil exploration in Ras al-Khaimah Emirate has continued since 1967, with reasonable oil and condensate reserves. However, the primary production was offshore well from the Saleh field, thoroughly exhausted and running out of further production. Furthermore, in 1998, the Ra's al-Khaimah Oil and Gas Company declared that its exploration of the Ajman-1 well failed to find any exploitable reserves economically; thus, the company could not continue exploration. The Ajman, Um-al-Qaiwain, and Fujairah are the only emirates lacking oil deposits. Fujairah Emirate is involved primarily in oil refining as a critical player in the GCC region (Butt, 2001). Each of the three oil-producing Emirates has established its council under the federal Ministry of Energy for regulating all activities related to its respective local oil and gas industry, such as construction projects, production, operation, and marketing. Figure 2 illustrates the relationship between the oil councils of each emirate and the federal ministry.

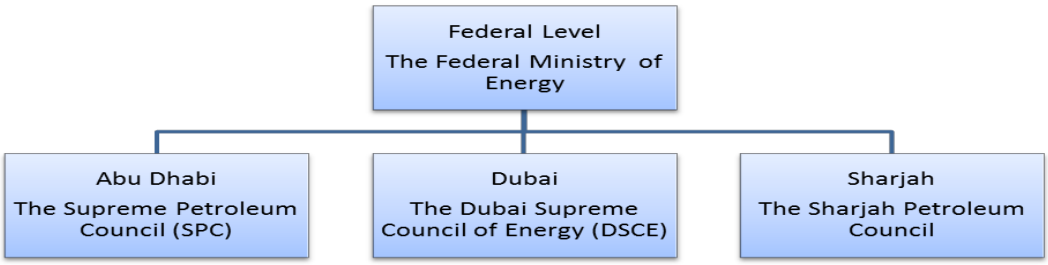

Figure 2: Legislative councils for oil of the three oil-producing Emirates

(Source: Kashwani, 2017; p. 53)

2.2.2 ADNOC - An Example of Construction Projects Industry

The ADNOC Group is a flagship and symbol of the oil business and production diversity where the construction project presents profound infrastructure activities. Consequently, ADNOC activities have been the focal research studies for investigating a bundle of business problems, mainly studying the potential factors involved in the construction project execution and implementation stages- from initial planning to entire completion in the ADNOC business context.

ADNOC currently runs about twelve subsidiaries and firms across the territory of the Abu Dhabi Emirate involved in a wide variety of oil and gas operations- from discovery, production, storage, refining, local distribution, and export marketing, along with launching production lines for manufacturing a broad range of petrochemical products. Since Abu Dhabi Emirate takes over 90% of the proven oil reserve in the UAE; consequently, the ADNOC group reflects the main moving power in the UAE oil market, as well as the most prominent economic drivers to generate vast revenues to contribute significantly to Abu Dhabi Emirate income (Al Mansoori et al., 2020).

The diversity of ADNOC business and industrial activities represents typical case studies to have attracted special research attention. For instance, a search by *Google Scholar* while drafting this thesis (April 2012) returned about 4380 published research studies focused on ADNOC's diverse activities. Furthermore, since the construction project industry is a dynamic and practical field, especially in businesses of economic importance such as oil and gas industries, there is necessary to tackle the potential factors that cause unwelcome disturbance during project execution. Therefore, many researchers investigated these potential delay-causing factors in the oil industry in several aspects.

Al Mansoori et al. (2020) conducted a quantitative study on identifying and ranking the potential factors that affect the organisational performance of ADNOC as a case of the oil and gas industry in Abu Dhabi. The authors unveiled about twenty-five factors involved in performance sustainability; the seven top factors are (i) rewards and recognition, ii) low employee turnover, (iii) effective behaviour, (iv) assuring job security, (v) effective support system, (vi) learning opportunities, and (vii) increase employee satisfaction. The author argued that the generated findings would be helpful for further investigations on other factors affecting performance in the oil and gas industry.

Pipeline projects represent one of the core construction activities of ADNOC. Al Birki et al. (2020) shed light on the performance and efficiency of existing design and specifications related to pipeline project engineering and suggested essential changes in specifications and optimisation for getting desired cost savings. The authors argued that revisiting the current applied specification and approaches across ADNOC operations would award high efficiency and low cost. The project

management approach is the heart of successful execution; therefore, project management has become a discrete scholarly research discipline in business and engineering management fields.

Al Shamsi (2019) investigated construction project management in the UAE oil and gas industry and took ADNOC as an example. Al Shamsi stated that project management in construction assists in breaking the project timeline into various phases to ensure high quality and minimal risks, along with applying specific parameters to evaluate the success of each phase; among these parameters are project deliverables, restricted timeline, completion assessment, identifying tasks and expectations, and risk avoidance. The safety measures of construction projects in the oil and gas industry are a necessary precaution for successful execution through employing a robust risk assessment system.

So, Kashwani's study (2017) focused on assessing the four safety elements required by ADNOC for construction projects: people, environment, assets, and reputation (PEAR). Kashwani employed a questionnaire survey to determine the top risk factors associated with oil construction projects. The concerned study revealed that behavioural safety of the project personnel, management style, and skills of using equipment were essential risk factors. Kashwani provided relevant recommendations for further improvement of the safety system.

Leadership style and job satisfaction are considered vital elements in the motivation of affiliated personnel to achieve productive jobs with desired performance. Al Hammadi et al. (2020) applied the *Contingency Model of Leadership Effectiveness* (CMLE) to investigate the potential impact of the behaviour of leaders on an organisation's performance in ADNOC. The authors found that the traditional

leadership task-oriented leadership is dominant in contrast to relationship-oriented leadership. At the same time, Al-Hosani (2011) focused on the influence of the workplace environment on job satisfaction, personal communication, and motivation for knowledge sharing among the ADNOC staff. Finally, al-Ali et al. (2018) focused on happiness, optimistic mood and social relationship on job satisfaction and performance.

ADNOC also puts much concern on preventing oil and gas emissions from polluting the surrounding environment. In this context, Al Beshr et al. (2018) discussed the ADNOC proposal for developing a greenfield oilfield project (Mender field). The project aimed to merge oil engineering with environmental conservation activities near the Arabian Oryx Park (Sir Baniyas Island), an environmentally sensitive biodiversity zone. ADNOC also strives to pursue the incorporation of advanced technologies into the oil and gas industry. Al-Mulla et al. (2019) discussed the impact of knowledge and information sharing, merge policies, and accidental work tensions on managing organisational changes occurring in ADNOC. Khan et al. (2018) discussed the different stages employed in the technology management process of ADNOC R&T+D in assessing supervisory tasks, project execution, steering projects for reaching technology maturity to be involved in controlling sulphur dioxide (SO4) emissions.

2.3 Research Intention

The construction projects are considered necessary infrastructure to strongly support the oil and gas industry from the early stages of exploration, well development, and so on through operations with modifications on the production site up to the final stages in refining, transportation, and export. However, as the number of construction

projects continuously grows, the delay remains a frequent and recurring situation while receiving considerable scholarly attention. Gonzalez et al. (2014) indicated that the leaders of the construction projects, the assistance of construction consultants and the project team members should collaboratively participate in overseeing all stages of the project lifecycle and execution plan- from design to delivery on time (i) conceptual design, (ii) preliminary design, (iii) detailed design, (iv) construction, and (v) testing, commissioning, and delivery. Suppramaniam et al. (2018) provided another cycle stages pattern initialised as EPC:

i. Engineering (E)- includes conceptual designing, preliminary designing, and detailed designing.
ii. Procurement (P) includes purchasing and delivering the required items.
iii. Construction (C)- includes construction execution, testing, commissioning, and handover.

2.3.1 Overview

In the project management domain, numerous research studies focused on determining the potential causes of construction project delays. These scholarly research investigations found that the delay-causing factors are more or less similar, except some for induced by specific prevailed local conditions. Most typical construction delay-causing factors are project design inaccuracy, incompetent contractors, lack of team irresponsibleness, and the like (Acharya, Kim, & Lee, 2004). Chin, Kek, Sim, and Seow (2017) mentioned that the factor affecting the timely completion of the projects needs to be investigated further by using the fundamental data real-world implications.

The causes of delays highlighted by this study are not so much different from previous studies. This study investigates such impactful factors affecting the timely completion of construction projects in the oil industry as resource planning, project planning, project monitoring, oil prices fluctuation and project leadership. So, this study used actual data collected from the Abu Dhabi Oil and Gas companies to tackle the mentioned delay-causing factors related to the project's timely completion. The construction projects commonly need an extended time other than initially scheduled to execute as per plan and set objectives. Consequently, during its long execution, the project could face so many delay-causing factors or barriers, which may obstruct smooth operation. Thus, it means there are not many projects that do not have any problems and have been completed within their set schedule.

Hajialinajar et al. (2019) noted that many researchers would attempt to investigate the breaks in expected project completion times and determine the factors contributing to the project's timely completion. Therefore, the current study is filling this gap by examining the project's timely completion factors. Zheng, Natarajan, and Teo (2016) also noted that future studies should explore project time completion more in-depth. This study follows this gap and undertakes a more in-depth examination by taking several factors that may affect the project completion time.

Li, Zhang, and Hosseinian (2017) focused on project timely completion and suggested this area needs to be explored further with new evidence. So, this study is uncovering this gap to provide new evidence related to the project's timely completion by examining the oil and gas industry of Abu Dhabi. Tang, Zhang, and Zhou (2017) also studied project completion time and suggested that future studies consider cost and other factors. Therefore, this study focuses on filling this gap by

taking the many factors affecting the project completion time. Baharum et al. (2018) studied environmental factors' effects on the project's timely completion. They recommended that other than environmental factors be included in prospective studies. This study is now fulfilling this gap and taking other than environmental factors such as allocation of resources, project planning, project monitoring, contractor performance, and project leadership that may affect the timely completion of the projects.

2.3.2 Delay-Causing factors- Impactful Roles

The observed factors related to the potential cause of delays in construction projects in the oil of one of the leading oil-producing companies in the Abu Dhabi Emirate whose respective impactful roles played in causing project delays are detailed herein below:

Project Plan/Planning **(PP)**- An initial approved and formal document that serves as a detailed guide for implementing and controlling the various phases of the project. The primary purpose of the project planning guidelines is to document related planning statements and decisions to improve communication and information sharing among stakeholders concerning documenting the approved scope, cost, and schedule (PMI, 2013).

Project Resources Allocation **(RA)**- In the context of project management, resource allocation and resource management are used interchangeably to define the planning of various activities related to the specific resources required for those project activities, considering the availability of the required resources within the timeframe for project completion (Leppänen, 2019).

Project Contractor's Performance **(CP)**- The contractor is an individual or an organisation that signs a mutually binding agreement whereby the contracted vendor agrees to deliver the specified items for the current project. Efficiency, then, is the contractor's ability to deliver the items on time (Lee et al., 2014).

Project Monitoring **(PM)**- A systematic compilation and analysis of the information obtained and parallel processes to decide the objectives that have been achieved and analyse any deviations. Monitoring is thus considered one of the most powerful tools that influence the performance and successful, timely completion of projects. However, monitoring always aims to evaluate and improve a project's targeted efficiency and effectiveness (Shapiro, 2007).

Project Leadership **(PL)**- The main task of a project leader is to control the various construction processes from planning to completion within a certain period using appropriate methods. Therefore, the competencies of the project manager are considered a crucial factor for successful project implementation and the creation of competitive opportunities in similar markets (Al Ameri, 2016; Shenhar, 2015).

2.4 Importance of Study

There is much significance linked to this research study because of its broad scope. This study will have a more significant impact on the oil and gas industry of Abu Dhabi, UAE, with its result because it will further help the project-devoted construction industries in controlling the five-potential delay-causing factors (i.e., plan/planning, resources allocation, contractor performance, monitoring and evaluation, and project leadership) for the timely completion of a construction project (Leach, 2014).

It has been identified that the result of this research analysis will benefit not only in oil and gas industries but the multiple organisations, such as construction companies and manufacturing industries (e.g., machine and vehicle manufacturers, pharmaceutical industry, and the like). In this context, manufacturers involved in these oil-related industries have to undergo several plant constructions or renovations for expanding their business and operations (Walker, 2015). Thus, construction projects tend to take longer in these industries than in the oil and gas industry. Therefore, the study's findings can benefit them because these are the primary factors that hinder the timely completion of the project in bigger manufacturing plants.

The result gained from this study will also benefit construction professionals in many ways. Architects, contractors, engineers, site developers, project managers and quantity surveyors can be benefited from this research. If the hypo-dissertation is proved correct, they will come to know how these factors impact the timely completion of the project because accomplishing a project at a given time is equally essential for all these associated people. If they get delayed, they have to face significant issues (Hwang & Ng, 2013). Through the findings of the present research, they will be able to control these factors for achieving the project's success at a given time.

The research investigation was explicitly focused on the oil and gas industries of the Abu Dhabi Emirate. However, this study could also give a similar story to other oil and gas industries established in different regions across UAE and neighbour Gulf countries. Every oil and gas industry would be facing similar issues of late completion of the construction project, and the primary factors involved in the delayed completion are the same (Rose, 2013). So, the results gained from this

industry will be helpful for similar industries in Kuwait, Bahrain, Oman, Saudi Arabia, and Iraq by applying the generated measures and findings where appropriate.

The potential implications of the generated results are also beneficial for other related agencies, such as governmental and private agencies that undertake the construction work for various aspects. For example, the government conducts road construction, airport construction, railways, and metro construction projects. Other private agencies undertake construction and renovation tasks to improve living standards (Shenhar, 2015). For example, while undertaking road construction projects, the government agency can recognise the elements impacting the practical completion of the project, and through this, a construction firm can save up on its cost by not paying hefty charges to the agency for the delay in projects. Thus, these agencies can be benefited from this research study.

Lastly, it can be observed that the present research study will help the construction professionals such as architects, contractors, builders, project managers, site developers, and quality surveyors will gain a high amount of knowledge regarding the proper construction, the utilisation of appropriate leadership skills, application of contingent leadership skills for controlling remaining factors, such as proper planning of the project and close monitoring for avoiding deviations, optimum utilisation, and effective allocation of resources in different economic and financial conditions and robust approach of selecting capable project contractors (Preston et al., 2015). Furthermore, they will also acquire knowledge regarding the reviews of other researchers who have studied in a similar field that what they think, and a mix of these results can be used for success in the project completion. Through this study,

the pool of knowledge of prospective researchers could be increased (Azimi et al., 2011).

2.5 Chapter Conclusion

Many relevant research studies reported that a proposed project is rarely delivered within the specified goals and scheduled time. This chapter reviews the scholarly literature relevant to the research problem concerned with identifying the delay-causing factors affecting the timely completion of construction projects in the oil-gas industries. The scope of this research study is limited to the construction project in the oil and gas industry of Abu Dhabi Emirate. This research study takes construction project-related activities of ADNOC, such as core pipeline networks, oil and gas production fields, pumping stations, nodes of gathering systems, power-generating plants, and storage facilities. Likewise, it provides a real-world example investigation of delay problems.

The scope of the research is limited to developing a conceptual framework, as shown in Figure 3, to highlight the delay causes affecting the timely completion of construction projects of ADNOC as an example selected to study a construction project in and gas industry would be meeting the research requirements for this dissertation in terms of various participant roles during the planned schedule, execution, evaluation, completion reporting. Successful execution of construction project within the scheduled timeline and allocated budget based on agreed-upon specifications and standards, besides gaining the satisfaction of the stakeholders (Heagney, 2016).

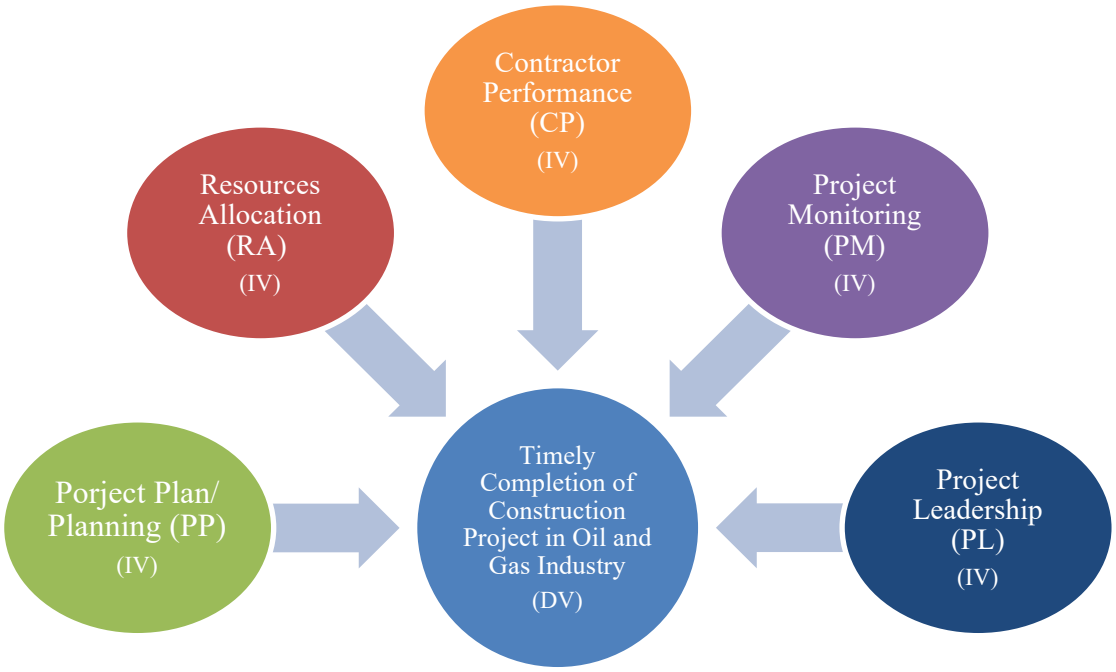

Figure 3 A Diagram of a Conceptual Framework for the Study's Variables

Rehman (2015) states that when construction project execution accomplishes the desired functionality, meets target objectives and purpose, and gains advantages to the contractor; thus, the project is acknowledged as a successful project. However, many scholarly works on the construction projects industry unveiled that the primary challenges facing this industry are delays caused by various factors. Therefore, incorporating advanced methods and approaches is necessary to reduce delays in the projects industry and rationally avert their consequences. Doubtless, every research study on construction projects tackles some real-life issues that are often associated with specific project execution circumstances.

Based on relevant literature on the construction project, particular predictable challenges would be raising some limitations; among these are (i) time, (ii) data collection, (iii) budget and financial resources, and (iv) keen interest sample members in participation. Time is the most significant constraint that research faces because the study must be completed within a given deadline. Therefore, some extra

time has to be considered by the supervisor for completing the task. In addition, gathering the required research data usually faces a bundle of access restrictions. For instance, some organisations imposed an embargo on access to their documents and data over many years, other classified their data as sensitive. Thus, the issue of reaching the reliable information sources within the oil and gas plants because some imposed restrictions as issuing prior permission required from the authority to enter the plant and access the suitable sources.

The approval letter took more time than required, reducing the time available for other actions in the research study, posing a challenge to completing the research within the allotted time. The availability of sufficient budget and funding is an essential element, but a limited budget negatively impacts the quality of the research. Therefore, finding an alternative funding source is necessary to make the study a success. (Anantatmula, 2010). Active participants undoubtedly contribute to obtaining reliable results and reasonable findings. However, some survey participants are reluctant to complete the questionnaire satisfactorily or provide adequate information, even when encouraged with several follow-up questions.

CHAPTER 3: LITERATURE REVIEW

3.1 Introduction

The right approach to executing a successful project is to understand the causes behind the delay and their dynamics relevant to this industry. Many events have attracted much concern in investigating these delay-causing factors, such as long-term low oil prices due to unsettled regional tensions, and currently, the prolonged COVID-19 pandemic and recession contracted many construction-related industries. Thus, the technical management methodology provides the basis for successful and sustainable project execution, enhancing oil projects as essential components of economic growth. Zarei et al. (2018) argued that delay analysis could play a key role in increasing productivity and efficiency in oil and gas construction projects (OGCP).

The retrieved literature aims at providing further details for supporting research objectives, questions, and hypotheses. It also presents suggested underpinning theories i) project management competency, and ii) programme theories for supporting the selected variables i) timely project completion (as a dependent), and ii) five independent variables related to project execution issues (e.g., plan, resource allocation, monitoring and evaluation, contractor performance, and leadership), purposely to defining the potential relationships among the selected variables. Furthermore, these variables are used in constructing the conceptual framework of this research study for detailing the relationship between previously mentioned variables; one is a schematic representation through interlinks. Also, the proposed framework addresses how the interrelationship of independent-dependent variables conceptualises the impact of the delay-causing factors on the timely completion of the construction project in the oil industries (Al Ameri, 2016).

3.2 Underpinning Theories

An industry-oriented organisation perseveringly seeks an optimal value generated from its investment in related projects and should establish a clear link between the expected project outputs and the actual requirements for achieving its business strategies. Thus, an organisation always tends to align the project deliverables with its ultimate business goals and would be better selective regarding its investment in projects (Too & Weaver, 2014). This section provides the theories based on, and the model of this research is developed. This study adopts two underpinning theories, these are i) *project management competency theory*, and ii) *programme theory*.

3.2.1 Project Management Competency Theory

McClelland and McBer (1980) proposed this theory to deal with the first stage of this study, i.e., management or leadership. It also describes an individual's primary characteristics, which play a keen role in theorizing working performance to ensure the achievement of the desired outcome. It is a widely spread assumption that originates the project management competence regardless of the individuals who are performing the job as project managers or leaders with having enough competencies and effectiveness in their performance towards the venture success. Competency of leadership is a combination of multiple factors like interpersonal skills, working knowledge, individual attitude and conduct having its link with better performance. Boyatzis (1982) studied contractions of projects to advocate the nine indicators of the competency-based model behavioural input of the management is appreciated and proposed nine signs, i) leadership, ii) good team building, iii) commonality and accessibility, iv) trustworthiness and integrity, v) application of the understanding, vi) communication, vii) self-efficiency, viii) relation-building, ix) knowledge.

The theory also deals with the leadership section of the study. Leadership impacts all the stages of a successful project as it controls planning, monitoring and evaluation, and other factors like cost. As defined in the leadership section, the leadership approach decides the project's future. If a leader has a toxic approach, it will result in high employee turnover. A typical leader advances from the front to enhance the motivational level of the team, which is a crucial factor in the success of any venture. This theory is directly related to this work's timely completion of leadership and team performance.

3.2.2 Programs Theory

Bickman (1987) proposed this theory, which defines the interference in what way is confirmed for the contribution to the path through a consecutive chain of activities (e.g., from a project, programme, procedure to reach a defined strategy) to produce the intended effects truly. It is inclusive of the pros and cons. It also helps show the other related elements that further support the production of impact. This theory comprises a set of statement that defines specifically how, why, and which condition allows the programme effects to happen, forecasts the programme results, and describe the essential requirement needed to have the required programme impact.

In this research domain, many researchers combined different relations into programme theory decisions to result in a boost of theory interest in various sections in the monitoring and evaluation section in the latest past. The start stage of the venture development is the essential requirement if it has been established then the programme theory is implemented to attain the required goals of the project. The chances of project success enhance by the consecutive stages of the planning. This work is all about the completion of the project at an appropriate time as desired by the stakeholders; then, it becomes a successful project. In addition, such a project

contains multiple stages such as leadership selection, planning, succession monitoring and evaluation and finally, feedback. These elements of the project are interlinked parallel. The failure of one element throws a substantial impact on others; for instance, a well-planned project without efficient monitoring and follow-up will fate to failure.

This theory will help in three stages of this work: i) planning, ii) monitoring and evaluation, and iii) other influential factors like cost, deadlines along with efficiencies. programme theory is essential when leadership and stakeholders are in need to have a clear picture regarding the success or failure of the project. This theory provides clarification regarding project perspective, which provides the basis to project monitoring and evaluation in purifying, governing, and improving the overall project. The mentioned debate linked the second and so on stages of this work i.e., planning, monitoring and cost effects; however, it would be applicable after the initiation of any venture with this theory.

3.3 Construction Projects in Oil Industry - The Challenges

Implementation of construction projects is crucial in supporting the oil and gas industry concerning efficiency and productivity. Therefore, delaying project completion as the timeline planned generates adverse consequences. As delays are inevitable, mainly in megaprojects, the project planners and designers should focus on suitable approaches to minimise delay-associated effects. Suppramaniam et al. (2018) argued that the construction projects participate in the oil and gas industry whose success is based on robust planning and preparation of primary project stages from the beginning with keeping evaluation throughout different phases until the stage of completion and delivery.

ADNOC incorporated all three stream sectors into its business and industry activities to become an integrated oil and gas company. Its various subsidiaries conduct a diversity of oil-related functions, such as oil exploration and production, refining and petrochemical products, export, maritime and land tanker fleet, pipelines, gas processing, providing exploration and production services and consultations, distribution of refined products through a network of more than 400 petroleum stations throughout Abu Dhabi Emirate. These planning and preparation work continue throughout the phases of the project until the final handover to constantly optimise inputs and maximise outputs of the project. The construction phase being the most significant phase before commissioning, start-up and final handover, needs to be completed thoroughly or to an expected quality, standard to ensure that it would not affect the following phases of the projects with inheritance issues (Boschee, 2012).

Reviewing literature about the characteristics and challenges in the Engineering, Procurement and Construction (E.P.C.), the major oil and gas projects tend to be huge, complex and apply various advanced technology. The developed product in the E.P.C. phase is unique and comprises many inter-consistent subsystems and components that require substantial human effort and significant capital investments (Yeo & Ning, 2002). Completeness of scope definition is critical for the success of the detailed design, construction, and start-up. Therefore, the poorly defined scope can result in considerable changes, and the project may be exposed to cost and time overruns besides disputes among involved companies (Salama et al., 2008).

Commonly, industrial projects of adequate scope definition have better time and cost performance by 14 % and 24 % than projects of poor scope performance (Construction Industry Institute, 1996). Typically, the designing of oil and gas

projects is complicated, multi-disciplinary, and developed progressively through the project life cycle (Rashed, 2006). Moreover, work is divided among many organisations (Yeo and Ning, 2002), and designing activities are interdependent. Thus, intensive communication and effective coordination are imperative for accurate design. Ashcraft (2014) emphasised the importance of an integrated information system presence for improving project performance.

The long duration that most oil and gas construction projects require imposes some challenges that may affect the time performance within the project execution. For example, such challenges as (i) unpredictable time duration of some activities like negotiation, (ii) obtaining approval from authorities, (iii) high uncertainty of on-time delivery of long-lead equipment from international suppliers, (iv) incomplete information as a result of phase overlapping between engineering, procurement, and construction, v) frequent changes mainly promoted by external factors, and vi) high uncertainty in planning promoted by Lack of suppliers' involvement in planning and designing long-lead equipment (Yeo & Ning 2002).

Ashcraft (2014) identified the main parameters that can influence contractor performance in terms of cost and time factors in the oil and gas construction project as (i) improper selection of contract type and (ii) awarding contracts to the lowest price contractor among technically accepted contractors and poor contract administration. Procurement and logistics also play an essential role in major projects where efficient performance in this area remarkably improves cost and timing performance (Willoughby, 2005). The procurement activities involve sourcing, purchasing, contracting and onsite material management (Yeo & Ning, 2002). Further, procurement is essential during the E.P.C. phase since material and equipment costs are significant parts of the total cost. Other distinctions include the

size of the project, the complexity in procurement contracting, environmental and human impact, scope creep and uncertainty, and time constraints.

Yeo and Ning (2002) suggested applying modern strategies such as collaborating in the procurement of E.P.C. projects. The argument is that the recent approach helps to streamline the project procurement process, remove nonvalue added activities, enable efficient information flows among organisations, and involve suppliers in the planning and designing phase for higher accuracy. However, this approach requires careful supplier pre-qualification, selecting reliable suppliers, developing strategic contracts, and linking organisations through networked information systems (Salama et al., 2008). Fanousse (2017) added that mega construction projects in the oil and gas industry are considered the most challenging delivery success. Apart from their mega sizes, with budgets that exceed $500 million, there is often an overlap between construction and the engineering phases. Some oil &gas projects are worth more than $7 billion, requiring about 7,000 labourers and an annual turnover of 300 per cent (Chanmeka et al., 2012).

Megaprojects are frequently facing various challenges; for instance, the necessity to manage multiple, concurrent, and complex activities while at the same time sustaining schedules that are tough together with tight budgets. Multiple partners, technical complexities, budget uncertainties, and aggressive schedules sometimes combine to lead to decreased productivity and notable overruns in cost-plus schedules in megaprojects; this calls for even increased complexity in their management (Fanousse, 2017). This event presents even more challenges, including the management and the integration of a vast labour force, competition for limited resources, and lengthy project schedules that last numerous years. These distinctions

make the construction of megaprojects, especially in the oil and gas industry, different from other construction projects (Hwang & Ng, 2013).

Nechully et.al. (2018) reported that innovative technologies help Oil and Gas sector in enhancing the production levels and reduces capital/operating expenses. They also mentioned that adopting innovative technologies like IIOT, Robotics and New EOR technologies enhances efficiency, safety and reliability of operations in Oil and Gas sector. They also claimed that the Oil and Gas sector is very conservative in its outlook and prefers to continue with the obsolete technologies compared to other industries and sectors.

3.4 Delays in Construction Projects Industry

Every construction project includes two distinct phases, namely (i) the pre-construction phase (e.g., the time between the initial ideas about the project and the award of the contract) and (ii) the construction phase (e.g., the period from the award of the contract to the actual execution of the construction). Delays occur in both phases; however, most project delays occur in construction to have led to an urgent need to identify precisely what relevant factors lead to schedule overruns, focusing on the construction phase (Frimpong et al., 2003). Therefore, practitioners in the field need to develop the skills necessary to anticipate potential problems they may face on their current and future projects. Therefore, identifying common problems encountered on previous projects in the construction environment is a good option (Long et al., 2004). However, successful implementation of construction projects is not typical of various reasons for the delay.

3.4.1 Delay Concept

Construction project delay is the primary concern of the project business community and attracted the interest of researchers in academia and business. The delay phenomenon is inherently essential because it has been reported in different construction projects executed in various industries. Generally, a *delay* can be defined as "the overlap of time between the contract date and the date agreed by the parties to complete the project". For the owners, delay implies loss of profits due to the lack of production facilities and productive space or dependency on existing facilities. In addition, in certain situations, delaying indicates higher overhead costs for the contractor due to longer work time, higher material costs due to inflation or increased labor costs (Shahsavand et al., 2018).

Delays are known to be the major events that cause inconvenience for project managers (Carden, 2008), creating significant difficulties for projects (Aibinu & Jagboro, 2002). Delays have consequences such as reduction in project productivity, increased costs, missed opportunities and elimination of projects' economic feasibility (Zarei et al., 2018). Construction delays occur if the real progress is slower than the planned / contract timeline. The delay/time lag in completing construction projects is a critical problem affecting the construction industry and is a troubling global issue. There are different occurrences in which more than one factor induces delays. One pause often contributes to the other (Hari & Pandey, 2016).

Delaying in such completion put on hold millions of dollars of other investments. In complex construction projects involving different activities, delays are analysed based on two significant parameters, i.e., time and cost. Indeed, the impact level of delay differs from one project to another. Delays can adversely affect the

stakeholders; end up with zero incentives or negative productivity, or termination of contract agreements or litigations (Johnson & Babu, 2020). It is becoming unusual that a project work gets over within the stipulated period. According to Ogweno et al. (2016), the successful accomplishment of the construction project at the right time is considered a sign of project efficiency.

The successful accomplishment is measured by time spent, the total cost involved, and the quality of work done. The construction delay affects the timely completion, cost, and quality. Proper decision making well ahead of starting a project, approving designs, working drawings, material selections, and logistics planning may reduce future problems arising during the construction stage (Al Maktoumi et al., 2020).

3.4.2 Types of Delays in Construction Projects

Delay represents a critical challenge to timely project completion. The factors involved in causing delays are project-specific; in other words, they vary in sources, the extent of effects, and consequence duration according to the nature of the construction project. In the case of the UAE, construction delays are still not faded, but many innovative methods and approaches have been employed to minimise the causes and consequences of delays.

Common delay-causing factors discussed by the construction projects literature are underestimated productivity, poor project planning and scheduling, poor management and supervision, incorrect construction methods, unreliable equipment damage, subcontractors, or suppliers. Project plans and project schedules always refer to the conditions of assumptions and forecasts that existed when the plans and timetables were made; hence problems will arise in the event of a mismatch between estimates and assumptions with actual reality.

Soon (2010) argued that the common obstacle that frequently occurs is a disturbance with the proposed timeline of project execution in terms of delay. Delays occur in different forms; therefore, they are classified according to their nature, magnitude of direct impact, and importance of causative factors. Menesi (2007) classified delay types into three categories based on liability (i) *Excusable*, which further is subdivided into compensable and non-compensable owners or contractors, (ii) *non-excusable*, and (iii) *Concurrent*. Further details about each category are provided next.

3.4.2.1 Types of Delays in Project Execution

There are two types of this delay as detailed below:

a) ***Excusable Compensable Delay*** is induced by an error that exclusively occurs due to a series of wrong actions, negligence or mistakes conducted by either the project owner or the contractor to raise compensation delay, whether by changing work scope or delay in scheduled settlement of payments (Kaming et al., 2019). However, the client-side requires most of the time for changing work scope since the client always produces in written *vis-à-vis* variation in scope of work. In this type of delay, the contractor often compensates with the time extension and cost paid against change in scope of work starting from when to be completed and how the project is going to be accomplished, so on how the required resources are provided and delivered at a convenient time without disturbing any stage or step of the project plan (Bhatti, 2019), whereas Soon (2010) discussed impose of government regulations, such as environmental safety, health precaution, and workers prevention.

b) ***Excusable Non-Compensable Delay*** (unsatisfactory delays) is often caused by third parties or unpredictable incidents beyond the control of either owner or the contractor; this would usually lead to an extension of schedule or timing of the completion of the required schedule, resulting in a changed cost or budget being claimed by the owner or contractor (Kaming et al., 2019). Fanousse (2017) indicated that the contractor causes excusable non-compensable since uncontrollable factors might cause such delay. Therefore, a time extension is usually granted without paying compensation. Factors that include this type of delay are (i) Natural, and environmental disasters, (ii) Unanticipated delay in supportive material, machines, or equipment delivery, (iii) Protest or strike of workers, and (iv) Impose of government regulations during project execution.

3.4.2.2 Non-Excusable Delay

Non-excusable delay usually arises from the contractor or Subcontractor due to any reason, maybe because of a deficiency in employees' production or maybe because of financial difficulties. Hence, no time extension is granted for such delays, but the contractor has to compensate the client if mentioned in the agreement. Sambasivan and Soon (2007) found that the effects of delays in construction projects can be country specific. Bhatti (2019) reported some factors that can be the reason behind causing non-excusable delay type; these are:

- Inappropriate equipment and construction material,
- Lack of subcontractor performance,
- The incompetence of the main contractor to control the project site,
- Financial difficulties faced by contractors.
- Work is not executed per specifications,

- Quality of work is not maintained at sites.
- Unable to manage site progress according to scheduled plan and planning.

3.4.2.3 Concurrent Delay

Concurrent delay can be defined as when more than one type of delay happens simultaneously (concurrently), either together or independently, to affect the execution progress of the construction project timeline. Concurrent delays occur when both owner and contractor are responsible for the occurrence of the delay (Dubai Statistic Centre, 2018). Kraiem and Diekmann (1987) revealed that time allowed for construction project performance is usually an essential consideration for both owner and contractor of the project. Nevertheless, it is typical for construction projects to be delayed. Delays may be caused by the project owner (compensable delay), by the project contractor (non-excusable delay), by a third party (excusable delay), or many different types of delays occur concurrently.

3.4.3 Delays in UAE Construction Projects- Causes and Consequences

The boom of urbanisation and intensive extension of residential and commercial buildings have drastically pushed the construction industry in UAE to be one of the key players participating annually, with a considerable percentage of the UAE GDP (Dubai Chamber of Commerce, 2017). Besides that, the construction industry is globally considered the backbone for the development and prosperity of any country. For instance, the UAE improves living standards and enhances life quality by providing basic infrastructure facilities like inner-city roads, highways, bridges, schools, hospitals, hotels, and commercial centres.

Alaghbari et al. (2007) indicated that billions of US dollars had been invested in many ongoing mega-projects across the UAE, such as Saadiyat Island and Masdar

City in Abu Dhabi Emirate, Mohammed Bin Rashid Al-Maktoum City and Palm-Jumeirah in Dubai Emirate. Currently, the construction market in the UAE is booming to meet the essential requirements of the upcoming Expo-2020; meanwhile, the industry faces several challenges and barriers (Bhatti, 2019). For instance, Faridi and El-Sayegh (2006) found that about 50% of the construction projects in the UAE suffered from one or more delay-causing factors. However, investment in mega-projects with massive dollars is often associated with potential financial risk. Ren et al. (2008) reported that time and cost overrun are frequently and unceasingly faced in construction projects irrespective of their size, nature, and complexity. According to Motaleb and Kishk (2010), about 50% of UAE projects showed time and cost overruns due to delays in approval. Delay in client-decision making and poor initial planning. Wilks (2015) referred to a study conducted by the *Chartered Institute of Building* (CIOB), which identified that Dubai Metro Construction has suffered from various difficulties causing a five-year delay that severely increased the cost by 85% above the budget due to a large number of disputes from design and scope changes.

Mpofu et al. (2017) identified the most significant reasons for postponements in the UAE construction industry. The study stated that construction is not a single entity, as several industries overlap its activities. They suggested that it is crucial to understand that various "*encountered problems*" of construction that are not to be vanished from the work or anomalies to be excluded from the theoretical models. However, they reported some critical delay-causing factors as mentioned herein (i) idealistic contract duration imposed by the client, (ii) incomplete design and inadequate planning at the tender time (by contractors), (iii) too many changes regarding scope, design, and order procurement orders, (iv) poor project planning and control (by project managers), (v) delay in gaining permit/approval from the

different governments. Authorities, (vi) poor labour productivity problems, (vii) slowness in the decision-making process by the owner, and (viii) inadequate site management, monitoring and control.

Motaleb and Kishk (2013) investigated the risk of delays concerning construction projects in the UAE to have reported about forty-two ubiquitous delay-causing factors, which are further sorted into five groups: owner, consultant, and project manager, contractor, financial and external factors. Motaleb and Kishk (2010) also indicated that the construction sector constitutes 14% of UAE GDP to be the fifth largest sector; they also found five top factors to be: (i) change orders, (ii) lack of ability of client or client representative, (iii) the client was slow in decision-making, (iv) the client has a lack of experience in construction, and (v) the contractor showed poor site management and supervision.

Hegazy (2012) discussed the adverse impact of delays on project execution regarding claims, which reach billions of US dollars. Hegazy added that there was always disagreement between parties about delays and their causes. In this case, the client and engineer always tried to mitigate delays to avoid giving the contractor extra money; on the other hand, the contractor always tried to impose delays on getting the maximum time and money. In 2017, the UAE Ministry of Finance reported that about US$611 had been invested in construction projects between 2012-and 2017; delays and associated claims represent severe risks to all parties involved in the projects.

Al-Gheth and Sayuti (2020) conducted a meta-analysis review of related published studies on various delay-causing factors affecting different phases of the project life cycle to highlight similarities and differences between UAE specific factors against

the factors reported in other countries. The review work identified several delay-causing factors grouped into fourteen categories, such as engineering, financial, management, client issues, and contractor issues. The construction project industry in the UAE context agrees with two common global delays: project management and financial issues. However, the top specific delays groups in the UAE are (i) contractor management, (ii) financial-client, and (iii) management-client. In an international context, the top three groups are (i) contractor management, (ii) management-client, and (iii) contractor financial issues. Table 2 shows the ranking of delay-causing factors in the international and the UAE construction project industry.

Table 2 Rank of factors causing project delays in UAE and globally

Group name	International rank	UAE rank
Management-contractor	1	1
Financial client	2	4
Management-client	3	2
Labour and equipment	4	5
External factor	4	6
Management-consultant	5	8
Design-consultant	5	7
Financial contractor	6	3
Material	7	8
Contract	7	8
Project	8	7
Authorities	1	8
Design-client	9	9
Design-contractor	9	9

Based on the group-wise classification, Al-Gheth and Sayuti also reported the percentage of occurrence of the top delay-causing factors in both the UAE and global

contexts. As a result, the construction project management assumed the highest percentage of delay occurs in the UAE context; this means that the training and development (T+D) programmes for the project team members should be incorporated into project plans to raise and improve their skills in negotiating with project technology, methodology, and tools of the day for applying robust management approaches. Table 3 shows a comparison between percentage of occurrence of delay-causing factors in UAE and international contexts.

Table 3 Percent of delay-causing factors in UAE and international contexts

Group name	International (%)	UAE (%)
Management group	43	65
Finance group	21	19
Labour and equipment	10	7
Materials	4	1
Design	7	2
External factors	12	5
Contract	4	1
Total	**100**	**100**

(Source: AlGheth, & Sayuti, 2019)

Johnson and Babu (2020) investigated the primary delay cause in the oil and gas construction projects in the UAE by using a concurrent mixed method to approach the construction project professionals. The data analyses revealed the top ten delay-causing factors in time and cost overrun, as listed in Table 4.

Table 4 Ten top-ranked causes of time and cost overrun in the UAE

Rank	Causes	Score
1	Design variation from client and consultant	4.66
2	Unrealistic schedules and completion dates projected by clients	4.57
3	Delay in gaining government permits and approvals	4.55

4	Inaccurate time estimation by consultants	4.51
5	Poor selection of contractors and suppliers by the client/poor procurement strategy	4.49
6	Delay in getting approval from consultant for variations Incomplete drawings and details provided by the consultant	4.47
7	Poor planning and scheduling by consultants	4.34
8	Delay in the client decision-making process	4.32
9	Delayed payment to contractors	4.30
10	Prolonged procedures of inspections by consultants	4.23

(Source: Johnson & Babu, 2020)

3.4.4 Delays in Oil & Gas Construction Projects- International Experiences

Construction projects worldwide are suffering from some kinds of delays; however, they are sharing effects of common delay-causing factors button various extents. This section highlights some international experiences of delays in oil and gas construction projects from different regions. Overall, the literature pays close attention to lengthy approval procedures, poor scheduling and plan, environmental difficulties, fatigue and human error, low quality of imported materials, design change and poor communication among project parties.

Kaming et al. (2019) analysed factors involved in causing delays in construction projects in the Indonesian liquefied natural gas (LNG) industry. The development of the LNG industry exploited engineering procurement construction as a contract model. Based on their study. The researchers selected seven delay-causing factors associated with the LNG construction projects; these factors were (i) human resources, (ii) management practices, (iii) material availability, (iv) external sources, (v) plant-needed equipment, (vi) method adopted, and (vii) quality standards.

Suppramaniam et al. (2018) conducted a comparative and meta-analysis review of the related scholarly literature to have found that several significant factors induced delays in the construction phase of oil and gas projects in Malaysia. The similarity of these delay factors can be grouped into six major groups, namely client, contractor, engineering, external, project and resources. Dey (2012) found delaying factors in a refinery construction project in central India to be (i) technical risks, (ii) financial, economic, and political risks, (iii) organisational risks, (iv) natural hazards and (v) statutory clearance risks. The findings show that the risk factors at the project level are the results of external factors. Also, the risk factors in the work package and activity level are operationally created because of internal causes such as material and labour productivity, implementation issues and team ineffectiveness. The study shows that the project delay is almost operational, as it deals with an oil pipeline project where factors like ground sever conditions put contractors in a real challenge.

Thuyet et al. (2007) surveyed to identify the risk factors affecting oil and gas construction projects in Vietnam have identified five factors as significant causes of project delay these are i) bureaucratic governmental systems and lingering project approval procedures, ii) poor design, iii) incompetence of project teams, iv) inadequate tendering practices, and v) delays in internal approval processes by the owners. Pham and Hadikusumo (2014) conducted an exploratory study in the Vietnamese petrochemical industry to return several root causes grouped in six phases (i) preparation of investment, (ii) scope and contracting, (iii) engineering, (iv) procurement, (v) construction, and (vi) start-up. However, both owners and contractors are considered the primary sources of delay problems in which the role of contractors is more important than owners. Chan (2011) studied the human aspect of the projects by connecting the *accident risk* with *project delay*. Ten top risk items

were categorised into four groups (i) personal, (ii) job, (iii) unsafe practices, and (iv) unsafe work conditions. These findings suggested that fatigue was the leading risk factor in causing a delay in Chinese oil and gas construction projects. The generated results of the study also emphasised the vital role of human resources in project success, which was neglected by many contractors, especially in Iran, where the wages are delayed for months.

Sepehri (2006) studied Iranian South Pars construction projects to report some evidence of failure and overrun that often-taking place in planning phases other than in construction or control phases. Sepehri also presented some failure factors, including (i) project planning, (ii) quality assurance, (iii) testing, (iv) configuration management, and (v) development process. Alireza and Kavous (2013) surveyed to identify and rank the causes of delay in gas pipeline construction projects in Iran. The study identified ten top and important causes of project delays these were (i) imported materials, (ii) unrealistic project duration, (iii) client-related materials, (iv) land expropriation, (v) change in orders, (vi) contractor selection methods, (vii) payments to contractors, (viii) obtaining permits, (ix) late delivery of ordered materials by suppliers, and (x) contractors cash flow. Sweis et al. (2019) investigated the primary causes of delays in Iranian oil and gas construction projects using a root cause analysis (RCA) technique. They found that 84.7% of cases are due to overrun time, owner-contractor conflicts, and financial and cash flow disputes.

Jergeas (2008) assessed the overrun time and cost in three Canadian mega oil areas of sand projects in Alberta to divide the delay into categories (i) feasibility study, risk management, (ii) direct cost and time estimation, and iii) engineering practice. These categories were associated with specific risk factors such as (i) incomplete scope

definition, (ii) inadequate front-end loading, (iii) poorly completed front-end deliverables, including milestone schedule slippage, (iv) inappropriate project strategies for mega oil sands environment, and (v) incompetence management of construction phase. Jergeas and Ruwanpura (2010) extended further the previous study of Jergeas in 2008 to have classified causes of overrun cost and timeline schedule as (i) misplaced optimism, (ii) misguided objectives, (iii) misaligned strategies, (iv) misdirected execution, and (v) missing links. The findings of both studies illustrated some challenges of delivering oil mega-projects, where planning, scheduling, and controlling play leading roles in causing project delays. The focus of these two studies is on the operational and technical challenges.

Orangi et al. (2011) investigated construction projects' cost and time overruns in Victoria, Australia. The study applied a risk mapping-based management approach to discussing the root causes and suggested fifteen root causes in three projects, including (i) design problems, (ii) communications, (iii) materials procurement approvals, and iv) planning and scheduling, and (iv) environmental conditions. Finally, Salazar-Aramayo et al. (2013) presented a conceptual model for managing construction projects related to the exploration and production of a Brazilian company. They urged that the oil and gas production construction projects are both internally complex and high-risk and also subjected to pressure from various stakeholders, which worsens this complexity.

Ruqaishi and Bashir (2013) presented the generated findings from a study on oil and gas construction projects in the Sultanate of Oman. The study identified seven major delay causes, among which poor interaction with vendors in the engineering and procurement stages was considered a significant cause. In addition, the study

emphasised the critical roles of the contractor's duties that linked the sub-contractor's problems with project failure. Such linkage has been the regular claim in many construction projects in Oman. Although the delays in the Omani oil and gas construction projects are a continuing concern, the previously presented studies are the significant representations that thoroughly investigated and analysed this problem to report similar findings (e.g., Berends, 2007; Omonbude, 2007; Salama et al., 2008; Chanmeka et al., 2012; Merrow, 2012; Al-Subaih, 2015).

Ruqaishi and Bashir (2015) further investigated the causes of delay in construction projects in oil and gas processing and service facilities in Gulf Cooperation Council (GCC) countries took Sultanate of Oman as a case study by employing a questionnaire-based survey submitted to fifty-nine managers of construction projects from several Omani oil and gas organisations. The survey results displayed a high degree of agreement regarding perceptions of project stakeholders, clients, contractors, and consultants on the causes of project delay. There is no evidence suggesting that the causes of construction project delay differ significantly according to organisation size or organisational ownership. Moreover, seven factors were identified as significant causes of project delay. Although six of these identified elements are general factors that can account for the delay in any project in any industry, one of them—poor interaction with vendors in engineering and procurement steps—is unique to oil and gas construction projects. Table 5 shows a summary of delay-causing factors.

Table 5 Causes of delay-causing factors in the Omani oil and gas industry.

Client related causes
Delays in project financing and making payment for completed work
Client interfaces and change requests

Slow decision making by the client
Unrealistic contract duration and imposition of requirements
Poor definition of subsurface input data
Re-engineering of different units caused by poor basic design package
Re-engineering of different units caused by poor basic design package
Poorly defined or vague scope of work
Complications in the tendering process
Contractor related causes
Poor understanding of the scope of work during tendering
Difficulties in project financing by the contractor
Poor site management and supervision by the contractor
Problems with subcontractors
Inappropriate construction methods implemented by the contractor
Inadequate planning and scheduling of project by the contractor
Rework due to errors during construction
Rework due to errors during construction
Inadequate experience of the contractor
Unfamiliarity with government regulations and laws
Material related causes
Low labour productivity
Shortage of equipment
Low efficiency of the equipment

Consultant related causes
Delay in preparation and approval of drawings during construction work
Delay in performing inspection and testing
Inadequate quality assurance/control
Lack of ownership in the project
Poor management of contractor’s schedule
Change in material type during construction caused by the poor quality of materials
Delay in delivery of materials
Labour- and equipment related causes

Shortage of labour
Contract related causes
Mistakes and discrepancies in the contract document
Inadequate project duration defined in the original contract
Poor definition of payment milestones/distribution of cash flow
Inadequate delay penalties/poor incentives
Conflicts among joint owners of the project (for joint-venture projects)
Contract relationship-related causes
Major disputes and negotiation
Inappropriate overall organization structure linked to the project
Lack of effective communication among project stakeholders
Poor definition of interfaces causing scope creep
Poor interaction with vendors in the engineering and procurement stages
External causes
Unforeseen effects of weather conditions on construction activities
Changes in government regulations and laws
Effect of social and cultural influences
Changes in market conditions
Problems with neighbour

(Ruqaishi & Bashir, 2015)

3.4.5 Impacts of Delays on Construction Projects Industry

Beyond dispute, the consequences of delays in the construction projects introduce unwelcome disturbance in the project plan and timeline. These adverse effects negatively influence the stakeholders of the construction project, mainly the clients and contractors, to pave the way to arbitration, disputes, litigation, and total project termination (Bhatti, 2019). In contrast, Ismail and Suppramaniam (2018) reported that delays in the construction phase are heading to cause the failure of accomplishing the targeted time, increase budgeted cost, and reduce the specified quality of the construction project. Furthermore, Kumar (2016) argued that when

projects are delayed, usually their schedule is either extended from the initial plan or accelerated and, consequently, acquire additional costs.

Most of the studies identified similar sound effects as mentioned, but the only variance is in the ranking of each effect. Some studies showed a minor difference in the effect of construction delay, which included additional points, namely reduction in profit for the contractor, non-productivity loss for the owner, distrust of contractor, delay in the progress payment and loss of market value of the contractor (Amoatey et al., 2015). It is recognized from previous studies that time overrun, cost overrun, disputes, arbitration, litigation, and complete abandonment were the critical consequences of delay in the construction step (Khattri et al., 2016). AlGheth and Sayuti, (2019) enumerated the frequency and impact ranking of delay-causing factors tackled in the relevant literature.

Zarei et al. (2018) discussed the generated results from an investigation on delays consequences towards construction projects in oil and gas production and petrochemical industries using Semantic Network Analysis (SNA). Their findings revealed commonly occurred delays that can be categorised into five standard processes of project management as proposed by PMBOK, as illustrated in Table 6.

Table 6 Different categories of delay-causing factors of the IPI project

Group	Definition
A	Delays related to the initial negotiations
B	Delays related to contracting processes
C	Delays related to the planning process
D	Delays related to the control process
E	Delays related to the closing process

(Source: Zarei et al., 2018).

Zarei et al. (2018) also investigated relationships between elements of each category as a critical factor in the investigation. The findings of their investigation on the main constituting elements of each category. These factors were then collated, analysed, and finalised in a general session attended by members of all expert panels. The final consensus on the element layout is displayed in Table 7.

Table 7 Main categories of delay-causing factors

Delay Category	Components
A- Initial negotiations	Absence of industrial feasibility study and capacity planning.
	Incomplete and ineffective contracts.
	Lack of required engineering procurement documents or incomplete documents from engineering procurement.
	Inaccurate or wrong estimation of costs.
	Uncontrollable factors such as monopolies or market fluctuations.
	Lack of reviews, feedback, and corrective actions.
	Time-consuming process of reviewing and confirming suggestions and plans by engineering procurement.
	Frequent changes in technical design by engineering procurement.
	Long-time lags between the changes announced by engineering procurement.
	Lack of standard and well-defined communication systems between EP and equipment manufacturers.
	Unclear definitions of responsibilities and duties of engineering procurement and equipment manufacturers.

(Source: Zarei et al., 2018)

B-Contracting processes	Absence of industrial feasibility study and capacity planning.
	Incomplete and ineffective contracts.
	Lack of required engineering procurement documents or incomplete documents from engineering procurement.
	Time-consuming process of reviewing and confirming suggestions and plans by engineering procurement.
	Frequent changes in technical design by engineering procurement

	Long-time lags between the changes announced by engineering procurement.
	Delayed payments by engineering procurement.
	Deficiency of project management systems.
	Unpunctual delivery of equipment and materials.
C- Planning process	Incomplete and ineffective contracts.
	Time-consuming process of reviewing and confirming suggestions and plans by engineering procurement.
	Frequent changes in technical designs by engineering procurement.
	Delayed delivery of equipment and materials by engineering procurement.
	Lack of standards and well-defined communication systems between engineering procurement and equipment manufacturers.
D- Control process	Inefficient organizational structure and internal processes of equipment manufacturing companies.
	Lack of use or access to new software for designing.
	Deficiency of motivational systems in equipment manufacturing companies
	Deficiency of human resources management in equipment manufacturing companies.
	Lack of powerful management in equipment manufacturing companies' resource planning and procurement.
	Deficiency of production/project planning systems on equipment manufacturing companies.
	Deficiency of quality planning systems
	Deficiency of financial planning system of equipment manufacturing companies.
	Changes in the scope of the implementation of the project by engineering procurement without involving the equipment manufacturing companies.
	Lingering process of opening and providing materials and goods.
	Inefficient management of subcontractors of equipment manufacturers.
	Inefficient warehousing system in petrochemical factory sites.
	Inaccurate or wrong estimation of costs by equipment manufacturing companies.
	Time-consuming process of reviewing and confirming suggestions and plans by engineering procurement.

D- Control process	Frequent changes in technical designs by engineering procurement.
	Delayed delivery of equipment and materials by engineering procurement
	Inefficient management of subcontractors of equipment manufacturers.
	Inefficient warehousing system in petrochemical factory sites.
	Inaccurate or wrong estimation of costs by equipment manufacturing companies.
	Time-consuming process of reviewing and confirming suggestions and plans by engineering procurement.
	Frequent changes in technical designs by engineering procurement.
	Delayed delivery of equipment and materials by engineering procurement
	Delayed payments by engineering procurement.
	Deficiency of motivational systems in equipment manufacturing companies
	Lingering process of opening and providing materials and goods.
	Deficiency of project control systems of equipment manufacturing companies.
	Absence of any analysis of the past events or periodical reports by equipment manufacturing companies.
	Late requests for corrections or revisions of delay causes and proposition of strategies for compensating the delays by equipment companies.
	Lack of integrated control systems for production.
	Lack of integrated quality controlling systems in equipment manufacturers.
	Deficiency of human resources controlling systems in equipment manufacturing companies.
	Deficiency of financial/budget controlling systems in equipment manufacturers.

(Source: Zarei et al., 2018)

These categories were subject to further discussions by experts and professionals in the field. Their discussions led to a refined version of categories based on these points:

a) The delays in the execution process are primarily due to the problems of the contracting process, and therefore contractual problems are core causes of process issues. In addition, it was expressed and agreed that delay causes are varied across different processes undertaken by different contractors. Consequently, it is impossible to generalise such causes, and therefore categorising them under generic themes is not helpful. The authors, therefore,

concluded that the classification of “delays related to executing processes” should change to “delays related to contracting processes”.

b) In practice, the processes related to project closing come into play after the project’s execution processes and handing over to the project owners. Since the scope of this research covered processes up to project delivery to owners, projects panels concluded that “delays related to closing processes” are outside the scope of this exercise and should be omitted.

3.5 Selected Variables

3.5.1 Timely Project Completion

The timely project completion is a dependent variable. The complete timeline of any construction contract decides whether the project will be complete with the stipulated tenure or not (Kikwasi, 2012). When a contract is unsuccessfully executed in agreement with the decided timeline, it does not meet the expectations of the customers from the construction cost perspective (Indhu & Ajai, 2014).

The construction contract agreement is the duration of the contract and the scope of project deliverance, along with inclusive project costs. McNair et al. (2011) discussed the project timeline regarding cost and quality, which are considered the core clauses of any construction contract agreement, and must include the project cost, time, and quality; thus, the presence of the length of agreement duration should include all the aspects as mentioned above (Pall et al., 2020). In addition, it is the complete timeline of any construction project which decides whether the project will be complete within the stipulated tenure or not (Wachira, 2001).

Lu et al. (2017) explored the causing factors of cost performance concerning two types of construction projects in terms of completion and delivery, namely design-

bid-build (DBB) and design-build (DB), to conduct a comparison between existing differences of found causing factors between these two delivery methods. Bentz et al. (2008) argued that the existence of the length of an ideal agreement duration for which the proprietor recovers the ideal costs. He further affirmed that if an optimal timeline is given for the execution of the contract, the acceleration is conditional with an additional premium. There are numerous factors like resources, quality, scope, timetable, budgets, risk, the satisfaction of the client, and support of the stakeholders, which can function as a hurdle role in the completion of the project. In addition, many factors can function as a constraint in the completion of the project; however, the constraints triangle consists of performance, time and cost that limits the universe for successful completion of the project.

Several variables can function as constraints in the completion of the project. The constraints triangle consists of performance, time, and cost, limiting the universe for completing the project. The primary focus of any project manager is on three factors linked with the achievement of the project on-time execution by delivering the acceptable stakeholder quality within the aligned project budget. The separation of a project into different stages makes it conceivable to lead it in the best possible way. This exercise results in the division of the load of the entire project into small sections, thus making the monitoring more easily. The project's inception stage is the begging. At this point, the project idea is explored and explained. The objective of this stage is the examination of the project's feasibility. Furthermore, it is decided to whom the project will be allocated, and which vendor (or vendors) will be convoluted. Whether there is any suitable support ground between those who are convoluted, this or the forthcoming leader of the project composes a proposal containing a deception of the previously mentioned matters. Finally, the ultimate

benefactor of the project assesses the proposal and, upon endorsement, invests the needed financing; therefore, a venture formally starts upon getting the final approval (Wachira, 2001). Although the process of project deliverance does not have a stage called financing, budgetary limitations influence every procedure stage (Görög, 2011).

Mansfield et al. (1994) examined the correlation between cost overwhelms and project postponement and recognised that an appropriate agreement does exist between the two elements. The project leader's ability to say no is essential to being good in project leadership. The project will, in general, extend once individuals have gotten excited about them. The fundamental idea is that we should have projects to which individuals continue, including targets and tasks that keep growing and are about to go off schedule; they will not accomplish their unique goals (Pall et al., 2020). The project members form a partnership concerning the implications of the project for constructing the sense of agreeing on the project kind.

A prototype developed project delivers full application functionalities, yet they do not need to be appropriate for usage in a specific context (Waihenya, 2011). Delay in completion of any project is usually considered one of the communal, expensive, and full of risk issues faced in the project of contractions. It is one of the factors for creating discrepancy and claims, which ends in lawsuits, because of times' superseding significance for the proprietor and the contractor (Ahmed, Azhar, Kappagntula, & Gollapudil, 2003). Postponements of the projects do not result from an isolated disastrous event. They frequently develop gradually throughout work.

Determining the essential postponement requires us to compare the schedules as planned and as built. Postponements can cause considerable harm to a proprietor; this

has encouraged the proprietor to devise the arrangements of the contract and process of the project to antedate, manager and recompense for such deferrals, intending to secure a safe position compared with the contractor (Brennan, 2002). Arditi et al. (2017) conducted a study aimed at exploring the potential relationships between the organisational culture of a construction firm and delay and examining the correlation between leadership behaviour and inadequate performance of project execution as a common delay-causing factor. The effective execution of the projects by remaining within the evaluated cost and recommended plans depends upon a methodology requiring thorough engineering judgment. Many investigations were conducted to assess reasons for postponement in construction projects.

Considering the World Bank report published in 1984, this study got some support regarding the facts that have been discussed in the above paragraph discussion. The main three reasons faced by any project while executions are (i) government unclear policy, (ii) Absence of proper project design, and (iii) lack of organisational competencies. Acharya et al. (2004) assessed that in between 14-18 months, postponement would produce an extra expense of $261-344 million in the USA to state along with local governments. Ogunlana et al. (1996) investigated the postponement of building-based projects in Thailand as an instance of the developing country's economy. They found three kinds of fundamental hitches (i) primary resources supply shortage, (ii) customer and advisor issues, and (iii) contractor inability problems.

3.5.2 Project Plan/Planning

Project Planning is referred to various related processes of the project execution to be accomplished within a given deadline (Heravi, Coffey, & Trigunarsyah, 2015).

Moreover, it also refers to ascertaining optional techniques, order, and duration of project activities and the resources that must boost the chance for a successful project (Tasevska, Damij, & Damij, 2014). Project planning includes the plan and procedures that are necessary and related to the completion of the project (Wang & Gibson Jr, 2010). The process of ascertaining optional techniques, order, and duration of project activities and the resources must boost the chance for a profitable project.

The effectiveness of project planning can be considered the area in which a project obtains its planned goal. Moreover, during the planning process, decisions taken have had an important impact on the expected outcomes of a project (Clayton, 1989). In addition, the planning efforts made before the beginning of the project implementation when there are relating fewer expenditures have also been manifested to have a lot of higher level of impact on the expected project outcome in contrast to efforts taken on after a project has begun when expenses may be substantial (Hamilton & Gibson Jr, 1996). However, the tasks related to projects and resources are often overlooked in efforts to improve project planning effectiveness. Understanding the functions of the project planning process itself and its link to its environment can be critical for formulating methods to improve project planning effectiveness. Faniran et al. (1994) recognised and measured the variable that is directly noticeable with the prospects to impact the effectiveness of efforts made for project planning and assess the effects of an individual for these variables on the process of project planning.

The research work was also done in the previous study is expanded by (i) scrutinizing the way how individual conditional variables collaborate to impact the

effectiveness of planning and (ii) recognising central determinants (that are indirectly measurable) of the effectiveness of the project planning. As long as the project planning is arranged to maximise the chances of obtaining success of a project, it is widely accepted in the literature on project management that this process has a significant influence on achieving the project's desired results. There are several options on what additional efforts should be involved in project planning and how these efforts can be implemented to ensure success. (Cohenca, Laufer, & Ledbetter, 1989). They assess three aspects of project planning attempts, i.e., time planning, time control and frequency of alteration, and in conclusion, the efforts of planning should be modified to encounter differing situations.

Based on the examination of project planning, the effort and recognised sufficient allocation of time throughout the project planning process need to be planned before implementing the project as the main requirements for boosting the project's performance (Faniran et al., 1994). Furthermore, Faniran et al. (1994) also recognised an overemphasis on planning and control at the cost of methods, and a significant insufficiency in planning practices is action planning. The effectiveness of project planning can be considered by the range in which a project obtains its planned goals.

De Wit (1988) used four criteria to assess the effectiveness of the project planning, which include: performance of budget, planning performance, capability, and satisfaction of all Stakeholders. Furthermore, a standard description was provided by Pinto and Slevin (1988a) regarding the success of the project and proposed that the project outcomes can be measured regarding usage: cost, performance, time, project product usage or applicability and satisfaction of the user, whereas Cohenca et al.

(1989) assessed outcomes of project planning by measuring the range of planning variance, the level of plans usage variance of working hour.

The combined features of a project which have a straight effect on project performance are known as the project environment. The characteristic which has been used in preceding study research to distinguish projects comprise a level of complexity (Bennett & Fine, 1980), degree of unreliability, i.e., (Laufer, 1991), size, i.e. (Bennett, 1983) and as well as the level of competition at kind, i.e. (Ireland, 1985). Many studies have been conducted to determine the critical success factors (CSFs) that donate to the project's success.

3.5.3 Project Resources Allocation

Project Resources allocation is a general approach that requires scheduling and planning of cost-minimizing using human resources, which is not a task itself but a quantifying method predominant whether tasks are allocated for variant projects (Das, Singh, Panda, & Yasuda, 2015). Moreover, it also refers to allocating the resources to the construction projects necessary for the execution and completion of the project (Mahjouri & Ardestani, 2010). Allocation of resources in project management plays a significant role, while there is limited scope in the use of management sciences towards project management. It is approached that allocation of resources requires planning or scheduling of interpretation of minimizing costs via application human resources, which is not a task itself but a quantifying method prevailing whether tasks allocated or not for variant projects.

Worker skills play a crucial role in completing various tasks, where various projects require exceptional skills to complete. The improvement of decision-making power and performance of the economy may fundamentally and significantly affect its

ability to carry out plenty of planned works (Koshijima & Umeda, 2001). Numerous skills are a significant phenomenon of the workforce that would efficiently help overcome and reduce costs, while the productivity in the manufacturing sector can also be improved by deliberating participation in the working process. In different projects, the multi-skilled labour force is a valuable model in the assignment of project or work of construction, where concentration is ascertained marginal response to the overestimations and completions while delivering with minimum benefits (Gomar, Haas, & Morton, 2002).

Furthermore, in organizations where workflows require a bit larger to be performed, multi-skilled workers perform their part of the role to minimize such bulks. At the same time, tasks assigned according to organizational charts vary, but performances of such individuals through their assigned capabilities and social networks also put forth an impact on minimizing the flaws prevailing in systems of workflow management which can also be asserted from the model of assessment (Shen, Tzeng, & Liu, 2003). Evaluation of projects also requires multi-skills when human force is used to accomplish tasks that are periodically scheduled according to the environment of the multi-project system. Staff learning can also reduce the outsourcing costs that directly impact the returns of projects. Training and assignments of different projects to staff cannot even benefit the organization but also helps improve the working environment with plenty of benefits to current labour rather than hiring new ones (Wu & Sun, 2006).

Projects of diversified nature require planning and resourcing towards their accomplishment; with a skill diverted human force, it can be a far more manageable approach to reach in particular tenure. Moreover, all works are based on experience

and knowledgeability where the current working team can put their efforts to meet deadlines. However, an effective and timely work completion condition can only prevail when formal learning and training sessions are provided to the human force not only to reduce cost but also for the benefit of decision-making power in a working environment (Certa, Enea, Galante, & La Fata, 2009). Due to the rising dynamic conditions of the economy and rising competition in industries, itself plays a significant role in their restructuring while when neglected costs let them a force to do so. Therefore, most companies preferably choose profitable projects that require deadlines and the efficiency of work satisfaction level, where it is also asserted. At the same time, a study showed that the human workforce could significantly put its role in achieving the career goals and personal satisfaction in the area of work completion and decision makings (Yoshimura, Fujimi, Izui, & Nishiwaki, 2006).

The study restricts human allocation and travels beyond different areas of the economy while keeping in view species threatened by the allocation of resources towards them by the organizations having conservation of funds. It helps in survival and can also benefit the country's economic, ecological, and social structure; management decision is the regime to protect such scary and unnecessary losses to the countries (Joseph, Maloney, & Possingham, 2009). There are different opportunities available in running projects towards their furnishing standards and organizations' satisfaction; out of these opportunities, there must be an adequate means to use these resources for the available evaluation of such projects despite rising upcoming questions in such projects. Such optimal use of resources can be made not only the singly mean to be accomplished but also hides different weak areas by allocation and factors measuring such allocations under the available and running projects (Carbno, 1999).

In ascertaining projects, many factors must be focused on while planning and investing; the feasibility, profitability, security, and many other means must be ascertained despite limitations that can also be not forgotten. Decision-making chart of an organization out a significant role in the management and valuation of such projects for the projected regimes in a competition environment, weights including investments are the vital factors to be ascertained a best-adjusted part in electing projects due to the impacts prevailing various ecosystems (Sheehan, Brace, Williams, & Sullivan, 2000). Economic background examines the social work or ecological force and other factors to play essential aspects in the countries' economy. Projects usually require the human workforce, but in different scenarios, software management can also have a significant influence on the profitability and feasibility ratios that usually admire investors for lurking on were not only working force measures are required but also budgeted and scheduled constraints are focused with an eminent environment (Nair, 2014).

A dollar spent on R&D regarding projected assignments can also be a significant factor in evaluating the expense budget. However, the data before data collection can easily reduce the theory of estimation in future to limit organizational structure from after costs and after efforts (Bassett, 2000). A significant slump in labour availability bumped in decades. An essential factor ascertained and examined in pursuing resources required in nature or organization for project allocation; in fact, new projects require skilled labour to achieve significant and potential effectiveness of projects with aggregate and accurate decision-making. Relationships between the working force, resource allocation and environmental behaviour are interlinked in project completions, while the worker is counted to be an essential and influential part of any projected process of decision making (Yaakob & Kawata, 1999).

3.5.4 Project Contractor's Performance

The business of construction projects has been progressing rapidly in the UAE to be one of the key players and contributors to boosting national economic development. Thus, the proven performance of project contractors is an essential criterion for the assurance of successful completion of any construction project through converting the project plan into practical reality. Contractor performance has gained a standard definition of such critical factors to embrace construction cost, time, quality, and related sustainable development; these factors collectively developed the overall contractor performance (OCP) as proposed by Xiao and Proverbs (2003). Since a construction project's successful or failed execution depends on the quality of the contractor's performance, it is essential to continuously monitor and evaluate performance throughout all essential activities of the project completion plan. Thus, advanced technology and management tools in the project industries have made projection execution more complicated. So, it is necessary to consider various evaluative criteria for monitoring and evaluating performance (de Araújoet al., 2016).

Pesämaa et al. (2018) debated that performance feedback produces a significant and direct positive effect on the entire performance evaluation of the construction process. In contrast, the performance evaluation of project contractors is usually based on criteria, such as their capability to deliver the project on time, within the budget and to the proposed specifications (Li et al., 2017). However, evaluation methods of performance should classify contractors according to their past project experience records and levels to assist the client in deciding whether to hire a qualified contractor for future projects. For example, de Araújo et al. (2016) considered six groups of performance evaluation criteria: interdepartmental relations, expert management, experience quality, skilled personnel, time control, and financial

capabilities, and measured them by the *ELECTRE TRI* method to classify construction contractors following their performance. Consequently, improved contractor performance could increase the client's satisfaction and, in turn, boost the contract's reputation and increase market visibility.

Therefore, Rui et al. (2017) argued that professional capability and experience are among the criteria that could determine the selection of a qualified and best contractor to manage and complete the project within timeline and bearable cost coupled with execution quality (Razi et al., 2020). Furthermore, the record of contractor performance also provides a reliable reference to the client whether to decline or select the construction contractor accordingly and stimulates the success of a construction project satisfactorily. Nevertheless, the contractor's record should go through a transparent and fair procurement system without personal interest or bias. So, Rui's research group also proposed the analytical hierarchy process (AHP) as a decision support model to select the best contractor.

Tao and Kumaraswamy (2012) shed light on the potential relationships between contractor's input and contractor's performance outputs to find a directional relationship between better inputs and the yield of better performance outputs. Such interrelationship would be helpful in decision-making concerning the selection of the right contractors for completing the project execution on time with minimal or zero delays. Faridi and El-Sayegh (2006) reported performance factors that impact contractor performance in developing countries; among these prevailed in the UAE construction industry are shortage of human resources skills, poor supervision and site management, unsuitable leadership, and equipment failure contributing to construction delays.

3.5.5 Project Monitoring and Evaluation

This section reviews relevant scholarly research studies highlighting some success stories of the M&E project execution. Project monitoring is the assessment of the plans, processes, and procedures executed for project completion (Isaac & Navon, 2014). Moreover, it is a process of systematically analysing and collecting the running project's information and comparing the project's results against the project's intentions (Aliverdi, Naeni, & Salehipour, 2013). In addition, the process of analysing the execution of the contract planning, processes and procedures that helps to timely completion of the project is said to be monitoring the projects (Buchanan, Walter, Nagle, & Schneider, 2012).

Regarding working in a group or team, many research activities in the field recommend focussing on how much teams have created a shared mental model, which is considered an essential element in teams' performance. Some same investigations in the domain of the development of the software have made comparative outcomes. Görgens and Kusek (2010) argued that monitoring and evaluation of any project is the mixture of two procedures, although both are distinct but integral to each other. Therefore, it is a process to systematically analyse and collect the running project's information and compare with the project's results against the project's intentions (Hunter, 2009). While on the other hand, M&E Systems are structurally related components set having a similar purpose of pursuing the implementation and outcomes of a project (Sambasivan & Soon, 2007). In this manner, it is a unified reflection and communication setup that supports the project's implementation.

System of Monitoring and Evaluation system comprises four sections linked with each other and are Monitoring and Evaluation system implementation setting, project stakeholder involvement in the project and finally, M&E outcomes communication with others (Holte-McKenzie, Forde, & Theobald, 2006). Monitoring and Evaluation systems theoretically must be interdependent enough to be on the outside reliable and genuine informally but not independent in such a manner that it loses their significance (Gaarder & Briceño, 2010). It ought to accordingly have the option to impact strategy-making from the proposal of exercises learned just as is maintainable extra time for it to be receptive to the requirement of the stakeholders. M&E is vital for project design, implementation, and completion (Chaplowe, 2008).

It is beneficial not only for small but also for large-scale projects, as the information received from it enables the project manager to have sound decision-making by aiding in identifying the onboard areas of the project. Furthermore, those which are needed to amend or exchanged through other forms of the project are the requirement of the different monitoring and evaluation system, data collection, and information at the project life cycle; every level results in the addition of values with the assurance that all targets of the project have achieved. Görgens and Kusek (2010) also proposed that another benefit of the project M&E system is that the weaknesses that fall in the project and cause a delay in project completion may be identified within the stipulated period so that the management might adopt suitable measures to avoid any pendency in completion of the project (Chaplowe, 2008).

Chaplowe (2008) also argues that one of the reasons to call the effective monitoring and evaluation system is the interaction between the workers, measures, technology of the data, and finally, the stakeholders with the view of achievement of the

feasibility and proprietorship. Some other investigations also proposed that the values of the monitoring and evaluation system are intrinsic, and the information that both provide is significant in enhancing the overall performance of the project. Hunter (2009) argues that this could help gain from how and what we are getting along done by concentrating on adequacy, effect, pertinence, and supportability.

Prabhakar (2008) showed that monitoring and feedback led to the project's success. Moreover, Papke-Shields, Beise, and Quan (2010) found that monitoring the project's development continuously seemingly increased the odds of a project's success. According to their research, monitoring and controlling are crucial to managing project scope, risk, communication, time, human resources, and quality. Furthermore, Hwang and Lim (2012) also set up that monitoring and assessing quality performance, timetable performance, and budget performance could also lead to the project's success.

Ika (2012) conducted a regression analysis of project M&E data to reveal a numerically significant and positive connection between every five critical success factors (CFS) and the success of the project. In contrast, the essential success factors include training, design, coordination, monitoring and organisational environment. Also explained is that the most important critical success factors for project managers are planning and monitoring. Ika also classified M&E as one of the vital project successes elements and indicated that the success of the project was inconsiderate to the level of efforts of project planning but, on the other side, discovered that a substantial relationship exists between the use of evaluation and monitoring tools and project "profile," a success basis that was an untimely pointer of long-term influence of the project.

There is no doubt that several infrastructure projects started in third world countries usually fail for many reasons. Among the factors that cause the project's failure are the weak planning and process and the lack of an effective monitoring system (Arditi, 1985). In this context, it further is stated by the IUCN that monitoring a system with having poor planning structure is challenging. In addition to it, according to Idoro's (2012) investigation, although the project planning matters a lot in the success of any project, if there is no proper monitoring system, the well-planned project will fail. In this context, Ika, Diallo, and Thuillier (2010) emphasised that M&E is even more critical than planning in the attainment of project success; likewise, one of the parts of the project management technique whose principal aim is to obtain success of the project was monitoring the progress of monitoring (Chin, 2012). There seems to be an agreement in project management studies that monitoring, and evaluation are vital contributors to project success.

Therefore, planning and monitoring are walking parallel to achieve the success of any construction project. Otieno (2000) assessed the impact of monitoring and evaluation on the project as it did not associate with the task of monitoring and evaluation of the project. Monitoring and evaluation also have not received much attention as an administrative practice, despite the abundant evidence of monitoring and evaluation's commitment to the execution of the project. They lack the required capacities to take on serious tasks conducted in the exiting cycle of the project (Zall-Kusek & Rist, 2004). The primary need for the monitoring and evaluation system is to provide on-time information regarding the operational activities of the project in the view of the planned and set outcomes, which are distinct in purpose.

Zall-Kusek and Rist (2004) further clarified that assessment is a supplement to observing in that when a framework of the examination shows signs that the efforts are not in agreement with the decided lines, useful evaluation base information helps remove the issues that exist in the system and causing to delay project completion. In the monitoring and evaluation, literature researchers like (Cameron, 1993) explored two main reasons why monitoring and evaluation are treated as two tasks, as the monitoring and evaluation failure ends with the fruitful and cost-cutting info regarding making any decision because of deficiency in a collection of accurate information and failure of analysis of the collected information. Second, the monitoring and evaluation concern is responsive to the planning failure slightly, then incompetence and ineffectiveness of the project managerial role (Cameron, 1993).

3.5.6 Project Leadership Styles

Project leadership refers to the leadership qualities of the person who manages the processes of the projects (Anantatmula, 2010). In addition, the project managers' ability to manage the whole procedure, plans and processes (Yang, Huang, & Wu, 2011) in the execution of the project. Moreover, it also refers to the qualities and abilities of the project leader that enhance the speed of the processes and help in the timely project completion (Müller & Turner, 2010). The model shows that project planning, resource allocations, contractor performance, project monitoring, and leadership are associated with the project's timely completion.

Taking a management perspective, the nature of projects presents additional challenges to those involved in them. Projects are distinguished by a unique and interim nature (PMI, 2017). Moreover, from a procedural point of view, the distinctiveness in the project involves a set of solo activities that take to a distinctive

process, whereas these activities are all-time disordered, and they never get to a stable or regular condition; appropriately, process normalization is impossible. Furthermore, according to the deliverable perspective, the distinctiveness of the project implies that the harvests are notable. In addition, it implies that the non-standardized outputs should be expected. A project management process is impacted by issues during a project's life cycle since there is a limit to the number of guidelines or standards that can be stated if any. Moreover, the project is becoming further composite over time.

Project complexity is different scale or size (too small or too large), deficiency of clearness in project demands from customers, the correlation among components inside the project, and doubt in methods of performing projects. Tasks related to functional management primarily include recurring problems or issues in operational management. Due to a regular or steady process, operation managers can rely on progressive standardized methods to direct all problems and issues. Furthermore, many organizational commitments only for some issues or problems are made by functional managers that are distinct and unprotected by the standardized agreement, that is, management by deviation.

Correspondingly, in project management, functional managers and, every single problem or issue is considered distinct; therefore, project managers should allot an essential part of their precious time solving their problems, which standard agreements will otherwise tackle should the issues appear inside the setting of operation management. operational managers both might experience less significant challenges than their equivalents (Mantel, Meredith, Shafer, & Sutton, 2001).

However, the project managers regularly deal with distinctive managerial procedures because "everything is an exception." In addition

Managers would also observe themselves in situations much lower than favourable due to projects' short-term nature. Whereas the short-term here means that the projects are performed in a duration to end before the required date. The project typically manages time pressure/plan. Hence, in many moments, they should hurry critical decisions with having less time and knowledge to examine and intend. Furthermore, project managers should also motivate members who are in their team and other stakeholders. The impermanent nature of the project institution is because of the temporariness of the project.

Tuckman (1965) said that the team project undergoes different early stages of growth and development before the "performing" condition. Therefore, the initial project conditions, such as the storming stage and the norming stage, would need the group to sort out challenges experienced throughout the initial conditions of projects that are worsened by representative project group compositions consisting of individuals from several disciplines. Furthermore, a shared leadership/managerial problem in the project is instability. Hence, it is the authority of the project manager to direct group dynamics, inspire members and speed up the process of obtaining the extreme performance condition.

Moreover, to make the group work, chief project managers must be adjustable and flexible to make the group work to boost the group performance; the chief project managers should be up to employ different means over the legal authority. Extra challenges have been noticed for the project managers who perform inside a trail or effective matrix institutional pattern (Mantel et al., 2001). On these occasions,

project managers are distinguished by their deficiency of legal authority and hence have fewer managerial grips (e.g., penalizing system and reward) to productively oversee projects. In contrast, managers should request functional managers for satisfactory group members and other resources that must begin projects in a few cases. In addition, another struggle is dealing with several shareholders with various and most frequently clashes of interests.

Unnecessary clashes between project group members and other stakeholders can occur due to unproductive management of various interests, which hampers group performance by looking attentively at the clash resolution. Project managers must work over their legal authority to persuade, negotiate, and bring all project group members to one platform, and as well all stakeholders join towards common objectives and conduct the projects. So, project managers are central to higher-level project performance (Pinto & Kharbanda, 1995).

In realizing institutional (parent) victory, it is agreed with the traditional belief that suggests the significance of project managers (Toney, 1997). However, the decisive sign is revealed by the notable challenges experienced by project managers from different sources. Furthermore, amusingly such managers must perform over their formal name (e.g., manage) by vigorously pursuing and applying a more fundamental role of authority or leadership. Usually, projects are distinct and are often related to uncertainty, complexity, and unknowns.

The role of a project manager is more challenging than that of functional managers. Moreover, to work around functional and institutional environments conventionally arranged to assist functional managers, other challenges faced by the project managers are legal authority, working in a matrix institution where the problem is the

unity of order and giving leadership with no documents (Cleland, 1995). As a result, project managers are recognized as leading various sets of people with less direct management over the group members (Cleland & Ireland, 2002). Besides, projects could be controlled using groups in a work area that is composite for two causes: first, every project is distinct, and the second cause is that requirements for group selection and inspiration are frequently away from ideas (Smith, 2001).

A representative institutional pattern presents related issues for group selection; in contrast, no project manager may have the option to choose a project group. Further, few members of the project group are involved in multiple projects simultaneously. From the evidence of Kerzner's (2017) survey, it is clear that human factors play a significant role in project failures in terms of cost and time. Poor relationships with humans, lousy productivity, inadequate motivation, and lack of commitment from workers are reasons behind project failures. The differences between leadership and management are not always apparent, so it is significant to understand them.

Management usually is focused on traditional functions like planning, then organizing, and in the end, controlling. Moreover, in common, management is apprehensive with decision making regarding functions and processes to enhance operational effectiveness and efficiency. Alternatively, leadership means guiding and motivating people to make them realize their ability and obtain institutional goals that are challenging and harder. Furthermore, leadership is categorized into different leadership styles, such as transformational leaders who motivate their followers and contribute to solving different problems (Seltzer & Bass, 1990).

Situation leaders focus on different tasks and relationship actions (Blanchard & Hersey, 1996). The transactional leadership style, built on the interchange of work

and reward, is extra suited to institutional methods, whereas transformational leadership is more functional when one is apprehensive about relations. Two elements relate to projects that compass the significance of management roles in the project's performance. The first element is that the project must control a group consisting of various disciplines, whereas the second element is that projects are distinguished according to risk, uncertainty, complexity, and unknowns. In addition, management functions such as institutions, planning, and management are at the centre of effective and efficient use of project resources.

3.6 Relationship between Dependent and Independent Variables

This section devoted for investigating the relationships among the variables under the study. Ruqaishi and Bashir (2015) investigated the causes of delays in construction projects in oil and gas processing facilities in Oman and served as a case study for the Gulf Cooperation Council (GCC) countries. The survey results showed a high degree of agreement among the perceptions of project stakeholders, clients, contractors, and consultants on the causes of project delay. In addition, there is no evidence suggesting that project delay causes differ significantly according to organization size or organizational structure ownership. Moreover, seven factors were identified as the significant causes of project delay. However, six of these identified elements are general factors that can account for the delay in any project in any industry; one of them, poor interaction with vendors in the engineering and procurement stages, is unique to construction projects in the oil and oil gas industry.

Mwesigye (2018) examined the project planning process for construction projects to assess unidentified gaps in construction project planning that led to untimely project completion and evaluate the impact of project planning stages on timely project

completion. 96% of respondents believe that project schedule impacts the timely completion of construction projects. In addition, 91% and 87% gave the information that defining the scope of works and estimating activities' duration, cost and resources per activity influence the completion time of projects. However, the research further established that not all the planning activities identified impacted the timely completion of projects.

Kazemi et al. (2018) used the fuzzy Delphi approach for identifying delays in oil and gas construction projects. The study suggested that eleven factors were introduced as causes of delay in oil and gas construction projects. These include owner, contractor, consultant, equipment, workforce, materials, design, contract and contractual relations, laws and regulations, organizational factors, and environmental factors. Latif et al. (2019) also reported that changes in the scope of the project, lack of communication between parties and shortage of skilled labour were three top delay factors in Oman. Kazemi et al. (2018) showed that sanctions, governmental management systems, weak project management by the contractor, technical and managerial weaknesses of the consultant, financial problems and delay in payment by the owner, low efficiency of the equipment, low productivity of the workforce, changes in laws and regulations, inappropriate organizational structure linking to the project, changes in the design, and changes in the price of materials are the most crucial factors causing a delay in oil construction projects.

Kraidia et al. (2018) study concludes main factors negatively affect timely project completion: Improper safety regulations, improper inspection and maintenance, weak monitoring not proper design, construction & material defects, lack of proper training, threats to staff, and shortage of the IT services & UN availability of modern

equipment, operational errors, and conflicts over land ownership, lack of sufficient research on the subject matter. Alavi and Nadir (2020) established that the oil and gas industry requires employing systematic techniques by the highly skilled and experienced management team in the oil and gas projects. The professionals and experts in this field must possess a sense of balance regarding the utility of risk contingency to link engineering and organizational management. Therefore, oil and gas project managers must enjoy an interdisciplinary knowledge of applicable technology in the project and respective management and organizational expertise.

3.6.1 Project Planning and Timely Project Completion

Doubtless, project management has been recognized as a professional practise; the significance and quality of project planning are the vital keystones of every successful project. However, the existence of projects is since the start of civilization. Project management as a discrete field appeared in the 1950s and 1960s with the expansion of network methods such as the critical path method (CPM), programme evaluation and review technique (PERT). In 1969, the formation of the project management institute (PMI) had more strengthened this concept. Its recommendation, the project management body of knowledge (PMOK), emphatically advocates the significance of project planning (PMI, 2000).

Several empirical types of research on project management success elements proposed planning as one of the vital contributors to the project's success (Pinto & Slevin, 1988a). Still, this conservative thinking can be challenged. The literature on strategic management provides a censorious insight into the impact of strategic planning on the performance or success of the business. Austin (1994) argued that the rise and fall of strategic planning is one landmark in this discourse. Inexpertly in the

literature on project management, few uncertainties have been recently evaluated regarding the significance of formal planning (Andersen, 1996). So, is project planning significant? We have begun our research with that inquiry in mind. Moreover, our objective was to revisit the usual paradigm about the central significance of project planning and to understand the contradiction of trail planning with successful results and good planning with poor results.

We presumed that proper planning might not be enough to forecast success, and other elements must determine the failure or success. Furthermore, this presumption follows doubts about project planning that existed previously like. Unfortunately, most innovation management practices are appeared to be predicated on the implicit assumption that we can beat the sloppiness out of the process if only we would get the plans tidier and the teams better organized. The role of experiments and skunkworks, the zeal of champions, and the power gained from exploiting the innovative user as the partner is denigrated as an aid only for those who are not smart enough to plan wisely. We thought back on the ancient civilization pronouncement of Dwight Eisenhower:

Plans are nothing; planning is everything. Many writers concur that the projects are painstaking work, time limitations, and a complex and unique attempt that has not been done prior. Therefore, it is challenging; instead, it is even impossible at the beginning planning phase to precisely know which activities must be conducted regarding finishing the project and to find their cost and duration framework. In addition to the high doubt related to projects, the traditional focuses on the project planning within the industry also the specific empirical outcomes are even more astonishing. Thus, we explain Eisenhower's assertion to mean that in project

management, project original plans and project objectives will have to be altered to sermonize the dynamics raised by doubt and to boost the success of the project, whereas, on the other side, high cost of transaction can be caused due to plan changes, which impact is negative on the results of the project (Andersen, 1996).

It is possible that plans can change for various reasons, and they may be a result of recommendations made by the project team, or they may result from a change needed by a customer, or even from a change initiated by a new manager who joins the project at a later phase and wishes to create a new plan. However, there are times when projects are considerably changed; so that once the project has been completed, it may no longer be relevant (Mishmish & El-Sayegh, 2018). Therefore, much pressure can result in losing initial focus on the project. Moreover, the initial question concerning project planning can be rewritten: *how do changes in either objectives or plans influence the project's success*? As the prior study difficultly addresses this question, we think that cautious empirical inquiry is needed to understand better the consequences of the changes in project management success (Rui, Peng, Ling, Chang, Chen, & Zhou, 2017).

Referring to Eisenhower, the central question of this report would be restructured as follows: *is it correct that plans are nothing changing plan is everything*? The fundamental goal of this research was to empirically study the influence of project objective changes, planning of a project, as well as variations of plans of project success, and to determine whether an excellent quality of project planning could reimburse for the possible negative consequences of changes. In contrast, the second objective was to know how contextual features of the project affect objective changes and how such alterations jeopardize the success of the project (Taghi-Zadeh, 2016).

The next part discusses the empirical and theoretical literature on the restrictions of identifying hypotheses and planning projects based on that analysis. Whereas in the third part/section, we obtain and empirically trail conceptual structure, and in the fourth part, outcomes and relevant discussions are made and then presented. Moreover, the implications of our outcomes for the exercise of project management are debated in the fifth part. Finally, the summary and outlook for additional study are presented at the end of the final part.

The debate on legal structure planning and its influences on collaborative performance is like the debate on planning projects and their influence on the project's success. Consequently, the area of strategic planning looks to be a significant origin of knowledge accompanying the debate on project management. Also, strategic planning literature normally sermonized three various areas of problems: the significance and influence of plans on the performance, contextual impact on the planning of the method and the planning of the method itself (Armstrong, 1982).

3.6.2 Resources Allocation and Timely Project Completion

There are many projects of construction at different phases of implementation in various countries, while all of them have some contradicting views upon their scheduled performances, some argue on the disregards of commitments, and some argue on their resource allocations. Various features result in delay causes, where such features are necessary to be identified to get overcome through some fundamental steps and aims to achieve the same perspective. Some studies aimed to achieve the targeted objectives that prevail in refraining timely completions of construction project. Some perspectives that usually focused to response properly in

accordance to timely project completions are to examine, to determine, to establish some effects and to count some effects of resource allocation, project leadership, planning of projects and monitoring of project within time frame for construction will surely help out managements also for planning and implementations (Murithi, Makokha, & Otieno, 2017).

Constructions projects are related to resource allocations, which may also result in causing delays; some factors were selected to interpret the cause of delays, external, contractor, consultant and owner factors are eminently elected in this study to evaluate the essence of such duration failures, which are most highly ranked factors among different studies. The scope selected was found limited to some areas, which are usually among such factors where the allocation of resources failed timely construction completions (Alaghbari, Kadir, & Salim, 2007).

To identify the global phenomenon of delays in the industry of construction, it is also essential to analyse the impact factors and effects that usually cause or influence the construction industry because while evaluations resource allocation eminently covers all such factors to regret or eliminate such cause of delays. Earlier studies tried picking a single-entry factor that influences construction industries, while in this study variant factors are analysed to successfully sort out the missing resources allocation and indeed determined the ten most eminent clauses that usually influence on the construction industry and the relationship between them conducted in their effects and causes (Olawale & Sun, 2010).

Some countries were elected to strive out the global view regarding construction sector and allocation of resources, where Indonesia a developing country is also counted for this study where plenty of variables selected to analyse the impacts and

prominent factors enabled layouts the delay causing stages and factors in timely constructions reflecting resources allocations a contributing channel (Kaming, Olomolaiye, Holt, & Harris, 1997). Planned projects significantly conclude their best outputs in meeting deadlines while arranging all resources in accordance with their construction projects, Vietnam fall in developing countries eminently took many factors to analyse the cause of delays in construction projects where more than twenty-one clauses were interpreted during causing factors that prevail in lack of resource allocations.

In the case of Africa and Asia are also comparatively considered for such study and different constraints were initially examined to be forcefully lasting impacts on meeting construction deadlines (Le-Hoai, Dai Lee, & Lee, 2008). Civil Engineers are the central part of the construction industry, where some mathematical theories were established to find delays in such civil engineering cases for construction sectors of south-western Nigeria. Plenty of clients, contractors, consultants and many others elected to evaluate more than 70 factors that prevail in causing delays of construction while using multi-stage works and various materials with ultimate regressions to interpret such goons falling under deadlines, where resulted factors significantly endorsed such lack of resources causing delays (Amu & Adesanya, 2011).

Construction industry always relates towards infrastructure and escalation of project valuations while emphasizing the causes and effects on timely completions whereas, socio-economic conditions dramatically can be disaster towards meeting deadlines efficiently in the context of Saharan Africa studies. Cost escalations and plenty of consequence occurrence shown significant impacts of resources towards timely completion of construction projects. These timely completions have far taken

importance in vide area of studies in many countries whether developing or developed, where different means were also generated to overcome the issue that was usually performing eminently in causing delays of constructions, statistical and mathematical standard technique also took part to analyse such impacts that risk factors cover the other area in the same standard. Models used in the study provide not only gossips to overcome delays but also highlighted issues that provide a sharp percentage of such effects (Žujo, Car-Pušić, & Brkan-Vejzović, 2010).

The construction sector of Ghana also plays a vital role in the benefits of its economy, even though delay factors are also effective means for creating rupture inefficiencies of the construction industry which is also confirmed through various contractors and clients who perform in accordance with their benefits in the construction sector. More than thirty-two factors were identified in this study to examine the most prominent and best-fit interpretations in the evaluation of elimination of delay causing parts in industry of construction to further the process of implementation for not only greater profits but also efficient working standards. In Ghana, different surveys were conducted in accordance with the availability of data while in discussion with a different group of people to interpret the exact issue that deliberately delivers the financial constraints towards construction delays, a leading wrong allocation of resources in the construction of projects (Fugar & Agyakwah-Baah, 2010).

An investor usually not expects delays in their projects due to their ascertained profits, while most projects usually or naturally indulged in part of causing delays itself like the selection of projects, underground and groundwater, etc. As stated in Ghana study, questionnaire data gathered while surveying public including plenty of

contractors and clients with simultaneous queries and interpreted some significant factors that not only affecting the costs of projects but also running future effects on the delays of construction projects that will surely outrun the costs on which projects were selected. In project valuation, usually, all aspects were covered including planning and costs of the projects but an outsourcing a new era that usually causing prominent delay in construction, while to overcome the issue to such delay a proper causing method must be used to eliminate the issue that prevails largely in allocation of resources and project management with effective means of standards (Frimpong, Oluwoye, & Crawford, 2003).

Different surveys were conducted to evaluate the clauses of delays; Saudi Arabia is one of them in analysing the same issue where the delay occurred in construction projects due to eminent factors that are impacting in other countries of the world in the construction industry. Plenty of variables were selected in this study by electing more than twenty-three contractors and more than 20 outsourcing consultants that provide services regarding the construction of projects whether residential or others, more than 70 highlighted clauses were identified with consideration of percentages that interpreting the high influence of resources on construction sectors. All the factors were identified in accordance with selected parties that endorse significant role in the development of construction sector, whereas, it is found that out of seventy percent projects more than forty-five projects considered to be delayed out of seventy-six projects that can be a disaster to the economic condition of Saudi Arabia and oil-rich and exporter country (Assaf & Al-Hejji, 2006).

In Asian countries, Malaysia is fast growing countries among many others while the growth of Malaysia is also increased since the 1970s, while the construction sector of

Malaysia is most contributing sector towards its economy, whereas the major construction projects are eminently performing better than other this country is also facing the same issue where deadline is not met in accordance with their standards. The risk factor is most prominent in project completion and costs, but the contributory factors also eminently play their role in causing delays of constructions; meanwhile, the data collected among different areas also analysed pieces of evidence to reduce what exceeds (Al-Momani, 2000).

Historical background of construction sector is playing significant role in the best means of economy, and a significant pillar of economic access generates not only incomes but also plenty of employments to skilled and unskilled ones with various benefits not only for the sake of profitability channel but also for reduction of cost and elimination of factors causing delays in construction industries. Eminently factors causing delays usually found in residential projects due to the part played by their owners in accordance with their wishes, standards, and material supplies, while interviewing with certain contractors, residents, investors and many other the most emphasizing issue raised is resource allocation in construction of projects by meeting deadlines. Not only the owners perform in the construction of residential houses, but they also result in other factors that indeed cause further delay, whereas also weather and economic conditions significantly playing its part in causing such delays (Sweis, Sweis, Hammad, & Shboul, 2008).

3.6.3 Project Contractor's Performance and Timely Project Completion

Failure or completion delay of a construction project is often suffering from poor performance due to improper selection of contractors. Nonetheless, selecting a capable project contractor is one of the crucial requirements for completing a

construction project within a planned deadline. The contractor is either an individual, organisation or firm that signs a mutually binding agreement obligating the contracted seller to provide the specified items to the running project. Thus, efficiency is the ability of the contractor to achieve items delivered on time (Lee et al., 2014).

Construction contractors often evaluate the projects following their profitability ratios while claiming disputes in such parts and understanding the terms of construction contracts. Consequently, contractors need legal aid to understand clients' contract terms and conditions. The project managers analyse various project construction areas while being a part of it, whether its conditions or any other, but project valuation inserts its esteem work to eliminate such delays (Al-Momani, 2000).

3.6.4 Project Monitoring and Timely Project Completion

Every project requires a monitoring process to evaluate the effectiveness of project management and its right sides and gaps of completion; it requires plenty of factors to be determined, such as strategic planning, a framework and an analysis of strengths and weaknesses with the budgeting process that enables projected frameworks a successful completion within the given tenure. Therefore, to analyse the success of project completion, it is necessary to examine to what extent such factors as frameworks, planning, budgeting, and SWOT analysis directly or indirectly affect its success.

Kenya is the most important country in project management, where plenty of countries directly or indirectly started some projects. Many respondents were taken into consideration, from which ninety per cent of them availed of the opportunity.

They inferred results that deliberately interpreted strategic planning as the most highlighted percentage factor influencing project success while many others endorsed the per cent effects, but a lighter flame is generated towards project completion (Barasa, 2014). Projects may vary on specific standards. In developing countries, projects are usually outsourced, whereas, in developed countries, the parent country invests and monitors the projects prevailing on their economic grounds. It usually significantly requires monitoring of land and various aspects such as budgeting, costing, expensing, and planning. The different areas covered in this study specify the monitoring standard followed by their forest service of Canada as detailed analysis given through imaginary analysis and support of Canadian space agency is also enhanced (Wulder et al., 2008).

Despite the importance of projects, organisations practice remaining in project completion instead of learning that investors are interested in deadlines given to the organisation. In Kenya, where external service providers implement most projects, funded projects are monitored directly by their investors. Data collection for about seven years with more than fifty respondents revealed a correlation between monitoring and project closures, which are a particular means donors seek to reduce expenditures incurred or incurred on projects through unity (Gaturu & Muturi, 2014). Many researchers studied the relationship between the project competencies and the monitoring of the project environment, which establishes a temporary link between them, but is interpreted by assigning different models to analyse the relationship and the impact between them by different variables, using a data sample that includes not only professionalism, but also all the components that would allow the necessary information to evaluate the monitoring aspects after the completion of different projects (Liu, Chen, Jiang, & Klein, 2010).

The building industry delivers a maximum proportion to the economies where the projects may vary with its standard, but in building, it directly hits the GDP of any country, which is the primary factor they stand upon. So, the study examines monitoring and completion and explains the inputs and outputs of several projects, including project inputs and outputs. In contrast, planning and monitoring in the completion of projects highlight their significant contribution. However, an objective policy standard must design and manage such projects to eliminate the weaknesses lurking between monitoring and project completion decision-making process also affects the timely completion. However, effective decision-making will lead to projects improving well-being for completion (Munano, 2014).

Monitoring and evaluation of projects are the fundamental factors that will lead to the success or failure of projects because all this also involves the evaluation of decisions, such as washing projects that provide maximum results to investors but also lead to a lack of satisfaction standards, which leads not only to a lack of future profits, but also customer dissatisfaction. Therefore, primary data is collected, taking into account a variety of variables, primary questionnaires from professionals and community members, which strongly confirm the relationship between monitoring and completion of projects with adequate resources This requires monitoring of projects, but weak oversight of monitoring and completion results in low turnover with donors or direct investors (Migwi, 2015; Mutoro, Asinza, Kanda, & Malenya, 2017). Projects of different designs and allocation are not only considered efficiencies, but also more significant outputs for the donors and investors (Mutoro et al., 2017).

Management usually practices following all standard operating procedures to look after the projects that are in loops and the projects of incoming timelines, it may vary in nature, but the mainstream of deadline remains focused. The descriptive survey is conducted to analyse the relationships between monitoring and completions by taking data from more than 350 construction companies in Nakuru Town in Kenya with a systematic sampling procedure. The study recommends the standard of quality to be observed in such projects that enable the investors to carry on with the same perspective and not to hold investments, whereas policy-makers successfully induced a satisfaction model to oblige and satisfy the donors or investors to carry on further projects where monitoring standards are maintained by manager projects and engineers for the effective implementation of completion of projects (Kwasira, Wambugu, & Wanyoike, 2016).

3.6.5 Leadership Styles and Timely Project Completion

It has been noticed that several projects have experienced various failures despite the allocation of huge investments and employment of advanced technology and methodology in executing project plans. One of many core reasons behind such failure or poor execution is the lack of required leadership qualities. The project leader plays a vital role in efficiently and effectively streamlining work and successful execution. However, numerous studies tackled the potential multi-roles of the project leader as core forces in driving organisation development and required resources (Shenhar, 2015).

The administrative style of the leadership is demonstrated in impactful organisational skills in establishing efficient and effective interlinked elements, such as the socio-psychological level of the employees at the workplace. Brown, Posner, and Journal

(2001) argued that performance is inclusive of both behavioural and results and adjustments of behaviour and work actions for achievement of results. Nevertheless, leaders could be superior compared to their leaders. Shenhar (2015) argued that transformative leaders are pre-emptive in raising the level of awareness of followers regarding stimulating collective interests.

Cole (1997) stated that it is required in certain circumstances where change is required, for example, for settling any rising disputation like a call for moving into strikes. Accordingly, it is necessary to mobilise leaders to be involved in negotiations with the workers to find suitable solutions concerning their complaints about resuming their work in a convenient workplace, moreover, grounded on the great conviction of the leaders regarding vital issues, high standards of ethics and morality, risk sharing, the achievement of goals while having a look at others' well-being (Floris, Wiblen, & Anichenko, 2020).

Much research proposed several interlinked elements by focusing on how the organisation's rules and regulations assure work completion in practical and positive ways for induction of better performance. A query like to keep the project running smoothly we require what kind of resources, like reliable vehicles, full of skills and supportive staffing, healthy official environment with salary package, policies of the management particularly for retention of the staff, a sound reporting organisation, communication channel, balance in between work-family life and finally delegation of the authority.

Are the policies, processes, and practices ensuring the clients' healthy engagement in the administration of the project? The services are available in the location, in the proper form as required by the stakeholder at a time. Though leadership's prime

objective is to develop skilled project teamwork members; thus, the leadership form deals with the command and acquiescence. The centralisation of power in this leadership style is based on avoiding the interference of subordinates, such as suggestions (Bonau, 2017). Thus, the leadership's ability to give or keep back rewards and penalties would be the leadership's ability.

Gannon (1979) suggested that such leadership had some pros and cons regarding things being done, but the employees stand interdependent in leadership due to hurdles that stand against their skills development. However, a competent leadership accelerates the pressure on the team members to push up their performance to attain high production by applying minimum cost with the usage of procedures like tight budgeting, cutting the costs, individual settled targets, solid standards for improvisation of productivity and financial outcomes in the short run. Musaazi (1982) determined that the leadership lacks any consultation to assign tasks to its team and carried it out without any query. Likert and Likert (1976) suggested that competent leadership with a high enactment goal line boosts the pressure on its team for maximum production with minimal costs. Its achievement is practised with a challenging monetary budget, reduction in costs, individual maxima and harsh lines for impressive productivity and financial results in the short run.

Caldwell and McKeown (1993) stated it leads to no space for an autocratic leadership if it is disinclined to endow others. Charlton (2000) explored those managers of the projects with tight controlling measures usually face resistance, antipathy, the wrong output of work, high turnover of the staff and protest of the team against such policies. Execution adequacy gets from human yearning and values that are undetectable organisational roots, though, to nature, values of an

organisation's root are the ultimate task of a leader, which comprises only essential human goals. Uris (1964) investigated the styles of leadership to have found that bosses got on well companions and felt relaxed with the leadership. This leadership pattern increases their motivation level, and they work harder for project success by quick decision making and consultation when challenges arise, making work more productive and efficient.

Uris also suggested the theory of contingency that proposes an appropriate matching between the leadership style while interacting with juniors and the level to which the project leader controls and influences others having its dependence on the adequate performance of the group. Individuals with this leadership style usually work randomly because of spending more time in arguments and discussions frequently keenly personal. Moreover, Uris argued that there are responsive terms of frustration and arrogance in organisational behaviour when staff face a leadership direction environment that entirely depends upon the leader, while the absence of leadership leads to no work. Contingency theories in leadership back a great liberty deal to leadership. It focuses on the personal relationship among leadership styles, various situations, and employees' demands. Effective leadership styles have a dependence on allowing a specific degree of freedom while administering the style of the leadership. The study of Nuhu (2010) on leadership styles on performance of the employees in Kampala City Council observed that were there within the department. The workers face a low level of authority from their bosses; the quality of work is high in contrast with other sections.

Murimi (2016) indicated that leadership is displayed where the focal point of intensity in the whole is more towards the group and where interaction is higher

between groups. Problems most of the time lay by the manager before subordinates and welcomes the Leaders to impose debate, where the decision is expected to appear from discussion except the decisions. Fisher (1995) noted that this specific leadership style has advantages for not only the worker but also for the employer when engaging in schedules of the performance if while work requirement meeting shares equal responsibilities. Yammarino et al. (2012) interviewed a sample of workers in Hong Kong about their preferable approach to a versatile style of leadership in project management. Tuuli and Rowlinson (2010) investigated the leadership styles of construction project managers in Hong Kong about their preferences towards democratic leadership, where their training is to be sensitive to subordinates at the workplace. There are no rules, no regulations, and complete freedom granted by the leadership in terms of groups' decisions. It boosts the independence of the employees while they are setting their goals and deciding means for their achievement.

3.7 Research Gap

Based on the existing gaps, this study examines the potential impact of selected delay-promoting factors, as discussed in Chapter 1 (Section 1.1.3), on the timely completion of construction projects in the oil industry. A related study by Chin et al. (2017) mentioned that the factors affecting the timely completion of projects need to be further investigated using real-world data. This study fills this gap by investigating the factors affecting the timely completion of projects using real-world data from oil companies' project business in the Emirate of Abu Dhabi. Hajialinajar et al. (2019) suggested that future researchers investigate the interruptions in the estimated project completion time and consider the factors that may pose a risk to timely project completion. The present study will fill this gap by investigating the

factors that affect timely project completion. Furthermore, Zheng et al. (2016) provided direction in their research that future studies should conduct a more thorough examination of project timeliness. Therefore, this study follows this existing gap and conducts a more thorough investigation by considering several factors influencing project time. Li et al. (2017) studied the timely completion of projects and suggested that this area needs further research with new evidence.

This study now fills this gap and provides new evidence for the timely completion of projects by examining the oil and gas industry of Abu Dhabi. Tang, Zhang, and Zhou (2017) studied project completion time and suggested that cost and other factors should be included in the evaluation of project completion time in future studies, and this study now fills this gap by considering the many factors that affect project completion time. Finally, Baharum et al. (2018) conducted a study on the impact of environmental factors on the timely completion of projects and recommended that factors other than environmental factors should be included in prospective studies. This study now fills this gap and considers factors other than environmental factors, such as resource allocation, project planning, project supervision, contractor performance, and project management, which may affect the timely completion of projects.

Investigating more in-depth on the various factors lead to delays in the project time completion and dealing with these factors can be improved by involving several field experts. At this end, the literature review alone cannot help that much to fill the practice gaps related to this issue as the field experts.

The research aims to investigate the following hypotheses:

Hypothesis 1: Project planning will affect the timely completion of the projects in the oil and gas industry in Abu Dhabi.

Hypothesis 2: Resources allocation will affect the timely completion of the projects in the oil industry in Abu Dhabi.

Hypothesis 3: Contractor performance will affect the timely completion of the projects in the oil industry in Abu Dhabi.

Hypothesis 4: Project monitoring will affect the timely completion of the projects in the oil industry in Abu Dhabi.

Hypothesis 5: Project leadership has influence on the relationship between resource allocation and timely completion of projects in the oil industry in Abu Dhabi.

3.8 Chapter Summary

Today's construction projects in the oil and gas industry are a fast-moving industry with complex networks of partners, contractors, material manufacturers, and investors. As a result, construction project leaders are increasingly called upon to make decisions in a complex business environment where technical and financial skills make a difference in building an agile project industry. Academic literature indicates that the oil and gas industry in the UAE has enjoyed strong support from the state leadership. In addition, the chapter details the factors responsible for different types of delays in oil and gas construction projects in the UAE and

highlights the factors responsible for delays in similar industries in other countries to represent international experiences.

The chapter also provides a comprehensive account of the selected variables, including their role, interrelationships, and importance in building the conceptual framework. Our proposed framework comes in line with a framework proposed by Al Ameri (2016) which addresses how the interrelationship of independent-dependent variables conceptualizes the impact of the delay-causing factors on the timely completion of the construction project in the oil industries (Al Ameri, 2016).

As the literature aims at providing further details for supporting research objectives, questions, and hypotheses. The literature suggested two underpinning theories, which are project management competency, and programme theories for supporting the selected variables that include timely project completion (as a dependent), and five independent variables that are related to project execution issues (e.g., plan, resource allocation, monitoring and evaluation, contractor performance, and leadership), purposely to defining the potential relationships among the dependent and independent variables. The five selected variables in our study are contrasted as independent variables and the timely project completion as a dependent variable. These variables represent the factors specific to the oil and gas industry in the Emirate of Abu Dhabi, which have been observed and recorded as common causes of delay, they act as a useful addition to the literature and supports interpretation of the projects from the data collection phase to the project completion phase. This comes in line with Ruqaishi and Bashir's (2015) study, where they investigated the causes of delays in construction projects in oil and gas processing facilities in Oman by

identifying seven independent variables as the significant causes of the project delay as a dependent variable.

CHAPTER 4: METHODOLOGY AND RESEARCH PARADIGMS

4.1 Introduction

This study aims to critically evaluate the potential role of the factors leading to delays in the timely completion of construction projects in the context of the Abu Dhabi oil and gas industry. The selected variables are i) timely project completion (as a dependent), and ii) five independent variables related to project execution issues (e.g., *Project planning*, resource allocation, monitoring and evaluation, contractor performance, and leadership), purposely to defining the potential relationships among the selected variables. Furthermore, these variables are used in constructing the conceptual framework of this research study for detailing the relationship between previously mentioned variables; one is a schematic representation through interlinks. Also, the proposed framework addresses how the interrelationship of independent-dependent variables conceptualizes the impact of the delay-causing factors on the timely completion of the construction project in the oil industries within the UAE in large and in Abu Dhabi in specific.

The purpose related to this study is to examine factors such as resource allocation, project planning, contractor performance, and project monitoring affecting the timely project completion in the oil and gas industry in Abu Dhabi. Thus, the adopted quantitative research method could satisfactorily answer the proposed research questions and the related hypotheses. Therefore, positivism is the research paradigm (Philosophy) for this research study and data analysis and interpretation.

The existing body of scholarly literature on identifying various delay-causing factors associated with construction projects in oil industries, particularly in the UAE, reveals a scarcity of focused research studies. This little attention might be due to insufficient practical experiences among the community of project personnel in

detecting and probing the factors causing delays in specific projects. Such a challenge has sparked a keen interest in UAE project-oriented organisations to conduct various academic and professional investigations. Therefore, this study considers literature scarcity and lack of practical project experience in the academic challenges of the UAE oil and gas industry. Similarly, this research study also represents a value-added scholarly contribution to project literature in the UAE.

4.2 Research Methods- An Overview

It is beyond dispute that the new scientific knowledge is known to operate only through appropriate research methods for tackling the research problem under investigation. Therefore, the research methods fall into three broad categories, namely, (i) design issues, (ii) measurement issues, and (iii) analysis issues; however, the research method adopted here often outlines the core features and elements in each of these three categories. The proposal of the planned research study must possess enough power to probe effectively the problems raised in the research objectives. The attained power is exemplified in the interaction of three factors related to data collection and analysis, namely, (i) sample size, (ii) inquiry formulation (hypotheses, questions, interviews, and the like) and (iii) error estimation during the analysis. These elements are, in turn, involved in the selection of a suitable research method, including a specific instrument for data collection and analysis.

A research approach is a discipline in which different research methods acquire knowledge. Many research methodologies are used in research studies from the project management domain. Research methods can be classified according to some dimensions into (i) qualitative-quantitative, (ii) manifest-latent, (iii) exploratory-

confirmatory, (iv) descriptive-inferential, and (v) metrical/non-metrical (Wu, 2012). Blaxter et al. (2010) examined the difference between the two terms: "methodology' and 'method'. The term method refers to a specific means of collecting data. In contrast, methodology refers to the strategies surrounding the multiple methods of data collection as required by different types of attempts to achieve a higher degree of reliability and validity.

It is helpful to illustrate the major components of each research method, such as their use of closed ended versus open-ended questions and their focus on numeric versus non-numeric data analysis (Wu, 2012). Thus, before designing a research proposal, the initial consideration is to identify a framework for conducting the study. Three approaches to research are frequently adopted, depending on the nature of the study. These approaches are quantitative, qualitative, and mixed-method methods, widely used in researching a broad spectrum of social studies (Creswell, 2014). Each of the approaches mentioned above has its philosophical assumptions about knowledge claims, strategies of inquiry, and specific research methods.

When the philosophy, strategies, and methods are integrated, they furnish a range of frameworks for conducting research. However, the relevant research literature also emphasises other research characteristics, such as reliability, validity, and information orientated. Creswell (2014) indicated that determining the size and nature of the research sample is considered an essential first phase during the research study because it could help to notify the quality of inferences that the researcher has made and stem from the underlying findings. In both quantitative and qualitative studies, researchers should decide the number of participants to select (i.e., sample size) and how to select these sample members (i.e., sampling scheme).

4.2.1 Paradigm Adoption

This Section outlines relevant research paradigms and philosophical foundations of research methodologies employed in a research investigation in general. It also justifies adopting a research method to tackle the research problem according to the proposed research aim, objectives, hypotheses, and questions. Then, the operational definition of the constructs and the development of hypotheses taken by the literature are presented. It also provides the measurements of each construct, such as timely completion of construction projects, project resource allocation, project planning, contractor performance, and project monitoring and project leadership. The remaining part of this Chapter provides the instrument, data collection procedure, and data analysis.

Conducting an academic research investigation involves adopting a suitable research method and philosophy to design a planned procedural framework for leading data analysis and interpretation and filling knowledge gaps concerning research problems and topical themes. Therefore, the fundamental concepts of the research problem require the validity of the research aim, objectives, hypotheses, and proposed questions to be methodology-driven approaches. Hence, this study found the research work of Blaxter et al. (2010) helpful in describing the below approaches that are pertinent to the nature and scope of this study:

(a) Sampling method employs either probability or convenience sampling. Probability sampling is a random, stratified and cluster design, whereas convenience sampling is a non-probability that includes various approaches to focus on target individuals or groups in specific settings. So, the common contact approaches include phone interview, online survey, and face-to-face interview.

(b) Questionnaire/Interview length reflects the number of questions or inquiries sent to the participants to obtain the required research data. However, whether short or long, the questionnaire/interview length does not necessarily reflect the quality of the research under investigation.

(c) Response facilitators include a preliminary notification of the participants before distributing the questionnaire by various means. Besides that, it is necessary to follow up with participants to ensure a satisfactory response rate.

(d) Target population characteristics approach considers the demographic such variables as gender, age, educational level, and job responsibilities.

(e) Appeals are used to motivate the respondents to reply promptly; for instance, telling the participants that their feedback would be valuable for completing the research objectives.

Many researchers in social studies recommended that relevant philosophical assumptions and diverse approaches or techniques are needed for conducting a robust research study. Blaxter et al. (2010) defined a broad research approach as "*A proposed plan or project designed purposely for conducting an encompassing investigation on a specific problem involving the intersection of philosophy/theory, research design, and specific methodology*". Over time, an enormous range of methodologies and paradigms has been developed to address specific philosophies and factors related the success and failure of project execution and delivery. The growing body of scholarly literature pertinent to research methods had indicated that each research philosophy often links directly to the knowledge pool development of a specific field purposely to enhance sufficiently research strategy.

The developed research strategy aims at selecting a suitable research design and applicable methodology for the sake of finding satisfactory answers to the proposed research questions. Accordingly, the type of methodology adopted by any research depends upon the central research objectives, aim, and proposed hypotheses and questions (James & Vinnicombe, 2002). The three central assumptions are concerned with research philosophy; are *ontology*, *epistemology*, and *methodology* to show how the researchers perceive the processes used in research conduct and its outcomes.

Neumann (2003) argued that in conducting a research study, the researcher might make claims about the knowledge gained about the surrounding nature and human activities in a social context (*ontology*); how this can be known (*epistemology*), including the ways to acquire knowledge, the processes, and methods for investigating and gathering data (*methodology*). This issue might involve a dialogue between the investigator and the theme of the research inquiries and questions.

Research in social studies gives an option to split investigations on the research problem into two broad techniques qualitative and quantitative and could be integrated into a mixed method to produce satisfactory answers and solutions. However, each technique with its strengths and weaknesses. However, it is worth adopting the right approach that fits the nature of the research problem for generating comprehensive empirical data about a research topic. As mentioned in the Abstract of this study, quantitative method research fits the approach for tackling the research problem under investigation. The philosophical facets underpinning methods can facilitate the research methods' identifications of paradigms (Clark, 1998).

In the domain of scientific research in social science, there are three different schools of philosophical paradigms: *constructionism, pragmatism*, and *positivism*.

Constructionism identifies how an individual does construct and seeks an understanding of the worldviews in which they live and work. *Pragmatism* is a set of accumulated ideas tackling world-view practices, i.e., truth and reality. *Positivism* formulates and confirms theses and thereby predicts general patterns of human activities (Blaxter et al., 2010). Al-Hamdan and Anthony (2010) reviewed scholarly research studies that incorporated quantitative and qualitative methods research to reveal that *positivism* and *post-positivism* have been increasingly used paradigms in quantitative and qualitative studies, respectively. Different aspects of the two paradigms are illustrated in Table 8.

Table 8 Different Aspects between Positivism and Post-Positivism Paradigms

Positivism	**Post-Positivism**
The researcher acts as an external observer separated from a tackled phenomenon	Intertwine both observer and phenomenon under investigation.
Seeks to define causal relationships	The purpose of the researcher determines the true phenomenon.
Seeks to consider one truth to explain a phenomenon of interest.	Seeks to understand the meaning of the phenomenon of interest.
Quantitative; context removing both methodologies and assumptions.	Qualitative; holistic analysis.
Increase reliability.	Increase validity.

(Source: Al-Hamdan & Anthony, 2010)

Reference theories and methods are needed for identifying the potential roles of the previously mentioned primary factors involved in causing construction projects to delay in construction projects in the oil and gas industry in Abu Dhabi. Many similar scholarly studies in the related construction project literature have been tackled delay-causing factors by adopting either quantitative or qualitative method research

in data analysis and interpretation, which based on the nature and context of the study. The nature of this study and the approach by which the required research data could be conveniently collected is a questionnaire-based survey since the participants are geographically scattered raises a difficulty to reach them physically.

There is also no direct effect of the researcher upon the participants; this would help to obtain satisfactory answers to the research questions in the proposed questionnaire. With this adoption, the survey data are analyzed by using a quantitative research method whose paradigm philosophy is *positivism*. In contrast, face-to-face interview (qualitative) was inconvenient due to some internal restrictions imposed by the oil industry organization where the study is conducted, besides avoiding any bias in answering interview questions.

4.2.2 Quantitative Research

This research aimed to answer the need to study natural phenomena. Moreover, the quantitative approach has always incorporated the analysis of numerical data collected from the topic or entity under investigation. Particular attention has been paid to measuring and analysing causal relationships between the variables concerned between two states: the population sample of interest and the survey conditions under control. What is quantitative research? Bogdan and Biklen (1998) defined this method in the social science research context “Representation of charts and graphs for illustrating the research results that generated quantitatively. Further, it employs such words as variables, populations and results as the core vocabulary.”

This definition highlights some key features of the quantitative approach that differentiate processes performed in data collection and analysis. However, there are

some areas where quantitative methods are indispensable in research, such as surveys, laboratory experiments, and mathematical modelling of natural and social phenomena. Quantitative method research also typically answers where, what, who, and when (Crabtree & Miller, 1999; Silverman, 2013). However, it has been noted that quantitative methodology does not answer why a particular phenomenon occurs or how it occurs (Silverman, 2013).

The quantitative analysis provides the necessary in-depth and various investigative tools to successfully understand the how and why of a given phenomenon (Symon & Cassel, 1998). In this paradigm, (i) the emphasis is placed on facts and interconnected causes of behaviour, (ii) the information that is in the form of numbers could be quantified and summarised; (iii) the mathematical procedures are the norm for analysing the numeric data; and (iv) the generated findings are expressed in statistical vocabularies (Golafshani, 2003).

Quantitative method research might be further conducted as either experimental or non-experimental. Empirical research involves a study of the effect of the systematic manipulation of one variable(s) on another variable. The manipulated variable is called the experimental treatment or the independent variable. The observed and measured variable is called the dependent variable. In non-experimental quantitative research, the researcher identifies variables and may look for relationships among them but does not employ the variables, such as in survey research (Ary, Jacobs, Irvine, & Walker, 2018; pp. 26-28). The survey is usually associated with a research approach specifically intended to put structured questions to the groups of people concerned. So, the investigators questioned the actual status of some related outcomes of the survey.

It is necessary to distinguish various research designs for reporting what appropriate questions should be proposed to answer the specific research problem. Blaxter et al. (2010) shed light on some advantages and disadvantages of surveys in quantitative method research as detailed below:

(a) *Advantages*- (i) The survey aims to represent generalised results with a proper sample, (ii) The survey could be easy to administer without the need for any fieldwork, (iii) The investigator could repeat engaging surveys in different settings to allow comparisons between related studies, and (iv) Surveys could provide much reliable data quickly with an acceptable response rate.

(b) *Disadvantages*- (i) The displayed data in Tables or Figures would be a focus of researchers, (ii) The data would be focusing on underlying processes and changes, (iii) The survey often relies on breadth rather than depth for its validity; this is a crucial issue for small-scale research, and (vi) The researcher could not check the early responses promptly to provide further explanation for not straightforward questions.

4.2.3 Qualitative vs Quantitative Methods

Scholarly debates continuously run among social scientists concerning the relative significance of quantitative and qualitative strategies for investigating the social research problem. The views taken by individual researchers vary from those who see the two research strategies as radically separate to a considerable number of others who adopt a mixed method as a standard instrument for generating more vibrant results. Although qualitative research has become increasingly popular, quantitative strategies are still more scientific or objective. Despite this, qualitative researchers have felt compelled to argue their case vigorously. However, discussions

on this distinction between the two methods are not fruitful since the ultimate outcomes of both methods would be either number or text (Creswell, 2014).

A significant difference between qualitative and quantitative research is that researchers who adopt the qualitative approach rely on a few variables and many cases, whereas researchers who adopt the quantitative approach work with many variables and a few cases. For this reason, it is to take a quantitative approach in the study of a non-social case or phenomenon, where the selected variables are under the researcher's control (Johnson & Harris, 2002). It may be helpful to demonstrate the differences and similarities between the two research strategies, as shown in Table 9 and Table 10, respectively.

Table 9 Differences between qualitative and quantitative research methods

Attribute	Qualitative	Quantitative
Aim	The aim is complete and detailed. description of what is observed.	The aim is to count things to explain what is observed.
Purpose	Obtrusive and controlled measurement.	Generalisability, prediction, causal
Objective Subjective	Subjective individuals' interpretation of events is important.	Objective – seeks precise measurement & analysis.
Tools	No tools used in collecting the perspective data.	The researcher uses tools, such as surveys, to collect numerical data.

Outputs	Data is in the form of words, pictures, or objects.	Data is in the form of numbers and statistics.
Sample	Usually a small number of non- representative cases. Respondents selected on their experience.	Usually, many cases that represent the population of interest, which is randomly selected, respondents.
Researcher Role	The researcher tends to become subjectively immersed in the subject matter.	The researcher tends to remain objectively away from the subject matter.
Analysis	Interpretive assumes dynamic reality (Holistic).	Statistical and assumes a stable reality (Particularistic).
Approach	Process-oriented	Outcome-oriented

Table 10: Similarities between qualitative and quantitative research methods

Qualitative	Quantitative
It could be used in testing hypotheses and theories	It also used in exploring, generating, and testing hypotheses and theory
Qualitative data includes quantification	It collects qualitative data through open-ended questions

4.2.4 Regression Analysis

Regression analysis is a branch of mathematical statistics that aims to unify various data analysis methods for interpreting the dependence that could be established between the proposed variables using statistical data. In the statistical modelling technique, regression analysis is a statistical approach to investigating the relationships between a dependent variable (a criterion, denoted as Y) and one or

more independent variables (or predictors, denoted as X1, X2, X3… X∞). The statistical interpretation of these linear relationships is termed Multiple Regression Analysis. The Multiple regressions approach is a technique that allows additional factors to enter the analysis separately, allowing the effect of each to be estimated.

Researchers usually seek to ascertain the causal effect of one variable upon another. In other words, the interrelations between the two types of variables could give some insight into how the typical value or effect of the dependent variable changes when any one of the independent variables is held fixed (Rawlings et al., 1998). In this case, regression is employed to estimate the independent causal variables' quantitative effect that could directly influence the dependent variable. Therefore, the researcher also typically assesses the statistical significance of the estimated relationships, i.e., whether the degree of confidence in the actual relationship is close to the estimated relationship (Sykes, 1993).

Rawlings et al. (1998) described two approaches to regression analysis. It can be performed in various ways, such as the Simple regression approach, which formulates some hypotheses about the possible relationships between the variables of interest. Thus, the hypotheses should state the existing causal relationships between the concerned variables as precisely as possible. It would be valuable for quantifying the impact of various simultaneous influences upon a single dependent variable. Further, because of the bias of the omitted variables in the simple regression, multiple regressions are often essential, even when the investigator is interested only in the effects of one of the independent variables.

4.2.5 Reliability and Validity

The use of reliability and validity is shared in *quantitative* research, which could also illuminate ways to evaluate or maximise the validity and reliability of qualitative research studies. The widespread statistical analysis software, such as a *statistical package for social science* **(**SPSS**)**, has been widely welcomed by many social studies and related subjects, such as health sciences, market trends, consumer attitudes, and the like. The SPSS is also involved in data management (e.g., case selection, file reshaping, and creating derived data) and data documentation (e.g., metadata descriptions, as stored in the data files). These functional features are considered the basis of the SPSS software.

The general concepts of both terms *reliability* and *validity* are presented briefly next. The general concept of reliability is to focus on the dependability and consistency of the instruments employed in the performance of the research method (Weathington et al., 2010). Neuman (2011) sheds light on two main types of reliability the stability of reliability (i.e., stability over time) and representative reliability (i.e., stability across groups). Joppe (2000, as cited in Golafshani, 2003) defines reliability as quoted "*The extent to which results are consistent over time, and an accurate representation of the total population under study is referred to as reliability, and if the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable*". However, Kumar (2011) outlined some of the main factors that influence the reliability of research instruments, including the wording of the questions, physical setting, the respondent's mood, nature of interactions, and regression effect of an instrument.

Based on Neuman's (2011) suggestions, several factors could help improve the reliability of the present study by (i) conceptualizing variables to increase reliability when the measurement involves only one concept and (ii) asking more detailed questions to cover the variables in the conceptual model and then using specific questions to measure each variable using the appropriate scaling. Kirk and Miller (1986, as cited in Golafshani, 2003) identify three types of reliability referred to in quantitative research, which relate to:

(a) The degree to which a measurement, given repeatedly, remains the same.

(b) The stability of a measurement over time

(c) The similarity of measurements within a given period". LeCompte and Goetz (1982, as cited in Franklin & Ballan, 2001) defined reliability in the qualitative research as "*The extent to which the set of meanings derived from several interpreters are sufficiently compatible*."

(d) Thus, examining trustworthiness is crucial to ensure reliability in qualitative research.

Validity refers to whether the test correctly measures the construct it intends to measure. Thus, validity is related to measuring the empirical indicator's fitness and the construct's conceptual definition. Some measurable areas of validity are faced with validity, content validity, concurrent and predictive criterion validity, and convergent and discriminant construct validity (Neuman, 2011). Golafshani (2003) defines this concept as "*The relationship between the score obtained in a test and another related measure; the degree of linear correlation between both elements determines the validity coefficient*." Regarding face and content validity, the researcher scrutinised the instrument by conducting a peer review to maximise the

logical links between the questions and the research objectives to ensure that the coverage of the topics researched was balanced.

Regarding criterion validity, the researcher compared the instrument to other studies to establish the concurrent and predictive validity of the study. Validity can be threatened internally and externally (Creswell, 2014). Internal threats include history, maturation, regression, selection, treatment diffusion, mortality, compensatory demoralisation, compensation rivalry, testing, and instrumentation (Creswell, 2014). In the present study, the selection was the only internal threat that might be relevant — making sure that the targeted participants satisfied the selection criteria for the study mitigated the selection threat.

Joppe (2000, as cited in Golafshani, 2003) explained what validity is in quantitative research: "*Validity determines whether the research truly measures what it was intended to measure or how accurate the research generated findings are". In other words, does the research tool allow the researcher to hit "the bull's eye" of your research object? Researchers generally determine validity by asking a series of questions and will often look for the answers in the research of others*".

Wainer and Braun (1998, as cited in Golafshani, 2003) described the validity in quantitative research as quoted "*Construct validity. The construct is the initial concept, notion, question, or hypothesis that determines which research data are to be collected and the appropriate approach for the collection. So, the researcher actively causes or affects the interplay between construct and data to validate their investigation. In this sense, the researcher's involvement in the quantitative research process would greatly reduce the test validity.*"

4.3 Research Design

The research design refers to the systematic strategy to achieve the research objectives and answer the research question formulated in chapter one (Saunders, Brook, & Eugene, 2006). This study investigated the role of selected factors that interfere with the timely completion of projects in the oil industry in Abu Dhabi. Another objective of the study is to investigate the moderating role of project management between the relationships of five predictors and timely project completion. Therefore, a sound research design is required to achieve the study's objectives.

This study followed the characteristics and philosophy of the deductive approach, which involves "developing a hypothesis (or hypotheses) based on an existing theory and then designing a research strategy to evaluate the hypothesis." It was also specified that deductive reasoning means moving from the specific to the general (Gallaire, Minker, & Nicolas, 1989). This study also aims to evaluate the hypotheses generated in this study based on the theories discussed in the previous chapter; therefore, a deductive approach was adopted in this study. A survey’s findings can be easily examined with descriptive and inferential statistics, and they can also be used to determine relationships between various variables Furthermore, this study is correlational as it is designed to evaluate the relationship between the variables under study. "In a cross-sectional study, the researcher measures the outcome and exposure in the study participants simultaneously (Dyer, Lassila, Jokinen, & Vallittu, 2005).

Therefore, this study uses a cross-sectional design that focuses on the purpose of the study in the context of single-item analysis to minimize the likelihood of losing respondents and significantly increase time savings, which is the main advantage of

such a cross-sectional design (Leedy & Ormrod, 2005). Furthermore, in this study, a quantitative data approach using a questionnaire is used to identify the factors' effects on the timely completion of projects in the oil industry.

4.3.1 Target Population and Sampling

The target sample population of the survey was the staff affiliated with the ADNOC construction projects associated with the oil and gas industry within the territories of Abu Dhabi Emirate. The reason behind selecting this population is that the information regarding the project planning and monitoring is occupied by the direct leaders and the project managers associated with the construction projects. The list of oil and gas companies operating in Abu Dhabi will be obtained from the official websites. The companies will be selected based on a convenient technique of sampling. “A convenience sample is a non-probability sampling method where the sample is taken from a group of people easy to contact or reach” (Etikan, Musa, & Alkassim, 2016).

Thus, in the first stage, the oil organization that is in Abu Dhabi are more convenient for the researcher to get the responses from the respondents and will be selected based on the convenient technique of sampling. In the second stage, this study will select simple random sampling to allocate the employees for the responses. “A simple random sample is a subset of a statistical population in which each subset member has an equal probability of being chosen” (Kadilar & Cingi, 2004). Thus, the project managers and leaders in the organization have equal chances to select the employees for responses selected randomly in this study, and data will be collected from the selected managers and leaders of resource allocation as well as project planning and monitoring teams from the selected companies.

4.3.2 Unit of Data Collection and Analysis

This study used the unit of analysis proposed by Hill and Birkinshaw (2010). The oil industry was selected to examine the impact of resource allocation on project completion and the moderating role of project management in the relationship between resource allocation and project completion. The quantitative method was used to collect the data from the respondents by using the survey questionnaires. The data collection approach was done by distributing the questionnaires to the leaders and managers by an official correspondence to ensure the maximum participation from the organization departments to add to the responses rate. Before collecting the data from the respondents, many procedures were required to be full filled such as obtaining a recommendation letter regarding the data collection as well as a letter of request to obtain the current list of oil and gas companies operating in Abu Dhabi.

After getting the list of oil and gas companies from the ADNOC (Mother company), the selected companies were permitted to obtain the data from their employees by receiving the filled questionnaire. Then, an approval and introductory letter explaining the research objective was sent to the related authorities. After getting the formal approval, data was collected through an official meeting using the survey questionnaire. The collection and distribution of the questionnaires and data collection process took around six months.

4.4 Research Model

The relevant research literature assisted in designing the research model and illustrated the potential interrelationship between the dependent variable (I.e., timely project completion) and each of the five selected independent variables (see 1.3.1; 1.4) in a proposed research model, as depicted in Figure 4.

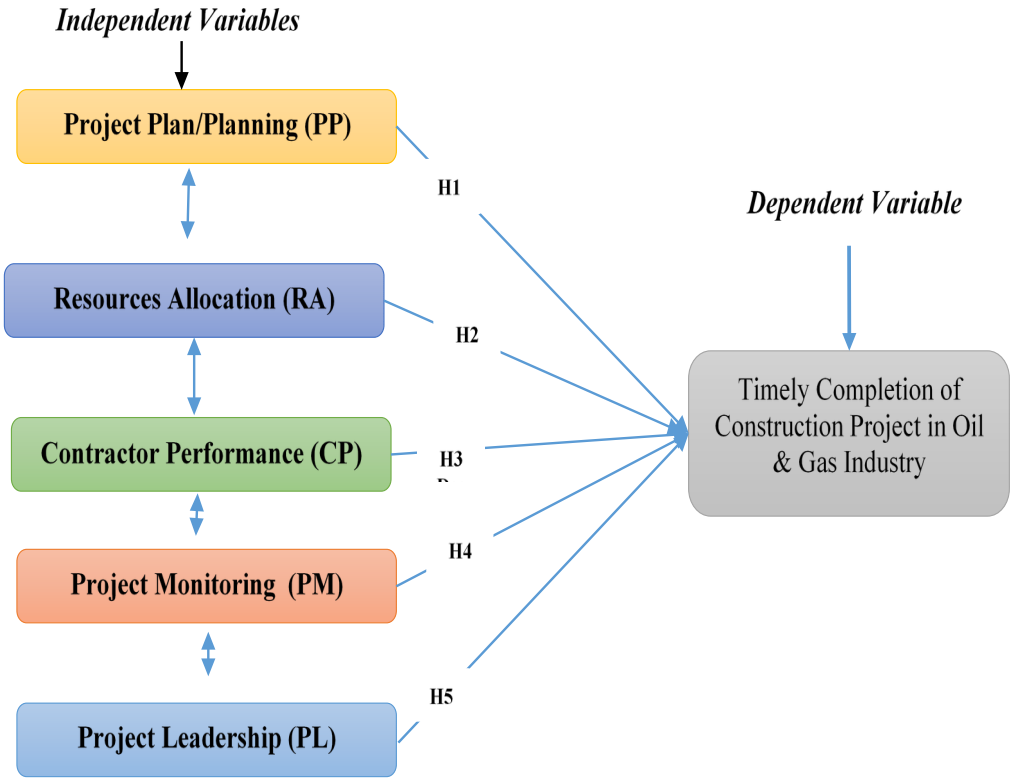

Figure 4 Conceptual research model

4.4.1 Project Planning and Timely Project Completion

Project Planning is the primary aspect that affects positively or negatively the timely completion of the project in the organization (Heravi et al., 2015). Effective project planning should enhance the possibility of timely completion of the projects (Tesfaye, Girma, Berhan, & Beshah, 2015). Moreover, if the project planning is effective and well-executed, then the possibilities regarding the timely completion of the projects increase (Laslo, 2010). Based on these kinds of literature, the present study proposed the stated below hypothesis:

Hypothesis 1: *Project planning will affect the timely completion of the projects in the oil and gas industry in Abu Dhabi.*

4.4.2 Resources Allocation and Timely Project Completion

Resources allocation is the foremost factor that positively or negatively affects the timely completion of any project in the organization (Yaghoubi, Noori, Azaron, & Tavakkoli-Moghaddam, 2011). In addition, well resource allocation should enhance the possibility of timely completion of the projects (Deblaere, Demeulemeester, & Herroelen, 2011). Moreover, if the resources are managed fairly and efficiently allocated, then the possibilities regarding the timely completion of the projects increase (Hashemin, Ghomi, & Modarres, 2012). Based on these kinds of literature, the present study proposed the stated below hypotheses.:

Hypothesis 2: *Resources allocation will affect the timely completion of the projects in the oil industry in Abu Dhabi*.

4.5.3 Contractor Performance and Timely Project Completion

Contractor performance is very influential in the timely execution and determining the quality of construction projects. Many factors cause the problem of construction projects in the oil industry. Among the most common influential issues is the contractor's management capability and quality services to customers, whether an organisation or individual. Therefore, contractor management and service delivery experience significantly affect the contractor's performance. Based on these kinds of literature, the present study proposed the stated below hypotheses:

Hypothesis 3: *Contractor performance will affect the timely completion of the projects in the oil industry in Abu Dhabi*.

4.4.4 Project Monitoring and Timely Project Completion

The excellent monitoring of the project has positively or negatively influenced the project's timely completion (Aliverdi et al., 2013). Every project requires the

monitoring process to evaluate the effectiveness of project management and its right sides and completion gaps (Pajares & Lopez-Paredes, 2011). In addition, the timely completion of the projects depends upon the effective monitoring of the running projects in the organization (Maravas & Pantouvakis, 2012). Based on this literature, the present study proposed the stated hypotheses:

Hypothesis 4: *Project monitoring will affect the timely completion of the projects in the oil industry in Abu Dhabi*.

4.4.5 Project Leadership and Timely Project Completion

The successful completion of any project is based on the effective management of the constrictions like scope, quality expectations, stipulated timeline, and finally, the cost. Skilled leadership is necessary for all manners to attain it. There are different leadership styles: transformative style, authoritarian leadership style, democratic style and finally, Laissez leadership style and permissive influenced the on-time project completion. (Murimi, 2016). Based on these relevant scholarly works, we proposed the below hypotheses:

Hypothesis 5: *Project leadership has influence on the relationship between resource allocation and timely completion of projects in the oil industry in Abu Dhabi*.

There are four direct relationships, and the model indicates four indirect relationships. There is a direct relationship between the timely completion of the project and the predictors such as resource allocations, project planning, contractor performance, and project monitoring. While indirect relationships are related to the moderation effects of project leadership among each direct relationship stated above.

4.5 Measures

All instruments and measures used in this study were adopted from previous studies, and the scales are reliable and valid. The items are measured using the five-point Likert scale. According to this five-point Likert scale, “5=strongly agree, 4=agree, 3=neutral, 2=disagree, and 1 =strongly disagree”. The five-point Likert scale increases the response rate and quality, along with extenuating the frustration level of the respondents (Babakus & Mangold, 1992). However, the scale used in the research is adopted from the past studies; thus, the reliability coefficients can easily compare with the exact nature of preceding studies that were also using the same scale for measurement (Saleh & Ryan, 1991).

The dependent variable that is used by the study is timely project completion (TPM), while the independent variables are resource allocations (RA), project planning (PP), contractor performance (CP), and project monitoring (PM). In addition, project leadership (PL) is used as a moderating variable in this research. Section I of the questionnaire contains a total of 33 items comprising timely project completion (6 items), resources allocations (5 items), project planning (6 items), contractor performance (5 items), project monitoring (5 items) and project leadership (6 items). Section II contained four demographic dynamics that were gender, nature of employment, age, and education.

4.5.1 Timely Project Completion

The project can be defined as a provisional task with a definite beginning and an end. This attempt is made to create a unique thing: a product or service or a result (Rose, 2013). The contract agreement of the construction clearly defines the duration of the contract and the project deliverance scope, along with inclusive of the project costs.

It was proposed that clauses which discuss the project time with cost and quality are the core clauses of any construction contract agreement. In addition, Heagney (2016) defined a project as an activity that is commenced for meeting the creation of a unique product or service, but activities attempted to complete repetitive activities are not considered a project.

When a contract is not successfully executed in agreement with the decided timeline, it does not meet the expectations of the customers from a construction cost point of view. While Walker defines project delay (2015), failure of planning, project supervision, resource allocating, contractor performance, or project leadership can lead to failure to meet standards or reach the set target on time or time and cost overrun. This timely project completion variable is measured by using the six items scale that is also used by Regassa (2019) in his analysis of construction project completion. The items were measured using the five-point Likert scale, "5= Strongly agree, 4= Agree, 3= Neutral, 2= Disagree, and 1 = Strongly disagree". highlights the adopted items of timely project completion, as shown in Table 11.

Table 11: Scale of timely project completion (TPC) construct

Code	Survey Items	Scale	Reference
TPC1	Proper project planning practice affects TPC.	Five-point Likert scale	Kariungi, 2014
TPC2	Local community obstructions also affect the project completion deadline.	Five-point Likert scale	
TPC3	Political situations affect project completion deadline.	Five-point Likert scale	Regassa, 2019
TPC4	Economic conditions affect project	Five-point	

	completion deadline.	Likert scale
TPC5	Changes in project scope affects project completion deadline.	Five-point Likert scale
TPC6	Financial challenges may affect project completion deadline.	Five-point Likert scale

4.5.2 Resource Allocation

Allocation of resources in project management plays a significant role, while there is limited scope in utilizing management sciences for project management. Kosta et al. (2012) defined the allocation of resources as a procedure that includes the assigning and forecasting of the available resource in the most optimal, economical, and effective way. The constraint of resources forces the researcher to do its allocation most effectively. Likewise, Hwang and Ng (2013) indicated that RA helps select the best available resources for the project via managing resources in the best way possible during the entire project to evade less or more utilization of the workforce.

A significant slump in labour availability bumped in decades, which is an essential factor ascertained and examined in pursuing resources required in nature or organization for project allocation; new projects require skilled labour to achieve significant and potential effectiveness of projects with aggregate and accurate decision makings. This predictor of resource allocation is measured using the five items scale Omari (2018) also used in his analysis of the factor affecting the construction project completion in Kenya. Table 12 highlights the adopted items of resource allocation.

Table 12: Scale of Resources Allocation (RA) construct

Code	Survey Items	Scale	Reference
RA1	The project scope is described by the top management	Five-point Likert scale	
RA2	The detailed plan us formed by the	Five-point	

	organization	Likert scale
RA3	Encountered risks could be managed properly	Five-point Likert scale
RA4	Critical path is clearly indicated in the plan	Five-point Likert scale
RA5	Presence of seasonal weather conditions should be considered	Five-point Likert scale

4.5.3 Project Contractor Performance

Ruqaishi and Bashir (2015) conducted a study investigating the leading causes of delays in construction projects in the oil and gas industry. The results showed that the leading causes of delays were:

- Poor site management and supervision.
- Problems with subcontractors.
- Inadequate planning and scheduling of the project by contractors.
- Poor management of contractors' schedules.
- Delay in delivery of materials.
- Lack of effective communication among project stakeholders.
- Poor interaction with vendors in the engineering and procurement stages, which was noted that the last cause was unique to the oil and gas industry.

Bin Seddeeq et al. (2019) identified and assessed the causes of time and cost overrun in the Saudi Arabian oil and gas construction industry. In total, 38 cases were identified through an in-depth literature review, supplemented by an interview with an expert in this field. The study's findings indicated that contractor factors aroused delay oil and gas construction industry. Umar et al. (2020) reported that Delays in

construction projects constitute a significant source of concern due to their associated cost increases and loss of revenue.

The Gulf Cooperation Council (GCC) faces massive delays in their projects. Such delays in the GCC were among the factors fingered in the collapse of the UK's Carillion. Substantial variability exists within the GCC construction sector, despite cultural similarities, which requires country-specific studies. The quest to understand delay causes results from the need to curtail waste and adjust to the new regime of low commodity prices. A structured survey questionnaire was administered at two independent events organised by the RICS and ICE in Muscat. Contractors were most likely to cause delays among six categories of sources of delay.

The contractors' performance in this study ensures that the construction project plan for the oil and gas industry has been successfully implemented and that problems encountered during completion are appropriately addressed. The contractors' performance is then used as the indicator of the critical construct measured and analysed by the scale employed by Regassa (2019) and Umar et al. (2020). The measurement includes a scale of 5 objects. The items were measured using the five-point Likert scale: 5= Strongly agree, 4= Agree, 3= Neutral, 2= Disagree, and 1= Strongly disagree. Table 13 indicates the scale performance of the project contractors.

Table 13: The scale of contractor performance (CP) construct

Code	Survey Items	Scale	Reference
CP1	Involvement of contractors/suppliers in the project scope affects TPC.	Five-point Likert scale	Umar et al., 2020
CP2	Responses of contractors/suppliers to	Five-point	

	the needs of project's owner is required.	Likert scale	
CP3	Supervision quality of contractors / suppliers affects TPC.	Five-point Likert scale	Umar et al., 2020
CP4	Coordination between various project stakeholders affect TPC plan.	Five-point Likert scale	
CP5	Execution of work scope as per firm's standard procedures.	Five-point Likert scale	Regassa, 2019

4.5.4 Project Monitoring and Evaluation

Evaluation of projects also requires multi-skills when human force is used to accomplish tasks, which are periodically scheduled according to the environment of the multi-project system. Staff learning can also reduce the outsourcing costs that directly impact the returns of projects. Aliverdi et al. (2013) described the project monitoring in an incredibly detailed manner that it denotes the process of keeping a trail of all project-related statistics and metrics, including the performance of the team and the duration of the task, analysis of the potential issues and then taking the counteractive measures for ensuring that the budget and scope of the project should meet the specified deadline. Similarly, Genersch et al. (2010) also enlightened that monitoring the project means the action taken on by the team leader to ensure that the expected outcome is meeting the actual result of the project.

For this report, the project leader aims to ensure that the construction project plan for the oil and gas industry has been implemented successfully and that challenges faced during the completion are addressed. In the present study, project monitoring is used as a predictor of the primary construct, and it is measured according to the same scale as Regassa (2019) did in his analysis. The measurement includes five items scale. The items were measured using the five-point Likert scale representing 5=

Strongly agree, 4= Agree, 3= Neutral, 2= Disagree, and 1 = Strongly disagree. Table 14 shows the scale of project monitoring.

Table 14 Scale of project monitoring (PM) construct

Code	Survey Items	Scale	Reference
PM1	Different stakeholders accept the criteria easily.	Five-point Likert scale	
PM2	Efficient indicators reflect effective monitoring process.	Five-point Likert scale	Regassa, 2019
PM3	Availability of sufficient number of trained officers for the project.	Five-point Likert scale	
PM4	Availability of sufficient number of experienced officers for the project.	Five-point Likert scale	Ghani & Ismail, 2017
PM5	Professional skills of the performers are necessary for the project.	Five-point Likert scale	

4.5.5 Project Leadership

Shenhar (2015) conducted on project leadership study to have defined project leadership as “the act of leading a project management team effectively for accomplishing the project”. A project leader requires both leadership and management skills for the practical completion of the project. Bull (2010) also defined project leadership as project organisation, and its capabilities are termed project control. Project managers take the leading part in higher-level project performance in realising institutional success as a significant task of the project managers. Thus, PL is measured using the 6-item scale Regassa (2019) to analyse factors that affected the construction project completion. Table 15 highlights adopted items of PL.

Table 15: Scale of project leadership (PL) construct

Code	Survey Items	Scale	Reference
PL1	The project leader empowers the project team members.	Five-point Likert scale	Regassa, 2019
PL2	The project manager does not deal with routine conflicts.	Five-point Likert scale	
PL3	The project manager is not flexible.	Five-point Likert scale	
PL4	The project manager does not engage within the project team members.	Five-point Likert scale	
PL5	The project manager does not inspire the project team members.	Five-point Likert scale	Aga et al., 2016
PL6	The project manager is not creative.	Five-point Likert scale	

4.5.6 Pilot Study

A pilot study will be performed to check that the questions of the variables are clear and understandable for this study's respondents. Around 100 surveys will be sent to the managers and leaders of the oil and gas industries that are working in Abu Dhabi Oil and gas companies. After getting the approval from the relevant and competent authorities and once a good number of valid responses are received back from the respondents. The questionnaires will be distributed randomly to the managers and leaders and requested them to fill the response and give their comments about the items of the questionnaire that are understandable and clear for them. Feedback and comments will be noted once it received from the project managers and leaders. The conclusion will have good feedback for any amendment, and changes will be required for further enhancement and modification. In addition, the internal consistency of the items that will be used in the research is verified by conducting a reliability analysis. The main objective of checking the consistency will confirm that

the questions of the variables will be correlated with each other and measure the same variable.

The findings exposed the coefficients of the reliability of all the variables. The coefficients of reliability shown by the outcomes were: timely project completion (0.843), resource allocation (0.925), project planning (0.903), contractor performance (0.812), project monitoring (0.746), and project leadership (0.880). In addition, the inner consistency of the items used in the research was adequate, and alpha values are also higher than 0.70. Thus, the questionnaire is understandable and can be distributed for the actual study later. Table 16 shows the generated findings of Likert analyses.

Table 16: Reliability analysis of constructs

Constructs	No. of Items	Alpha
Timely Project Completion	6	0.870
Resource Allocation	5	0.846
Project Planning	6	0.798
contractor performance	5	0.896
Project Monitoring	5	0.745
Project Leadership	6	0.832

4.5.7 Data Processing and Analysis

Further analysis should include both descriptive and inferential statistics conducted after the final data collection—reliability and validity analysis involved to confirm the validity of the items and the inner consistency. Furthermore, to evaluate the hypotheses, this research uses multi-regression. The data screening will be conducted after collecting the final data collection and before data analysis. This screening aims to confirm the missing values and multivariate outliers. The missing values happened

when the respondents did not answer the questions, and these missing values were managed by replacing the means values of the data.

A study conducted by Hair et al. (2010) recommended that if the data with missing values are small, then the means values are the appropriate method to replace the missing values. Outliers show the extreme response that the respondent gives, and this can misrepresent the outcomes (Tabachnick, Fidell, & Ullman, 2007). Mahalanobis distance formula will be used to check the multivariate outliers in the data, and outliers exist when the Mahalanobis score is higher than the critical value and will remove. After the preliminary analysis, the research will use descriptive analysis, which is an identical analysis that describes the characteristics of the data and the demographic profile of the respondents. Frequency distribution will use by the research to explain the characteristics of the data as well as the demographic profile of the respondents.

In order to examine the relationship between the Timely Project Completion and each one of subscales used in this study, Pearson's correlation coefficient was computed. This index is a statistical tool for determining the strength of the relationships between the study's subscales. Data collected from the participants were coded and analyzed using the Statistical Package for Social Sciences (SPSS 27). Cronbach alpha which is a measure of reliability was used to assess the internal consistency of the instrument and was calculated for each of the six scales presented in this research. For analysis of demographic variables, various descriptive statistics like percentages, means, and standard deviations were used. Furthermore, the investigation of whether there is a statistically significant correlation between the Timely Project Completion and each one of subscales used in this study, Pearson's

correlation coefficient was computed. Multiple regression analysis examined the relationship between timely project completion and other independent variables (project planning, resource allocation, contractor's performance, project monitoring, and project leadership).

4.6 Summary

This chapter described the research methodology used to achieve the study's objectives. The research methodology and sampling techniques were described in detail, and the rationale for using each method and technique was justified. In this study, quantitative data collection methods were designed and applied in order to gain the best features of each data collection and analysis tool. An online questionnaire, as a data collection instrument, was designed and applied in order to gain the best features of the interrelationships among the variables under investigation, while descriptive and inferential statistics were used to analyse the quantitative data. The inferential data analysis used a multiple regression technique, with further discussion on the measurement of reliability and validity.

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CHAPTER 5: DATA COLLECTION AND ANALYSIS

5.1 Introduction

For the aim of investigating the several factors causing delays in ADNOC construction projects associated with the oil and gas industry within the territories of Abu Dhabi Emirate. The reason behind selecting this population is that the information regarding the project planning and monitoring is occupied by the direct leaders and the project managers associated with the construction projects. However, the researcher determined five factors that commonly cause these delays to analyse their influence on the projected timeline of the construction projects in the oil industries and their potential consequences. From the list of oil and gas companies operating in Abu Dhabi which obtained from the official websites, a convenient sample of size 258 is selected which consisted of construction project managers who shared information about the negative consequences of the five factors reported as causing delays associated with construction projects in the oil industry.

This chapter presents the results obtained from the findings of the research study. It includes the general information of the respondents that were targeted in the study. The presentation provides raw data first about respondents. Analysis was based on the research objectives and the dependents and independent variables. The structured questionnaire was designed as a survey instrument to gather the required data for gaining better understanding about relationship between dependent variable (timely project completion {TPC}) and independent variables (PP, PR, CP, PM, and PL) through analyzing the feedbacks of 258 respondents completed the questionnaire.

structure. The online questionnaire is Likert-Five scale. The data was analyzed and presented in frequencies and converted into percentages, in addition to the means and

standard deviations, and thereafter presented into tabular forms to make it is easy to understand and interpret. Finding out demographic information of the respondents is particularly important because it enables the researcher to gauge better understanding of the data received and to know the type of people dealing with.

5.2 Demographic Description of the Participants

5.2.1 Participants Profile– Qualification, Gender, Ethnics, and Involvement

The first part of questionnaire was allocated to exploring the demographic characteristics of participants, which includes questions about their academic qualification, nationality, gender, type of project they participated in, total experience, current position, work experience in oil and gas company, work experience in the current organization, team size, and number of projects they engaged with as a project team member previously.

Regarding The academic qualification of the participants, 2 respondents hold high school (0.8%), 2 hold diploma (0.8%), 32 hold higher diploma (12.4%), 136 hold bachelor's degree (52.7%), 71 hold master's degree (27.5%), while 15 respondents hold Doctorate degree (5.8%), as shown in Table 17.

Table 17: Academic qualifications of the participants

Degree	Frequency	Valid Percentage
High school	2	0.78
Diploma	2	0.78
Higher Diploma	32	12.40
Bachelor	136	52.71
Master	71	27.52
Doctorate	15	05.81
Total	**258**	**100.00**

Regarding gender of respondents involved in study, 88.8% of the sample (n = 229) were males, while 11.2% (n = 29) were females, as shown in Table 18.

Table 1: Gender of the participants

	Gender	Frequency	Valid Percentage
Valid	Male	229	88.80
	Female	29	11.20
	Total	**258**	**100.00**

Regarding nationality of respondents, 36.4% (n = 94) of respondents were Emirati, 18.2% (n = 47) of respondents were Arab, and 45.3% (n = 114) of them had other nationality, as shown in Table 19.

Table 18 Nationalities of the participants

	Nationality	Frequency	Valid Percentage
Valid	Emirati	94	3.6.43
	Arab	47	18.22
	Others	117	45.35
	Total	**258**	**100.00**

The participants participated in different projects as 189 participants (73.25%) participated in both miner and major projects, 39 participants (15.12%) in major projects, while 30 participants (11.63%) in minor projects, as shown in Table 20.

Table 19: Number of participants who worked with different types of projects.

	Project	Frequency	Valid Percentage
Valid	Major	39	15.12
	Minor	30	11.63
	Mixed	189	73.25
	Total	**258**	**100.00**

5.2.2 Work Experiences of Participants

This part of the questionnaire is devoted to inquiring about current job position, years of work experience in oil companies and in current affiliated company in particular, number of the team members the participants involved with them, number of projects accomplished by them, and how many projects they have been engaged with as a project team member previously. Regarding the current job-positions, 78 participants (30.23%) were engineers, 69 (26.74%) were in senior positions, 46 (17.83%) were managers, 23 (8.92%) were professionals in operational processes, 17 (6.59%) were team leaders, 13 (5.04%) were either CEO, SVP, or VP, and 12 participants (4.65%) were project contractors, as illustrated in Table 21.

Table 1: Current job positions of the participants

	Job Title	Frequency	Valid Percentage
Valid	Engineers	78	30.23
	Sr Personnel	69	26.74
	Managers	46	17.83
	Operations	23	8.92
	Team Leaders	17	6.59
	CEO/SVP/VP	13	5.04
	Contractors	12	4.65
	Total	**258**	**100.00**

Concerning years of professional experience of the participants: 41 participants (15.89%) had less than 10 years of experience, 125 (48.45%) had 10-20 years, and 92 (35.66%) had more than 20 years of work experience, as shown in Table 22.

Table 1: Total years of professional experience of the participants

	Years of Experience	Frequency	Valid Percentage
Valid	<10	41	15.89
	10-20	125	48.45
	>20	92	35.66
	Total	**258**	**100.00**

Regarding years of the previous work experience of the participants in oil and gas companies, 32 of the participants (12.40%) had less than 5 years of previous experience in oil and gas companies, 57 (22.09%) had 5-10 years, and 169 participants (65.51%) had more than ten years of previous experience, as shown in Table 23.

Table 1: Previous work experience of the participants in oil company

Years of Experience		Frequency	Valid Percentage
Valid	<5	32	12.40
	5-10	57	22.09
	>10	169	65.51
	Total	**258**	**100.00**

Concerning work experience in the current oil company, 56 of the participants (21.71%) have been working in the current oil company less than 5 years, while 104 (40.31%) had experience 5-10, and 98 participants (37.98%) had more than ten years of experience, as displayed in Table 24.

Table 1: Years of the work experience in the current oil company

Years of Experience		Frequency	Valid Percentage
Valid	<5	56	21.71
	5-10	104	40.31
	>10	98	37.98
	Total	**258**	**100.00**

Concerning the average number of team members under the participant's supervision, 126 of participants (48.84%) supervised a project team consists of less than 10 members, 82 (31.78%) supervised a project team of 10-50 members, whereas 50 participants (19.38%) supervised a project team of more than fifty members, as displayed in Table 25.

Table 20 Number of project team members under the supervision of the participants

Team Members		Frequency	Valid Percentage
Valid	<10	126	48.84
	10-50	82	31.78
	>10	50	19.38
	Total	**258**	**100.00**

Concerning the number of the construction projects executed successfully with which the participants have engaged. 64 of participants (24.81%) have engaged in less than two executed projects successfully, 65 (25.5%) have engaged in 3-5 successful projects, whereas 129 (25.5%) have engaged in more than 5 completed projects, as illustrated in Table 26.

Table 21: Number of projects completed successfully the participants engaged.

Successful Projects		Frequency	Valid Percentage
Valid	<2	64	24.81
	3-5	65	25.19
	>5	129	50.00
	Total	**258**	**100.00**

Regarding number of the projects the participants have previously engaged in as a team member, 57 participants (22.1%) have engaged previously in less than two projects as a team member, 53 (20.54%) have engaged previously in 3-5 projects, whereas 148 participants (57.36%) have participated previously in more than 5 projects, as described in Table 27.

Table 1: Number of projects the participants have engaged previously.

Previous Projects		Frequency	Valid Percentage
Valid	<2	57	22.10
	3-5	53	20.54
	>5	148	57.36

Total	**258**	**100.00**

5.3 Testing Reliability

The research question (RQ1) "*What role does each of the selected factors play in delaying the planned completion of the oil construction project*?" has been employed in testing reliability.

Cronbach's alpha coefficient (Cronbach, 1951) is a measure of internal consistency and is the most commonly used measure of reliability (Peterson, 1994). Cronbach's alpha can be anywhere between 0 and 1, with higher alpha values indicating greater internal consistency or reliability. Although there is no absolute consensus, many researchers consider coefficients above .7 to be acceptable, while substantially lower values suggest that the scale is not reliable. According to George and Mallery (2016), an α value greater than or equal to .9 is excellent; .8 is good; .7 is acceptable; .6 is questionable; .5 is poor; <.5 is unacceptable. For the purpose of this study, the researcher will rely on the criteria offered by George and Mallery (2016), but will also take into account different factors that might have influenced alpha values (e.g., number of items).

Cronbach's alpha coefficients were computed to test the internal consistency of the six subscales: Timely Project Completion (TPC), Project Planning (PP), Resource Allocation (RA), Contractor's Performance (CP), Project Monitoring (PM), and Project Leadership (PL). In general, $\alpha \geq .9$ is excellent; $\geq .8$ good; $\geq .7$ acceptable; $\geq .6$ questionable; $\geq .5$ poor; $\leq .5$ unacceptable (George & Mallery, 2016).

In the present study, all six alpha coefficients were above .9 (Table 8.2), suggesting excellent reliability.

Table 28 shows the Cronbach's Alpha coefficients ranged between 0.746 and 0.852 which indicate acceptable to good reliability for all the six subscales. This means that there was no internal inconsistency in any of the six subscales considered; that is, the deletion of any item would not increase Cronbach's alpha. Hence, the data collection instrument used in this study was reliable and indicates an adequate consistency. The overall Cronbach's Alpha (Cronbach's α = 0.804) confirmed this result.

Table 22 Overall Cronbach's Alpha Coefficients of the Questionnaire's Subscales

Subscale	**Number of items**	**Cronbach's α**
TCP	6	0.746
PP	6	0.846
RA	5	0.754
CP	5	0.852
PM	5	0.801
PL	6	0.823
Total	**33**	**0.804**

5.3.1 Test Reliability of Dependent Variable- Timely Project Completion

A series of Cronbach alpha tests were conducted to determine firstly the reliability of scale of the dependent variable *Timely Project Completion* as a whole, and secondly for examining the internal consistency of TPC-related items. Cronbach alpha analysis was performed for each item belonging to scale of the dependent variable to have returned sufficient internal consistency of items that found to be 0.708, 0.708, 0.736, 0.710, 0.727, and 0.718, respectively. These results indicate an adequate consistency for the study (> 0.700), as shown in Table 29.

Table 23 Cronbach Alpha Analysis for each item of the TPC scale

Items	Scale means if item deleted	Scale variance if item deleted	Corrected item-total correlation	Cronbach alpha if item deleted
TPC1	50.88	15.365	0.578	0.708
TPC 2	51.08	15.077	0.537	0.708
TPC 3	50.93	16.431	0.377	0.736
TPC 4	50.89	15.607	0.597	0.710
TPC 5	50.82	16.376	0.505	0.727
TPC 6	50.84	15.992	0.550	0.718

5.3.2 Reliability Test of Independent Variables

5.3.2.1 Reliability Test of Project Planning (PP)

The Cronbach alpha tests for the scale of PP-related items including (i) a detailed project scope, which was clearly described by the project owner (PP1), (ii) risks to be managed were properly planned (PP2), (iii) the projects activities duration estimated by the project team is realistic (PP3), (iv) presence of key project team member participation effects the time project completion (PP4), v) realistic deadline given by the authorities is sufficient (PP5), and (vi) effective contingency plan prepared by the project management team is suitable (PP6), which came as 0.808, 0.823, 0.790,0.855, 0.830 and 0.810, respectively. As shown in Table 30, The generated results are indicating an adequate consistency for the study.

Table 30: Cronbach Alpha Analysis for each item of the PP scale

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach Alpha if Item Deleted
PP1	20.59	10.190	0.698	0.808

PP2	20.54	10.901	0.625	0.823
PP3	20.95	8.883	0.770	0.790
PP4	20.37	11.978	0.419	0.855
PP5	21.04	9.884	0.593	0.830
PP6	20.81	9.945	0.684	0.810

5.3.2.2 Reliability Test of Project Resource Allocation (RA)

Allocation items were exposed to Cronbach alpha tests to reveal that certain factors affect the TCP at different levels i) availability of human resources affects RA1, ii) competencies of project managers affect RA2, iii) construction assets availability (e.g., materials & amp; equipment) affect the deadline of the projects RA3, iv) financial fund affects the RA4, and v) technology resources affect the RA5. Thus, the internal consistencies were found to be 0.744, 0.725, 0.752, 0.740, and 0.748, respectively. Thus, the generated results are indicating an adequate consistency, as seen in Table 31.

Table 31: Cronbach alpha analysis for each item of the RA scale

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
RA1	18.17	3.311	0.567	0.735	0.744
RA2	18.10	3.780	0.498	0.705	0.725
RA3	18.01	3.464	0.619	0.743	0.752
RA4	18.20	3.339	0.497	0.710	0.740
RA5	18.44	3.372	0.456	0.729	0.748

5.3.2.3 Test Reliability of Contractor Performance (CP) Scale

Cronbach alpha for testing the items belonging to contractor performance, including five factors affect the timely project completion at different levels, these were i) contractors/suppliers involvement in the project scope affects CP1, ii) contractors/suppliers responding to project owner needs affects CP2, iii) the quality of contractors/suppliers' supervision affects CP3, iv) coordination with various stakeholders affects CP4, and v) execution of scope of work as per the company procedures / standards affects CP5; these effects were found to be 0.850, 0.847, 0.833, 0.856, and 0.845, respectively. These generated values indicated an existing consistency acceptable for all items of the scale, as displayed in Table 32.

Table 32: Cronbach Alpha Analysis for each item of the CP scale

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
CP1	17.83	3.766	0.831	0.760	0.850
CP2	18.00	3.393	0.830	0.733	0.847
CP3	17.75	3.825	0.804	0.701	0.833
CP4	17.81	3.878	0.826	0.736	0.856
CP5	17.95	3.637	0.821	0.806	0.845

5.3.2.4 Test Reliability of Project Monitoring (PM) Scale

Cronbach alpha tests were performed for items included in project monitoring (PM) scale, which were i) easy acceptance criteria by different stakeholders affect PM1, ii) effective indicators of the effective monitoring process affect PM2, iii) sufficient of

experienced project team available for the project execution affect PM3, iv) sufficient processes, procedures, and tools available for the effective monitoring process affect PM4, and v) sufficient time to monitor the project stages affects PM5. The results obtained were 0.811, 0.772, 0.761, 0.784, and 0.806, respectively, which indicated adequate consistency as tabulated in Table 33.

Table 33: Cronbach Alpha Analysis for each Item of PM Scale

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PM1	17.13	5.787	0.802	0.757	0.811
PM2	16.81	6.115	0.760	0.738	0.772
PM3	16.68	5.761	0.750	0.770	0.761
PM4	16.78	5.452	0.764	0.714	0.784
PM5	16.86	5.470	0.787	0.705	0.806

5.3.2.5 Test Reliability of Project Leadership (PL) Scale

The Cronbach alpha tests were run for items of the project leadership scale, including (i) project manager empowers the project team to affect. PL1, (ii) project manager deals with conflicts to affect PL2, (iii) project manager is flexible with scope variation to affect PL3, (iv) project manager engages the project team to affect PL4, v) project manager is creative and innovative to affect PL5, and (vi) project manager has the right communication skills to affect PL6. The generated results of tests were found to be 0.784, 0.797, 0.840, 0.783, 0.760, and 0.790, respectively, to indicate that an adequate consistency of scale of the items exists, as illustrated in Table 34.

Table 34 Cronbach Alpha analysis for each item of PL Sale

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PL1	21.04	8.822	0.639	0.445	0.784
PL2	21.07	9.531	0.582	0.406	0.797
PL3	21.78	8.624	0.432	0.223	0.840
PL4	21.08	9.424	0.678	0.517	0.783
PL5	21.25	8.245	0.716	0.574	0.765
PL6	20.95	9.309	0.617	0.506	0.790

5.4. Validity Test

Validity is an essential criterion for the quality of a reliability test. However, *does the term validity refer to how a test could precisely measure what is supposed to be measured*? Therefore, many methods are being used to estimate the validity of a test, including content validity, concurrent validity, and predictive validity. In this study, several tests were conducted to examine the survey data's suitability for identifying the delay-causing factors. These tests included the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity and Commonalities. The total variance was explained, and a rotated component matrix was incorporated to confirm validity (Williams et al., 2010). The KMO measure varies between 0 and 1, which is closer to 1 as better, and the value of 0.6 is a suggested minimum. The generated value of the KMO measure was 0.854, representing a valid test score indicating an adequate consistency, as shown in Table 35.

Table 35: KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**0.854**
Bartlett's Test of Sphericity	Approx. Chi-Square	3221.768
	Df	528

	Sig.	0.000

Table 36 shows the commonalities of 33 survey questions between 0.739 and 0.854.

Table 36: Commonalities

Variables' Items	Initial	Extraction
TPC1	1.000	0.757
TPC2	1.000	0.739
TPC3	1.000	0.742
TPC4	1.000	0.754
TPC5	1.000	0.744
TPC6	1.000	0.708
PP1	1.000	0.844
PP2	1.000	0.835

Cont. Table: 36 Commonalities

Variables' Items	Initial	Extraction
PP3	1.000	0.773
PP4	1.000	0.840
PP5	1.000	0.791
PP6	1.000	0.798
RA1	1.000	0.749
RA2	1.000	0.751
RA3	1.000	0.749
RA4	1.000	0.775
RA5	1.000	0.755
CP1	1.000	0.835
CP2	1.000	0.823
CP3	1.000	0.815
CP4	1.000	0.841

CP5	1.000	0.833
PM1	1.000	0.811
PM2	1.000	0.772
PM3	1.000	0.813
PM 4	1.000	0.843
PM 5	1.000	0.776
PL1	1.000	0.816
PL2	1.000	0.854
PL3	1.000	0.795
PL4	1.000	0.817
PL5	1.000	0.798
PL6	1.000	0.805

Table 37 lists cumulative variance percentages that were accounted by the current and preceding factors. For instance, the 6th row in the Table shows a cumulative value of 66.645% of total variance got by the first-nine factors.

Table 37 Histogram and P-P Plot of the Timely Project Completion Variable

Items	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	Variance %	Cumulative %	Total	Variance %	Cumulative %	Total	Variance %	Cumulative %
1	9.295	28.167	28.167	9.295	28.167	28.167	3.828	11.601	11.601
2	2.72	8.248	36.415	2.72	8.248	36.415	3.697	11.203	22.804

	2			2					
3	2.551	7.729	44.144	2.551	7.729	44.144	2.978	9.025	51.829
4	1.518	4.600	48.744	1.518	4.600	48.744	2.966	8.988	58.817
5	1.362	4.128	59.872	1.362	4.128	52.872	2.558	7.753	68.570
6	1.245	3.773	66.645	1.245	3.773	56.645	1.722	5.220	75.790
7	1.216	3.686	78.330						
8	1.088	3.296	82.626						
9	1.014	3.073	84.699						
10	0.949	2.875	69.574						
11	0.859	2.603	72.177						
12	0.812	2.462	74.639						
13	0.752	2.279	76.918						
14	0.716	2.171	79.089						
15	0.634	1.921	81.009						
16	0.605	1.835	82.844						
17	0.569	1.724	84.568						
18	0.523	1.585	86.153						
19	0.467	1.415	87.568						
20	0.426	1.292	88.859						

21	0.408	1.237	90.097						
23	0.364	1.104	92.403						
24	0.347	1.050	93.454						
25	0.297	.900	94.354						
26	0.291	.883	95.236						
27	0.280	.850	96.086						
28	0.259	.784	96.870						
29	0.248	.752	97.623						
30	0.226	.684	98.306						
31	0.217	.657	98.964						
32	0.200	.606	99.570						
33	.142	.430	100.000						

Table 38 shows the rotated factor loadings (factor pattern matrix), which represent how the variables are weighted for each factor and the correlation between the variables and the factor. Because these are correlations, values range from -1 to +1. On the format subcommand, -1 used the options blank (0.50), which tells SPSS not to print any of the correlations that are 0.5 or less; this makes the output easier to be read by removing the low correlations clutter is not meaningful The results of rotated factor matrix are presented in Table 38.initially, I did not get the desired results as some of the items were loaded on other factors or loaded on two factors which leads

to generate extra factors in the overall analysis. I removed these items incrementally (TPC3, TPC6, PP4, RA5, and PM 5) and get the final results presented in Table 38.

Table 38: Rotated Component Matrix (Factor Pattern Matrix)

	Factor					
	1	2	3	4	5	6
Timely Project Completion 1					0.585	
Timely Project Completion 2					0.765	
Timely Project Completion 4					0.786	
Timely Project Completion 5					0.816	
Project Planning 1		0.736				
Project Planning 2		0.612				
Project Planning 3		0.825				
Project Planning 5		0.664				
Project Planning 6		0.734				
Resource Allocation 1			0.726			
Resource Allocation 2			0.517			
Resource Allocation 3			0.759			
Resource Allocation 4			0.618			
Contractor's Performance 2						0.713
Contractor's Performance 4						0.590
Contractor's Performance 5						0.748
Project Monitoring 1				0.578		
Project Monitoring 2				0.599		
Project Monitoring 3				0.661		

Project Monitoring 4				0.625		
Project Leadership 1	0.748					
Project Leadership 2	0.667					
Project Leadership 3	0.763					
Project Leadership 4	0.714					
Project Leadership 5	0.688					
Project Leadership 6	0.683					

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 17 iterations.

5.5 Testing Assumptions of Linear Regression

5.5.1 Assessing Outliers and Normality

Before proceeding to the main analyses, outliers and the normality of the distributions were assessed for the Timely Project Completion variable.

5.5.2 Outliers

Several potential outliers were identified by relying on visual representations (histograms and P-P plots). Standardized Z scores were used to further examine the outliers. The following criteria were used: $|Z| \geq 1.96$ – potential outliers, $|Z| \geq 2.58$ – probable outliers, $|Z| \geq 3.29$ – extreme outliers (Field, 2018). In this study, only two participants had $|Z| \geq 2.58$, that being on the Timely Project Completion variable. However, a histogram (Figure 5) showed that these values were not separated from the rest of the distribution. Therefore, these values were retained, as they were outliers rather than extreme values.

5.5.3 Normality of the Distribution

Since significance tests for normality (i.e., Shapiro-Wilk and Kolmogorov-Smirnov) are advised not be used in large sample sizes (Field, 2018), normality of the distributions was assessed by relying on visual representations of skewness and kurtosis. Both the visual representations histogram and P-P plot as shown in Figure 45.a, Figure 5.b and skewness (sk = - 0.796) and kurtosis (k = - 0.126) coefficients suggested that the Timely Project Completion variable is normally distributed.

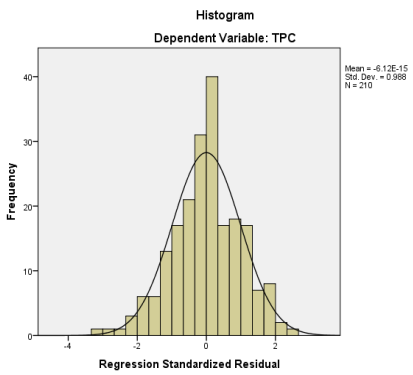

Figure 5.a: Histogram: Timely

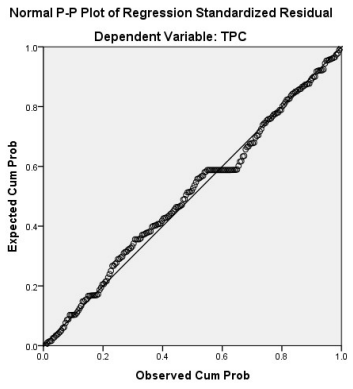

Figure 5.b: P-P Plot: Timely Project

Project Completion (TPC) Completion (TPC)

Figure 5 Histogram and P-P Plot of the Timely Project Completion Variable

5.5.4 Multicollinearity

Finally, we want to check absence of multicollinearity using VIF values. Table 39 shows that each VIF value is below 10, indicating that the Multicollinearity assumption is met.

Table 39: Multicollinearity Test

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.031	.232		8.764	.000		
	PP	.000	.042	.000	.005	.996	.552	1.811
	RA	.247	.055	.299	4.454	.000	.659	1.518
	CP	.237	.058	.298	4.064	.000	.551	1.815
	PM	.095	.051	.154	1.872	.063	.436	2.293
	PL	.002	.045	.003	.046	.963	.529	1.890

a. Dependent Variable: TPC

5.5.5 Discriminant Validity and Correlation Analysis

Discriminant validity refers to the extent to which factors are distinct and uncorrelate d. Discriminant validity would be evident if the correlation between a subscale and its corresponding component score was higher than the correlation between the subscale and the other component score [12]. Results of discriminant validity testing of the Timely Project Completion are presented in Table 13.

In order to examine the relationship between the Timely Project Completion and each one of subscales used in this study, Pearson's correlation coefficient was computed. This index is a statistical tool for determining the strength of the relationships between the study's subscales. Pearson's correlation coefficient, which

can range from -1 to +1, is used to determine the strength of a association between two continuous variables. A perfect negative association is shown by a correlation value of -1, whereas a perfect positive relationship is indicated by a correlation coefficient of +1. A coefficient of 0 indicates that there is no relationship at all (Field, 2018). Pearson's correlation coefficient is a parametric test statistic, meaning that certain assumptions ought to be met in order to use it. Specifically, the data should be continuous, linear, normally distributed, homoscedastic, and free from outliers. Table 40 shows the results of these correlations. The table shows correlations between all six subscales.

The correlations were positive and significant at the $p < .01$ level between the Timely Project Completion and the Resource Allocation ($r = .523$), and between Timely Project Completion and Contractor's Performance ($r = .517$). Also, significant at the $p < .01$ level but a little bit weaker between Timely Project Completion and Project Monitoring ($r = .438$), and between Timely Project Completion and Project Leadership ($r = .343$). Finally, the study found a significant correlation between Timely Project Completion and Project Planning ($r = .302$). These findings imply that Resource Allocation and Contractor's Performance have the strongest and most positive implications on a Timely Project Completion.

Table 40 Pearson's Correlations: Relationships between Timely Project Completion (TPC) subscales

		Timely Project Completion	Project Planning	Resource Allocation	Contractor's Performance	Project Monitoring	Project Leadership
Timely Project Completion	R	1					
	Sig						
Project Planning	R	. .302**	1				
	Sig	.000					
	R	.523**	.369**	1			

Resource Allocation	Sig	.000	.000				
Contractor's	R	.517**	.430**	.586**	1		
Performance	Sig	.000	.000	.000			
	R	.438**	.624**	.418**	.580**	1	
Project Monitoring	Sig	.000	.000	.000	.000		
Project	R	.343**	.583**	.366**	.442**	.635**	1
Leadership	Sig	.000	.000	.000	.000	.000	

Note. ¿ $*p \leq .01\, level\,; *p \leq .05\, level\,(2-tailed)$

5.6 Testing Modelling

5.6.1 Multiple Regression Coefficients – R and β

Multiple regression analysis (MRA) is a statistical analysis that provides a way to objectively determine the possible significance and direction of relationships between each independent variable (predictor) and its outcome variable (Tabachnick & Fidell, 2007). Therefore, this statistical approach is a powerful tool for evaluating which independent variables will predict the variance of dependent variables selected for the creation of a research framework (Black & Babin, 2019). The interpretation of the multiple regression analysis (MRA), however, reflects the understanding of the multiple Pearson's product-moment correlation coefficient (R), whose value ranges from -1 to 1.

The value (0) means that there is not a linear relationship existing between predicted scores (independent variable) and criterion scores (dependent variable). While a value of (1) implies the linear relationship of the independent variables could perfectly predict the dependent variable. Thus, the generated values ranging between (0) and (1) indicate a less than perfect linear relationship between predicted and criterion scores (Black & Babin, 2019). Therefore, R2 may be adjusted to correct the

overestimated (inflated) value of the target sample population (Tabachnick & Fidell, 2007; Black & Babin, 2019).

Therefore, the adjusted R2 values recorded in this section indicate the degree (in percentage) to which specific constructs/factors were predicted and clarified by others before comparing the degree of prediction between the constructs/factors. Both standardized and unstandardized regression coefficients are also mentioned for the significant regression models. A standardized regression coefficient (β) is a coefficient resulting from the standardization of the collected data by eliminating any problems dealing with different units of measurement.

Thus, it reflects the relative impact on TPC of a change in one standard deviation in either variable. In other words, based on the value of the β coefficient, the predicting power of independent variables within a multiple regression model could be compared, i.e., the larger the β coefficient value, the more significant the predictor had in predicting (Black & Babin, 2019). Thus, the β coefficient is used herein to construct a regression equation for calculating the predicted values for each variable and probe the expected change in the dependent variable for each unit change in the independent ones.

5.6.2 Multi-Regression Analysis of all Variables

5.6.2 Multiple Regression Analysis

As mentioned in the above subsection, MLR is a statistical technique that uses several explanatory variables to predict the outcome of a response variable. The goal of multiple linear regression is to model the linear between the explanatory (independent) variables and response (dependent) variables. In essence, multiple

regression is the extension of ordinary least-squares (OLS) regression because it involves more than one explanatory variable.

This section deals with survey data obtained from the participation of 258 project professionals in an oil and gas company. The data collected answered questions about the role of the dependent and independent variables. Multiple regression analysis (MRA) examined the relationship between timely project completion and other independent variables (project planning, resource allocation, contractor's performance, project monitoring, and project leadership). Therefore, performing MRA tried to answer the main research question, "what are the main factors affecting timely completion of oil and gas construction projects in Abu Dhabi" within the UAE business environment.

An MRA was conducted to determine whether independent factors were statistically significant to function as predictors of timely project completion as dependent variable. The findings of MRA of the five proposed independent variables revealed that the constructs predicted and explained 38.0% of variance of TPC construct with adjusted R^2 values as displayed in . ANOVA test of the MRA gave significant values of regression at $p < 0.01$ level, as presented in Table 41.

Table 41 MRA of the potential effect of TPC on independent variables

Model Summary [b]				
Model	*R*	*R* Square	Adjusted *R* Square	Std. Error of the Estimate
1	0.629[a]	0.395	0.380	0.28163

a. Predictors: (Constant), PL, RA, PP, CP, PM

ANOVA test of the MRA gave significant values of regression $p < 0.01$ level, as presented in Table 42.

Table 42 ANOVA test for all predictors

ANOVA[a]						
	Model	Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	10.571	5	2.114	26.655	.000[b]
	Residual	16.180	204	.079		
	Total	26.751	209			

a. Dependent Variable: TPC

b. Predictors: (Constant), PL, RA, PP, CP, PM

Providing that the significant prediction of dependent variables as interpreted from the generated results of the regression coefficients, project planning (PP) was found to have a $t = .005$, $\beta = 0.00$, $p > 0.05$; thus, this predictor was not significant, and Hypothesis 1 was not supported. Resources allocation (RA) was found to have $t = 4.454$, $\beta = 0.299$, $p < 0.001$; thus, the predictor was significant, and the alternative Hypothesis 2 was supported. The independent variable contractor performance (CP)

was found to have t =4.064, β =0.298, p=0.000. This predictor was significant, and the alternative hypothesis 3 is supported.

The regression coefficient project monitoring (PM) showed t= 1.872, β= 0.154, and p= 0.063; this predictor was not significant, and Hypothesis 4 is not supported. The regression coefficient of project leadership (PL) was found to have t= 0.046, β=.003, and p= 0.963; this value indicated that PL is not a significant predictor, and hence Hypothesis 5 is not supported as well. Table 43 displays the regression coefficient of the five proposed independent variables.

Table 43 Regression coefficient for the five proposed independent factors

Coefficients[a]								
	Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig(p).	Collinearity Statistics	
		B	Std. Error	Beta((β))			Tolerance	VIF
1	(Constant)	2.031	.232		8.764	.000		
	PP	.000	.042	.000	.005	.996	.552	1.811
	RA	.247	.055	.299	4.454	.000	.659	1.518
	CP	.237	.058	.298	4.064	.000	.551	1.815
	PM	.095	.051	.154	1.872	.063	.436	2.293
	PL	.002	.045	.003	.046	.963	.529	1.890

a. Dependent Variable: TPC

5.7 Summary

The current chapter addressed details of collected data analysis; it started with a demographic analysis of respondents who participated in the online questionnaire. The next step was examining the reliability and validity of the sex scales applied in the study. Reliability tests showed the acceptance of the scale of timely project completion (TPC) as a dependent factor and the other five scales of independent factors, namely (project planning scale" PP", project resources scale" PR", contractor performance scale "CP", project monitoring scale "PM", and project leadership scale "PL"). In addition, validity tests, including the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy, were performed to support the interpretations of test scores entailed by evaluating the suitability of the data provided by the respondents.

Testing modelling involving multiple regression coefficients (R and β) was applied to all variables, as shown in Table 44, to measure their respective effectiveness. As per the analysis, only two independent variables, i.e., resources allocation, and contractor's performance variables, were included within the fitted model developed through the multiple regression modeling. The other three variables under investigation, i.e., project planning, project monitoring, and project leadership were not significant and should be excluded from the regression model as the P-values of these variables were more than 0.05. Hence, the resources allocation and contractor's performance play a good job in predicting the timely project completion. The findings of the correlation analysis imply that resource allocation and contractor's performance have the strongest and most positive implications on a timely project completion. While the other factors having weaker positive relationships with the timely project completion.

Table 44: Results of Tested Hypotheses

No.	Hypothesis	Finding
Hypothesis 1	Project planning will affect the timely completion of the projects in the oil and gas industry in Abu Dhabi.	Not supporting
Hypothesis 2	Resources allocation will affect the timely completion of the projects in the oil industry in Abu Dhabi.	Supporting
Hypothesis 3	Contractor performance will affect the timely completion of the projects in the oil industry in Abu Dhabi.	Supporting
Hypothesis 4	Project monitoring will affect the timely completion of the projects in the oil industry in Abu Dhabi.	Not supporting
Hypothesis 5	Project leadership has influence on the relationship between resource allocation and timely completion of projects in the oil industry in Abu Dhabi.	Not supporting

CHAPTER 6: DISCUSSION

6.1 Introduction

This study aims to explore the possible delay-causing factors associated with construction projects. The study also selects possible delay-causing factors from related scholarly publications in the context of the Abu Dhabi oil and gas industry, which may aid in proposing the conceptual research structure for this study.

The findings of the qualitative data analysis are discussed in detail in this chapter.

6.2 Interpretation of Research Findings

Delay during construction is affected by many factors that make meeting the established deadline arduous for the project team. From the literature, remarkably few studies have identified factors that affect the project schedule during the construction phase in construction projects in oil and gas companies. Project construction teams strive to complete projects according to schedule, within budget, and standards during the construction process. Therefore, it is essential to define and rank the variables that can cause schedule delays to enable the project management team to achieve the previously stated targets and avoid delays. Many construction projects in the oil and gas sector have become complicated; therefore, they have been completed late on the contractually agreed date between the owners and the contractors. Such delays have a considerable effect on both the owners and the contractors.

The delay during the construction process is affected by several factors that make it difficult for the project management team to reach the set deadline. The five proposed hypotheses were associated directly with the independent variables (project

planning, resources allocation, contractor performance, project monitoring, and leadership style) to incorporate into the conceptual model as it developed. The constructs were after that operationalized so that they could be accurately measured. Thus, a set of measurable independent variables was developed to gauge the model constructs according to the effectiveness of each variable in maintaining the dependent variable (timely project completion).

Results displayed in Table 1 showed that 52.7% (136) of respondents hold a bachelor's degree, 27.5% (71) had a master's degree, and 5.8% (15) had a PhD degree in their work field. Table4 shows that 73.3% (189) of the respondents were previously involved in minor and major construction projects. Table 6 displayed that 48.4% (125) of the respondents have experienced between 10-20 years of construction work, and 35.7% (n=95) of the respondents' experienced more than ten years of relevant working experience. Finally, table 8 revealed that 40.3% (n=104) of respondents had experienced 5-10 years in the current organization, and 38.0% (n= 98) of them had experienced more than ten years in the current organization. These demographic data show that most respondents can provide relevant data on factors affecting the timely completion of construction projects in oil and gas companies.

6.3 Results of Multi-Regression Analysis of the Proposed Model

The findings of MRA of the five proposed independent variables revealed that the constructs predicted and explained 38.0% of the variance of the TPC construct with adjusted R^2 values, as displayed in (0). The results in the tables indicated a significant positive correlation ($r = 0.629$) between the five independent variables and the dependent variable, which revealed the reliability and effectiveness of the proposed model in the prediction and explanation of the five predictors (independent

variables; project planning, project resources, performance of the contractors, project monitoring, and project leadership) of variation in the dependent variable namely "timely project completion"

Project planning results obtained by regression analysis showed that PP was not a significant predictor of 8.7% of the positive variation in the dependent variable "timely project completion" this means that there is no sufficient evidence to support Hypothesis 1. The question "Presence of key project team member participation affects the time project completion." had the highest relative importance level (RII-level) with a mean of 4.49 and RII of 90%. This result came in agreement with Yi et al. (2019) study, as they reported that the proper planning, proper schedule risk management, assessment, and prevention processes could aid in the overall schedule success. Shlopak et al. (2014) addressed issues related to planning within the pre-contract phase and their impact on construction projects.

The current results of simple regression analysis for the prediction power of "project resources" (RA) for variance in "timely project completion" (TPC) revealed that this construct predicted and explained at 27.0% of TPC variance, with a significant positive correlation 0.523, Hence, Hypothesis 2 is supported. Furthermore, the question "Construction assets availability (Materials & Equipment's) affect the deadline of the projects." had the highest relative importance level (RII-level) with a mean of 4.73 and RII of 95%. These results indicated that the availability of materials and equipment is the essential factor in timely project completion compared to other resources such as technological and financial effects. Our results were similar to Bin Seddeeq et al. (2019), who investigated the leading causes of time and cost overrun in Saudi Arabian oil and gas construction projects. They found

that the category “resources-related causes” consists of four causes. The most significant cause under this category was “material procurement issues”, with a significance index of 3.48. The least significant cause under this category was “Labours’ lack of skills and productivity”, with significance indices of 2.96.

Results of simple regression analysis for the prediction power of "contractor performance" (CP) for variance in "timely project completion" (TPC) revealed that CP predicted and explained 26.4% of TPC variance, with a significant positive correlation of 0.517 (Tables 36-38). Results also indicated that "The quality of contractors/suppliers' supervision effect the time project completion" is the most pivotal factor within the factors related to CP and hence, Hypothesis 3 is supported. Our results came in agreement with many studies since they reported that the quality of contractors is a compelling cause of delay in project completion. Alzahrani and Emsley (2013) identified what critical success factors (CSFs) impact the project's success. The factor analysis revealed nine factors related to the contractor, namely (i) safety and quality; (ii) past performance; (iii) environment; (iv) management and technical aspects; (v) resource; (vi) organisation; (vii) experience; (viii) size/type of previous projects; and (ix) finance.

Al Saeedi and Karim2020 investigated the Omani O&G project's performance and analysed the most common time and cost overrun causes. The study claimed that understanding the project's scope of work correctly and giving its time to be grasped by the contractors is one of the critical solutions to tackle the top factor of this research. Samsudin et al. (2020) showed that contractor experience and effective communication played a significant positive relationship on building project performance among construction projects in Malaysia.

The obtained findings from individual regression analysis for project monitoring (PM) revealed that this construct predicted and explained 18.8% of the variance of the TPC construct with an adjusted R^2 significant value at the 0.05 level. These findings also suggested moderated positive correlation between PM and TPC, but the P-value of this factor in the regression analysis is more than 0.05 and hence, Hypothesis 4 isn't supported which means that PM is not a significant predictor of TPC. The current findings came from Tavakolan and Etemadinia, 2017 who used the fuzzy logic technique for considering the uncertain nature of risks and delay factors in construction projects based on experience and subjective managerial judgement.

In addition, Rachid (2018) and Kazemi et al. (2020) reported that weak project management by the contractor and technical and managerial weaknesses by the consultant was identified as crucial delay factors. Hence, owners are supposed to ensure that oil construction projects employ competent and qualified personnel. Construction managers should have the necessary experience and qualifications in oil construction and project management. In this way, developing training programmes in different construction sectors will be helpful.

The findings from individual regression analysis for project leadership (PL) revealed that this construct was not a good predictor where it is explained only 11.3% of the variance of the TPC with a small, adjusted R^2 value. Asri et al. (2017) focused on role leadership styles in managing projects within the Oil and Gas Industries in Malaysia. This study applied quantitative and qualitative methodologies to obtain the most accurate information that would benefit the oil and gas industry players to evaluate their project managers. Strong leadership styles can enhance organisational capabilities in managing their project team to become more effective and efficient.

A comparison of the study, as shown in Table 44, results with the previous research indicated that the owner's financial problems were the most critical causes of delay in the oil and gas construction industry in the countries such as India and Indonesia (e.g., Prasad et al., 2019). While as found by Sandhyavitri (2019), changes in design and specifications are one of the significant causes of delays in oil construction projects in Iran and Indonesia. Moreover, our findings came in disagreement with prior research conducted by Ravand and Salai (2011) that low efficiency of equipment and low labour productivity are critical delay factors in construction projects. Pham and Hadikusumo (2014) found that ineffective planning and scheduling by the contractor was identified as one of the three essential delay factors in EPC petrochemical projects in Vietnam.

Moreover, poor site management and supervision and ineffective project planning and scheduling were identified as the leading causes of delays in Oman's oil and gas construction projects (Ruqaishi & Bashir, 2015). Furthermore, the most critical reason for delays from contractors in construction projects was poor site management and supervision in Thailand's oil and gas platform projects (Gomarnd & Pongpeng, 2018). In contrast, the current study and Aljamee et al. (2020) ranked types of bidding and rewards and weak project management as the top five most important causes of delay in Iraq's petroleum industry.

Kazemi et al. (2020) showed that the whole group causing a delay in oil construction projects are the environmental category, followed by organisational factors, consultant, contractor, owner, labour, contract and contractual relations, laws and regulations, equipment, design, and materials. They added that among different causes of delay, financial problems, and delays in payment by the owner, weak

project management by the contractor and technical and managerial weaknesses of consultants were ranked as the most critical delay causes. Similarly, low efficiency of equipment, low productivity of labour, changes in the price of material, changes in design, inappropriate organisational structure linking to the project, and changes in laws and regulations were identified as other crucial causes of delay in Iran's oil construction projects. Abdullah et al. (2018) found that delays in subcontractor's work, lack of subcontractor skill, and poor planning and scheduling were the most crucial factors causing a delay in Palm oil refinery construction projects in Malaysia.

Table 44 Comparison between the current study and some other studies

	The current study	Alhajri, & Alshibani (2018).	Bin Seddeeq et al. 2019	Abd Elrazek, & Gamal (2019).	Sweis et al. 2019	Al Saeedi & Karim (2020).	Kazemi et al. 2020
Causes related to project planning	5	3	1	1	6	2	5
Causes related to project resources	1	1	2	2	1	3	6
Causes related to contractor performance	2	4	3	Not investigated	3	1	3
Causes related to project monitoring	4	Not investigated	4	4	7	5	Not investigated
Causes related to project leadership	3	2	5	3	5	4	2
Causes related to Environmental factors	Not investigated	5	7	5	4	Not investigated	1
External factors (e.g., inflation, change in regulations	Not investigated	6	6	Not investigated	2	6	4

6.4 Chapter Summary

The chapter addressed the study's overall results and discussed these findings with findings of other results on the same topic. The demographic findings of the study indicated highly educated respondents who worked in the field of oil and gas construction projects. These findings indicated the presence of adequate experienced persons in the projects with variant job titles. The members of oil and gas construction completion involved fewer workers of one gender (11.2%) than the other, which can be attributed to the complicated and challenging nature of working on those projects. So that individuals of that gender can work only in places of administration or human resource departments. The oil sector in UAE contains many

international companies. Currently, oil companies, notably from the UK, the USA, Japan, and France, have 40% of the oil and gas production-sharing in the Abu Dhabi Emirate. So, it is not surprising that only 36.4% are national citizens are employed in oil and gas construction projects. By revising the work experience of the participants in the current study, the respondents reflected rich professional experience; about 78% have more than five years of experience in the current organization. Such professional experience would enable high competence in work performance, project delivery, and project outcomes.

In addition to engineers, who make up the majority of the project staff (30.2%), other professionals were also involved in constructing the oil and gas projects to strengthen the work team and contribute positively to the timely completion of the project.

The high Cronbach's Alpha (r=0.840) indicates the overall model's strong reliability of the data collection instrument. In addition to that we performed individually calculations of the Cronbach's Alpha for each independent variable, the results showed strong reliability for each one of the variables, namely, timely project completion, project planning, project resources, contractor performance, project monitoring, and project leadership, all of them had value > 0.70.

The regression analysis of the model showed that the five independent factors significantly predicted and explained 39.5% of the variance in timely project completion. In contrast, this percentage fluctuates during the individual regression analysis for each independent variable.

Although the percentage of contractors is the lowest (4.65%) among the total number of the persons who participated in the study, contractor's performance had the second rank in factors of delaying project completion, as contactor's performance predicted

and explained 26.4% of the variance of timely project completion with mean value 4.46 out of 5 in the Likert scale.

Leadership style in the proposed construction showed that project leadership has moderate importance as a factor of timely project completion, and leadership predicted and explained 11.3% of the variance of the timely project completion.

CHAPTER 7: CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

7.1.1 Preface of the Study

This study used the quantitative research method to conduct a questionnaire-based survey to determine the potential role of selected delay-triggering factors affecting the implementation of construction projects in the oil and gas industry in the context of the Abu Dhabi economic system. Phase I of the study identified and prioritized the significant factors contributing to planning changes in oil and gas projects based on the views of industry professionals. The research tools used in this phase included evaluating four sample projects carried out by ADNOC construction project staff in the oil and gas industry in the emirate of Abu Dhabi.

Phase II included selecting a simple random sample to assign staff to respond to the statistical population. Each member of the subset had an equal probability of being selected, according to Kadilar and Cingi (2004). In phase III, a conceptual model was constructed. Finally, model variables, including dependent and independent variables, were proposed, namely timely project completion as a dependent factor and planning of the project, resource allocation, contractor performance, project supervision and project management as independent variables.

7.1.2. Timely Project Completion- Relations with Delay-Causing Factors

The study used a questionnaire to collect the research data from the professionals involved in oil and gas projects for ADNOC in the Emirate of Abu Dhabi. Analysis of the survey responses revealed a high level of agreement among the participants that project resource allocation, contractor performance, project supervision, project

management and project planning are the leading causes of delays in oil and gas construction projects.

The primary research questions focused on exploring the nature and pattern of the relationship between factors involved in project construction as independent variables, and the dependent variable represented timely project completion. The conceptual derived model revealed that the significant contributions in timely project completion come from the suggested predictors. Each varies in importance when estimated in the regression model analysis, with a prediction strength of 39.5% of variance occurring in timely project completion. The findings obtained supported the study's hypotheses and answered the research questions. Regarding the data simple regression analysis, the study emphasises that not all factors have identical prediction power, beginning with project planning with minimum prediction power of 8.7% up to resources of the project with a maximum power of 27.0%.

Let us come deeply with questions of the study. *What are the potential roles of each factor in promoting timely project completion of the construction project*? The principal issue was, "does the availability of resources affect the deadline of the projects? " With a mean value of 4.73. The prime survey question Q15, "*how do construction assets (materials and equipment) affect the deadline of the projects*?" with a t-value of 149.48. in the second-order CP second t value142.04 mean value (4.46), particularly Q20 "*Does the quality of contractors/suppliers' supervision affect the time project completion*?", which had a mean value of 4.52. Thirdly, the t-test showed that project monitoring came in third order among the potential factor in promoting timely project completion of the construction project (t= 105.88), while

leadership came in fourth order with t value =104.22 mean value, and lastly, project planning came in fifth order with t value= 98.86.

Based on the results of this study and other similar works in this area, resources problems are among the most critical problems in oil and gas construction projects. Resources problems of owners lead to problems for contractors such as paying the wages of workers, employees, and subcontractors, paying the rent for machinery and equipment and buying needed materials for the project. The obtained potential roles played by each factor in promoting timely project completion of the construction project were supported in many previous studies such as Alhajri and Alshibani (2018); Sweis et al. (2019), and Seddeeq et al. (2019).

7.2 Contribution to Knowledge in the Discipline

The results obtained from the statistical analysis yielded a model in which pathways linked timely project completion to the other predictor factors, which would be expected to satisfy the goals of the organization in the field. The findings were subject to a validity test employing multi-regression analysis and interrelationships among the various variables. These findings could contribute to the existing literature in several ways:

(a) It provides some insights into the coordinating pattern formed between all parties involved in completing the planned projects within the structure intended to be conducted in the UAE construction project.

(b) It supports the knowledge that shows the linkage between the timely project completion and the independent factors' effect could delay project completion and possible potential roles and functions of the predictor factors.

(c) It addresses the knowledge gap regarding regression analysis and one-way sample t-test as the methodological approach to a sample obtained from the ADNOC. Few studies so far have done this.

(d) It criticizes the potential roles causing delays in construction projects that have not been considered in the UAE context. This study speculates on the critical roles of different parties in executing construction projects in the UAE. In addition, the study tackled the potential challenges that may come to interrupt the core functions of the target.

ADNOC has drawn the attention of many scholarly investigations as a case study; for instance, the scholarly search engines (e.g., google) retrieved about 5240 published studies focused on ADNOC's diverse activities. For example, studies by Al-Mulla et al. (2019) and Al Beshr et al. (2018) addressed other aspects of the company's performance. Nevertheless, no research focused on the factors that may be caused by delays in the schedule of projects completion, which was presented by the current study.

This exploratory and causal-effect study examined the relationships between the five predictor factors designated as independent variables and timely project completion designated as a dependent variable. Finally, a conceptual framework was built upon the findings of a quantitative analysis of the collected data. By paying close attention to various aspects of the roles of the potential independent factors, this study offers significant contributions along different dimensions. Among these are the following:

The developed model can be used to assess the success level of the construction project. The higher value of regression analysis obtained, the more prediction power of factors causing delay and, in turn, the better timely project completion. Its primary

intention was to contribute to the literature on projects construction and related project approaches to identifying the problems facing the accomplishment of projects and selecting what potential factors play in supporting the timely project completion.

This research study, it is hoped, offers information needed by the different parties in the project team about what their counterparts are doing to make cross-project learning and the associated challenges easy to confront. These data may be helpful in the effort to improve the practices in project activities processes in the UAE oil construction projects sector. Furthermore, the findings of this study could help in shrinking the gaps in knowledge by offering practical perspectives that could be implemented in professional settings by project managers and project leaders working in various project management domains since these project personnel want to use suitable models to maximize the possibility of project success by improving the means of managing their projects and programs.

7.3 Practical Implications

Apart from theoretical contributions, this research also provides practical contributions to the UAE project by incorporating the developed model derived from rigorous variable assessment and establishing interrelations; this could serve as a framework for project-based organisations to take on suitable applications of construction projects in practice. Furthermore, this model offers several factors that could help construction projects improve their practices, achieve their vision, mission, and show acceptable performance. The findings of the study imply that resource allocation and contractor's performance have the strongest and most positive implications on a timely project completion. There is much significance linked to this research study because of its broad scope. This study could have a more

significant impact on the oil industry of Abu Dhabi, UAE, with its result because it could help the project-devoted construction industries in controlling the five-potential delay-causing factors (i.e., planning, resources allocation, contractor performance, monitoring and evaluation, and project leadership) for the timely completion of a construction project.

The proposed model of the study also benefits construction professionals in many ways. Architects, contractors, engineers, site developers, project managers and quantity surveyors can benefit from this research. Providing that the developed hypotheses were supported, they can be expanded and applied to know how these factors impact the timely completion of the project because accomplishing a project at a given time is equally essential for all these associated people. They must face significant issues if they get delayed. Through the findings of the present research, they may enable controlling these factors for achieving the project's success at a given time.

The research investigation was explicitly focused on the Abu Dhabi Emirate. However, this study could also give a similar story to other oil and gas industries established in different regions across UAE and neighbour Gulf countries. Every oil and gas industry would be facing similar issues of late completion of the construction project, and the primary factors involved in the delayed completion are the same (Rose, 2013). So, the results gained from this industry are helpful for similar industries in the State of Kuwait, Kingdom of Bahrain, Sultanate of Oman, Kingdom of Saudi Arabia, and Iraq, employing applying the generated measures and findings where appropriate.

This exploratory study can be viewed as a lesson learned approach. This study will guide the development and adoption of necessary effective and efficient project management practices to complete the construction projects within budget and on schedule with superior quality and safety. Stakeholders' awareness about causes of delay gives them more options and improves capability in problem-solving throughout the project life cycle.

the five-potential delay-causing factors (i.e., planning, resources allocation, contractor performance, monitoring and evaluation, and project leadership) for the timely completion of a construction project.

The findings of the current research bring about managerial issues that need to be addressed as a way of tackling the timely completion of a construction project. In the first place, there is a need for monitoring and evaluating the contractor performance and to give more attention on the project leadership. Planning and resources allocation are significant factors for managing the timely completion of a construction project. Moreover, a professional project manager would also have a big responsibility of ensuring that a construction project will be completed on time and to avoid the delay causes.

7.4 Recommendations

This exploratory and causal-effect study generated some critical recommendations based on the significance of some of the potential factors. Consequently, project-based organisations in the oil and gas sector are advised to accomplish the targeted project inappropriate to the nature and content of their proposed projects. Moreover,

the proposed recommendations are expected to enhance the various project activities' inefficient implementation and successful accomplishment. In addition, this study developed evaluative criteria for measuring the performance of different parties in the organisations. The current study has developed a proposed framework to address how the relationship of independent-dependent variables could be conceptualised to curb the delay-causing factors impacting the timely completion of the construction project in the oil industries (Al Ameri, 2016). Based on our results, the study recommends the following to minimise and control the delay in oil construction projects:

(a) The model developed by the study emphasised the importance of well-defining the scheduling of various activities concerned with the specific resources required by those project activities while considering the availability of needed resources within the range of the project completion time. The resources include human resources, managers' competence, materials and equipment, technology, and financial resources.

(b) Regarding performance, the project contractors must be highly qualified for such mega projects to avoid delays in project completion. Contractors must stick to the company standards; they must consider the owner's needs besides other stockholders.

(c) Overseeing and controlling different phases and stages of a project concurrently for exchanging information, evaluating the risks involved, and sharing alternative solutions and solutions. Moreover, the work team's monitoring and control function over projects' milestones and activities should ensure that these activities align with the original project plan.

(d) The competencies of the project leader are considered a crucial driver of successful project accomplishment and creating competitive opportunities in similar markets. The managers of construction projects must consider some aspects such as communication between their teams, engaging the team project, and controlling the team members.

(e) Establish a project management committee or panel in oil and gas construction companies, consisting of senior members drawn from strategic planning, performance management, finance, and legal departments. The committee should be responsible for evaluating the requests for various projects before obtaining the budget and investigating each project's purpose and justification against the organisational objectives and targets to be accomplished.

(f) Provide training and coaching sessions for the project and programme managers to develop their managerial best practices and related technical skills. The managers could transfer their acquired knowledge to their project staff.

(g) Select and recruit professionals of various capacities whose qualifications and skills match the roles and activities for project management according to their job descriptions.

(h) Confirming the deficient performance of the current adopted professional practices and strategies could adversely affect the scheduled completion time of the construction project in the oil and gas industry.

(i) Identify the factors that could yield to inadequate completion of the construction project at the desired time in the oil and gas industry.

(j) Encouraging project leaders to adopt and employ appropriate approaches, practices, and strategies for completing the construction projects within the project timeline.

(k) Measuring performance efficiency of the project stakeholders in combating the delay-causing factors for improving timely project completion plan.

(l) Promoting project culture among other related professionals (e.g., architects, designers, site developers, surveyors, and the like) through getting the most benefits from generated knowledge and lessons.

7.5 Limitations

Nevertheless, this study is not without its limitations:

(a) The study covers only the construction projects in the oil and gas industry of Abu Dhabi Emirate, but it omits information on pipeline networks, oil or gas production fields, pump stations, nodes of gathering systems, power-generating plants, and storage facilities, etc.

(b) The consistency of the findings reported here can be improved by increasing the number of experts. It is also suggested to gather and investigate the opinion of different stakeholders, including owners and consultants.

(c) The study examined only five factors causing accomplishing delay, whereas many other factors could be addressed in this issue.

(d) The study did not involve external factors such as inflation, changes in resources prices, and laws and regulations. Nevertheless, this may be attributed to the political and economic stability in the UAE.

(e) The study did not involve the environmental factors considered in other studies such as Alhajri, and Alshibani (2018), Bin Seddeeq et al. (2019), and Abd Elrazek & Gamal (2019), Sweis et al. (2019), and Kazemi et al. (2020).

(f) The leadership style addressed in the current study was shallow as leadership style has a strong effect on timely project completion. Thus, it should be considered more.

(g) The study did not discuss the effect of organization size or organizational ownership, which may cause project delays.

7.6 Suggestions for Future Studies

(a) The developed model is suggested to be examined in similar industries in other countries such as Kuwait, Bahrain, Oman, Saudi Arabia, and Iraq.

(b) The developed model could be applied, in future studies, to related agencies such as government agencies that undertake the construction work for various aspects. The government conducts road construction, airport construction, railways, and metro construction projects.

(c) While undertaking road construction projects, the government agency can recognise the elements impacting the practical completion of the project, and through this, a construction firm can save up on its cost by not paying hefty charges to the agency for the delay in projects.

(d) The developed model could be applied, in future studies, to related agencies such as private agencies that undertake the construction work for various aspects.

(e) Future studies might also investigate the appropriateness of the developed model in exploring other factors causing completion delays, such as environmental factors and external factors.

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APPENDIX: THE QUESTIONNAIRE SURVEY

Research Title: ***Factors Influencing Timely Completion of Construction Projects in the Oil Industry in the United Arab Emirates- An Exploratory Study***

Welcome to My Research Survey

Dear Participant:

I am Mohamed Saif Alkaabi, working at Abu Dhabi National Oil Company (ADNOC). I am a postgraduate student in the doctorate programme at Aberystwyth University Business School in the UK. I am currently undertaking research in the area of project management. The aim is to find out what factors prevent the timely completion of projects in oil construction projects in the United Arab Emirates. The research methodology used is to send a questionnaire to the relevant managers and individuals involved in completing construction projects. The questionnaire will be used to determine which factors predominantly cause delays. This research study is being conducted under the supervision of Prof. Nicholas Perdikis.

Completion of the questionnaire is voluntary and without any obligation on your part. There are no known or anticipated risks in participating in this survey. Furthermore, the information collected does not represent a conflict or reflect the views of your affiliated organization but rather your professional expertise. The results and findings from this information will be used solely for academic research and to improve EPC design strategy for major oil construction projects.

The information collected will be kept strictly confidential, not be shared with third parties, and will be used only for this study. No mention will be made of you or your organization in any part of this study. For anonymity, your email address or your organization's website will not be mentioned or used in the text. I would be grateful if you could enrich this dissertation with your professional opinion. It will take about 10-15 minutes to complete the questionnaire.

Thank you in advance for your kind interest, valuable time, and participation in completing this survey questionnaire.

Respectfully Yours,

Mohamed Alkaabi

The Questionnaire

A. Participant's Profile

1. *Type of construction project you are currently working with*:

   ☐ Major ☐ Minor

2. *What is your highest academic qualification*?

   ☐ High school ☐ High Diploma ☐ Bachelor ☐ Masters ☐ Doctorate

   ☐Other _____

3. *Which of the following best describes your current job position*?

   ☐ CEO ☐ SVP ☐ VP ☐ Manager ☐ Senior ☐ Engineer ☐ Operation

   ☐ Contractor ☐ Other _____

4. *How many years of total work experience do you have*?

   ☐ Less than 10 years ☐ 10-20 years ☐ More than 20 years

5. *How long have you worked in oil companies*?

   ☐ Less than 5 years ☐ 5-10 years ☐ More than 10 years

6. *How many years have you worked with current oil organization*?

   ☐ Less than 5 years ☐ 5-10 years ☐ More than 10 years

7. *What is the average number of the team members under your supervision*?

   ☐ Less than 10 ☐ 10-50 ☐ More than 50 ☐ Not applicable

8. *As an end-user, how many projects have you previously been involved in*?

   ☐ Less than 2 ☐ 3-5 ☐ More than 5 ☐ Not applicable

9. *As a member of a Project Team, how many projects have you worked on previously*?

☐ Less than 2 ☐ 3-5 ☐ More than 5 ☐ Not applicable

B. Timely Completion of the Construction Project

10. *"Proper project planning practices effect the timely completion of the projects."*

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

11. *"Economic factors can also take part on the deadline of the project completion."*

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

12. *"Changes in scope of the projects can also affect the project completion timeline."*

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

13. *"Support of top management can affect positively the project completion deadline."*

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

14. *"Leadership skills can also positively influence a project's completion on time."*

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

15. *"Monitoring projects effectively improves the timely completion of the projects."*

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

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C. Resources Allocation

16. *"Availability of human resources affects the timely completion of the projects."*

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

17. *"Project manager's competencies affect the timely completion of the projects."*

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

18. "*Construction assets availability (materials & equipment) affects the deadline of the projects*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

19. "*Financial fund affects the time of project completion*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

20. "*Technology resources effect the time of project completion*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

D. Project Planning

21. "*The detail project scope was clearly described by the project owner*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

22. "*Risks to be managed were properly planned*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

23. "*The projects activities duration estimated by the project team is realistic*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

24. "*Presence of key project team member participation affects the time project completion*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

25. "*Realistic deadline given by the authorities is sufficient*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

26. "*Effective contingency plan prepared by the project management team is suitable*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

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E. Project Monitoring

27. *"Easy acceptance criteria by different stakeholders."*

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

28. "*Effective indicators of the effective monitoring process*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

29. "*Sufficient of experienced project team are available for the project*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

30. "*Sufficient processes, procedures, and tools are available for the effective monitoring process*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

31. "*Sufficient time to monitor the project stages*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

F. Contractor's Performance

32. "*Contractors/suppliers involvement in the project scope affects the project time completion*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

33. "*Contractors/suppliers response to project owner needs*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

34. "*The quality of supervision on contractors and suppliers affects the timely project completion*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

35. "*Coordination with various stakeholders*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

36. "*Execution of scope of work as per the company procedures/standards*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

---

G. Project Leadership

37. "*The project manager empowers the project team*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

38. "*The project manager deals with conflicts*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

39. "*The project manager is flexible with scope variation*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

40. "*The project manager engages the project team*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

41. "*The project manager is creative and innovative*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

42. "*The project manager has the right communication skills*."

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

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Mandatory Layout of Declaration/Statements

Word Count of thesis: DECLARATION	Factors Influencing Timely completion of Construction projects in the Industry in the UNITED ARAB EMIRATES. An Exploratory Study.
This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.	
Candidate name	Mohammed Saif Alkaabi
Student ID Number	179009779
Signature:	M.S Alkaabi
Date	19 April 2024

STATEMENT 1

This thesis is the result of my own investigations, except where otherwise stated. Where **correction services** have been used, the extent and nature of the correction is clearly marked in a footnote(s).

Other sources are acknowledged by footnotes giving explicit references. A bibliography is appended.

Signature:	M.S Alkaabi
Date	19 April 2024

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STATEMENT 2

I hereby give consent for my thesis, if accepted, to be available for photo copying and for inter-library loan, and for the title and summary to be made available to outside organisations.

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