Application of Agile Project Management in Kuwait Oil and Gas Capital Projects

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Mohammad Abdullah Ibrahim Alyatama

Dedication

I dedicate this thesis to my beautiful family, my wife, my son Khaled, and my daughter Al-Zinah, who have been patient with me and have taken the time over the past four years to help me complete this thesis.

I also dedicate this thesis to everyone interested in this field, and I hope that the research will present its desired goal.

Acknowledgement

Abstract

The extreme challenges and substantial volatility associated with oil and gas projects reflect the need for a more flexible, responsive, and adaptable framework than the Traditional Project Management approaches usually found in the sector. This study explores Agile Project Management best practices merged into the existing frameworks within Kuwaiti's oil and gas sector to create a Hybrid Project Management framework. It also investigates whether project managers understand this hybrid framework's value and believe it can benefit their organisations. This study applies explanatory sequential mixed-methods. The quantitative method surveys agile best practices and Oil and Gas projects' delay of 106 project management professionals. The quantitative method was followed by qualitative in-depth interviews with eight consultants who worked with both Traditional and Agile Project Management.

The results suggest six best practices to reduce project delays and address project complexity: Iteration Planning, Retrospective Meetings, Daily Stand-Up Meetings, Communication and Collaboration, Enhancing Team Skills, and Solving Contractual Issues. Project delays are due to contractual problems, communication issues, poor planning and coordination, and a traditional approach. The findings further indicate that the identified best practices can reduce these delays by strengthening their weaknesses.

The outcome of this study is a hybrid framework consisting of the proposed agile best practices, that are integrated as part of phase-gate project management. The framework includes the improved clarity and trackability of the waterfall methodology with the flexibility, smooth functioning, and adaptability of the Agile Project Management framework; hence the framework is recommended for Kuwait's oil and gas sector. Potential implementation challenges are then identified, including project managers who may not possess the experience and expertise to apply the hybrid framework. These are countered with recommendations for the best possible application of the hybrid framework. In the future, the framework will be applied in real case capital projects development.

Keywords: Agile Project Management, Oil and gas sector, Iterative planning, Retrospective meetings, Team skills, Communication, Daily stand-up meeting

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Abbreviations

APM	Agile Project Management
CMMI	Capability Maturity Model Integration
DSDSM	Dynamic Systems Development Method
EPC	Engineering, Procurement, and Construction
FDD	Feature Driven Development
XP	Extreme Programming
GCC	Gulf Cooperation Council
IPMA	International Project Management Association
IT	Information Technology
KPC	Kuwait Petroleum Corporation
MANOVA	Multivariate Analysis of Variance
O&G	Oil and Gas
PC	Procurement and Construction
PGS	Project Gate System
PM	Project Management
PMI	Project Management Institute
PMO	Project Management Office
TPM	Traditional Project Management

Chapter 1: Introduction

1.1 Research Significance

The findings of this project contribute significantly to the existing literature on Project Management (PM) by creating a new understanding of Agile Project Management (APM) best practices and providing recommendations for decision-makers and guidance for project managers. Employing this study as a benchmark, project managers and decision-makers in O&G projects can successfully integrate the identified best practices of APM in a waterfall environment, improving the cost-effectiveness, predictability, risk management, and, ultimately, the overall success of projects. Understanding and identifying Agile best practices and state-of-the-art PM methodologies allows managers to select the most suitable set of practices for a hybrid model, which is the key to delivering a successful O&G construction project. It is not only the set of practices but the mechanism that will increase the success rate of O&G projects given their high complexity and risk.

In addition to the findings produced in this study, decision-makers and managers who are involved with large-scale projects within the O&G sector can benefit from the findings; the APM, Traditional Project Management (TPM), and other PM methodologies have strengths that could be harmonised into a hybrid framework. Given the nature of this study, avenues for further research in this field are also suggested.

1.2 Background

A project can be defined as a specific, finite activity that produces a visible and assessable result while fulfilling project requirements (Kerzner, 2017). Therefore, projects differ from processes or operations, which usually provide similar outcomes repetitively. The key differentiating aspect of projects is their temporary nature, as they have a finite start and end date. They also include unique deliverables that can be measured by the outcomes, such as a product or service. These projects become progressively more elaborate as the work continues, additional details become available, and plans are clarified.

When measuring outcomes, one must be mindful of the distinction between project success and project management (PM) success (Cooke-Davies, 2002). A project is deemed successful when it achieves the objectives established by its leader and members. However, the success of PM is achieved when the project is completed within the allocated time, budget, and quality requirements. The emphasis in this study is to identify and harmonise the factors that lead to PM success; it is not limited to individual projects but focuses on achieving the strategic objectives of an organisation.

Organisations strive to meet their intended goals through planning and by providing the required resources. However, effective management requires that projects be managed to utilise everyday activities and processes that must be conducted during the project lifecycle (Marcelino-Sádaba *et al.*, 2015). Strategic plans are often realised through interrelated projects. According to Liberda *et al.* (2003), well designed project management allows individuals and organisations to achieve their business objectives more efficiently by implementing required changes in an organised manner.

Over the past 15 years, Agile methodologies have become dominant in the software and information technology industry. They have been investigated extensively in the scholarly literature since the first major study, published as the *Agile Manifesto* (Beck *et al.*, 2001). Agile approaches were conceived in the 1990s with methods such as *Extreme Programming* (XP) and *Scrum* (Schwaber, 2004)*;* today, these methods are widely practised under the terms *Agile Methods* or *Agile Project Management* (APM). Agile values and principles, as described in the *Agile Manifesto*, explicitly express the design and production of improved software, which have been broadly implemented in the IT field as a solution for mitigating project delays and meeting market demand (Serrador and Pinto, 2015). Agile methods are ideally suited to software projects (Misra *et al.*, 2009) and, on average, Agile projects perform better than those utilising traditional methodologies for large- and medium-sized software ventures (Jørgensen, 2018).

Capital projects are not categorically different from IT projects, as they have to be managed appropriately by leveraging resources and time to provide the desired deliverables (Kerzner, 2017). Moreover, capital projects offer a mechanism to mitigate risks and enrich quality to ensure successful project development and delivery. Not only are capital projects recognisable due to their high cost, but also their technical

and social impacts; therefore, the effective implementation of capital projects could reduce the potential risk of failures.

Agile methods are promising for non-IT projects, and the results from a study of 19 large- and medium-sized companies reveal that Agile practices are an innovative opportunity for adopting APM in other industries (Conforto *et al.*, 2014). It was shown that 42 industrial cases utilising APM obtained a positive impact on success factors, including management support, training, and coaching (Dikert *et al.*, 2016). The study of Serrador and Pinto (2015) reports a positive impact on efficiency and stakeholder satisfaction in a variety of non-software industries; however, their findings do not demonstrate any significant effect for construction projects. This may be due to significant project complexity and resistance to change from traditional approaches employed in the construction industry (Albuquerque *et al.*, 2020). Nevertheless, technical, organisational, and external complexities are reportedly reduced with the practice of lean and Agile management, which improves the performance of construction projects (Sohi *et al.*, 2016).

Figure 1.1 shows the trends of APM usage across industries. While the percentage of non-IT projects remains low, the benefits of utilising APM methods have led to the growing popularity of these methods in non-software development contexts, such as the construction, manufacturing, production, marketing, support, and supply chain management sectors.
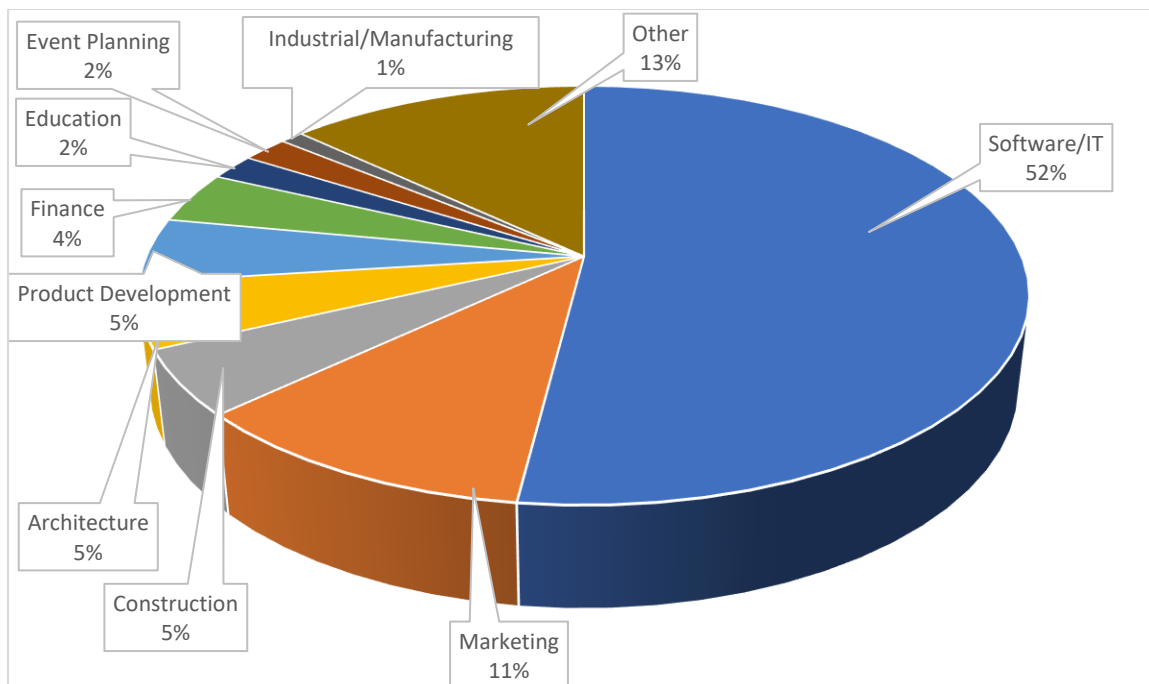
Figure 1.1: Trends in APM Usage by Industry (Adopted from Leslie, 2015)

While APM methods have significant potential in various organisations, choosing and adopting an APM methodology depends on project type, employee characteristics, relationships, and motivation (Rasnacis and Berzisa, 2017) as well as the management of a project (Lappi *et al.*, 2018). The critical factors that affect APM implementation include people, organisational culture, technology, collective work with business partners, and organisational structure (Ribeiro and Fernandes, 2010). Moreover, these findings produce several challenges: the effect and applicability of APM principles and values for the oil and gas (O&G) sector, and the PM success that the O&G sector may gain. Although there is some evidence for APM in non-software industries, these challenges have yet to be empirically answered regarding O&G capital projects, which signifies a research gap.

O&G projects are characterised by high risk and social impacts, specifically how projects affect the surrounding community; therefore, the success of O&G projects could provide sustainable success for organisations, even entire countries. Thus, if the success of APM in software projects could be replicated, then the success rate of O&G projects will increase.

This study presents a critical investigation of the applicability of APM best practices in the management of Kuwait's O&G projects. It is essential to understand the management of projects in the O&G sector because the associated challenges and volatility have increased the need to apply effective project management approaches to control and limit risks while reducing delays in the capital projects.

1.3 Project Management in the Oil and Gas Sector

Unlike PM in specific businesses, the O&G sector has several factors that increase the complexity of project execution. O&G projects are time-intensive due to their multifunctional aspects, which implies that any mistakes can become significant issues later (Postali and Picchetti, 2006). Moreover, the separation between operations and projects departments is not trivial (El-Reedy, 2016), which means such projects are not compartmentalised. Also, the sector suffers from increased levels of risk, including geological uncertainty due to the structure of oil reservoirs, the caprock characteristics, and the availability of crude oil. It also suffers from economic risks, which manifest in the fluctuations of crude oil prices, uncertain cash flows, and operational scales (Salazar-Aramayo *et al.*, 2013). In addition, the demand for resources is fine-grained to specific expertise (specialists who perform different jobs), which affects the complexity of decision-making concerning resource allocation. Finally, the growing attention to the environmental impact of the sector has raised the complexity of O&G projects, as subsidiary firms learn to adjust to regulations and liaise with numerous stakeholders from community leaders to non-governmental agencies.

Projects in the O&G sector can be conducted in-house or may need to be outsourced to other agencies in engineering, procurement, or construction-related companies, as these sectors are involved in every segment of the O&G business, from oil wells to distribution centres. The projects commissioned to discharge these functions utilise the five distinct phases in O&G: an appraisal of the existing situation, problem, and resources; selection of the appropriate team and leader as well as an external agency; definition of the scope of work, requirements, and milestones; execution of the project; and operation (YuTeck, 2007).

The existing project management framework in the O&G sector is primarily traditional, and one acute concern is the need to introduce diversity not only regarding gender but

also other ethnicities, cultures, and personalities (Labelle *et al.,* 2010). However, the sector features not only a dearth of knowledge regarding the role of diversity in decision-making, but also a lack of ample evidence concerning factors to address critical project outcomes, including project delays, quality, efficiency, and complexity (Adeleke, 2017).

Another important complexity criterion in managing projects in the O&G sector is the upstream exploration and production sector as compared to downstream, marketing, and distribution projects. Projects in the upstream segment of O&G generate a significant amount of revenue, need large amounts of investments with the potential for zero returns, and meet considerable demand with wide fluctuations in prices (Salazar-Aramayo *et al.*, 2013). Moreover, the geographic distribution of crude oil resources, which is primarily centred in countries with increased political risks, lends additional complexity to PM in this segment. Furthermore, the nature of work in the exploration and production sector demands the involvement of multidisciplinary teams and requires specialists to perform different jobs that remain interdependent. Salazar-Aramayo *et al.* (2013) illustrate this interdependence, citing the example of a reservoir engineer waiting for the report of the drilling engineer and his cost estimate before finalising the invoice for a licensing process. The authors further extend the example by noting that the drilling engineer must wait for the geoscientist's report on bottom-hole location before providing a cost estimate.

There is not only multi-disciplinarity among teams in the exploration and the production segments, but also within their understanding of the roles and requirements divided between them (Close, 2006). Individual employees do not always realise how their performance affects other members or leads to delays due to the lack of feedback and collaboration. Furthermore, there is no mechanism in the Traditional Project Management (TPM) framework that allows project members to come together, reflect, and communicate the project's progress or how their performances can meld. This study importantly illustrates the need for change from the traditional framework and the weaknesses manifest in it that contribute to project delays and inefficiencies.

As a result of the complexity of O&G projects, identifying factors that might lead to project failures is crucial to project success. Badiru and Osisanya (2016) identify several such factors, including sharing incomplete or ill-defined requirements,

proceeding without consensus among project members, and failing to define the scope of the project. Moreover, they illustrate that unrealistic requirements, ambiguity, inconsistency, and frequent changes could lead to delays and coordination difficulties. Finally, the lack of managerial support, ineffective communication, poor cooperation, and inadequate budgeting are further indications of future failure in PM.

Therefore, in the O&G sector, projects experience a considerable degree of interdependence between the roles and responsibilities of upstream and downstream segments. The high level of risk increases complexity and indicates a substantial need for a shift from the traditional framework to a more responsive framework that can address the sector's complexity.

1.4 Oil and Gas Sector in Kuwait

Kuwait has a prosperous economy that derives 40% of its GDP from the O&G sector, which contributes 92% of its exports (OPEC, 2020). The country has 5.9% of global oil reserves and the capacity to produce over three million barrels of oil per day (BOPD) as per statistics at the end of 2019 (British Petroleum, 2020). Ahmed (2011), whose thesis reviews projects in Kuwait's O&G sector, lists two categories of projects conducted by KPC: Procurement and Construction (PC) projects and Engineering, Procurement, and Construction (EPC) projects. EPC projects are involved in engineering, procurement, and construction, in which a contractor is assigned the entire task from design, engineering, and procurement to the final building. After the EPC project is deemed complete, it is tested before final delivery to the customer. Within PC projects, the client completes procurement and construction, and only the engineering aspect is shared with the contractor. Unlike EPC, the contractor in PC projects does not design anything but only secures the required resources for construction. The final task is again tested before handover to the client.

Ahmed (2011) shares further details pertinent to Kuwait's O&G projects. Few organisations can fulfil the procurement needs of EPC and PC projects, which is why a considerable amount of procurement occurs through imports. Consequently, procurement is a critical phase of a project, as many environmental factors can impact the project's delivery and lead to delays. Furthermore, the projects are involved in detailed risk management exercises to track and mitigate risks. Kuwaiti O&G projects,

like many government projects, are secured only after a tender to which all interested vendors submit bids; the successful bidder is required to proceed. At the same time, the State Audit Bureau is authorised to audit the revenue and expenses of all projects.

Al-Hajji and Khan (2016), who work for the Kuwait Oil Company (KOC), have conducted a study regarding PM best practices in the O&G sector and report that regular correspondence and communication enables stakeholders to reach agreements and avoid conflicts to resolve key project issues. However, it is unclear whether the company has implemented this approach in all projects or if its contractors and vendors are also required to implement it. Unless the practices of communication and collaboration are adopted formally in all company projects, its benefits will not become apparent in project outcomes, or they will not affect a visible and perceptible difference.

Contractors hold a pivotal position in the O&G sector in Kuwait as they are involved in all project phases from predesign to final delivery (Qabazard, 2019), and their role remains active throughout the lifetime of a product or service to allow for the provision of operational and maintenance activities. Therefore, the role of contractors in Kuwait's O&G sector requires a particular administration because any overlooked loopholes can affect project outcomes. However, there is insufficient information available in the literary domain regarding PM techniques within contractual administration. Therefore, Agile tools, which value customer collaboration over contract negotiation and individuals and interactions over processes and tools, have been adopted in a limited manner within the O&G sector. It has been shown previously that Agile values are limited to communication and collaboration for individual projects (Al-Hajji and Khan, 2016).

This study aims not only to assess the existing PM practices applied in the O&G sector in Kuwait, but also to determine whether the project managers and other employees associated with the projects in different capacities understand Agile values, and whether they believe that they can benefit the company's PM.

1.5 Problem Definition

Delays in O&G projects can lead to a shortage of oil production, which then contributes to higher prices, thereby creating a burden on the consumer (Salazar-Aramayo *et al.*, 2013). Completing projects on time is of utmost importance for O&G companies as it is directly linked to their ability to achieve the primary strategic objectives of sustaining or increasing production to meet the ever-growing global market demand (El-Reedy, 2016). However, on-time completion of these projects is a challenge for many companies. Ruqaishi and Bashir (2013) note that in the past three years only 62% of Oman's O&G construction projects were completed on time, while only 50% of projects in the United Arab Emirates were completed on time. Across the globe, it has been reported that only 52% of projects meet their deadlines (PMI, 2018), while other studies indicate an even lower percentage at only 37% (PM Solutions, 2013). These figures indicate that completing projects within a given time frame is a significant challenge for the O&G sector.

The Kuwaiti O&G sector is comprised of large ventures with significant outcomes whose operations span several years. These projects have presented managers with substantial challenges, considering their multidisciplinary teams (issues related to resource-levelling) and the efforts needed for the construction of pipelines and oil production facilities. Adding a further dimension to the difficulty and intricacy of these projects is the strategic importance of the outcomes for the national economy. With billions invested in the production of O&G, any delays or unmitigated risks can immensely impact both corporate and national levels in addition to increased vulnerability, intensified safety concerns, and environmental hazards.

All O&G projects have some characteristics in common: (1) they have considerable safety and environmental impacts; (2) they are technically complex with several sub-projects that demand the integration of different technical fields; (3) they are typically conducted in remote areas and, therefore, face unique logistical and communication-related challenges; and (4) they necessitate the usage of high-tech, made-to-order products (Dey, 2012; Ruqaishi and Bashir, 2013). Given such challenges, traditional O&G projects fail due to inadequate project planning and scope variation as a result of inadequate team engagement (Mohammed and Suliman, 2019).

Considering these characteristics and their underlying challenges, many O&G companies have followed customised project methodologies that adhere to best practices and resource-levelling strategies. For instance, as described by Al-Salem *et al.* (2018), KOC implemented the project gate system (PGS) framework in 2012 (see Figure 1.2) in its surface facility projects. The PGS is believed to enhance risk management via effective prioritisation, improving project execution, and ensuring the coordination of multifunctional activities with bona fide decision-making. The method includes a 'go-no-go' process from the first step of the project to the next step through a gatekeeper method. The model has five stages: identification, concept selection, project definition, project execution, and operate and monitor. However, it has been applied in only one business cluster to date (surface facility projects) and is similar to the methodology developed by the Project Management Institute (PMI), which inherits the identified problems of the waterfall methodology.
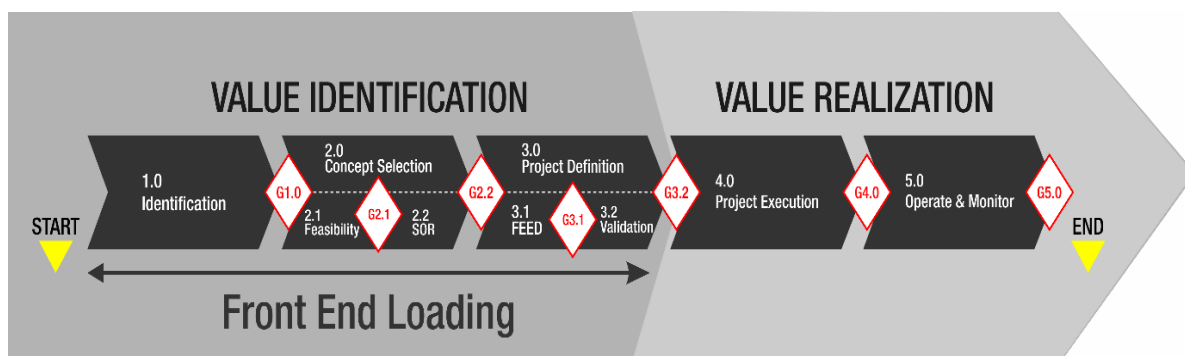
Figure 1.2: The Project Gate System (PGS) Framework (Adopted from Al-Salem *et al.*, 2018)

In the Korean O&G sector, Yi *et al.* (2019) propose a schedule management process to reduce losses in engineering procurement and construction. However, schedule management for procurement (on its own) does not mitigate the potential risk, failure of execution, or delivery. Instead, it assumes that every work unit will be completed as agreed while excluding the overall project outcomes, which takes more effort from engineers and may not tackle unexpected project changes. A study of four companies in Bahrain demonstrates that construction projects utilise either a phase-gate methodology, adopted from Chevron (see Figure 1.3) and further described by Martikainen (2017), or in-house PM methodologies (Abdulla *et al.*, 2019). The phase-gate methodology ensures effective vendor and product management through phase-

gates that provide a mechanism for the assessment of quality; it consists of five stages: an initial assessment, business case preparation, development, testing and validation, and production launch. While phase-gates' criteria allow for objective decision-making, the phase-gate process may impose a needed change in the organisational structure that interferes with creativity and innovation and does not show how other projects could be interwoven.
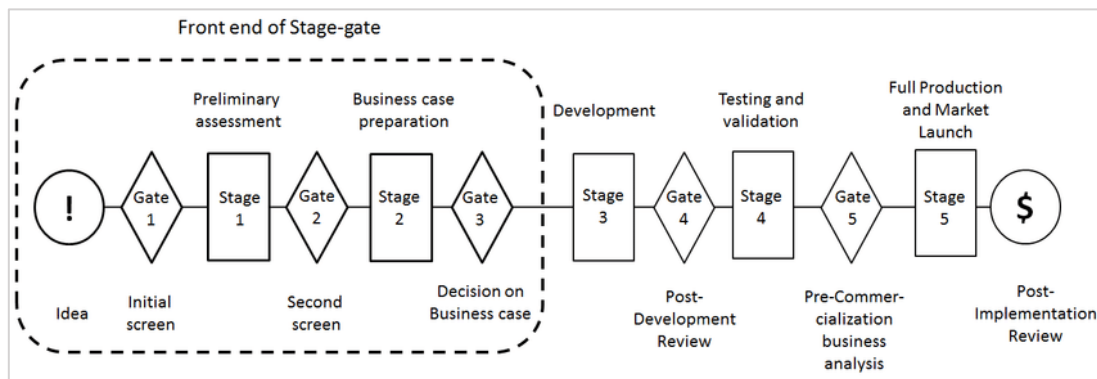
Figure 1.3: Phase-Gate Methodology (Adopted from Martikainen, 2017)

In a globalised world, O&G PM models vary across countries and do not utilise a single PM model but rather customised models (e.g. PGS in Kuwait, phase-gate in Bahrain). However, since the majority of project managers follow traditional waterfall PM frameworks, they are faced with similar challenges related to delays in project execution. A perusal of the recent literature reveals numerous solutions for mitigating capital project delays in the Middle East (Al-Hazim *et al.*, 2017; Alhajri and Alshibani, 2018; Arditi *et al.*, 2017; Zidane and Andersen, 2018). In Kuwait, delayed projects have been the focus of several studies (Al-Tabtabai, 2002; Soliman, 2017; Alghais and Pullar, 2018; Kotb *et al.*, 2018). However, the focus of these studies is on government infrastructure projects (not oil and gas-related), rather than projects in the O&G sector specifically.

1.6 Research Purpose

This research intends to make an empirical and professional contribution to O&G capital projects by suggesting the best-suited APM practices in the traditional waterfall PM framework to address delays. By identifying and implementing best practices, this study aims to enable Kuwaiti O&G companies to improve the efficiency of their projects by reducing delays and addressing complexity. Utilising existing empirical research,

this study analyses factors that cause delays in O&G operations first generally, and then within the specific context of Kuwait.

This research will increase the competency of the O&G companies taking into consideration the global industry where customer demands and stakeholder management are becoming more complex. The rationale behind this study is that applying a hybrid methodology, which chooses the best practices of the Agile project framework, will be useful for project managers in reducing project delays and dealing with increasing project complexity.

1.6.1 Research Questions

This research employs a positivist philosophical position and a deductive reasoning approach in an attempt to answer the following questions:

RQ1: What Agile Project Management (APM) best practices can be applied in the Traditional Project Management framework to reduce delays in oil and gas capital projects in Kuwait?

RQ2: How can APM best practices be applied in the Traditional Project Management framework in oil and gas capital projects in Kuwait?

RQ3: How can a Hybrid Project Management framework (Traditional/Agile) address project complexity to reduce delays in oil and gas capital projects in Kuwait?

The answers to these research questions will allow practitioners and researchers in PM fields to understand whether Agile values have a place in industries other than software management. Moreover, the results will deliver the best practices that should be formally adopted by project managers who understand the usefulness of the Agile framework. Finally, the practicalities of implementing the identified best practices in the hybrid framework are assessed so that all practitioners remain mindful of the challenges and barriers they may encounter and take steps to ensure that their hybrid frameworks have optimal chances of delivering successful, efficient, and timely projects.

Chapter 2: Literature Review

2.1 Introduction

The objective of this chapter is to (1) review the list of best practices that are used in agile project management, (2) find the critical reason of why Oil and Gas capital projects get delayed, and (3) group the list of agile project best practices into new categories to help reduce the potential delays in Oil and Gas projects (Illustrated in Chapter 4).

This study explains the project challenges and issues in the O&G sector, especially in matters relating to project delays. Kuwait's O&G sector serves as a pivotal case study in this exploration. The critical insight derived from the preliminary research is that projects in this industrial segment fail or are delayed due to an over-reliance on Traditional Project Management (TPM), also referred to as the waterfall PM approach.

This chapter analyses the root causes of O&G capital project delays and investigates the Agile best practices that could ease such delays by interleaving these practices with the TPM approach. Thereby this chapter highlights the gap in the literature and assists in the description of the identified research problem. The obtained knowledge of APM is utilised in the discussion chapter to supplement and support the applicability of hybrid PM methodologies involving APM and TPM in Kuwait's O&G capital projects.

A manual and electronic literature search was conducted to identify the publications available on the various facets of the research topic. The search was primarily conducted utilising a variety of electronic databases such as Emerald, EBSCO host, Science Direct, Scopus, and Google Scholar. The following are a subset of relevant search strings that were utilised: *project management*, *Agile project management*, *traditional project management*, *waterfall project management*, *Agile best practices*, *project management in oil and gas sector*, *oil and gas projects*, *project management models*, *Agile frameworks*, *challenges in oil and gas project management*, *oil and gas success factors*, and *delays in oil and gas projects*. The electronic search targeted

peer-reviewed journals and other publications and focussed on the period between 2009 and 2020 to ensure that the search was recent and relevant.

A best practice is defined as a method that has been accepted as superior to a given set of alternatives in a certain context. Agile successful practices include the use of small teams, iteration planning, and obtaining rapid and continuous feedback. As the application of Agile best practices is not yet the norm in capital projects, the present review is more likely to lead to a preliminary framework that emphasises the effect of best practices on TPM. After an extensive search and evaluation of available publications in this area, which followed the guidelines of Farrington (2003), over 110 publications met the inclusion criteria. The approach of Farrington (2003) was applied in the strategic project management selection process (Al-Sobai *et al.*, 2020). Table 2.1 shows the inclusion criteria that were used to filter research articles.

Table 2.1: Criteria for Article Selection

Criteria	Description	Criteria Example
Descriptive validity	Accuracy of gathered information	Does the article have accurate reported results?
Statistical conclusion validity	Inference drawn from project delays and Agile best practices	Does the article use proper statistical parameters?
Construct validity	The objectivity of studied Agile best practices and enablers	Does the article use data validation, if applicable?
External validity	The degree it can be generalised	Does the article compare different case studies and contrast them?

This literature review chapter follows a sequential order. First, the preamble in *Section 2.1* describes the methodology and results of the literature search. Second, *Section 2.2* conceptualises PM. Third, *Section 2.3* conceptualises and discusses TPM as a standalone sub-topic. Fourth, *Section 2.4* introduces APM best practices. *Section 2.5* outlines the most common PM methodologies employed in the O&G sector. *Section 2.6* examines the root causes of O&G project delays. *Section 2.7* addresses the applicability of a mixed approach in light of the described challenges and is analysed

from the perspective of Kuwait's oil sector. The chapter also develops the hypotheses and conceptual framework of the project in **Section 2.8**. Finally, **Section 2.9** provides the chapter summary.

2.2 Project Management

2.2.1 Defining Project Management

2.2.1.1 Defining A Project

A project is an activity in which humans, machines, materials, or financial resources are organised in a unique way for a particular task or assignment within a specific timeframe to deliver the stated goals (Turner and Zolin, 2012). Therefore, a project is temporary in the sense that it has a defined start and conclusion and thus a clear scope and finite resources. The Project Management Institute (2017) suggests that a project presents an excellent opportunity for individuals and organisations to achieve either business or non-business targets more effectively by realising the necessary change in a planned manner. In line with this perspective, Bryde *et al.* (2018) define a project from an organisational outlook, calling it a temporary 'organisation' established by the parent company to conduct tasks on its behalf.

According to the Project Management Body of Knowledge (PMBOK), a project is a time-framed initiative undertaken to complete a goal in the form of a product, service, or programme (PMI, 2017). Similarly, Salazar-Aramayo *et al.* (2013) describe a project as a complex effort that involves the interconnection of activities to achieve objectives in a temporary, non-repetitive manner. Bočková *et al.* (2019) provide a simple perspective on what they believe describes a 'project best'. They maintain that a project is a process of transferring organisational goals into the intended outcomes, products, and services—in an almost congruent conceptualisation.

2.2.1.1 Defining Project Management (PM) and Project Lifecycle

In recent decades, PM has become a core competency, and the role of the project in achieving efficiency and productivity has invited increasing attention. The term *project management* was introduced in 1953 in the United States defence-aerospace sector

(Morris, 2013). Presently, PM is viewed as a professional discipline with a unique body of knowledge and skills attached to it.

Turner and Zolin (2012) argue that project management necessitates the consideration of five elements: organisation, scope, time, quality, and cost. Correspondingly, Kerzner (2017) extends the definition to show that a project refers to assignments that have specific deliverable goals to be accomplished within certain specifications: they have finite limits, require human resources and equipment, have defined commencement and conclusion dates, and are multidisciplinary.

Traditionally, as noted by Binder *et al.* (2014), PM has emphasised planning and control to satisfy the delivery of business processes. According to the PMBOK, PM is defined as the application of techniques, tools, knowledge, and skills to specific activities to achieve the primary objectives of a project. In contrast, Kerzner (2017) illustrates that PM is designed to utilise the existing resources within an organisation better to allow tasks to flow horizontally as well as vertically. Therefore, the approach described by Kerzner does not disrupt the vertical, bureaucratic flow of work but demands that the organisation communicate (horizontally) so that tasks can be completed more efficiently throughout the company. The horizontal line of work remains in the hands of the project managers, while the vertical flow of work is handled by the line managers. After considering the above definitions, this study defines PM as a '*process of planning, organising, controlling, and directing resources in an organisation for relatively short-term objectives that have been established to meet specific goals*'.

The review of literature has identified many factors that could influence PM, such as business clusters, time constraints, and workforce dynamics. A project's lifecycle describes how the project should be managed to meet its defined objectives (Kerzner, 2017). The project lifecycle entails five phases: project definition and feasibility, task planning, project team organisation, project execution, and project closure (Field *et al.*, 2015) (see Figure 2.1*:*). Such a phased development in projects is useful to execute sub-projects, including the definition of their requirements, evaluation of alternatives, system design, and implementation. The project lifecycle determines the project phase deliverables in the prototype state with the required production steps,

which is critical for how this research develops the Hybrid Project Management approach.

It should be noted that agile projects remain faithful to the lifecycle and processes of projects detailed in the PMBOK Guide (Sliger, 2008). Although PMBOK was first published in 1996, it has unexpectedly come to cover a wider area so that no definitive means of defining the perfect project lifecycle exists. Process groups do not represent stages, instead they combine seamlessly over a project's lifecycle, subject to revision as required. As with project lifecycles, it is possible to undertake mapping process groups to an agile fractal, comprising iteration levels, release levels, and total project levels (Sliger, 2008).
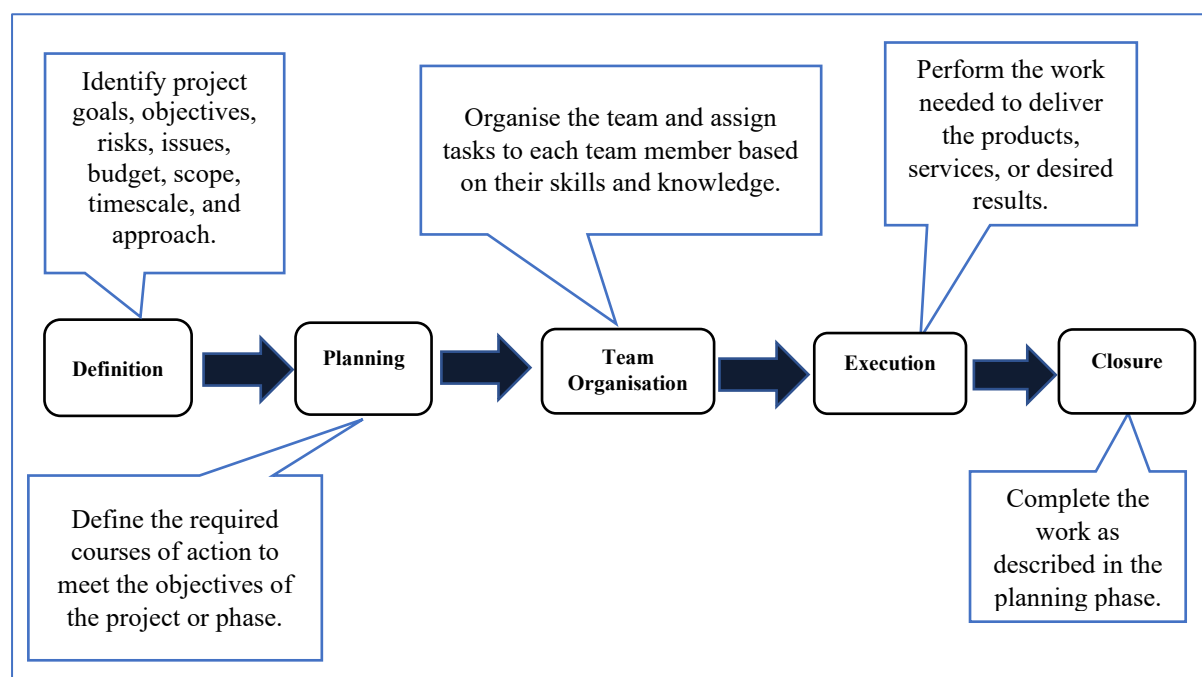
Figure 2.1: Project Management Lifecycle (Adapted from Field *et al.*, 2015)

2.2.2 Project Management Models

In addition to the IT software development processes that emerged in the 1970s, further approaches have become available. One of the most widely used IT software development models is the linear sequential model, often known as the waterfall model (Andrei *et al.*, 2019). The waterfall model is composed of development processes that run one after the other; it is considered appropriate for small projects that have stable requirements which are not likely to change (Andrei *et al.*, 2019). One advantage of the model is that it has a low-risk variable (with minimum changes), as all activities are

elaborated ahead of execution; therefore, resource and stakeholder management is straightforward. Although there are numerous variations of this model, they generally include five phases, which are intended to convert customer requirements into a usable product or service: engineering, analysis and design, development, testing, and operation. Although this model continues to be utilised in several business clusters, it lacks a mechanism for the adaptation of customer feedback (Dima and Maassen, 2018), which means that this model does not work well when customer feedback is received frequently and must be incorporated into software and non-software modules.

As per the reviewed literature in this study, there have been many initiatives and standards which originated from the waterfall model such as the rapid development models (known as 'modified waterfalls') identified by McConnell (1996), the waterfall with overlapping phases model (known as the 'sashimi model'), and the V-Model (Matković and Tumbas, 2010).

2.2.2.1 Project Management Guidelines and Standards

Along with other evolving standards, the PMBOK guide provides a set of processes as well as professional best practices for project practitioners within the PM industry. According to the PMBOK guide, the project manager plays the role of the primary decision-maker (PMI, 2017). However, another methodology—Projects in Controlled Environments (PRINCE2®)—lends project authority to senior management rather than the project manager alone (Jamali and Oveisi, 2016). The PRINCE2 standard provides the project manager with processes for overseeing projects on behalf of the senior management in the organisation, Figure 2.2.
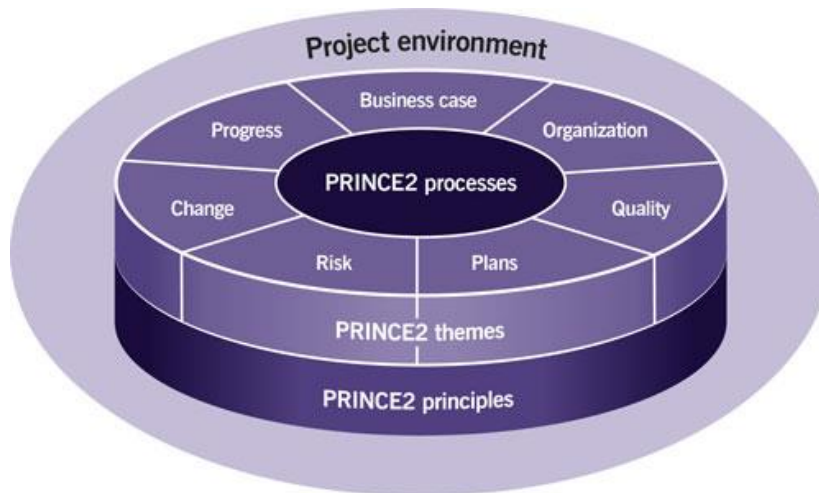
Figure 2.2: PRINCE2® Model (Adopted from AXELOS, 2019)

As noted by Matos and Lopes (2013), PRINCE2® is not concerned with the vital role of project managers who have non-technical or soft skills; the seven fundamental principles that form the basis of the PRINCE2® methodology are (1) management by exception, (2) management by stage, (3) continued business justification, (4) definition of roles and responsibilities, (5) learning from experience, (6) focussing on the product, and (7) tailoring to suit the project environment. The latest version of these models places particular emphasis on the model's flexibility, allowing managers to customise it depending on their projects' needs.

Many of the available PM models can be grouped as either TPM (waterfall) or APM. Although the traditional waterfall PM approach is currently dominant in the O&G sector, many projects continue to fail to meet their targets on time. Because O&G projects are dynamic and have high risks, an adaptive and flexible approach is needed. Agile is a PM approach that could be implemented to satisfy this need (Nafisah *et al.,* 2019). Its practical delivery is utilised in 47% of organisations (KPMG *et al.*, 2019).

2.2.2.2 Traditional Project Management (Waterfall)

Some authors argue that waterfall PM has its roots in industries such as construction and manufacturing in which the model arose as a necessity (Adenowo and Adenowo, 2014). In such fields, projects are often managed sequentially. For example, a project manager cannot commission the building of a wall without first completing the foundation. Moreover, once the foundation has been set, it is difficult or prohibitively

expensive to rework it. Likewise, a waterfall model does not allow revisiting a previous phase once that phase has been completed (Söderland and Geraldi, 2012).

2.2.2.2.1 Phases of a Waterfall Model

Regardless of the criticism that surrounds this traditional PM model, it continues to offer a well-defined set of guidelines and requirements needed before the project initiation and implementation (Dima and Maassen, 2018). This model provides a basic plan for any project before commencement and continuation in a strict, orderly manner. Kannan *et al.* (2014) generalise the phases of a waterfall model as follows, Figure 2.3.
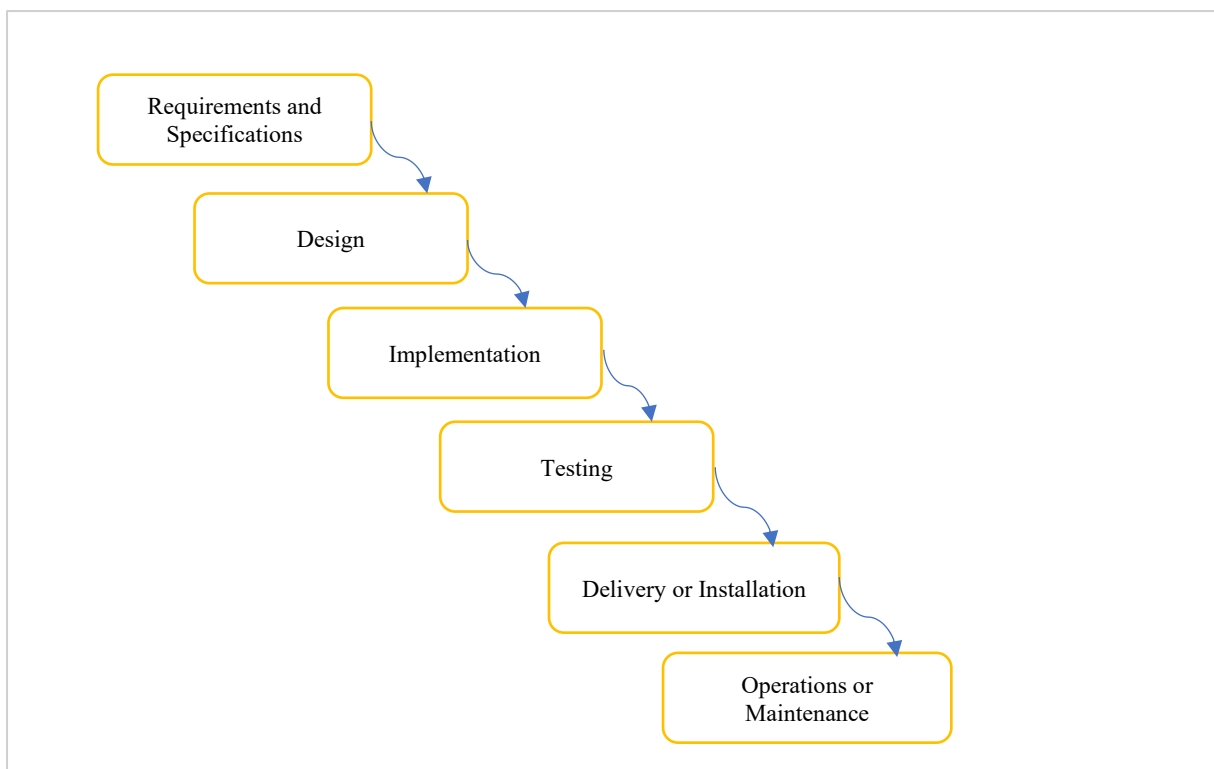
Figure 2.3: Waterfall PM Model (Adapted from Kannan *et al.*, 2014)

i.   *Requirement and Specification*—This is the first stage of any waterfall PM lifecycle, but it is the most time-consuming, costly, and vulnerable-to-errors phase. The fundamental goal of this stage is understanding, gathering, and documenting the needs of the user and the project (Balaji, 2012). Requirement elicitation needs the combined effort of both the project

manager and customer to document all interfacing, performance, and functions required for the project. This phase leads to the production of large documents containing all the elements and answering all 'what to build' and 'how to build' questions.

ii.   *Design*—The design phase solidifies, approves, and comprehensively documents the options suggested in the first stage. This stage is often referred to as the 'design document' (Kramer, 2018). The project's details are described so that no gaps remain that might affect its functioning and success. The details encompass project specifications, processes, procedures, success metrics, and testing criteria.

iii. *Implementation*—This relates to the information obtained from the design phase. The project manager now commences the project with this information. If the design document contains all the requirements and is completed efficiently, then the implementation phase runs smoothly (Kannan *et al.*, 2014). The project manager must observe the procedures, specifications, and timelines, as outlined in previous stages.

iv.   *Testing*—This phase entails a thorough examination of the project deliverables against the specifications, standards, and metrics outlined in the first and second phases (Kramer, 2018). If the project fails to meet the criteria as described by the stakeholders in the design document, then the team may have to revisit the implementation stage to make amendments or even revisit previous phases.

v.   *Delivery, Installation, or Deployment*—Once the project meets the desired standards and passes the testing stage, it is ready to be released to the end-user. Ideally, the project should pass both practical and non-practical testing before it is released to consumers. The effective implementation and completion of the previous phases as outlined in the design document should ensure higher quality delivery of the end product with more satisfied users reduced maintenance costs, and faster, more accurate, and reliable results (Balaji, 2012).

    vi.   *Operations and Maintenance*—The majority of projects, especially in non-software industries, continue even after installation or deployment. Usually, the PM team evolves into a support role (or deploys a separate support team) to assist the end-users should any maintenance needs or malfunctions occur. Projects or products that demand regular upgrades or updates should also be incorporated into the maintenance phase (Balaji, 2012). In both software and non-software projects, maintenance may include activities such as product/service optimisation, removal of obsolete functions, the introduction of new functions, the enhancement of capabilities and functions, error corrections, and repairs.

2.2.2.2.2 Strengths of the Waterfall Model

According to Kannan *et al.* (2014), one of the primary benefits of a waterfall model is that it provides a structure for the departmentalisation and control of project development. A programme can be formulated with targets for each phase of development, moving from conceptualisation to deployment to maintenance. Each stage of the project development conforms to strict guidelines, allowing the project to be completed on time. Due to its linear and sequential structure, Kannan *et al.* (2014) note that problems in each stage can be detected before proceeding to the next phase. If the procedure is appropriately set and followed accurately, then time and cost are correctly realised (Amlani, 2012).

The waterfall model allows a smooth entrance for any new member by utilising existing extensive documents to understand the project specifications and expected deliverables (Amlani, 2012; Kannan *et al.*, 2014). The documentation is also a memory aid as it provides a ready reference for similar projects in the future and can be utilised in the process of operations and maintenance after project completion. However, the waterfall model is proven to be suitable for small projects and teams in which members are distributed across different places. As noted by Amlani (2012) and Kannan *et al.* (2014), the number of resources required to implement a waterfall model is also significantly lower compared to other PM models.

2.2.2.2.3 Weaknesses of the Waterfall Model

Although the waterfall methodology has often been applied in a variety of industries including O&G, it continues to draw considerable criticism from practitioners and academics alike. According to Dima and Maassen (2018), this model's chief weakness is that it cannot ensure quick changes to the stakeholders' requirements until the project is finalised. Consequently, Larman (2004) argues that the waterfall model can only be applied for projects that are considered to have unchangeable or more stable requirements at least for an extended time. Ali (2017) opines that errors in previous phases can be transmitted to the next phase because verification, testing, and troubleshooting only occur after the implementation phase. Kramer (2018) adds that the disadvantages associated with this traditional form of PM include problems that materialise if there is no feedback and iteration among phases, maintaining that there can be no recourse to remove imperfections at a later stage. Consequently, Dima and Maassen (2018) assert that this model only suits traditional types of PM in which requirements circulate from the top to the bottom of the hierarchy with little or no contact with consumers and stakeholders.

Amlani (2012) argues that the team members in the other phases may sit idly, while only those involved in the current phase are working. Firstly, if changes are to be made in the waterfall process at later stages, then the project may need to be restarted, making the process rigid. Secondly, it can be challenging to accurately allocate the time required for different stages of the process, allowing room for incorrect assumptions that can impact time management or even cause the failure of the entire project. Kannan *et al.* (2014) posit that real-world projects are hardly sequential, and thus the waterfall model cannot be adapted for use with large and demanding projects.

To conclude, the realistic lifecycle PM methodologies are iterative and interactive, and PM processes must accommodate this fact. Unless PM can address the increasing complexity in customer demands, supply chain logistics, regulations, and market mechanisms, it cannot fulfil the needs of the project. With information technology making communication and the availability of data a rapid exercise, PM needs to be Agile and efficient.

2.3 Agile Project Management

The APM provides solutions for project time and cost overruns utilising a family of methods under the Agile framework. This framework represents an overarching philosophy for software development, emphasising the value of the sequence of iterations and satisfying customers at the end of each project. It is defined by the software philosophy expressed in the *Agile Manifesto* (Beck *et al.*, 2001): an iterative and evolutionary PM methodology that should be executed collaboratively by special, self-organising teams with a practical governance model to produce high-quality outcomes in a costly and time-effective manner (Moniruzzaman and Hossain, 2013).

The *Agile Manifesto* has four values (Beck *et al.*, 2001): (1) individuals and interactions hold a higher priority than tools and processes, (2) collaborating with customers is prioritised over contract negotiations, (3) working software is prioritised over document-keeping, and (4) change responsiveness is more important than following previously established plans. The *Agile Manifesto* is based on 12 principles that highlight the need for frequently delivered versions of the software product based on customer feedback. The 12 principles are presented in

Table 2.2, which additionally portrays how these principles can be applied to non-IT projects such as those in the O&G sector. The PMI reports that 71% of organisations prefer the Agile approach as it allows them to develop competence to sense their external and internal environments, adapt to them, and deliver a relevant, high quality, competitive, and cost-effective product (PMI, 2018). Therefore, teams weigh requirements against risks, which changes the scope of work at the start of each iteration. With self-organised teams, collaborative interactions provide a reasonable compromise between the project limitations of scope, risk, and convenience.

Table 2.2: Agile Methodology Principles (Beck *et al.*, 2001)

#	Principle	Relevance to Non-IT Oil and Gas Projects
1	The top priority is to satisfy the customer through the early and continuous delivery of valuable software.	Efforts are needed to ensure the timely delivery of functional systems of components.
2	Changing requirements, even late in development, are welcome. The Agile method harnesses the transition for the strategic benefit of the client.	This process should alleviate the effect of changing the requirement on O&G subsystems while keeping track of cost and time.
3	Deliver working software frequently, with a preference for the shorter timescale. This time ranges from a couple of weeks to a couple of months.	Timely and frequent delivery of value-added components is ensured.
4	Developers and business people must work together daily.	Silos are minimised, and cooperation is encouraged.
5	Projects need to be built around motivated individuals by giving them the environment, support, and trust to get the job done.	Motivate the team with shared objectives in line with strategic business goals.
6	The most effective and effective way to communicate knowledge to and inside a development team is to have a face-to-face conversation.	Integrate meetings to share information and decisions; pursue a team approach rather than an adversarial approach.
7	The primary measure of progress is working software.	Focus on working systems and subsystems rather than contract deliverables.
8	Agile processes encourage sustainable development. There is an indefinite need for sponsors, consumers, and developers to maintain a steady pace.	Schedule and resource-levelling help to equip experienced team members with needed skills to provide the highest quality.

9	Pay continuous attention to technological quality, and agility is enhanced by good design.	The better the design and specification of the work package, the shorter the potential delay will be.
10	Simplicity is essential to minimise the amount of unfinished work.	Simple designs reduce the risk of failure.
11	The best architectures emerge from self-organising teams.	Schedule and resource-levelling help create collaborative, productive teams.
12	The team reflects on how to become more effective at regular intervals and then and adjusts its behaviour accordingly.	Root causes of problems and delays are identified, and continued buy-ins from customers are encouraged.

With the combination of these 12 principles, the most widely utilised Agile methodologies include 'Kanban, Scrum, Lean Software Development (LSD), Extreme Programming (XP), Dynamic Systems Development Method (DSDM), Crystal, and Feature Driven Development (FDD)' (PMI, 2018).

2.3.1 Lean Software Development

As an Agile methodology, LSD teaches project managers to achieve optimal quality, speed, and savings as well as value in the business by applying seven lean principles that have already revolutionised the fields of R&D and manufacturing (Poppendieck and Poppendieck, 2003). Lean software development eliminates wasted time (e.g. automated unit tests; Poppendieck, 2007) and efforts by selecting productive, valuable, and prioritised features for a system in which features are delivered in small batches (Rodríguez *et al.*, 2019). This methodology focusses on organising teams that deliver a quick value to the customer without rigorous methods. The speed and efficiency of the methodology rely on accurate and consistent collaboration between the developers and customers; therefore, providing a decision-making process for individuals that utilises the minimum possible amount of time.
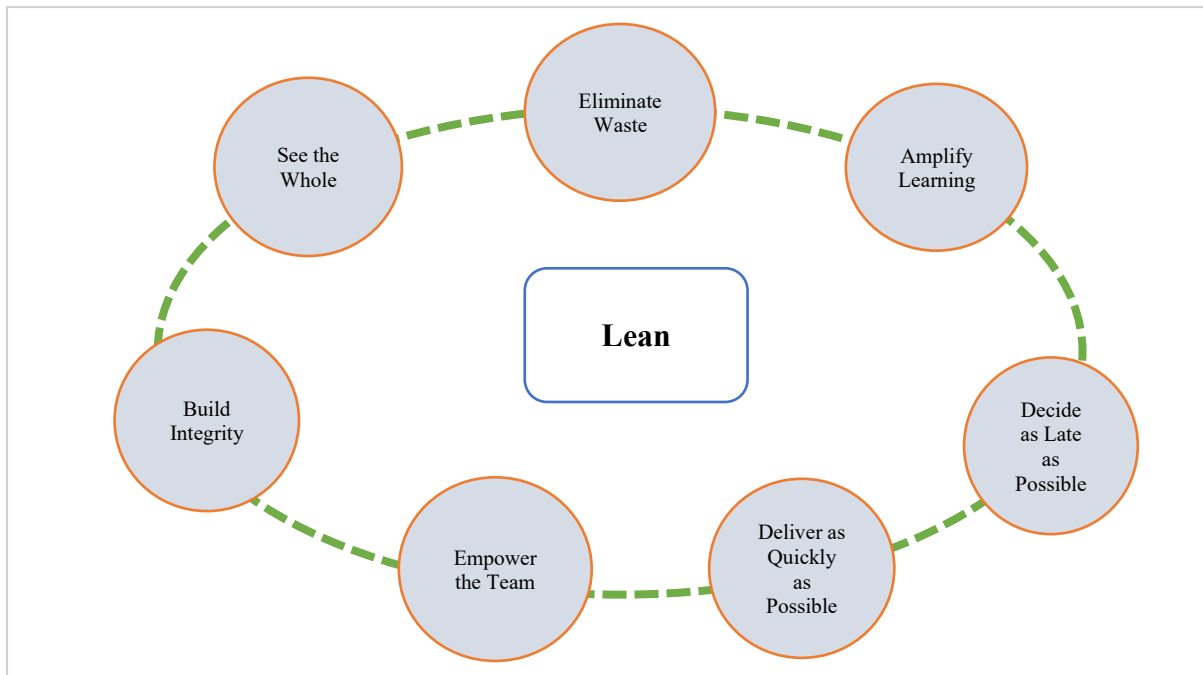
Figure 2.4: Lean Principles (Adapted from Poppendieck and Poppendieck, 2003)

Lean principles, derived from Toyota production processes, are now being applied in numerous domains with expectations that managers can radically process performances through them (Solaimani *et al.*, 2019; Gambatese *et al.*, 2017). These principles emphasise that less is more and streamline every part of the project cycle as integral aspects of the process. The lean concept maintains that efficiency can be applied and waste can be managed at all levels—including each team member, department, interdepartmental operation, the company as a whole, and the relationship between the company, suppliers, and customers. The seven principles in LSD are illustrated in Figure 2.4. These principles play a vital role in this study as they clarify some of the practices of APM, which could be included in the questionnaire survey for the consideration of the respondents.

2.3.2 Scrum

Scrum is an iterative type of APM that incorporates various overarching practices of PM (Cervone, 2011). The methodology has three primary stakeholders: Project teams, owners, and scrum masters will work together. In this instance, through the creation of product backlog's made up of active units (bug fixes/software features), product owners collaborate closely with their team for the identification and prioritization of system functionality. Based on the established priorities, the primary stakeholders and the team estimate and begin working on successive shipping software increments

(called *sprint*s) with a typical timing from two to four weeks (Mollahoseini Ardakani *et al.*, 2018). Each sprint increment is evaluated after completing a sprint retrospective meeting (a maximum of three hours for one-month iterations), and the cycle continues until no further sprint increments need to be implemented. The team ensures improved collaboration through daily meetings (usually 15 minutes in duration) (Schwaber and Sutherland, 2017).
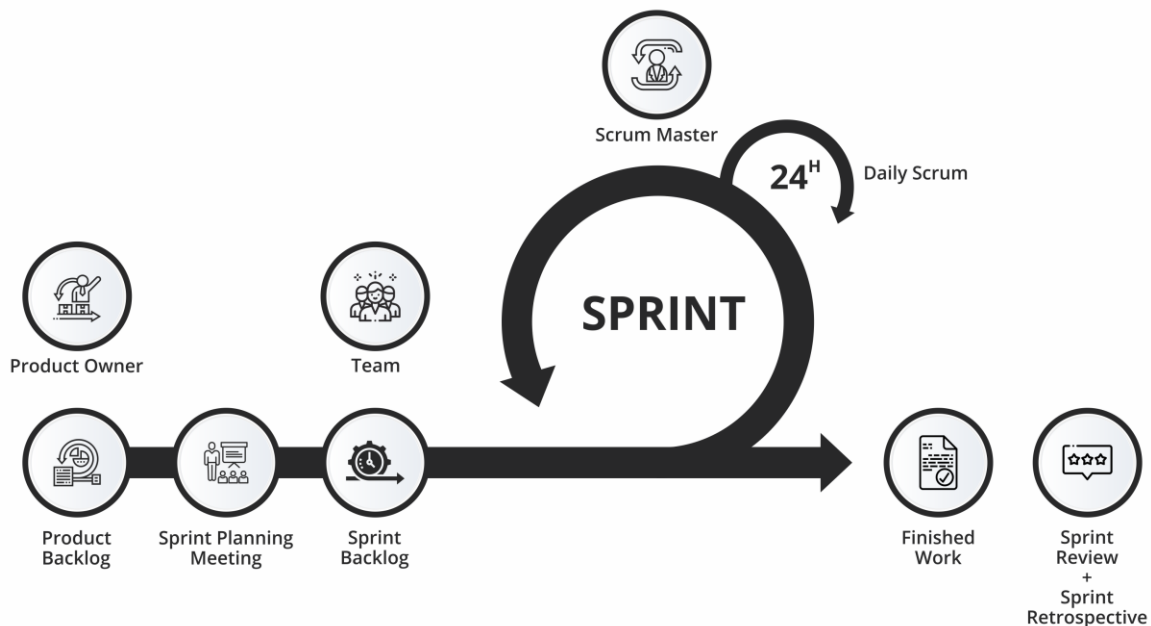
Figure 2.5: Scrum Process (Adapted from Schwaber and Sutherland, 2017)

According to Schwaber and Sutherland (2017), Agile Scrum methodology is grounded in empirical process control theory or what is otherwise referred to as *empiricism*. Scrum utilises an iterative, incremental approach to control risk and optimise predictability. The three pillars that guide every implementation in Scrum are transparency, adaptation, and inspection. From the beginning, transparency necessitates the definition of common standards so that observers share an understanding with project managers and team members. Adaptation occurs when the project inspector determines that one or more aspects of the project are unacceptable and decides to adjust the unacceptable process or item. Defects must be identified as soon as possible to allow the process to expedite adaptations and avoid any further deviations (Apoorva Srivastava *et al.*, 2017). To prevent unnecessary adaptations, Scrum users must frequently inspect artefacts (inspection process) and processes to detect and correct undesirable variances. However, inspection activities should not be excessive to avoid delaying the entire project. As such, inspections must be performed

by skilled team members at the point of work. A Scrum process should be visible to those who are responsible for the end product (Ariza *et al.*, 2018). As portrayed in Figure 2.5, the Scrum methodology has four events that require inspection and adaptation, including '*sprint planning*, *daily scrum*, *sprint review*, and *sprint retrospective*' (Schwaber and Sutherland, 2017)*.*

2.3.3 Extreme Programming (XP)

As a disciplined Agile framework, Extreme Programming (XP) is known for continuous software development, quality, and speed (Dudziak, 2000; Wake, 2002). The model improves software quality by utilising the pair programming practice in which the developer plays a game with the customer to complete the needed software features. The method assumes that, over time, the cost of changing software increases due to vague and changing requirements; therefore, XP attempts to reduce costs by continually evolving the software to match the clients' needs. The model includes the following fundamentals (Beck, 1999): (1) the project stakeholders' decisions are different from those made by business owners; (2) the unit test is written before programming, while the test is performed several times each day, therefore allowing a minimal system to aid faster production; (3) the pair programming concept allows two programmers or one programmer and one user to access the same screen; (4) the simple design that changes over time removes unneeded complexity; and (5) the applicability is for small non-critical software only.

Communications in XP are often informal and conducted through strong, short paths. Although there is a small range of artefacts (deliverables), they are delivered frequently (Dudziak, 2000). As noted by Anwer *et al.* (2017), XP is regarded as a PM methodology that focusses on the four variables of cost, time, quality, and scope. As illustrated in Figure 2.6, the process runs from the identification of project requirements to completion with automated unit testing and iterations during the task stage while customer inputs in iteration planning, meeting, and testing are also incorporated. XP is considered a lightweight methodology; it is not applicable for large-scale capital projects.
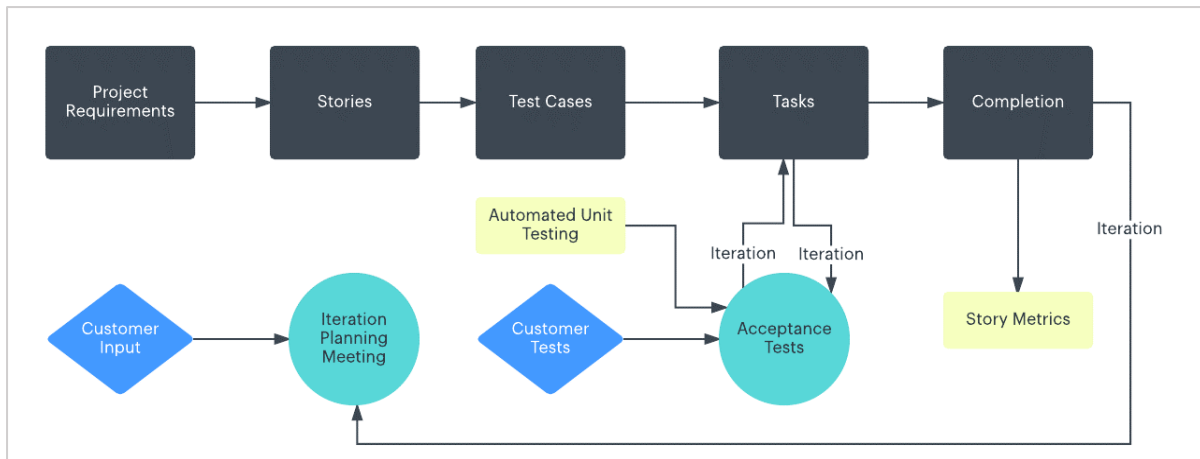
Figure 2.6: XP Process (Adapted from Dudziak, 2000)

2.3.4 Kanban

Kanban is a visual workflow of daily tasks that portrays the work tasks as resources assigned to each task. The methodology ensures that the next item is pulled from the backlog (similar to Scrum backlog) by limiting the amount of work in progress and the promotion of continuous collaboration (Anderson, 2010). David Anderson was the first person to utilise this methodology, which he implemented with a software development team at Microsoft (Anderson, 2010). According to Anderson and Carmichael (2016), Kanban has five fundamental principles: '(1) *visualise workflow*, (2) *limit work progress*, (3) *measure and manage flow*, (4) *make process policies explicit*, and (5) *use models to recognise improvement opportunities*'. The Kanban board is utilised as the primary tool to visualise and coordinate teamwork (see Figure 2.7). Various columns on the board illustrate the series of activities with cards that represent the work features. The tasks at hand are labelled work in progress as a way of managing and limiting the amount of work at hand.

Different diagrams and statistical illustrations should be employed to monitor the project process, such as cumulative flow diagrams, queue size, and cycle or lead time (Ahmad *et al.*, 2018). Policies should be formulated during the initial project stage to ensure that the workflow is achieved because they establish conditions that make the pulling system work, including assigning activities and tasks to developers and pulling tasks from one stage to another. Finally, models should be utilised to improve opportunities within the project. Anderson (2010) identifies three models, including the

Theory of Constraints, ideas from Lean Thinking, and variants on how to understand and minimise variability.
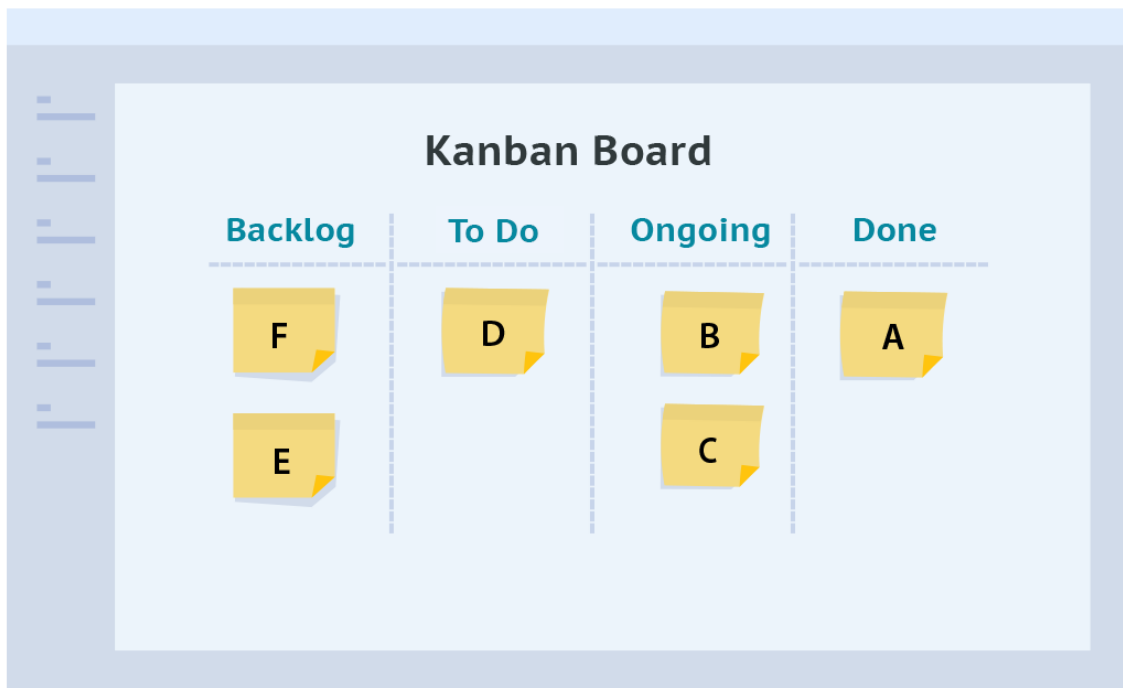
Figure 2.7: Kanban Board (Adapted from Anderson, 2010)

Kanban is another new methodology that can find an application in the traditional framework of PM adopted for the O&G sector.

2.3.5 Dynamic Systems Development Method (DSDSM)

The Dynamic Systems Development Method (DSDM) process is an APM that can be applied to provide a positive impact on all business outcomes (Anwer *et al.*, 2017); it is built on the philosophy that projects must be aligned in a way that clearly defines strategic goals and prioritises the delivery of the project benefits (Richards, 2007). The DSDM rapidly develops software and provides practice for comprehensive planning, managing, and executing iteratively (Chapram, 2018). The principles of DSDM(Figure 2.8) focus on connecting customer requirements with empowered, collaborative teams and integrated testing (Stapleton, 1999). In DSDM, the system specifications are scheduled and delivered in short-time, fixed-length boxes and are then prioritised using the 'must have, should have, could have, and will not have' (known as the MoSCoW rules). The fundamental aspects of DSDM principles include focussing on

the business needs, ensuring timely delivery, collaborating, refusing to compromise quality, building the project in stages to deliver increased quality of work, approaching the project through iterative actions, and providing continuous and clear communication (Agile Business Consortium, 2014).
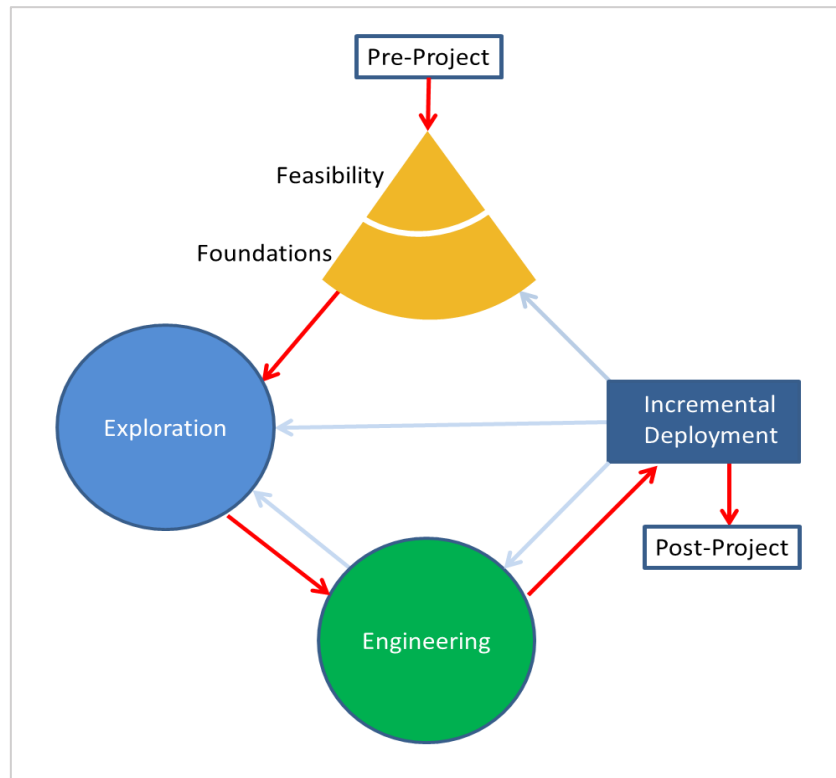
Figure 2.8: DSDM Method (Adapted from Richards, 2007)

Like the preceding methodologies, DSDM has features that can be useful for designing the hybrid APM as its practices are linked to APM and appear to be well-suited to the O&G sector.

2.3.6 Crystal Methodology

Alistair Cockburn, one of the earliest pioneers of the APM methodology, developed the Crystal method to IBM in 1991 (Cockburn, 2004). It is based on seven principles: *frequent delivery*, *personal safety*, *reflective improvement*, *focus*, *osmotic communication*, *technical environment*, and *easy access to expert users.* Crystal methodology is human-powered, meaning that the project should be flexible and tailored to the needs and skills of team members and their interactions (Sunner, 2017). The methodology adopts the usage of colours to indicate project difficulty based on

team size and criticality; it assigns different colours to the project based on the needed policies and best practices: crystal yellow, crystal orange, crystal clear, and others. Like DSDM, the Crystal approach is ultra-light, meaning that it does not demand significant documentation or reporting (Anwer *et al.*, 2017).
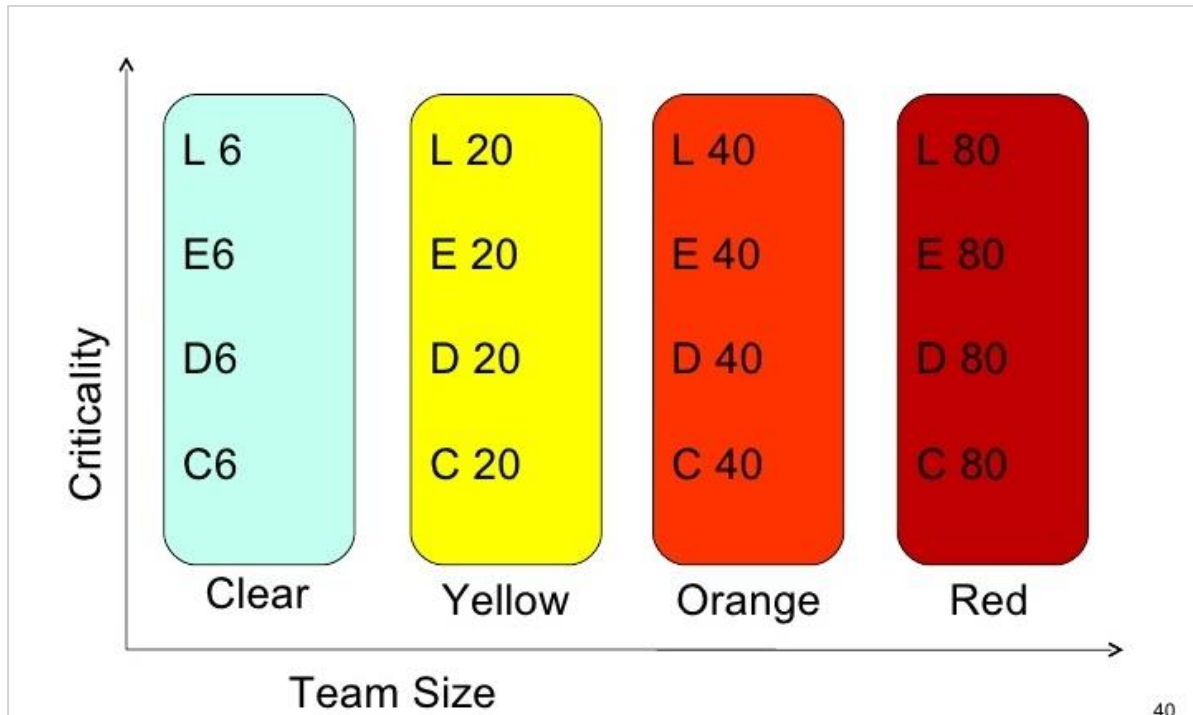
Figure 2.9: Crystal Methodology (Adapted from Cockburn, 2004)

Crystal methodology (Figure 2.9) is important to this study as it shows that human interactions are as meaningful as planning and delivering projects: without due attention paid to them, PM cannot be as efficient as its potential.

2.3.7 Feature Driven Development (FDD)

The Feature Driven Development (FDD) methodology, established in 1997, is considered to be substantially responsive and insists on producing premium quality; providing accurate status updates; delivering frequent, tangible results; and avoiding any disruptions in the implementation process (Goyal, 2007). The FDD system is a short iterative process to deliver tangible software based on features (Tirumala *et al.*, 2016). After the necessary software features are established, they are built iteratively in a process known as 'plan by feature, design by feature, and build by feature' that continues for two weeks (Ambler, 2005; Palmer and Felsing, 2001).
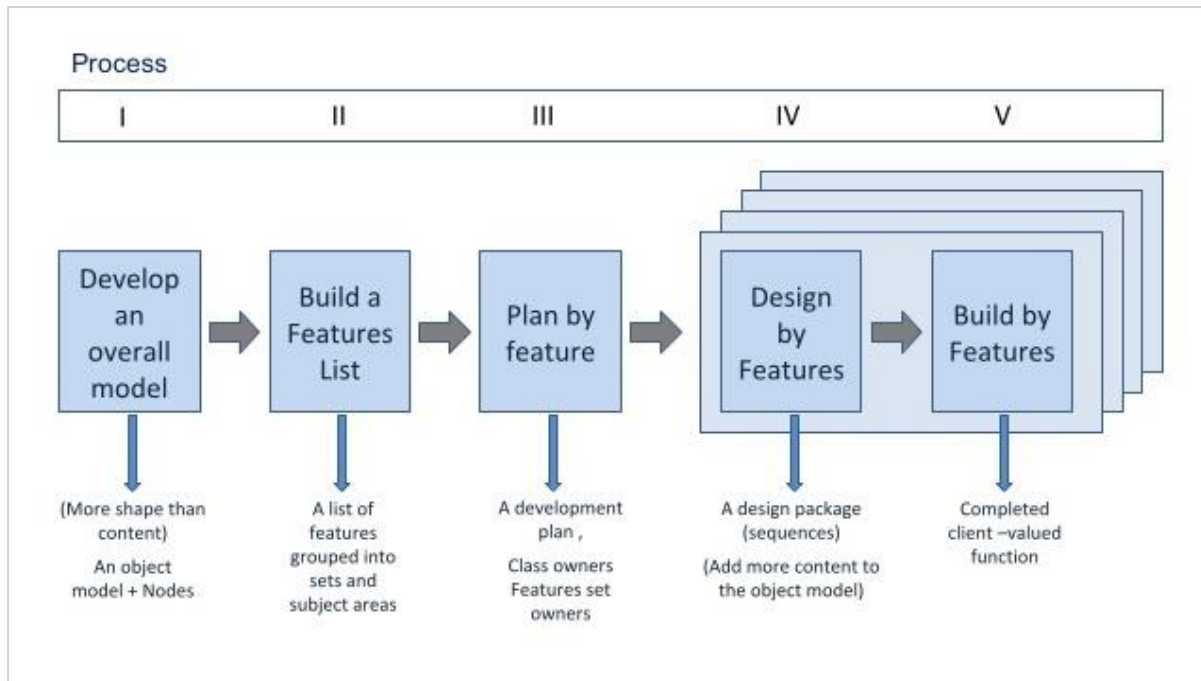
Figure 2.10: FDD Model (Adapted from Ambler, 2005)

The stepwise manner of FDD (Figure 2.10) can be useful for PM as it allows the focus to remain on the design and features of the project; therefore, innovation and creativity are pursued without compromising on quality.

2.3.8 Agile Best Practices and Success Factors

A best practice is an approach or an attribute that has been accepted as superior to the alternatives in a certain context. Agile successful practices include keeping small teams, iteration planning, getting rapid, and continuous feedback. This literature review reveals that all Agile-based methodologies are iterative and focus on incremental development (Vijay *et al.*, 2016; Kotaiah and Khalil, 2017; Hanssen *et al.*, 2018). This commonality between Agile-based methodologies is centred on the idea that customer requirements evolve as well as the association between cross-functional teams, self-organising (Hoda *et al.*, 2012). Therefore, an Agile methodology promotes faster development with an increased degree of quality and a higher aptitude to respond to change.

The complexity of large construction projects has necessitated the need to seek improved mechanisms for managing them. Recently, as noted by Mohammed and Jasim (2018), industrial sectors have benefited from the adoption of TPM and APM

methodologies to increase the success rate of implemented projects. Demir *et al.* (2014) argue that the TPM mechanism is often employed in stable and predictable environments. In contrast, APM is considered the optimal way to manoeuvre in changing or uncertain working environments. Within the O&G sector, projects can be managed through distributed and embedded knowledge that emphasises specific interactions. Accordingly, Bosch-Sijtsema and Henriksson (2014) propose a method through which industries can extract and obtain embedded and practised PM knowledge within the TPM framework. These interactions are thought to be vital as they are essential in executing projects. Furthermore, the authors note that traditional project design practices must concur with current PM approaches to complete a project within the targeted timeframe, scope, and budget.

In the majority of cases, the dynamics of the construction project fade as time passes, which may create uncertain and unforeseeable situations and challenges. APM practices could overcome these challenges as they arise. According to Wysocki (2009), the merit of such an approach is that it minimises resource waste—especially time—to the degree that it is possible to eliminate delays in achieving the project's objectives. For medium- and large-sized companies covering the majority of industrial sectors, Agile best practices in the IT domains could be better utilised for the benefits of large O&G capital projects as well. Best practices of APM can assist these companies in operating optimally with minimum delays. Essentially, APM best practices are a subset of the *Agile Manifesto* principles that allow APM the ability to be applied in project sectors other than the software industry.

2.3.8.1 APM Enablers and Best Practices Concepts

Agile enablers (attributes) are those elements that increase the system agility under study (Priyank Srivastava *et al.*, 2017); therefore, enablers support the development of business by enabling efficient development and the development of business requirements. Conforto *et al.* (2014) define enablers as the principles and conditions that must be implemented and observed to ensure project success. Accordingly, these enablers are perceived to be the internal and external factors that are explicitly or implicitly connected to the implementation of the PM approach. Conforto *et al*. (2014) further identify a list of 6 best practices that create favourable conditions for adopting Agile methods in non-software organisations. A similar list of factors has been reported

by Chow and Cao (2008) as well as Tsoy and Staples (2020). They highlight success dimensions including 'organisational factors, process factors, people factors, technical factors and project factors' while stating the choice of the ideal enablers to be project dependent. Conforto *et al.* (2014) argue that specific enablers could be utilised to ensure that there are no delays (associated with the TPM methods) that may affect the performance and utilisation of a particular practice, tool, or technique.

Conforto *et al.* (2014) further note that effective practices are those that encapsulate the project vision, while concurrently ensuring that the project plan communication processes and tools are simple at the point of contact. Furthermore, there may be a need to formulate activities that are conducted by teams that are self-directed and internally managed. This study argues that the critical best practices from the organisational category are the acceptance of Agile methodology and organisational readiness and capabilities. The optimal practices in the APM process are the capability of reconfiguration so that the project is flexible to change. Self-directed teams and project complexity impose the usage of effective APM. Nowotarski and Pasławski (2016) argue that APM practices could be monitored and updated, while concurrently having a contingency plan that can manage changes as they emerge.

2.3.8.2 PM Change Management

Nowotarski and Pasławski (2016) argue that a project can only be successful if it is based upon a plan that initiates a rapid response if the operational environment changes unexpectedly. In heavy industries such as construction and O&G, changes may happen before the maturation of a project. Furthermore, there are frequently delays in the implementation of the distinct stages of a project, which lead to undesirable consequences. With the 12 principles of Agile, companies adapt and modify methodologies to support their ever-changing needs. According to Cooper *et al.* (2002), a discovery stage is being added by some companies to the front end of the process to generate better ideas.

2.3.8.3 Success Definition

For a project manager, success maybe finishing the project on time and within the agreed-upon cost and scope (Blaskovics, 2016; Radujković and Sjekavica, 2017). However, it is essential to identify the significant success factors preferred by the

project owners. The concept of success in these studies is defined by four elements: financial success, strategic success, successful completion, and management success (Asrilhant *et al.*, 2004). While the internal business operations are the critical drivers of project success, they often receive little attention from management. It appears that managers neglect interdependencies, flexibility, learning, and innovation. They possess the illusion of control, and thus, they are less likely to embrace interdependencies. It has been identified that the maximum levels of driving power for project success come from a skilled team and an adequately implemented audit procedure (Hughes *et al.*, 2020).

Therefore, as noted by Hughes *et al.* (2020), managers have lightweight and short-term goals. The UK O&G sector, for example, has considered converging the internal factors to include financial, geological, and environmental aspects to achieve successful strategic PM (Asrilhant *et al.*, 2004). Not only internal factors but also other aspects such as the inclusion of quality and customer satisfaction are essential for the far-reaching success of a specific project. The overall goal of a successful project should include factors that encompass the firm and its employees, processes, and operations (Chow and Cao, 2008; Tsoy and Staples, 2020), as well as efficiency, impact on consumers, impact on the team, and preparation for the future (Pacagnella *et al.*, 2019).

2.3.8.4 Success in Oil and Gas Projects

Projects in the O&G sector that utilise the phase-gate methodology allow for scope clarity while providing regular meetings and value; therefore, the project methodology itself is a critical success factor for these projects (Abdulla *et al.*, 2019). To be successful in O&G projects, every phase of the project lifecycle should be successful from the perspectives of the client, owner, sponsor, and contractor (Shariatfar *et al.*, 2019). Therefore, the identification of APM's best practices is vital to enable them to be incorporated in Kuwait's O&G projects.

One best practice is communication and collaboration, and this is often claimed to be the critically effective best practice that makes an O&G project successful. This research is concerned with *people factors* that cover resources' capabilities and customer engagements, *technical factors* that comprise an Agile approach and

delivery strategy, and *project factors* that cover project type and nature. Based on an extensive literature review, this study identifies six best practices that can be applied to Kuwait's O&G projects, as illustrated in the Conceptual Framework (Chapter 4). These best practices are iteration planning, retrospective meetings, daily stand-up meetings, communication and collaboration, enhancing team skills, resolving contractual issues, and establishing characteristic viewpoints of project success. One contribution of this study is a hybrid methodology incorporating these Agile best practices in a normal waterfall model that could resolve project delays.

2.3.8.5 Iteration Planning

Iteration planning in Agile practices refers to an event in which all team members determine the amount of the *team backlog* that they can deliver during the upcoming iteration (McHugh *et al.*, 2012) towards milestones. The goal of iteration planning is to determine the features and functionalities that will be included in the next iteration, which allows risks and errors to be reduced as the project progresses (Sharp and Ryan, 2011). Before the start of each iteration, a *sprint* or iteration meeting is conducted between the customer and the project manager. The user *backlog* and stories are reviewed to determine all activities and tasks that can be completed in the next *sprint*.

Serrador and Pinto (2015) claim that planning for Agile iterations is vital because it enables the team and owner to receive timely feedback while reviewing the progress of the project implementation. Correspondingly, Al-Zubaidi *et al.* (2018) note that planning for iterations is essential because they produce a more satisfactory level of detail compared to high-level release plans: the details describe the short-term goals of each iteration by describing each task, the responsibilities of each member, and the schedule for each task. As a result, iteration planning facilitates the accurate prediction of the timeline of the entire project (Serrador and Pinto, 2015). It should also be noted that management does not interfere with iteration planning, which allows the developer teams to remain focussed on their stories and the targets of the *sprint*.

2.3.8.6 Retrospective Meetings

While iteration planning is a meeting held before the start of the iteration, retrospective meetings occur at the end of each iteration. Retrospective meeting as an Agile best

practice allows the team to stop and reflect on events during the iteration, including assessing whether each target was achieved and determining actions for improvements in the next iteration (Matthies *et al.*, 2019). The retrospective meeting is time-bounded; according to Andriyani (2017), it should not exceed a three-hour duration for each month's iterations. The project manager is accountable for ensuring that every team member attends and that they understand the purpose beforehand; therefore, the team may improve their progress over time (Fogelström *et al.*, 2010). At the end of each retrospective meeting, the team should identify areas that demand improvement and implement them in the next sprint. Andriyani (2017) introduces the concept of 'inspect and adapt', in which project managers plan to improve the final product quality through carefully designed processes which are improved iteratively and continuously adapted to proceed toward goals. Thereby, retrospective meetings are fundamental and necessary in any APM.

2.3.8.7 Daily Stand-up Meetings

Daily stand-up meetings are a crucial APM practice that provides an excellent opportunity for members of each group to communicate effectively on the progress made during iteration implementation (Dingsøyr *et al.*, 2019). Similar to the iteration planning and retrospective meetings, daily stand-up meetings are grafted into the rhythm of Agile management and have their own space in 'clock time', duration, and location (Stray *et al.*, 2016). According to Stray *et al.* (2016), these meetings usually last for 15 minutes, and team members address their tasks from the previous workday, their tasks for the current day, review obstacles that hindered their efficiency on the previous day, and note areas of improvement for the current day. Dingsøyr *et al.* (2019) concur that the fundamental purpose of daily stand-up meetings is that they set a daily tone for the ongoing project, thus influencing the overall quality of the project.

2.3.8.8 Communication, Coordination, and Collaboration

In Agile methodologies, three activities, labelled the 'three Cs' (communication, coordination, and collaboration), are considered vital to the successful completion of the project. Communication is defined as the shared knowledge and effective exchange of information between team members; coordination occurs when people in the group jointly manage social and technical dependencies; collaboration refers to

team members working together on specific independent tasks (Sharp and Robinson, 2010).

Conforto and Amaral (2016) argue that the key enablers of Agile projects are team feedback and collaboration. In particular, when collaboration and communication are lacking during the implementation of a project, there are likely to be omissions, which can result in poor management of needed changes, lower levels of quality, and even the collapse of the project. Consequently, the *Agile Manifesto* stresses the prioritisation of people and their relationships rather than the mechanical tools and designed processes; the manifesto especially encourages personal interactions as the fundamental way to share information and to collaborate amongst group members. Mishra *et al.* (2012) add that effective communication and collaboration enable members to develop workable solutions to complex problems as they continue to work on the project, which allows issues to be solved before iterations are completed. Alt-Simmons (2015) further notes that communication and collaboration encourage team success because the team's physical and virtual spaces provide critical areas for members to collaborate, communicate, coordinate, and share information. Therefore, collaboration and communication could result in a rapid and efficient implementation of project tasks. As shown in Figure 2.11, the cornerstone of communication is the customer, where communication and collaboration between skilled team members increase the project success based on the principles of People, Process, Technology, Business Strategy, and Organisation.
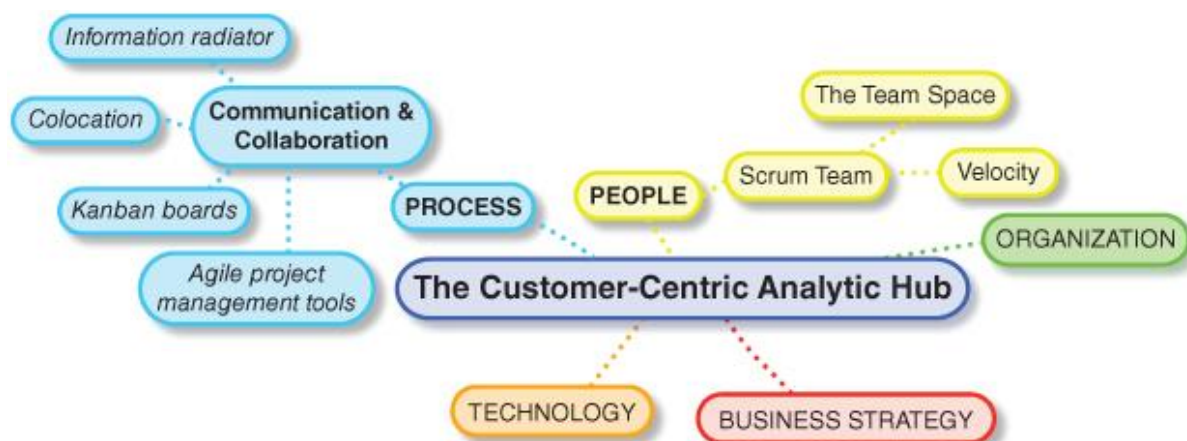
Figure 2.11: Areas for Communication and Collaboration in Agile Frameworks (Adapted from Alt-Simmons, 2015)

2.3.8.9 Enhancing Team Skills

A vital tenet of the *Agile Manifesto* is the adoption of effective teams to develop Agile practices and ensure that value is added at a rapid pace. Compared to waterfall PM, Agile teams are more productive: they are believed to create higher quality products, consistently satisfy customers, and adaptable to rapidly changing conditions (Moe *et al.*, 2010; Shaye, 2008). As noted by Aniche and de Azevedo Silveira (2011), teams in Agile systems are also encouraged to seek constant learning. Moe *et al.* (2010) add that a lack of experienced and skilled team members can lead to poor implementation and management of the project, which invariably leads to delays, defects, or failure. The scholars further note that the performance and success of the project depends significantly upon consistent collaboration, coordination, and strong team leadership. Therefore, Agile projects require the installation of self-managing professionals who can complete tasks efficiently and independently.

2.3.8.10 Solving Contractual Issues

Generally, Agile approaches envision completing tasks as swiftly and efficiently as possible; therefore, the management of contracts is a vital part of Agile methodology that could speed up the project execution. Contractual management could utilise a fixed-price model or fixed-price-per-iteration model; Agile methodologies manage contracts at the beginning of the project, which considerably solves contractual issues in project developmental stages (Banerjee *et al.*, 2011). Fallahnejad (2013) demonstrates that in the majority of traditional methods, payment issues are a principal cause of delays and project failures. Abdullah *et al.* (2011) further note that ensuring that all necessary resources and materials are available before and during project implementation is essential for project delivery. With Agile payment models, as Franklin (2008) also asserts, projects are completed efficiently because contractual issues are addressed before the project, or its next iteration, begins. Therefore, solving contractual issues is a best practice that can be adopted in any PM undertaking.

2.4 Hybrid Project Management

2.4.1 Benefits of Hybrid Project Management

A Hybrid PM methodology combines best practices from both TPM (e.g. waterfall) and Agile methods to create a novel PM method to function effectively in specified domains (e.g. construction) (Pace, 2020). Correspondingly, other researchers find the benefits of combining both Agile and waterfall methods, arguing that a hybrid methodology provides improved support for both exploitative and explorative capabilities. The critical element in such scholarly arguments is that Agile methods have already proven to be more successful in solving bottlenecks in IT projects than the traditional methodologies that were employed previously to manage small projects (Noll and Beecham, 2019; Vinekar *et al.*, 2006). Therefore, to solve issues of complexity and risk within O&G construction projects, there is a substantial need to combine functional elements of the traditional approach with the flexibility provided by the Agile methodology.

Stettina and Hörz (2015) report that the advantages of Agile best practices in a hybrid method include cost savings, speed of delivery, and flexibility to change should the need arise. Furthermore, Agile management eliminates administrative overhead upfront as a result of planning and extensive documentation. However, as noted by other scholars, the approach requires the rigorous adherence to the prescribed processes (Alaa and Fitzgerald, 2013); otherwise, it can lead to chaos (Thillaisthanam, 2010) or cost overruns (Conforto *et al.*, 2016). Under these circumstances, Pace (2019) offers an exciting viewpoint, stating that hybrid approaches should also be considered between methodology adoption and project environmental and organisational capacities. Conforto *et al.* (2014) also emphasise that project planning and control have posed severe challenges to different projects that have utilised the waterfall approach, and thus recommend incorporating Agile best practices within the standard framework to improve functionality, manage risks, and run the project more efficiently and promptly.

Stoica and Brouse (2013) note that both methodologies have different benefits and drawbacks, and a hybrid method should, thus, adopt working advantages from both while eliminating obstacles. For instance, Agile is better at making revisions, while the

traditional approach is better at ensuring that the project remains within the scope of the clients' requirements. While TPM is more successful in stable environments such as construction, many projects continue to suffer from delays, which could be solved by Agile best practices, such as constant communication, iterations, collaboration, and feedback (Ahern *et al.*, 2014). Ahern *et al.* (2014) show that managing complex projects require the ability to overcome constant uncertainties and to remain flexible in the outlook for the project. Similarly, Rasnacis and Berzisa (2016) recommend a hybrid methodology that combines the contingency plans and structure of TPM in the inauguration and planning stages to foster the project from start to finish while incorporating Agile practices to manage risks and execute the project more smoothly and efficiently.

Špundak (2014) suggests that combining both methodologies can produce many benefits for the project, including reducing delays and improving success. However, the study proposes the need to proceed with caution since the research methodology should be matched to the requirements of the project and not the other way around. In fairly structured organisations that continue to employ waterfall concepts and a typical Capability Maturity Model Integration (CMMI) philosophy, developers cannot fully adopt Agile concepts (Ivanov *et al.*, 2018). However, they can attempt to balance quasi-Agile concepts with the initial waterfall planning. Therefore, in O&G projects, it is essential to understand the specific characteristics of the project so that the appropriate technique, or elements from the traditional and Agile methods, can be applied to the project to ensure a decrease in delays.

A study of an Indonesian O&G project attempts to identify the conflict resolution mechanisms undertaken by project managers (Astuti and Martdianty, 2012). It reveals that the majority of project managers preferred combining cooperative and confirmative approaches. Therefore, project managers' approaches are influenced by the way they perceive differences in society (Singgih *et al.*, 2014). When there is a lower power differential, Wahjudi *et al.* (2014) note that a different conflict resolution technique may be utilised than those employed in a high-power distance culture. Again, the need to combine Agile and waterfall best practices is applicable in such situations because the combination allows greater flexibility and risk management solutions while maintaining the main objectives of the project.

Although construction projects are often delayed, applying APM to O&G construction in project execution can produce an improved share of success by reducing constant delays (Owen *et al.*, 2006). The predominant aspect of Agile is that it focusses on the project team members rather than the process. Consequently, Agile is likely to ensure true collaboration among construction project stakeholders and improved motivation within the project teams. The result of such remarkable improvements can further improve the delivery of project outcomes. Nevertheless, as Conforto *et al.* (2016) highlight, it is essential to determine which best practices of Agile suit projects to ensure that these projects successfully adopt and quickly implement Agile methodologies.

2.4.2 Factors of Hybrid Project Management Models

Martin *et al.* (2016) have identified several factors that could affect the selection of a PM model, including the project type and size, as well as the risk and time constraints. It should also be noted that during project execution, and regardless of the PM methodology, a conflict could arise either due to resource utilisation or contract negotiations. As such, Ramesh *et al.* (2018) posit that conflict resolution by the project manager has a direct effect on project success.

Salameh (2014) argues that a project may reflect the features of both TPM and APM. For instance, a project may begin strictly as a TPM project in the initiation and planning stages, in which tasks are conducted extensively and documented expansively. However, in the execution stage and beyond, the project may evolve and adopt Agile methods, such as iterative planning or close interaction and the incorporation of customer feedback. Such a hybrid methodology may benefit the project managers who can build upon their existing competence with TPM while learning the ropes of APM.

In many settings, the implementation of APM methods leads to positive changes in the process. Therefore, teams in O&G projects must be adequately prepared before the project's implementation and be willing to adapt to changing roles, practices, and processes during the project. Gustavsson (2016) notes that although Agile is closely connected to the field of software development, it could also be applied to more prominent industries, such as construction, that are attempting to depart from traditional concepts of PM to embrace agility and robustness. This study

acknowledges that because the O&G sector operates in a predictable environment, the traditional approach is applicable; however, O&G projects also suffer from risk and complexity. Therefore, an APM approach could be employed to address the growing innovations that have affected such industries (Špundak, 2014). Consequently, APM can be utilised to minimise any risks that are associated with the failure to define the scope of the project that may affect its quality and outcome (Benediktsson and Dalcher, 2005). The adaptation and execution of APM can be utilised to manage changes and ensure that the project is successful.

It could be argued that TPM and APM can be utilised to manage the paradox of predictability and uncertainty concurrently. Under such a scenario, any project, especially O&G projects, could experience distinct environmental disruptions during the project lifecycle. As identified in previously analysed literature, the choice and ability to adapt a single methodology depends on the project, the organisation, and the human resources that it possesses to complete the project successfully.

2.5 Causes of Delays in Oil and Gas Projects

Abdulla *et al.* (2019) posit that managing O&G capital projects increases challenges compared to other ventures that are considered complex, competitive, and usually significant. Considering these challenges, the majority of O&G projects suffer delays and other relative issues. Several scholars, including AlAmir and AlMarar (2019) and Ruqaishi and Bashir (2015), have examined the causes of such delays in various O&G project contexts. In these studies, a project is considered delayed when the time overruns due to project activities exceed the timeframe that was initially planned. Although it is common to maintain a contingency or buffer time for regular activities, critical activities have an equally early beginning and end date. Therefore, all activities, especially the critical path activities, may overrun the planned time, which is commonly referred to as a *project delay* (Abdulla *et al.*, 2019). As per the literature, reasons for delays in O&G projects emanate from a variety of issues including inadequate estimation of time, cost, and scope; and improper contractual, management, and team organisation issues. Other causes are summarised in Table 2.3.

2.5.1 Time, Cost, and Scope Issues

Problems that result from the iron triangle of projects (time, cost, and scope) are tightly coupled with project delays. According to AlAmir and AlMarar (2019), the majority of O&G capital projects have significant investment costs, relatively considerable technical risks, long lead times, and critical geopolitical factors. Delays often occur if the costs, time, and scope of tasks are not planned and managed well (Sylvester *et al.*, 2011). The management of the cost, time, and scope of O&G projects are, therefore, important in ensuring their success. Ruqaishi and Bashir (2015) examine the reasons for O&G project delays in Gulf Cooperation Council (GCC) nations, and their findings suggest that poor management of sites by contractors and supervisors often cause delays as well as defects in O&G projects.

Moreover, the authors illustrate that delays in such construction projects are further aggravated by inadequate planning and scheduling. Additionally, the study demonstrates a correlation between delays and poor management of project schedules due to unclarified team roles. In a similar study in Oman, Ruqaishi and Bashir (2015) highlight that poor communication and integration strategies lead to delays in projects, especially if they are coupled with improper planning and management, such as accepting frequent changes. Dey (2012) adds that the unavailability of materials, such as pipes, and the delayed procurement and delivery of pumping units could contribute to a situation whereby a significant time overrun is inevitable.

A case study of the failures within the oil sector in Canada demonstrates a relationship between cost and schedule overruns (Jergeas and Ruwanpura, 2009). Researchers in the study have found that misplaced optimism encourages the players to fail to appreciate that such projects are complex and have specific risks attached to them. Apart from misguided objectives, an inadequate definition of the project's scope, as well as its risks, may lead to a misuse of time. Blanc (2011) further confirms the same position in Canada, where several cost overruns and project schedules were extended by 20 years or more. However, Blanc (2011) notes that these delays often depend upon the project's size and its level of complexity. Moreover, the advanced systems, components, and structures that are involved are likely to lead to these significant

delays. Other studies, such as that of Prasad *et al.* (2019), indicate that financial issues are the most significant reasons behind delays in construction projects.

As argued by Jergeas and Ruwanpura (2010), misaligned strategies that are inconsistent with the scope and misdirected execution may increase challenges in project completion within the set timelines. In another case study, the Iranian gas pipeline projects were impeded by the poor management of the available monetary resources (Fallahnejad, 2013). This study reveals that material-related factors led to the increased probability that the projects would not be completed on time, although Iran is currently under multiple sanctions that seriously hinder its activities. Additionally, improvisations requested by the customers during construction are also identified as critical delay factors.

2.5.2 Contractual Issues

Practitioners and researchers, including Mbala *et al.* (2019), agree that clients, contractors, and consultants have an interrelated role in the speed with which a project is implemented. Therefore, there is an interconnectedness between the execution of contracts and the speed of project delivery. Salazar-Aramayo *et al.* (2013) state that exploration and production, which are run by different contracts, contribute to the delays registered in many O&G projects. Therefore, there is an increased likelihood that refining and distributing O&G may affect the speed of delivery in the entire management process of the project, especially if there are unresolved contract issues on the table. Contractual issues in O&G projects often result in schedule overruns and consequently in cost overruns. Olaniran *et al.* (2015) report that almost 60% of the ongoing projects in the world suffer from challenges to on-time delivery if there are unresolved cost overruns.

According to Ghandi and Lin (2014), contractual issues include sovereignty concerns, the political environment, and the know-how (team skills) in host countries. Moreover, one of the major drawbacks of contracts includes potential inefficient outcomes. Further issues include contract renegotiations, oil law, the handling of environmental issues and human rights by projects (Likosky, 2010), and risk management due to project complexity and trust management (Karami *et al.*, 2020).

Potential inefficient outcomes could result from unresolved contractual issues, including risks to safety and project failure. Consequently, the need to address these challenges is considered as research indicates the need for a requirement to ensure seamless interaction between project components including human resources, technology, and project structure (Salazar-Aramayo *et al.*, 2013). Significantly, Olaniran *et al*. (2015) add that the culture of project managers, as well as the environment, lead to cost overruns, which eventually contribute to missing established deadlines.

2.5.3 Management Issues

O&G projects strive to comply with PM standards (Smith, 2015; Sylvester *et al.*, 2010); however, the sector also fails to meet the basic requirements of the PM triangle, which focusses on costs, scope, and time. Quality and stakeholders' satisfaction with reduced conflicts (which enhance collaboration) are becoming increasingly important (Toor and Ogunlana, 2010). Several academic researchers, including Goldsmith and Boeuf (2019) and Immerwahr *et al.* (2008), argue that a single aspect of the PM triangle cannot be changed without affecting others. While some O&G contractors perceive time as the least important component, tight timelines can increase costs and minimise the project scope. Sylvester *et al.* (2011) contend that failure to balance the competing needs of scope, time, and cost can lead to slower deliveries of the project. Consequently, factors leading to cost overruns and delays in project implementation prove the reality that, at times, joint ventures can result in conflicts among the project's essential players (Olaniran *et al.*, 2015). Therefore, the issue is related to how to create the optimal balance between competing factors of time, cost, and scope under restrictions to quality and resources.

While it is difficult to deliver projects that meet the 'iron triangle', survey results indicate that challenges of inconsistent governance, managing benefits, and change throughout the project lifecycle are to blame for failures. In one study, a total of 58% of respondents reported that stakeholder satisfaction relates to project success, and only 19% of organisations claim to deliver successful projects (KPMG *et al.*, 2019). It can be challenging to manage different portfolios, while the inability to change the risk appetite may render it impossible to abide by the established timelines.

Significantly, it should be noted that improper PM and inadequate planning through unreasonable forecasting may affect how estimates are made or increase the possibility of bias in terms of optimism (Hatmoko and Khasani, 2019; Ruqaishi and Bashir, 2013). Moreover, deficits in human capital, regulatory delays, or uncertainties regarding prevailing policies may impair the delivery of the project (Dey, 2012). Van Thuyet *et al.* (2007) state that a project delay could be due to bureaucratic decision-making processes (either internally, externally, or both) and incompetent teams. Congruently, a study of projects in Yemen presents many issues related to project failure, including delays in decision-making, contractor inexperience, and insufficient collaboration (Kassem *et al.*, 2019). For Oman's O&G companies, weak interaction with vendors was rated as the predominant delaying factor (Ruqaishi and Bashir, 2013).

2.5.4 Team Organisation Issues

Most industries have realised the usefulness of stakeholder cooperation to plan and coordinate multiple activities for positive results. However, Gupta *et al.* (2019) note that collaboration can only be achieved when there is complete control of the project, which entails managing the project under restrictions of time, cost, scope, and resources. Team organisation could provide a competitive advantage to project execution within the oil sector (Talebbeydokhti and Sedghi, 2015). It is posited (Talebbeydokhti and Sedghi, 2015) that realistic timing, apportioning the correct amount of required funds and resources, prompt warnings regarding the project's progress, and placing skilled, knowledgeable teams in various departments can eliminate delays in the project's implementation. Other studies report that a delay in a project could also be related to the competence levels of team members (Khaleel and Hadi, 2017).

Other research, e.g. Emam *et al.* (2014) has noted that a common difficulty is that different parties in the project do not communicate, e.g., procurement and engineering teams do not interact. Since the majority of O&G projects employ a slightly similar framework to the waterfall methodology, the collaboration and communication between engineering, management, and contractors are not universal, often because of competence levels that vary across produced artefacts. Consequently, projects are delayed indirectly because of a lack of self-directing teams and collaboration as well

as an activities-based model (Pall *et al.*, 2020) rather than the evolutionary-delivery model of Agile practices.

Consequently, poor coordination and communication between the project parties remain an open issue with TPM, which indicates that it is a significant factor in project delays. Thus, team organisation as a critical success factor should outline clear communication channels between the contractor and project owner, who should have the capability, authority, and involvement with different stakeholders (Mathar *et al.*, 2020).

Table 2.3: Potential Reasons Behind Delays in O&G Projects

Causes of Delays	Potential Solutions	Source
• **Inadequate planning and scheduling** • **Poor management of sites** • **Poor management of project schedules** • **No effective communication** • **Weak interaction with vendors**	Plan iteratively to reduce scope creep; Enhance self-directing teams through collaboration and frequent meetings	(Ruqaishi and Bashir, 2015)
• **Unavailability of materials, such as pipes** • **The delayed procurement and delivery of pumping units**	Solving payment delays and subcontracting issues	(Dey, 2012)
• **Failure to balance the competing needs of scope, time, and cost**	Utilise efficient PM methodology	(Sylvester *et al.*, 2011)
• **Misguided objectives** • **Inadequate definition of the project's scope and risks**	Risk management	(Jergeas and Ruwanpura, 2009)
• **Poor management of the available monetary resources** • **Unrealistic project timeline**	Scheduling	(Fallahnejad, 2013)
• **Role of clients, contractors, or consultants**	Solving payment delays and	(Beng *et al.*, 2019a)

	subcontracting issues	
•**High-intensity environment**	Communication and collaboration	(Salazar-Aramayo *et al.*, 2013)
•**Conflicts among the project's essential players**	Stakeholder management	(Olaniran *et al.*, 2015)
•**Delays in decision-making** •**Contractor inexperience and insufficient collaboration**	Enhancing team skills	(Kassem *et al.*, 2019)

Chapter 3: Methodology

3.1 Introduction

Chapter 2 summarised and analysed the existing publications, including both theoretical and empirical work that explores how Agile and waterfall methodologies are applied in O&G projects. This chapter proposes a systematic methodology to achieve the research aims, taking into consideration the current state-of-the-art methodological approaches (Joyner *et al.,* 2018). According to Remenyi *et al.* (2000), a research plan is composed of a defined problem, research questions, and an extensive review of the relevant literature, which should then guide the selection of the optimal research methodology. This chapter, therefore, establishes and presents the rationale and justification for choosing the specific research methods for data collection, analysis, and interpretation.
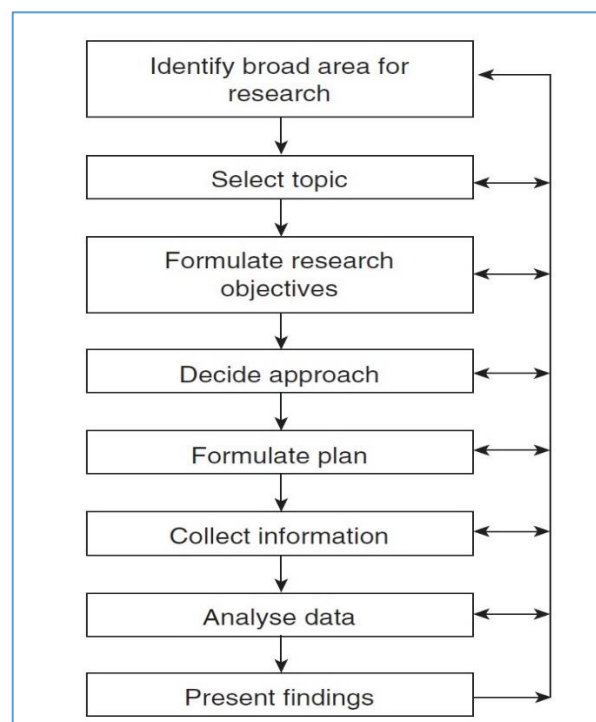
Figure 3.1: The Process of Empirical Research (Gray, 2018)

Figure 3.1 illustrates the process of empirical research and was utilised as a framework for structuring this chapter, which identifies the broad scope of research models that were followed; the research approach, philosophy, and strategy; the design of the case study; and data collection and analysis procedures. The chapter

also explains the reasons for undertaking a research study, how the research problem was identified, justification of the specific methods adopted to collect data, and the reasons behind the selection of the techniques utilised for data analysis (Kothari, 2018).

3.2 Research Models

Amongst several research models, the *nested* model of Bryman and Bell (2015) and the research *onion* model of Saunders *et al.* (2019), which are widely recognised, have been applied here. The former is comprised of three key elements: research philosophy, research approach, and research techniques. As described by Bryman and Bell (2015) the research philosophy denotes philosophical positions as well as the ontological and epistemological choices that underpin a research study; the research approach refers to a strategy of enquiry which also includes the research method and reasoning; the research technique describes the methods utilised to undertake the research, such as the literature review, interviews, surveys, and observations, among others.
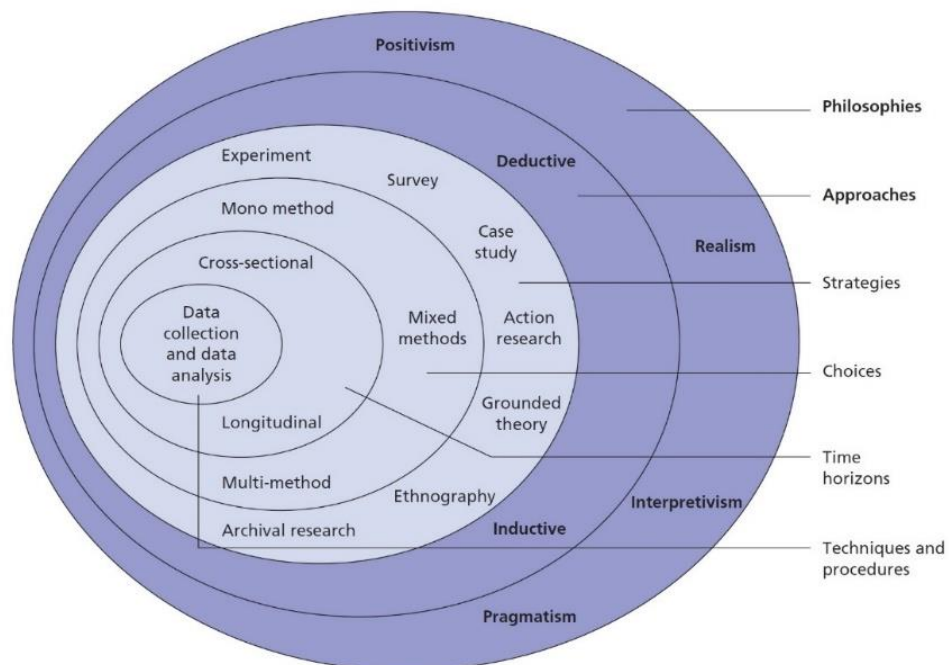
Figure 3.2: Research Onion Model (Saunders *et al.*, 2019)

Conversely, Saunders *et al.*'s (2019) *onion* model, as illustrated in Figure 3.2, consists of six 'layers': research philosophy, research approaches, research strategies,

methodological choices, time horizons, and data collection and analysis. Every layer depicts an increasingly narrow level of the research process. This project adopts the research onion as it is a simplified version (compared to the *nested* model) that supplies a more precise description of the research process followed to fulfil the research objectives, and is considered easily adaptable to nearly any type of research method and context (Bryman, 2011). The application of each layer of the adopted *onion* model and its strategic usage justification follows.

3.3 Research Philosophy

This research adopts a positivist philosophical position, implying that the study is grounded principally in scientific evidence to reveal how APM can be successfully implemented in O&G capital projects that traditionally have implemented the waterfall approach. As demonstrated subsequently, quantitative data obtained from a survey was utilised first, complemented by qualitative data drawn from interviews to illuminate the findings from the survey. As noted by Bryman and Bell (2015), the positivist philosophical position augments not only the validity of data but also the reliability of the produced findings. Correspondingly, Maxwell (2017) posits that a positivist stance allows researchers to achieve both validity and reliability, and to obtain findings that are widely generalisable. As both these factors are essential for the researcher, a positivist stance is employed, which aims to assess whether an Agile methodology in PM can be applied to Kuwait's O&G sector as successfully as it has been in other sectors. As this study is one of the first to investigate this problem in the specified context, a positivist philosophy is ideal as it allows for the exploration of a large number of projects to inform the research objectives.

3.4 Research Methods

This study adopts a *sequential explanatory mixed-methods approach*, which consists of two predominant methods: *qualitative* and *quantitative*. A sequential research approach begins with the sequential collection of quantitative or qualitative data, meaning that data collection does not happen simultaneously. The *mixed-methods* applied are an amalgamation of the leading research methods to provide complementary evidence that improves the validity, reliability, and generalisability of the research (Johnson *et al.*, 2019).

A quantitative research method draws on statistics to investigate the significance of gathered numerical data (Walliman, 2017). Saunders *et al*. (2019) state that quantitative research methods are often employed in studying and establishing the relationship between two concepts or variables, which is why they are often utilised in testing hypotheses. Consequently, quantitative methods are ideal for positivist research philosophies in which an established theoretical framework provides an overarching format for the study, and when the researcher is attempting to prove the relationships between them. Typically, variables are measured numerically, and outcomes are mathematically analysed and presented as graphs and other statistical visualisations. Quantitative studies apply statistical tools to assess data for reliability and validity.

On the other hand, qualitative methods focus on eliciting the opinions of respondents through open-ended questions or other research methods which reveal information that exceeds the constraints of quantitative analysis. Gray (2018) notes that a qualitative research design is a logical and rigorous process through which data are assigned meaning. Researchers progress through an initial description of the data and then divide it into smaller parts through a process of disaggregation to determine how it can be connected to form new concepts. This process is termed *content analysis*, and it creates clusters of common data which reveal distinct themes. According to Gray (2018), qualitative research can involve many types of data gathering instruments, such as observational protocols, questionnaires, interviews, and document analysis; a collection of such data often follows the process depicted in Figure 3.3.
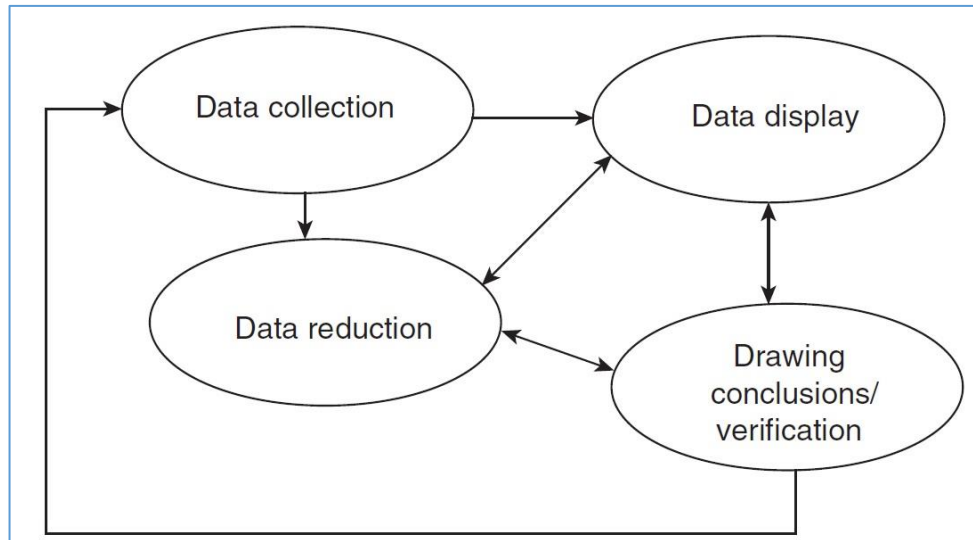
Figure 3.3: Interactive Model of Qualitative Analysis (Gray, 2018)

The importance of qualitative research derives from the fact that it is significantly contextual because data collection is undertaken in a real-life setting, focussing on the emotions, motivations, and prejudices of those interviewed, as well as their interpersonal relationships and conflicts. Qualitative methods and instruments are evaluated for credibility and trustworthiness.

Researchers often combine quantitative and qualitative methods for data collection to enhance the generalisability and validity of research outcomes and contribute to the existing theoretical knowledge base (Easterby-Smith and Thorpe, 2018). Furthermore, mixed-methods research offers more in-depth insights into *why* things occur and enables new perspectives on the research questions.
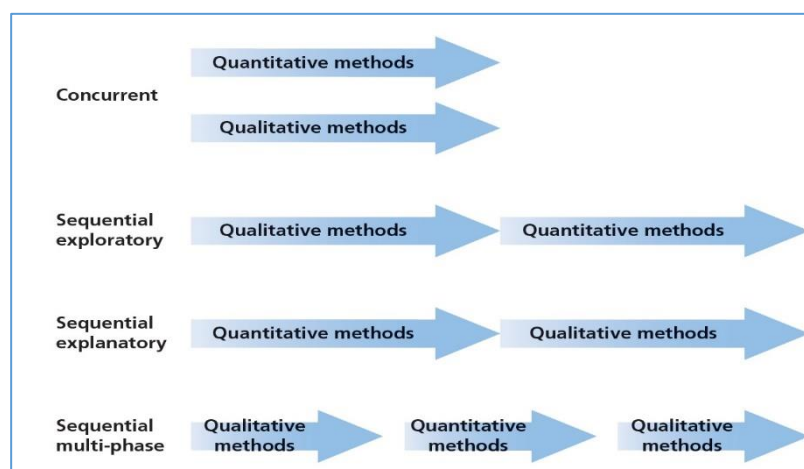
Figure 3.4: Mixed-Methods Research Designs (Saunders *et al.*, 2019)

Saunders *et al.* (2019) identify four types of mixed-methods approaches in research: *concurrent* (in which both qualitative and quantitative methodologies are weighed simultaneously); *sequential exploratory* (in which the study is qualitative but is supported by quantitative data); *sequential explanatory* (in which the research is quantitative but is supported by qualitative data); and *sequential-multiple phase* (in which a variety of either qualitative or quantitative methodologies are utilised), as depicted in Figure 3.4. This study employs a sequential explanatory design with a quantitative approach as the primary research method, while the qualitative analysis provides secondary support.

The adopted research design (sequential explanatory with mixed methods) indicates that the quantitative design was pivotal to the investigation. In contrast, the qualitative design was employed to validate data obtained from the quantitative methodology. This study began with a survey questionnaire to obtain quantitative research data, after which case study interviews were utilised to collect qualitative data. This mixed-methods design offers greater value to this research study. First, a mixed-methods design enables data triangulation and bolsters research validity, which addresses the weaknesses of individual data collection approaches. Mixed-methods are the appropriate choice considering the complexity of understanding how Agile practices can be implemented in the waterfall methodology in O&G projects (Jalali Sohi *et al.*, 2019). Second, several types of data collection instruments can be employed to obtain primary data and conduct all-inclusive analyses, which are vital in intricate research designs such as the one in this study (Creswell and Clark, 2017).

However, neither qualitative nor quantitative methods are sufficient by themselves to accurately capture the details and patterns of a particular context (Ivankova *et al.*, 2006); the methods complement each other and ensure a robust analysis. Therefore, the sequential explanatory mixed-methods design is straightforward and provides the opportunity to explore the results of the quantitative analysis in more detail (Ivankova *et al.*, 2006).

Consequently, a sequential explanatory mixed-methods approach is particularly suited because it allows the researcher to answer the three research questions identified in the introductory section. The first research question, which investigates the best practices that can be applied in a waterfall framework to reduce delays in Kuwait's

O&G capital projects, was addressed through the use of a questionnaire survey. The questionnaire design ensures that each variable (best practices and enablers identified in the literature review) was examined in line with its significance and applicability in the waterfall PM method in O&G projects. The other two research questions were examined through interviews with industry experts. The findings generated from these two questions complement, validate, and triangulate the statistical data obtained from the survey.

3.5 Research Design

A research design is positivist: it encompasses how to select and accumulate data, and concerns scaling and measurement approaches, tests, and data assessment (Cavana *et al.*, 2001). Moreover, it describes a collection of methods and investigative elements combined in a reasonably logical manner so that the topic under study can be addressed efficiently, therefore providing a solution blueprint. Dörnyei and Csizér (2012) state that significant research designs are those creating the lowest level of data bias and increasing reliability levels for collection and analysis of the requisite data. The quantitative research design, which is part of the adopted sequential explanatory mixed-methods, yields reliable and generalisable results when combined with qualitative data utilised to validate the resulting statistical information (Creswell and Clark, 2017).
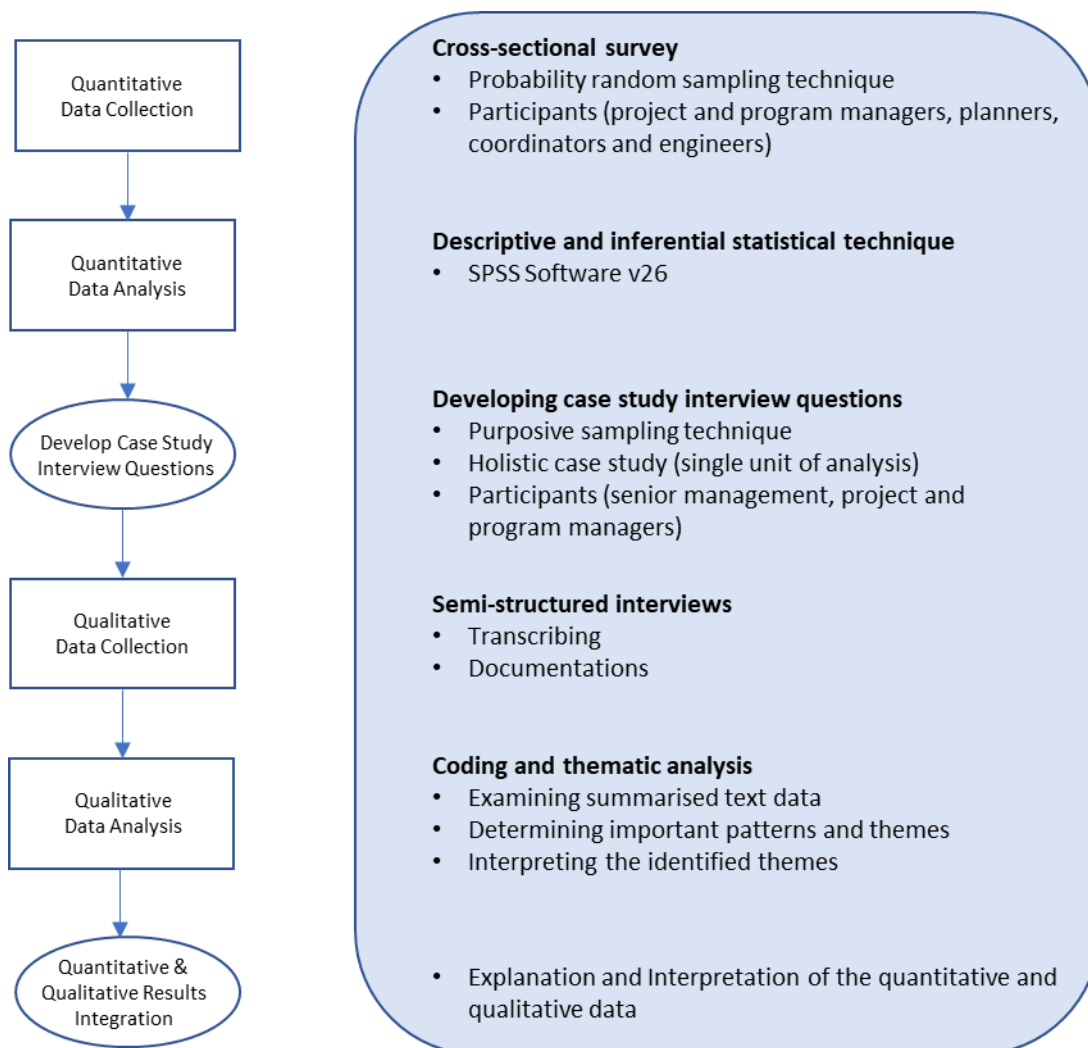
Figure 3.5: Adopted Research Design (Created by the researcher)

This research design is depicted in

Figure 3.5, which consists of quantitative and qualitative sequential mixed-methods. First, quantitative data was collected through cross-sectional questionnaires targeted to project and programme managers, planners, coordinators, and engineers. These roles are critical to project success, and they are part of the project management office (PMO). Second, quantitative data analysis utilising the statistical software program IBM SPSS version 26 (IBM Corp., 2019) was undertaken to provide preliminary findings and aid in the formulation of interview questions for the case study. This research followed the design and development of the interview questions based on Kvale's (2011) recommendations for conducting interviews. The next step comprised

semi-structured interviews in which the collected qualitative data were recorded and transcribed to support the analysis. Triangulation and integration of the results from qualitative and quantitative aspects of the research were undertaken to allow validation.

3.6 Data Collection

3.6.1 Quantitative Data Collection

According to Creswell (2005, p.126), 'a theory in quantitative research explains and predicts the probable relationship between independent and dependent variables'. Relatedly, research carried out within a positivist model employs quantitative data collection methods (Abu Nadi, 2012). One of the benefits of quantitative models is the consideration of adequate sample sizes, using computers tools to analyse data, and the ability to generalise findings to larger populations. Therefore, quantitative methods could be used to test hypotheses that demonstrate relationships between variables in order to generate descriptive data.

After conducting an extensive literature review and designing the research process, a questionnaire was developed to collect quantitative data. The questions were designed such that they are unambiguous and straightforward, while also avoiding oversimplification of the questions; therefore, this research followed the guidelines of Cavana *et al.* (2001) for effective question design to avoid measurement errors. Questionnaires were utilised to collect data because of the nature of this study's research problem and the underlying research objectives. The purpose of quantitative data collection was to test the formulated research hypotheses, which were formulated following the identification of research problems, identification of variables, and creation of the Conceptual Framework (Bryman and Bell, 2015).

Further, this study adopted Likert scales because the scale indicates responses from strongly positive to strongly negative, with a middle score depicting a neutral reaction. Moreover, Likert scales are the most commonly utilised scales in data systems research (Sekaran and Bougie, 1993). The 5-point scale was chosen because it is shorter, more direct, and simple to explain. A set of closed-ended Likert-style questions was prepared, and a probability-based random sampling technique was

utilised to identify the target respondents following the guidelines of Gray (2018). This research employed random sampling, as its outcomes can be generalised to an entire population (Creswell, 2018). Despite the goal to include the broadest selection of participants, an investigation of all participants in O&G projects was not possible; therefore, a case study of the O&G sector in Kuwait was taken into consideration. Moreover, a snowball procedure (Snijders, 1992) was used so that participants were able to nominate others who had a similar role to participate.

Using these techniques, the maximum number of participants was satisfactory to the requirements of the study. However, as the total number of employees in this case study exceeds 11,000, the total acceptable sample size is 10% of the total population, taking only the employees who are directly involved in the day-to-day project management activities (>1000); therefore, the sample size provides an acceptable margin of error between ± 7.5%- ± 10% (Conroy, 2015). Consequently, this research chooses various capital project stakeholders in one of the O&G companies in Kuwait, including engineers, coordinators, planners, and project and programme managers, who were engaged via email. A total of 110 research participants were involved in this study.

3.6.2 Qualitative Data Collection

The qualitative data were gathered through semi-structured interviews following the guidelines of Kvale (2011) for the designing, presenting, and reporting of interview data both practically and theoretically. Open-ended questions were used to explain, confirm, and interpret the results, which emerged from the quantitative phase of the study. Interview questions were designed to follow up on the quantitative results. Qualitative methods permit the elaboration of information from participants, allowing them to focus on issues most relevant to this research (Toledo-Pereyra, 2012). Semi-structured interviews were suitable as a tool to examine each respondent's personal experience and opinions in more depth than the previous step. Moreover, semi-structured interviews provide flexibility for choosing interviewees and discussing issues that require further elaboration (Longhurst, 2003).

Several employees from different units that participate directly in O&G projects in one of Kuwait's O&G companies were interviewed to identify patterns related to the delays

in O&G projects so that effective solutions for these problems could be recommended. These units include exploration, drilling, and production. Furthermore, questions were posed regarding the possibility of adopting the APM method in the company to ensure the efficient implementation of projects.

Following the guidelines of Alsaghier (2010), the interview length was less than 45 minutes to prevent interview fatigue. The interview script was recorded, and notes were taken during the interview following the pre-set guidelines of Etikan *et al.* (2016). The pre-written interview list of points enables the researcher to remain on track and to cover open questions. Moreover, valuable off-topic answers were recorded in the case they might convey important information.

Every interview process requires researchers to select participants from their desired target demographic (Murray and Sixsmith, 1998); therefore, a great deal of information about the research project, including the research methodology, interview questions, and ethical notes, was first sent to leaders of operational project units, with a request to forward information to other potentially important respondents. Some interviews took place in the face-to-face format while some were conducted on Skype due to the schedule of participants. As the validation of qualitative studies is often challenging (Kvale, 1989), and to avoid researcher bias, three external reviewers were consulted to ensure qualitative research reliability and validity. A purposive sampling technique, as described by Etikan *et al.* (2016), was employed to choose the interviewees. The purposeful sampling was homogeneous and helped to identify participants who share similar traits or specific characteristics.

3.6.2.1 Case Study Framework

Since the data for this study was gathered from one organisation, this research constitutes a case study investigation of project delays in O&G organisations (Yin, 2014). Kothari (2018) defines a case study as a 'complete observation of a social entity, be it an entire community, a cultural group, an institution, a family, or even an individual'. Kothari (2018) further argues that, during a case study, a particular unit under consideration is investigated intensively to highlight the processes occurring and their interrelationship. As the second and third research questions in this study are descriptive, they can optimally be examined and answered through a case study, as

described by numerous scholars (e.g. Mills *et al.*, 2010). Various researchers (Creswell and Clark, 2017; Mills *et al.*, 2013; Yin, 2014) suggest that a mixed-methods design is especially appropriate for case studies because it facilitates the validation and triangulation of research data. Concurrently, generalisations and inferences are extracted from the case data after studying the relevant aspects of the organisation unit intensively. Under the case study method, different instruments, such as questionnaires, in-depth interviews, study reports, documents, and letters, are utilised (Kothari, 2018).

As concluded by Guetterman and Fetters (2018), that a case study is a productive and viable option to be efficiently integrated with the mixed methods design. Combining a mixed-methods design with case studies can lead to a complete understanding of the research context if the study is conducted systematically. Scholars further argue that a mixed-methods case study can address increasingly complex and broad research questions than would be possible through mere observations in a case study (Guetterman and Fetters, 2018; Yin, 2014). As illustrated in Figure 3.6, case studies can be integrated into mixed-methods designs in two ways: through the mixed-methods–case study design (MM-CS) and case study–mixed-methods design (CS-MM) (Guetterman and Fetters, 2018).
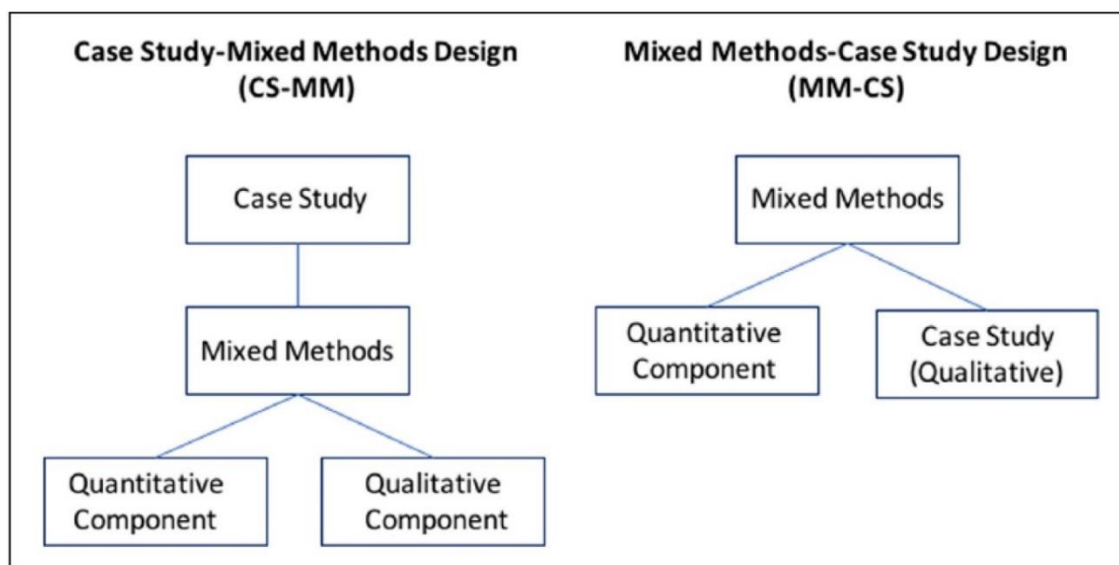
Figure 3.6: Integrating Case Study in Mixed-Methods Designs (Guetterman and Fetters, 2018)

In MM-CS, a mixed-methods study is combined with a nested case study, which allows for a more detailed view of the research context. The CS-MM design, however, is essentially a case study that utilises a nested mixed-methods design. In this study, the MM-CS design approach was followed to enhance the understanding of the issues related to the delays in O&G projects and the implementation of Agile methodology.

Yin (2014) argues that case study methods can examine a single case or several cases concurrently, Figure 3.7. The single case study can be utilised to characterise a critical or unique case, which enables the opportunity for proper observation and analysis of a phenomenon. The multiple case study approach involves more than one case to allow room for validation and comparison.
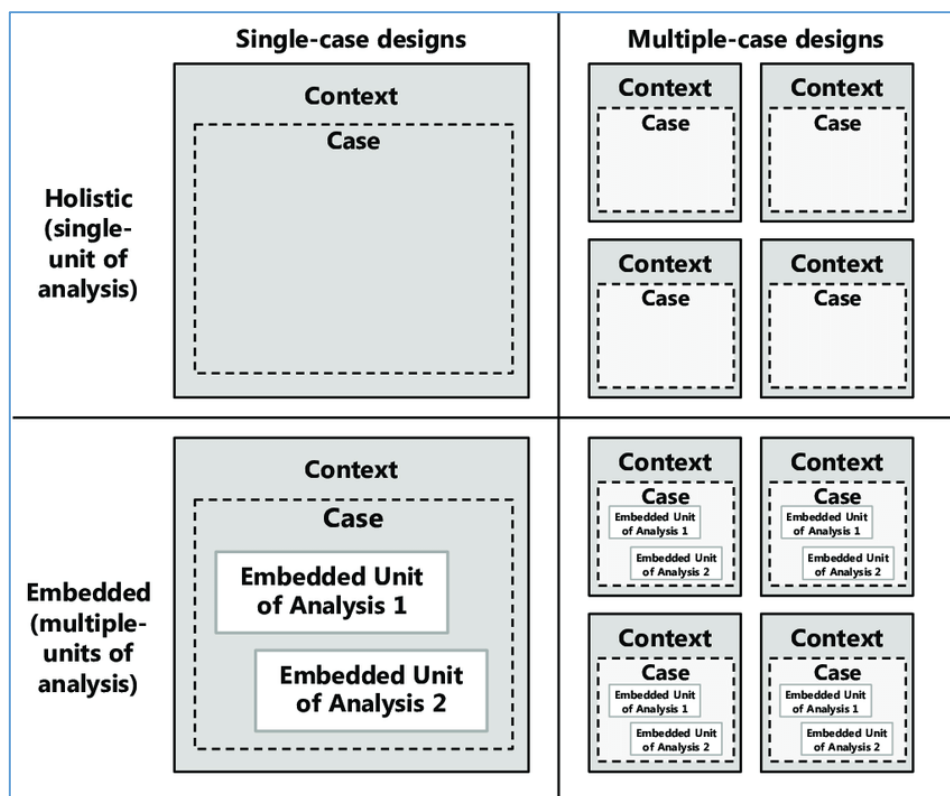
Figure 3.7: Types of Case Studies (Yin, 2014, p.50)

Yin (2014) further notes that a case study can examine an individual or an organisation, depending on the research questions. In a holistic case study, an entire entity is chosen as a single unit of study, such as a study of the organisational culture of a company. However, the term *embedded case study* is utilised when the study analyses different units or departments within the organisation (Yin, 2014). In a

multiple case study design, the same logic is applied. In the current study, a holistic approach (a single unit of analysis) was utilised because the research scope is to investigate the delays in Kuwait's O&G capital projects empirically. In other words, this study adopted a single case in Kuwait to address the fundamental problems that affect a single setting.

3.7 Data Analysis

Because both quantitative and qualitative data sets were collected, data analysis in this study occurred over two phases. The first phase comprised the collection of quantitative data and its adoption in the SPSS software. In the second phase, the quantitative data were analysed employing descriptive techniques, reporting mean, median, frequencies, and percentages, and inferential statistical techniques including correlation and regression analyses (Bryman and Bell, 2015). The most appropriate analysis method was selected after identifying the research variables because different styles of analyses are appropriate depending on the relationship between the key variables (Gray, 2009). The information generated from this phase of data analysis was then applied to answer the first research question in the third step.

In the second phase, the qualitative data generated through semi-structured interviews were entered into a Microsoft Excel file. This data was analysed through thematic analysis. As reported by Creswell (2018), this method is widely utilised in analysing qualitative data. Thematic data analysis was adopted because it allowed for the close examination of interview data to classify common thematic ideas, patterns, and topics that repeatedly appeared amongst the interviewees (Guest *et al.,* 2020). This phase of data analysis aimed to address the second and third research questions that focussed on identifying the APM best practices that can be applied in waterfall O&G projects as well as how the resulting hybrid method can reduce delays in such projects.

The use of the survey results and the interviews have allowed the triangulation of findings, which add a higher degree of validity and reliability to the results of this study (Babones, 2016). Moreover, the triangulation of methods is also useful for gathering different kinds of data and allowing this research to achieve its aims. Therefore, it allows for the assessment of different perspectives on an investigated phenomenon (in this case, O&G project delays).

The identified delays of O&G project presented in the Conceptual Framework were assessed utilising multivariate analysis of variance (MANOVA) to determine whether they act as moderators between the six primary independent variables (*Iteration Planning*, *Retrospective Meetings*, *Daily Stand-Up Meeting*, *Communication and Collaboration*, and *Solving Contractual Issues*) and the dependent variable of project delays. Before an Ordinary Least Squares (OLS) regression analysis was performed, an intercorrelation matrix of all independent and dependent variables was produced to obtain some insights.

3.8 Mapping the Methodology to each Research Question

Table 3.1 shows how each research question is intended to be answered.

Table 3.1 : Mapping research questions to Research Design.

Research Question	Research Design Technique	Description
What Agile Project Management (APM) best practices can be applied in the Traditional Project Management framework to reduce delays in oil and gas capital projects in Kuwait?	Quantitative Section 3.6.1 Section 3.7	The quantitative analysis aim to find the best practices of agile that are used in traditional project management, to reduce delays in oil and gas projects. Particularly the survey questions 12-19
How can APM best practices be applied in the Traditional Project Management framework in oil and gas capital projects in Kuwait?	Qualitative Section 3.6.2 Section 3.7	Semi-structured interviews were suitable as a tool to examine each respondent's personal

How can a Hybrid Project Management framework (Traditional/Agile) address project complexity to reduce delays in oil and gas capital projects in Kuwait?	Qualitative Section 3.6.2 Section 3.7	experience and opinions. The identified delays of O&G project presented in the Conceptual Framework were assessed utilising multivariate analysis of variance (MANOVA) to determine whether they act as moderators between the six primary independent variables (*Iteration Planning*, *Retrospective Meetings*, *Daily Stand-Up Meeting*, *Communication and Collaboration*, and *Solving Contractual Issues*) in more depth than the previous step.

3.9 Ethical Considerations

Since this study involved human participants, many ethical considerations were observed. First, permission was sought from the University Research Ethics Committee to conduct the research. After ethical approval was granted, the questionnaires were formulated, and survey questions were asked in a professional and scholarly manner to avoid offending or upsetting potential participants in any way. In the survey, all potential participants were notified from the onset that completion and submission of their responses implied their consent to participate in the study. Interviewees were contacted before the interview to acquire consent and schedule an interview date. The participants were not coerced in any way to participate in this research. Additionally, participants' anonymity was promised and strictly upheld, and the privacy of data was maintained.

3.10 Threats to Validity and Reliability

Validity is a measure of the degree of accuracy with which the instrument assesses what it is intended to measure (Reason and Bradbury, 2008), while reliability connotes the degree to which the results are consistent over a given period of time and accurately represent the study population (Golafshani, 2003). Tests were conducted to ensure validity and reliability, not only in the collection of data but also in its analysis and the reporting of findings. Tests included test-retest and internal consistency measures, as well as face and content validity assessments. All items were assessed for face and content validity by scanning it for any mistakes, ambiguous words, or complicated phrases. The results of the reliability analysis are presented in the next chapter, where Cronbach's alpha values are presented for all items to demonstrate that the scale was reliable (Cronbach, 1951).

Aside from research results testing, objectivity was observed throughout all processes and procedures in this research. Homogeneity of instruments and theoretical evidence from the literature is believed to further support the validity and reliability of results generated in this research. Efforts were made to avoid any instance of bias in the collection of data and its reporting.

3.11 Chapter Summary

This chapter has presented the methods chosen in this study, describing every component involved: research philosophy, research approach, design, population, population frame, and methods of collecting and analysing data. The chapter has revealed that the research study has been approached from the perspective of a positivist epistemology. A sequential explanatory and mixed-methods research design was employed with analysis informed by deductive reasoning. A single, holistic case study approach was employed. Quantitative data were obtained through a cross-sectional survey, while qualitative data were generated through semi-structured interviews. The analysis of quantitative data was conducted utilising the IBM SPSS software, while qualitative data were analysed employing the thematic analysis method. Finally, a description of limitations, ethical considerations, and the validity and reliability of the study were provided. The next chapter presents the results of the study

as well as a discussion illustrating how the study addresses the research questions and objectives.

Chapter 4: Conceptual Framework

4.1 Conceptual Framework

The literature review highlights the critical issues relating to O&G project delays and project failures. The goal of this study is to determine the feasibility of utilising a hybrid PM model involving both traditional and APM methods in Kuwait's O&G sector. It also aims to identify the APM best practices for the O&G sector of Kuwait and to build a fully informed hybrid PM methodology for that sector. The proposed hybrid PM methodology will reduce project delays and address rising project complexity. The outcomes of this study are expected to be a milestone in this research arena and to provide greater insight into Kuwait's O&G sector.
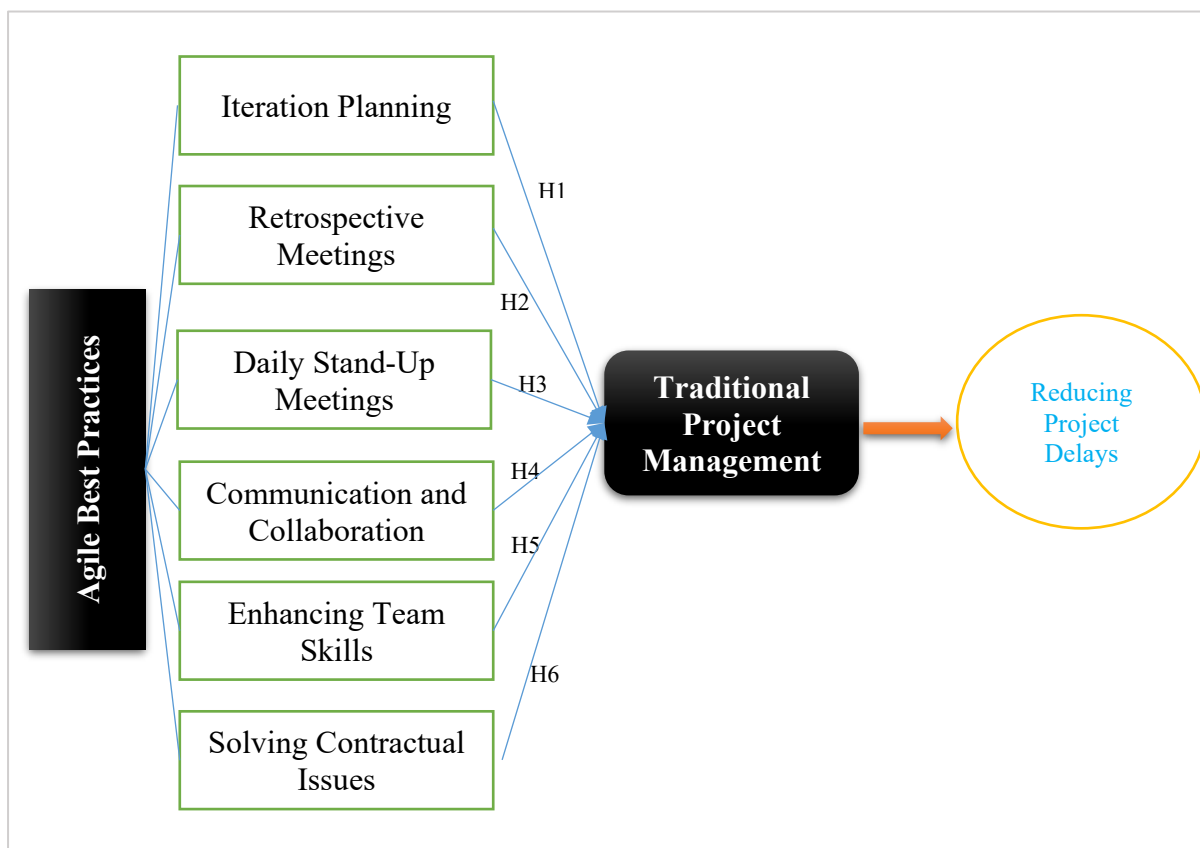
Figure 4.1: Proposed Conceptual Framework

As illustrated in Figure 4.1, this research identifies six Agile best practices that can be introduced into a TPM framework to facilitate the delivery of O&G projects. The central hypotheses are elaborated below.

4.1.1 H1: Introducing Agile iteration planning in a TPM framework can reduce *project delays.*

According to Serrador and Pinto (2015), Agile iterations are an appropriate starting point for APM because they address individuals as well as interactions, enabling timely feedback from customers before completing the project. Congruently, Al-Zubaidi *et al.* (2018) note that iteration planning should occur in the context of a project in which every area has a development line that is separated into iterations (phases). With iteration planning, the business processes become highly responsive to emerging needs, which provides the capability of reconfiguration and recovery of the project during development. Frequent development milestones provide stakeholders with deliverables and artefacts (faster) that can be utilised for the subsequent project phases (Conforto *et al.*, 2014). Moreover, iterations provide a mechanism of integration with other running projects and ways to process tasks concurrently. Therefore, introducing iteration planning in a waterfall framework would further improve project delivery in the O&G sector, allowing for improved efficiency and the fulfilment of organisational goals.

With the iteration planning in O&G projects, the planning cycle is repeated several times throughout the project's lifecycle based on the continuous feedback received (Conforto *et al.*, 2014). Therefore, the project team could manage the constant changes in needs and requirements as well as identify new opportunities and risks more effectively (Al-Zubaidi *et al.*, 2018). Iteration planning also demands the involvement and commitment of team members to develop and update the project plan while monitoring progress. Eventually, this results in effective communication and improved interaction among these team members and enables them to adapt to a complex project environment which reduces the project execution time (Drury-Grogan, 2014). Iteration planning is critical to resolving O&G delays because the contractual issues that were related to the commitment to complete work on time are now connected to artefacts that are the output of each iteration (Osorio *et al.*, 2011).

Therefore, decision-making is enhanced with an incremental portion of a project iteration that can be managed effectively.

4.1.2 H2: Introducing Agile retrospective meetings in a TPM framework can reduce project delays.

As stated by Matthies *et al.* (2019), retrospective meetings are fundamental for any degree of project success. Introducing effective retrospectives in O&G projects can positively impact work satisfaction, teamwork, and productivity, and thereby reduce possible time overruns. According to Fogelström *et al.* (2010), ensuring the efficiency of the project requires that the dynamics be managed with flexibility; therefore, utilising APM best practices enables project managers to adapt to changes and uncertainties that may arise within the operational environment. Moreover, poor scheduling and communication are enhanced further through the self-organised teams that are aware of project objectives (Dehaghi, 2019). Fogelström *et al*. (2010) further note that APM can be implemented in project retrospectives or meetings utilising a structured approach to convince project stakeholders to preserve efforts concerning the way the project is managed. Therefore, the project execution of APM aligns with the needs of the project and the changing environment.

As argued by Andriyani (2017), the 'inspect and adapt' principle of Agile methodology is embodied by retrospective meetings that enable Agile teams to evaluate and discover ways to adjust their process frequently. Furthermore, these meetings enable the development of a team action plan, the determination of areas for improvement, and the identification and discussion of obstacles before they arise. Retrospective meetings allow O&G projects to adapt to feedback from project owners and vendors and can be utilised to gauge the external factors that may degrade project performance. Informal meetings can also be utilised to reduce delays in decision-making, supplement contractor inexperience, and address insufficient collaboration.

4.1.3 H3: Introducing daily stand-up meetings in TPM can lead to the faster delivery of O&G projects.

According to Stray *et al.* (2016), the daily stand-up meetings in Agile methods enable quick feedback with team players that emphasise the self-organising team framework. Consequently, Dingsøyr *et al.* (2019) note that teams can make early decisions before

unwanted outcomes are created, or resources are wasted. At the construction projects design stage (in which a project is typically planned and implemented utilising the waterfall model), Scrum, one of the main approaches in the Agile framework, can be suitable for evaluating the daily progress of the project (Cervone, 2011; Demir *et al.*, 2014). Therefore, APM integrates the Scrum approach to ease coordination and ensure openness and complete transparency throughout the design phase (Demir and Theis, 2016). In O&G projects, the adopted Scrum approach ensures that the initial stages of the project are well designed and coordinated without the chance of delays, as often happens when TPM techniques are employed.

4.1.4 H4: Introducing Agile communication and collaboration in a TPM framework can reduce project delays.

As posited by Conforto and Amaral (2015), a key enabler of APM is the usage of continuous team feedback and team collaboration. Without these elements, omissions are likely, resulting in poor change management and lower quality overall. However, with excellent communication practices, errors can likely be identified on time and corrected before any adverse effect is experienced. Correspondingly, Salazar-Aramayo *et al.* (2013) present evidence that a well-developed team with significant communication flow influences better project scope elaboration and development.

Scope development depends primarily on effective communication as well as the knowledge and experience of the team members. Unless the team members are equipped with the necessary experience and specialised knowledge, the scope is not likely to reflect the project's proposal and execution process. The success of the hypotheses and objectives seen in Salazar-Aramayo *et al.* (2013) have been achieved through their PM framework: the Petrobras Project Development and Execution Programme (PRODEP). The PRODEP framework offers approved guidelines of PM (predominantly from PMBOK) that are connected to the supply chain and comprise several interconnected stages, which communicate intermediate results between stages. In an O&G project, communication and collaboration can ensure that everyone involved is aware of the objectives that may change over time or as a result of any change in the environment or resource utilisation. Poor communication leads to delays, which eventually cause increased expenses for the project account (Ruqaishi and Bashir, 2015). Therefore, well-defined communication channels reduce potential

delays in O&G production or equipment orders from vendors. Moreover, the organisational structure and the project steering committee are a significant factor that affects the realisation of the project objectives by harmonising improved communication and collaboration between team members (Hannevik *et al.*, 2014).

4.1.5 H5: Identifying and enhancing team skills in a TPM framework can reduce project delays.

As revealed by Ruqaishi and Bashir (2015), planning and scheduling are significant problems that cause delays in Oman's O&G projects, which may be due to a lack of adequately trained and experienced contractors. The project team members must identify good software packages that can be useful in managing schedules, and they must possess a high enough skill level to enhance project performance. A lack of trained and experienced team members can lead to poor site management which could, in turn, result in defects and delays.

According to Moe *et al.* (2010), APM depends significantly on team performance, team leadership, and coordination. In O&G projects, the team should consist of self-managing professionals who are independently focussed. These team members share the authority to make decisions and know how to execute their activities in an integrated and timely manner (Moe *et al.*, 2010). Skilled professionals should also possess the 'think talent triangle', which includes technology and PM skills, strategic and business skills, and leadership skills (PMI, 2019). Technology quotient professionals can enhance Agile development from 22% to 57%; therefore, teams who have the appropriate diversity of skills to match task complexity and can employ adaptive management styles facilitate the success of the project (Tsoy and Staples, 2020).

4.1.6 H6: Solving contractual issues in a TPM framework can reduce project delays.

Throughout project execution, contractors and subcontractors must be paid according to an agreed-upon schedule, which allows them to pay for necessary equipment and their much-needed employees. Payment delays are essential reasons for project delays in the Gulf area (Fallahnejad, 2013; Ruqaishi and Bashir, 2013). The study of Fallahnejad (2013) demonstrates that project delays in Iran were due to delays in the

payment process by the Iranian government. A similar study by Abdullah (2020) indicates that the contractual problems that cause a shortage of construction materials in Iraq are due to the lack of experienced customs employees, improper management of material factories, and the closure of material production plants. In Oman, poor site management of contractors and subcontractors, unforeseen accidents, ineffective contractual terms, and selecting bidders utilising cost factors as the only criteria were identified as elements that affect project efficiency (Al Saeedi and Karim, 2019).

When considering contractors and subcontractors in O&G projects, the need for new equipment and other external factors, such as land acquisition and legal issues, must be reviewed while drafting the original project schedule. Hiring subcontractors based on their experience rather than the project cost alone may ease the problem of delays associated with subcontracting (Al Saeedi and Karim, 2019). Providing sufficient resources to the project (including those required by subcontractors) is vital for its success since an adequate amount of resources ensures that the project begins and ends on time (Abdullah *et al.*, 2011). The majority of projects in the O&G sector experience delays if they have a weak commitment, or have permitted only partial authority to key decision-makers (Tsoy and Staples, 2020). Penttinen and Mikkonen (2012) additionally opine that the contractors and subcontractors involved with Agile need to be *Agile* themselves and undertake a measured approach according to the needs of the project.

4.2 Chapter Summary

This chapter has described the relevant literature which elucidates this study's variables and context. As demonstrated in the chapter, studies abound with information on traditional and Agile PM theories and applications in projects from numerous industries. However, the same cannot be said for their adoption in O&G capital projects, especially for the application of hybrid PM method. The literature review has illustrated that APM allows O&G projects to be delivered with improved efficiency and efficacy in an uncertain and complex environment. At the same time, the waterfall approach works ideally for smaller projects. However, there is a research gap concerning the applicability of Agile best practices in a waterfall framework in O&G projects. To date, the field has been silent on the type of challenges that organisations face when incorporating Agile best practices in settings such as the construction

sector. This research gap has justified this study as it analyses the adoption of Agile best practices in TPM approaches in Kuwait's O&G sector. Having explored some of the causes of delays in this area, the rationale for this hybridisation becomes more justifiable.

Chapter 5: Analysis and Findings

5.1 Introduction

This chapter concerns the analysis and findings from the survey and the interviews conducted with project management (PM) professionals in Kuwait's O&G sector regarding the applicability of Agile best practices in their current Traditional Project Management (TPM) projects to resolve delays, a common problem throughout the sector. The chapter begins with the presentation of the quantitative results from the survey that was formulated to provide a factual basis of primary data to evaluate Agile Project Management (APM) best practices and to explore critical enablers that may be implemented in a TPM framework. The demographic and project-related details of the respondents are presented utilising frequency and percentages for the current project framework and job titles.

Quantitative data collection was conducted to identify the variables that explain the delays in O&G projects. The individual variables are included in the survey as well as the opinions regarding Agile values, and the mean scores for each item as well as actual ranges and standard deviations (SD) are reported. Further, a reliability analysis was conducted to test for the internal consistency of the questionnaire. The intercorrelation between the variables was reviewed, and this research found that variables are significantly and positively correlated. Cronbach's alpha tests were employed in this regard, and all analyses confirmed the reliability of the scaled items with alpha scores exceeding the minimum cut-off point of 0.7 (Cohen, 2013). Moreover, a regression analysis was conducted to determine the concerted effect of the six independent variables on project delays, which was found to explain 33.6% of the variation in scores.

The qualitative analysis is also presented, beginning with the demographic details of the selected eight interviewees. Their opinions concerning the causes of project delays, the optimal APM practices needed in O&G projects, and their beliefs regarding each of the six independent variables, which are also the identified best practices, are presented. Research questions 2 and 3, concerning the facilitators of the hybrid

framework and the recommendations for its application in the O&G sector, are also discussed in relation to the opinions of the interviewees, which were condensed into common themes through a thematic analysis.

As mentioned in the methodology chapter, statistical analyses for this project were conducted utilising the IBM SPSS software (Version 26). This advanced software was employed to analyse the relationships between the study variables utilising statistical techniques, including reliability analysis, descriptive statistics, correlation, and variance, as well as analysis of covariance.

5.2 Description of Analysis Techniques

For scale creation, each of the core items (items related to the hypothesis of the study) comprising the independent variables was measured on a 5-point Likert scale, where a score of 1 denoted strong disagreement, and 5 signified strong agreement. Thus, for each item, a theoretical range of 1–5 with a maximum score of 5 was possible. The mean scores for each item as well as actual ranges and SDs are reported in the tables for each independent variable as described in the following subsections. Additionally, the six main independent variables (*Iteration Planning*, *Retrospective Meetings*, *Daily Stand-Up Meeting*, *Communication and Collaboration*, and *Solving Contractual Issues*) are composite variables, and it was, therefore, necessary to perform reliability analyses to test for internal consistency.

5.3 Quantitative Results

5.3.1 Participants' Demographic Characteristics

The researcher initially targeted 110 research participants for the research survey. A variety of professionals and specialists involved in O&G projects were approached, including capital project stakeholders in one of Kuwait's upstream O&G companies. Engineers, coordinators, planners, and project and programme managers were among those who were included in this sample. The targeted participants were invited by mail, and a total of 106 submitted completed surveys. This number corresponds to a response rate of 96.3%. For this study, this response rate was considered satisfactory as it meets the optimal standard for surveys as described by Fincham (2008), where response rates approximating 60% should be the goal and expectation

of researchers. Of the 106 respondents, 94.3% (n = 100) were male. Project management is a male-dominated occupation in the case study organisation, and this result was expected. The experience of participants is shown in Table 5.1. Of those, 18 (17.0%) participants have worked in their role from 0 to 5 years; 26 (24.5%) have had between 5- and 10-years working experience; 27 (25.5%) have had between 10- and 15-years of experience; and the majority, 35 (33.0%), have been working in their current roles for more than 15 years. Additionally, 91 (85.8%) worked in process-related projects, while others worked in projects in the building (5), power facilities (5), piping or flowlines (5).

Table 5.1: Participants' Experience for Quantitative Data Analysis

Participant's Experience Range	Percentage
0–5	17.0
5–10	24.5
10–15	25.5
More than 15 years	33.0

Table 5.2: Project Management Methods Currently Adopted by Participants

PM Method	*n*	Percentage
Traditional PM	103	97.20
Non-Traditional PM (PMI, PRINCE2)	3	2.80
Total	106	100.0

As presented in Table 5.2, 103 research participants stated that they currently employ TPM methodologies in their projects. Of the participants, 97.2% stated that they utilise a customised TPM framework, two (1.9%) claimed to employ PMI models, and one (.9%) reported currently utilising PRINCE2. None of the participants had yet adopted APM frameworks in their projects. The majority of the respondents—84 (79.2%)—said that they currently work in teams of 40 to 60 people in large-scale projects worth more than KD 100 million. There were variations in the job titles of respondents, as presented in Table 5.3. The predominant category was engineers (29.2%), followed by senior engineers (25.5%). Furthermore, there were sizeable numbers of planners (16%) and senior planners (13.2%).

Table 5.3: Job Titles of Participants

Job Title	*n*	Percentage
Consultant	5	4.7
Specialist	9	8.5
Senior Engineer	27	25.5
Senior Planner	14	13.2
Engineer	31	29.2
Planner	17	16.0
Other	3	2.8
Total	106	100.0

5.3.2 Demographics and Project Variables

A MANOVA was utilised to estimate the relationships between the demographic variables of gender, age, experience, and job title in addition to project-related variables such as project field, type of PM framework, project lifecycle, project size, and location. Gender was not found to be a significant predictor for any of the dependent variables.

Project delays were significantly related to the type of PM framework (p = 0.00, F = 7.64, df = 2, partial eta-squared = .129). The effect size of this relationship was estimated utilising Cohen's (2013) description, which states that partial eta-squared values from .01 to .06 are small, .06 to .1 are moderate, and .14 and above are large. Consequently, this relationship has a large effect size. The customised TPM framework (M = 4.26, SD = .34) differed from the PMI (M = 3.63, SD = .17) and the PRINCE2 (M = 4, SD = 0) projects. The findings show that 97.2% of participants see that TPM is currently adopted as the dominant approach. Note, the standard deviation measures show that the observed values are close to the mean; therefore, 95% of values fall within two standard deviations of the mean.

5.4 Application of Agile Best Practices in a Traditional Framework

5.4.1 Current Context

Some of the items in the questionnaire were designed to elicit the respondents' opinions regarding Agile values. These details are presented in Table 5.4.

Table 5.4: Respondents' Ratings for Kuwait's O&G Agile Values

Item	Minimum	Maximum	Mean	SD
Individuals and interactions are prioritised over tools and processes	2	5	4.32	0.684
Collaborating with customers should be prioritised over contract negotiation	3	5	4.44	.570
Working software is prioritised over comprehensive documentation	3	5	4.31	.667
Responding to change is prioritised over following a plan	1	5	4.05	.785

Therefore, the respondents were mostly in agreement with the Agile values of *Collaborating with customers should be prioritised over contract negotiation*, which was rated the highest (M = 4.44, SD = 0.57). This was followed by *Individuals and interactions are prioritised over tools and processes* (M = 4.32, SD = 0.684), and *Working software is prioritised over comprehensive documentation* (M = 4.31, SD = 0.667).

The majority of participants (85.5%) agreed that adopting the approach of *Individuals and interactions are prioritised over tools and processes* could potentially reduce delays in the delivery of O&G projects: 41.4% strongly agreed, 44.1% agree, 9% remained neutral and 5.5% disagreed. Moreover, the majority of participants (91.8%) agreed that *Collaborating with customers should be prioritised over contract*

negotiation could potentially reduce delays in the delivery of O&G projects: 45.9% strongly agreed, 45.9% agree, 3.6% remained neutral, and 4.6% disagreed. Further, the majority of participants (84.6%) agreed that *Working software is prioritised over comprehensive documentation* could potentially reduce delays in the delivery of O&G projects: 40.5% strongly agreed, 44.1% agree, 10.8% remained neutral, and 4.6% disagreed. Finally, the majority of participants (76.5%) agreed that *Responding to change is prioritised over following a plan* could potentially reduce delays in the delivery of O&G projects: 27% strongly agreed, 49.5% agreed 16.2% remained neutral, 6.4% disagreed, and 0.9% strongly disagreed.

5.4.2 Iteration Planning

The items comprising the iteration planning scale are reported in Table 5.5. There was a moderate-to-high level of agreement with all items. Generally, respondents agreed that iteration planning could improve PM processes; the highest-rated items were *Improve planning and scheduling processes* (M = 4.40, SD = .813) and *Dividing the project into smaller iterations could reduce unknown risk* (M = 4.38, SD = .710). Overall, the results indicate that the majority, 85 participants (80.2%), agreed that iteration planning could lead to increased flexibility in waterfall projects, with 7.5% of participants strongly agreeing, 9.4% neither agreeing nor disagreeing, 1.9% disagreeing, and .9% strongly disagreeing. Accordingly, 82.1% of participants agreed that integration of iteration planning could lead to an increased frequency of acceptance of project changes, which could lead to the faster delivery of O&G projects: 4.7% of participants strongly agreed, 8.5% remained neutral, while 3.8% and .9% disagreed and strongly disagreed, respectively.

By dividing a large project into smaller iterations, the majority of participants (68.9%) agreed that the unidentified risks that could potentially delay delivery of such projects could be mitigated: 12.3% strongly agreed, 15.1% remained neutral, 2.8% disagreed, and .9% strongly disagreed. Finally, the majority of participants (73.6%) strongly agreed that introducing iteration planning in PM could allow project managers to improve planning and scheduling processes that can resolve the issue of overrides. Only 3.8% and .9% disagreed and strongly disagreed, respectively.

Table 5.5: Descriptive Statistics (Iteration Planning)

Item	Minimum	Maximum	Mean	SD
Increase flexibility	2	5	3.88	.581
Increase the frequency of acceptance of project changes	2	5	3.90	.631
Dividing the project into smaller iterations could reduce unidentified risks	3	5	4.38	.710
Improve planning and scheduling processes	1	5	4.40	.813

Notes: n = 106. Cronbach's alpha = .729 (> minimum cut-off point of 0.7)

5.4.3 Retrospective Meetings

The next question in this section of the survey required respondents to state whether integrating retrospective meetings into a waterfall model can lead to agility. The items comprising the retrospective meetings scale are reported in Table 5.6 . There was a moderate-to-high level of agreement with all items. Generally, the respondents agreed that holding retrospective meetings can improve the PM process. The highest score was observed for the item *Enable project managers to adapt more effectively to changes* (M = 4.69, SD = .575). The lowest scoring item was *Facilitate the frequent adjustment of processes*, but the mean score of 4.14 (SD = .624) indicates a generally positive stance toward the statement. The majority of participants (71; 67.0%) agreed that retrospective meetings could lead to frequent adjustments of processes in waterfall projects; 11 (10.4%) strongly agreed, 17 (16.0%) neither agreed nor disagreed, 6 (5.7%) disagreed, and 1 (.9%) strongly disagreed. Similarly, the majority of participants believed that integrating retrospective meetings into a traditional model can enable the involvement of clients in project planning: 76 (71.1%) strongly agreed, 16 (15.1%) agreed, and 7 (6.6%) were neutral, while 5 (4.7%) disagreed, and 2 (1.9%) strongly disagreed. The majority of respondents (75; 70.8%) agreed that integrating retrospective meetings can enable managers to mitigate risks before they become major issues; 15 (14.2%) strongly agreed, and 9 (8.5%) neither agreed nor disagreed, while 4 (3.8%) disagreed, and 3 (2.8%) respondents strongly disagreed.

Table 5.6: Descriptive Statistics (Retrospective Meetings)

Item	Minimum	Maximum	Mean	SD
Facilitate frequent adjustment of processes	2	5	4.14	.624
Enable involvement of clients in project planning	3	5	4.45	.571
Enable project managers to adapt more effectively to changes	2	5	4.69	.575
Enable project managers to mitigate risks before they become issues	2	5	4.25	.618

Notes: n = 106. Cronbach's alpha = .748

5.4.4 Daily Stand-Up Meetings

A review of the literature demonstrated that scholars, including Stray *et al.* (2016) and Cervone (2011), argue that daily stand-up meetings, as implemented in the majority of Agile projects, are vital: they enable quick feedback with team players, easy coordination, and openness throughout the implementation of the project. For this project, the items relating to daily project meetings are summarised in Table 5.7. As observed in the responses to other Agile best practices, respondents were mostly positive toward these statements. The one exception was the statement *Provide an opportunity for the development of an action plan that identifies areas of improvement* (M = 3.73, SD = .684). Respondents were predominantly positive regarding the statement *Emphasise the importance of self-organising teams* (M = 4.7, SD = .572). Overall, the findings from the questionnaire indicate that 72.6% of respondents strongly agreed concerning the importance of self-organising teams for the faster delivery of projects. Integrating daily stand-up meetings in a waterfall methodology could reduce the potential for misguided objectives and ensure that deliverables are connected with objectives for faster delivery: 78.3% of respondents agreed on this capability, 12.3% strongly agreed, and 4.7% neither agreed nor disagreed, while 2.8%

disagreed, and 1.9% strongly disagreed. Similarly, 76.7% of participants agreed that daily stand-up meetings could enable teams to evaluate and discover ways to adjust their processes to ensure the faster delivery of projects.

Table 5.7: Descriptive Statistics (Daily Stand-Up Meetings)

Item	Minimum	Maximum	Mean	SD
Emphasise the importance of self-organising teams	2	5	4.70	.572
Reduce the potential for misguided objectives and ensure that deliverables are connected with objectives	3	5	4.13	.438
Reduce conflicts among the project's essential players	3	5	4.15	.432
Enable teams to evaluate and discover ways to adjust their processes in a frequent manner	3	5	4.13	.48
Provide an opportunity to develop an action plan that identifies areas of improvement	3	5	3.73	.684

Notes: n = 106. Cronbach's alpha = .845

A notable finding from this study is that the majority of the participants (50; 47.2%) were unsure whether the integration of daily stand-up meetings could provide an opportunity to develop an action plan and identify areas of improvement. Nevertheless, the 37 (34.9%) who agreed and the 15 (14.2%) who strongly agreed with the idea outweigh the two who disagreed (1.9%) and the two who strongly disagreed (1.9%).

5.4.5 Communication and Collaboration

Table 5.8 contains a summary of the statements that relate to communication and collaboration. Again, the results are positive. The item *Reduce delays in decision-making* (M = 4.62, SD = .593) was the highest-rated response. Respondents were least positive regarding the statement *Facilitate improvements in coordination*

between project teams (M = 4.05, SD = .695). The majority of the participants (75; 70.8%), strongly agreed that such an integration would lead to a reduction in delays in the decision-making process. Only three participants disagreed, and four strongly disagreed about this capability.

Furthermore, 76.4% of respondents agreed that communication and collaboration could facilitate improvements in risk planning and management, which can allow better and faster execution of the projects. For project scope, 75.5% of participants agreed that the introduction of efficient communication and collaboration strategies could facilitate improvements in the definition of a project's scope, which can be fundamental to a faster implementation of projects, particularly those that are exceptionally large and complex. Regarding the capabilities of these Agile best practices, few participants—two and three—disagreed and strongly disagreed with the statement, respectively. The others strongly agreed or remained neutral in their opinions.

Table 5.8: Descriptive Statistics (Communication and Collaboration)

Item	Minimum	Maximum	Mean	SD
Reduce delays in decision-making	3	5	4.62	.593
Facilitate improvements in the definition of the project's scope	4	5	4.4	.491
Facilitate improvements in risk planning	3	5	4.38	.577
Allow project personnel to better understand client requirements	3	5	4.37	.522
Facilitate improvements in coordination between project teams	3	5	4.05	.695

Notes: n = 106. Cronbach's alpha = .861

5.4.6 Enhancing Team Skills

The items comprising the team skills scale are reported in Table 5.9. There was a significant level of agreement with all items. These items were collectively the highest rated of all the items on the questionnaire. Specifically, the survey results indicate that when project managers enhance team skills in their project, it can considerably facilitate improved interaction and support between team members, which can ultimately lead to the faster delivery of projects.

Table 5.9: Descriptive Statistics (Team Skills)

Item	Minimum	Maximum	Mean	SD
Facilitate improved interaction and support between team members	3	5	4.39	.562
Improve team leadership and coordination	3	5	4.18	.582
Enable the team to better identify and mitigate risks	3	5	4.25	.518
Make project teams more productive and focussed	3	5	4.39	.562

Notes: n = 106. Cronbach's alpha = .778

Regarding the need for this Agile ability, 23.6% agreed, 69.8% strongly agreed, and 3.8% remained neutral, while 0.9% disagreed, and 1.9% strongly disagreed. The majority of research participants (74.5%) strongly agreed that enhancing team skills in waterfall PM can enable the team to better identify and mitigate risks that can lead to the faster delivery of projects; 73.6% strongly agreed that this initiative could make project teams more productive and focussed on achieving the project's goals. Similar to the integration of other Agile best practices, only a few disagreed or strongly disagreed with the advantages that such integration could bring to teams in O&G projects, especially in reducing issues that often lead to delays.

5.4.7 Solving Contractual Issues

Beng *et al.* (2019b) believe that clients, contracts, consultants, and contracting processes play a key role in speeding up or delaying project implementation. In the

majority of PM studies, including that of Salazar-Aramayo *et al.* (2013) and Olaniran *et al.* (2015), contractual issues are seen as the greatest challenge to the faster delivery of projects. In this project, the items measuring participants' responses to the introduction of changes to solving contractual issues are reported in Table 5.10. There was a moderate-to-high level of agreement with all items, especially with the item *Timely payment of contractors* (M = 4.72, SD = .530).

Table 5.10: Descriptive Statistics (Solving Contractual Issues)

Item	Minimum	Maximum	Mean	SD
Timely payment of contractors	3	5	4.72	.530
Setting and adhering to deadlines governing how new equipment is delivered	3	5	4.18	.453
Setting and adhering to deadlines governing how quickly land acquisition issues are solved	3	5	4.20	.446
Setting and adhering to deadlines governing how quickly decisions are made	3	5	4.10	.477

Notes: n = 106. Cronbach's alpha = .872

Of all participants, 71.7% agreed that the timely payment of contractors could lead to a reduction of delays, with 18.9% agreeing, and only 2.8% (3) expressing strong disagreement. Similarly, 77.4% and 12.3% agreed and strongly agreed, respectively, that solving contractual issues can effectively lead to the timely delivery of equipment, which directly impacts the faster delivery of projects. The majority of respondents (80; 75.5%) agreed that managing contracts in a timely fashion could lead to teams better adhering to deadlines as well as positively impacting how quickly project decisions are made.

5.4.8 Answering Research Question 1

As identified in the introduction and methodology chapters, the survey-based quantitative research was intended to address the first research question: *Which APM best practices can be applied in the waterfall framework to reduce delays in Kuwait's*

O&G capital projects? Based on the results of this study, the majority of research participants agreed that the following Agile best practices could improve O&G waterfall models in one way or another: (1) iteration planning (Mean = 4.14, SD = .42), (2) retrospective meetings (Mean = 4.38, SD = .25), (3) daily stand-up meetings (Mean = 4.18, SD = .25), (4) communication and collaboration (Mean = 4.36, SD = .28), (5) enhancing team skills (Mean = 4.3, SD = .20), and (6) solving contractual issues (Mean = 4.3, SD = .20). If means are weighted in a range between 0–100 by dividing each mean value by the sum of all means, the best practices could be ordered in descending order: retrospective meetings (14.66%), communication and collaboration (14.59%), solving contractual issues (14.38%), enhancing team skills (14.39%), and iteration planning (13.83%).

The studied best practices enjoy relatively the same percentage, which indicates that all factors are equally important and could reduce delays among O&G projects. Based on one of the four Agile Manifesto values, 'collaborating with customers is prioritised over contract negotiations', and, according to previous findings, communication and collaboration have a higher impact than resolving contractual issues. The majority of participants (85.5%) agreed that *Individuals and interactions are prioritised over tools and processes* could potentially reduce delay delivery of O&G projects.

Regarding best practices, 80.2% of participants agreed that iteration planning could lead to increased flexibility in waterfall projects. The majority of participants (70%) agreed that retrospective meetings could lead to frequent adjustments of processes in waterfall projects, and 72.6% of respondents strongly agreed concerning the importance of self-organising teams for faster delivery of projects. In contrast, 75% of participants agreed that coordination between project teams could lead to a reduction in delays in the decision-making process. The majority of research participants (74.5%) strongly agreed that enhancing team skills in waterfall PM, and 71.7% agreed that the timely payment of contractors could lead to a reduction of delays.

The majority of respondents believed in the importance of these best practices, observing them as fundamental to enabling faster delivery in large and complex projects such as those in the O&G sector. Furthermore, regarding project delays, respondents were asked to indicate their levels of agreement with a series of statements describing whether project delays could be reduced (see Table 5.11).

These items earned a high level of internal consistency (Cronbach's alpha = .709); therefore, they were summed and averaged to create a dependent variable measuring control over project delays.

Table 5.11: Descriptive Statistics (Solving Project Delays)

Item	Minimum	Maximum	Mean	SD
Delays in the completion of projects are unavoidable	1	4	2.79	1.02
Delays in the completion of projects are caused by the approach to PM utilised	4	5	4.89	.318
A different approach to PM could reduce delays in project completion	3	5	4.87	.367
Delays in project completion are controllable	2	5	4.46	.588

Notes: n = 106. Cronbach's alpha = .709

Before an Ordinary Least Squares (OLS) regression analysis was performed, an intercorrelation matrix of all independent and dependent variables was produced (seeTable 5.13. Some insights are worth mentioning. There are positive correlations between all the independent variables; however, the values do not demonstrate multicollinearity, as none scored above .7 for Pearson's coefficient. This value shows that the variables are measuring different constructs and are not overly associated with each other, nor are they a part of different constructs.

Table 5.12: Intercorrelation Matrix

	Reduction of delays	Retrospective meetings	Iteration planning	Daily project meetings	Communication & collaboration	Team skills	Solving contractual issues
Reduction of delays	1.0	.263***	.239***	.368***	.483***	.275***	.297***
Retrospective meetings	.263***	1.00	.205***	.286***	.186***	.186***	.213***
Iteration planning	.239***	.263***	1.00	.372***	.371***	.476***	.482***
Daily project meetings	.368***	.286***	.372***	1.000	.184***	.441***	.454***
Communication & collaboration	.483***	.186***	.371***	.184***	1.00	.319***	.331***
Team skills	.275***	.186***	.476***	.441***	.319***	1.00	.993***
Solving contractual issues	.297***	.213***	.482***	.454***	.331***	.993***	1.00

Notes: ***, p < .001

Furthermore, the regression model presented in Table 5.13 was found to be significant, with a p-value of 0.00, F = 8.35, and df = 6. The R-squared value was observed as .336, which indicates that all variables could predict 33.6% of the variation in the scores of the delays. As a result, the findings from the intercorrelational matrix indicate that all APM best practices included in this study are positively correlated, with a reduction of project delays with communication and collaboration (r = .483) showing the highest influence, followed by daily project meetings (r = .368), and solving contractual issues (r = .297). Communication and collaboration are reported by Conforto and Amaral (2015) and Salazar-Aramayo *et al.* (2013), who report that this practice influences the flow of project work. Daily project meetings have also been identified as important by Stray *et al.* (2016) and Cervone (2011), who state that they allow issues to be identified earlier, thus saving time. Olaniran *et al.* (2015) have stated that 60% of projects face delays because they do not address contractual delays in a timely manner.

Table 5.13: Regression Analysis

Model	Unstandardised Coefficients		Standardised Coefficients	Partial Correlation Coefficient	Sig.
	B	S. Error	Beta		
(Constant)	-.177	.806		.105	.827
Retrospective Meetings	.128	.121	.093	-.055	.294
Iteration Planning	-.045	.082	-.054	.257	.583
Daily Project Meetings	.366	.138	.254	.419	.009
Communication and Collaboration	.517	.113	.415	-.113	.000
Team Skills	-1.40	1.24	-.793	.118	.261
Solving Contractual Issues	1.47	1.24	.839	.105	.240

The results in Table 5.13 demonstrate that communication and collaboration are significantly related with the avoidance of delays, while team skills indicates a negative, though not significant, correlation. The single most considerable contribution to delays is made by daily project meetings (partial coefficient = .419), with a 95% confidence interval (lower bound = 0.74,0.93), and iteration planning (partial coefficient = 0.257). Alt-Simmons (2015) and Demir and Theis (2016) assert that communication is essential for team cohesion and functioning during projects. Aniche and de Azevedo Silveira (2011) suggest that team skills should include Agile management skills as they contribute to efficiency and effectiveness.

The qualitative data provided in the subsequent section is expected to supplement data from the quantitative findings to strengthen or disprove the hypotheses. This offers robust research validity and data triangulation, covering the weaknesses of each approach. As mentioned in the methodology chapter, this study adopted a sequential explanatory mixed-methods design, which means that the quantitative design was pivotal to the investigation. In contrast, the qualitative design was employed to validate data that was obtained from the quantitative methodology.

5.5 Qualitative Analysis

This section describes the qualitative data collected during the eight interviews. A thematic analysis was employed to determine commonalities between responses.

5.5.1 Demographic Profile of the Interviewees

Table 5.14: Demographic Profile of the Interviewees

Interviewee ID	Designation	Experience	Agile or Waterfall Models
A	Project Consultant	7 years	Both
B	Project Consultant	12 years	Both
C	Programme Manager	24 years	Both
D	General Superintendent	36 years	Both
E	Portfolio Manager	8 years	Both
F	Project Manager	5 years	Both
G	Project Manager	11 years	Both
H	Project Assistant	4 years	Both

All eight interviewees (Table 5.14) possessed varying levels of experience in the O&G sector and the PM field, ranging from relative newcomers, who had recently studied the Agile framework, to veterans with more than 36 years of experience, who have seen the application of both frameworks in this sector. All interviewees work in the O&G sector, except for Interviewee C who also works in construction.

5.5.2 Causes of Delays in Kuwait's Oil and Gas Projects

Table 5.15 presents the reasons provided by the interviewees when asked to identify, according to their experience, the causes of delays in projects in Kuwait's O&G sector.

Table 5.15: Causes of Project Delays in Kuwait's O&G Sector

Cause of Project Delay	Number of Interviewees
Contractual problems	7
Communication issues between vendors	6
Poor planning	5
Poor HR planning	2
Labour compliance	2
Budget inaccuracies	2
Coordination	1
Neglect of quality control	1
Lack of differentiation between projects	1
Equipment failure	1
Missing data	1
Lack of feedback	1
Usage of traditional approaches	1
Lack of identification of skills	1

Table 5.15 identifies the common themes in the causes of project delays. The most commonly cited reason was contractual issues, followed by communication and collaboration, and then poor planning. These issues are interrelated, thus, resolving one can solve the others.

When asked about the causes of delays in Kuwait's O&G projects, Interviewee A said, '*There are very poor interactions between vendors, especially in engineering and procurements stages. Once there are issues with contracts, you can never expect to execute your project in time*'. Interviewee C expounded upon the causes of delays in waterfall projects:

> '*I think most waterfall models are too slow because of lack of communication, coordination, [and the need for] better planning as well as issues such as the*

"one-solution-fits-all" syndrome, neglecting quality control, and expansion of functionality. Contractual issues can also lead to delays in TPM projects'.

Interviewee E blamed contractual issues, stating, '*As such, the time that it takes for a contract to be drafted, agreed upon, and implementation work to start is extremely punitive and adds to significant cost issues within the project'*. Interviewee F added:

'*I believe what really delays project implementation in large and complex sectors such as O&G is lack of proper planning, lack of effective communication, and inability to deal with contracts as early as possible to ensure that every resource that is needed, be it material or labour, is there where the project is being executed'*.

The findings of the interviews resonate with Fernandez and Fernandez (2008) and Fallahnejad (2013), who emphasise that contractual management is critical to prevent project delays.

Research Question 1: What Agile Project Management (APM) best practices can be applied in the Traditional Project Management framework to reduce delays in oil and gas capital projects in Kuwait?

The best practices of APM which were identified in the questionnaire surveys were also explored in the interviews. Table 5.16 identifies the common themes of APM best practices in the O&G sector.

Table 5.16: APM Best Practices (identified in Kuwaiti's O&G)

APM Best Practices	Number of Interviewees
Retrospective meetings	8
Communication and collaboration	8
Daily stand-up meetings	6
Few minutes or 15–20 minutes	4
Waste of time	2
Enhancing team skills	7
Administration of contractual issues	8
Iteration planning	4

Among the best practices considered in the questionnaire survey, retrospective meetings, communication and collaboration, and contractual skills were agreed to be the best practices needed in TPM in Kuwait's O&G sector. Matthies *et al.* (2019), Drury-Grogan (2014), and Andriyani (2017), among others, have supported retrospective meetings as practical tools for addressing project delays. Communication and contractual skills have received the support of several researchers as one of the most important factors that affect project deliveries (Fallahnejad, 2013; Mishra *et al.*, 2012; Olaniran *et al.*, 2015; Sharp and Robinson, 2010). Therefore, these practices receive the support of both survey respondents and the interviewees in this study, and support the evidence drawn from earlier research.

5.5.3 Retrospective Meetings

Interviewee A agreed that retrospective meetings were successful in reducing delays as '*retrospective meetings, or what we normally call sprint retrospective, give the team the chance to really inspect itself and create a plan for improvements to be implemented in the next sprint*'. Sprints are short stages which have specific time limits and act as milestones in the work schedule. Without completing a *sprint*, the team does not proceed to the next milestone. Interviewee B was also in favour of retrospective meetings, adding that:

> '*Retrospective meetings give the team a chance to implement improvements, reflect on the previous work, and identify the key elements that worked. … When you reflect on the past work and areas that you can improve going forward, you eliminate chances of errors that can ruin the project going forward. When you identify these risks, you give your project ground for efficiency and faster delivery*'.

This opportunity to reflect was additionally highlighted by Interviewee C, who stated, '*While iteration planning will give you a chance to plan ahead toward achieving manageable targets, retrospective meetings will give you a chance to look back at achievements and reflect on how to improve*'. Interviewee D added, '*When you improve going forward you eliminate unnecessary errors, which can really delay your*

project going forward. I think this also gives you a sense of focus and direction toward achieving project targets'. Interviewee F agreed, '*In this way, the team will be able to look for ways to improve as they move forward, giving them a chance to deliver projects faster, but also in better quality*'. Interviewee G summarised the benefits of retrospective meetings and iterative planning by stating:

> '*Iteration planning allows you to plan ahead, while retrospectives will allow you to look back on areas where teams can improve. This not only helps you speed up the process of implementation going forward because of the reduction of errors, it also allows teams to plan better and produce outcomes that are of high quality*'.

Finally, Interviewee H concurred, '*In terms of delivering projects faster, mitigating risks through project improvement as well as improvement of schedule management, the team can be able to hit deadlines much faster*'. Therefore, all eight interviewees were in complete agreement regarding retrospective meetings being a vital solution for addressing project delays in TPM frameworks in Kuwait's O&G sector.

Matthies *et al.* (2019) have asserted that retrospective meetings are critical for project management, while Drury-Grogan (2014) adds that retrospective meetings and iteration planning go hand in hand to build functionality and deliver quality.

5.5.4 Communication and Collaboration

Interviewee A was in favour of communication and collaboration and stated:

> '*Mainly, one of the major causes of project failures or delays in O&G projects is that most of the communication and collaboration is conducted through the written word and often at the start of the project. What Agile can bring to project management is this feature of improved communication, especially through stand-up and retrospective meetings*'.

Interviewee B illuminated why communication and collaboration are critical for the O&G sector by saying, '*In any kind of professional work, communication is vital. This is especially fundamental in complex projects such as O&G, which demand a lot of*

coordination and teamwork. Adding this Agile feature into the normal waterfall framework can lead to faster delivery of large, complex projects because it allows the team a chance to anticipate issues'. However, he was not in favour of daily stand-up meetings:

> '*In complex working environments such as O&G, I believe that the daily "scrum" just doesn't work. In fact, I believe that such meetings can become really tedious, like a sit-down meeting. The main problem with such a meeting format is how irrelevant so much of the discussion can be*'.

Interviewee C believed that communication and collaboration are the key factors in most areas of life. In O&G projects, they hold a special significance: '*This is the only way to get teams working together toward achieving project goals and also an opportunity to explain the project details and progress to external stakeholders*'. For Interviewee E, '*the biggest problem in projects are bottlenecks, which can be overcome by [the] introduction of effective communication and collaboration strategies within O&G projects*'. Interviewee H highlighted the connection between best practices by stating, '*With iteration planning and retrospectives, an added way of communication and feedback is brought to the management process*'.

In the related literature, Sharp and Robinson (2010), Alt-Simmons (2015), and Demir and Theis (2016) have all asserted that communication is the key to keep project teams on the same page, thereby delivering projects faster, with fewer mistakes, and higher quality.

To summarise, as with retrospective meetings, communication and collaboration were identified as appropriate practices to be implemented for improving the speed of Kuwait's O&G projects.

5.5.5 Daily Stand-Up Meetings

Similar to Interviewee B, Interviewee C was also concerned about the time spent in daily stand-up meetings, but he agreed that they are helpful for efficient PM: '*These meetings should be done in a quick manner to avoid instances of delay. These are basically a chance to "go around the room" and get everyone to present their results and daily targets before work starts*'. Interviewee E opined that:

'*in managing complex projects such as those in the O&G sector, a lot more coordination and cooperation is needed—more than what virtual meetings can offer. Thus, the need [is] for daily stand-up meetings but limited to a few minutes, which keeps them focussed to the immediate goals of the project*'.

Interviewee D agreed with Interviewee B regarding the ineffectiveness of daily stand-up meetings: '*Again from my experience, only about 8% of managers can be able to effectively handle stand-meetings without delaying. The goal is to minimise delay*'. Interviewee G agreed, saying:

'*My experience in this industry has demonstrated that most project managers do not know how to effectively implement daily stand-ups. These meetings are supposed to be very short, just a small window before starting [the] day's work to mention the day's deliverables and give the team a renewed focus on the project. … When implemented correctly, I believe this can allow faster delivery of projects that are executed in a waterfall framework, but when done poorly, it can lead to a wastage of time*'.

Interviewee F, however, was positive regarding daily stand-up meetings.

'*I believe every opportunity to bring the team together and ensure that everyone is on board with the objectives of the projects gives a team a renewed focus, which in the long run enhances the delivery of the project. It is like with the previous two questions; the sense of focus may enable faster delivery of projects*'.

 Interviewee H was also enthusiastic about daily stand-up meetings. '*People need to talk and be reminded of the project goals at every phase of implementation, and daily stand-ups are perfect for that. It is a great tool to improve communication between the teams*'. Therefore, daily stand-up meetings did not earn universal agreement among the interviewees, as some believed that they are an excellent practice, while most were of the opinion that they should be limited to a few minutes; furthermore, such meetings should be implemented only if they do not cause further delays and if the project managers can direct them well.

McHugh *et al.* (2012) and Dorairaj *et al.* (2012) emphasise the importance of daily stand-up meetings in bringing teams closer, allowing them to focus on a project's progress, and creating a shared mindset.

5.5.6 Enhancing Team Skills

For Interviewee A, team skills were important and necessary to '*identify team competencies to ensure that you have the right people working on the project, where tasks are matched with proficiency*'. Interviewee D added that '*identifying and managing team skills is where you draw the line between perfect and mediocre outcomes*'. Interviewee E believed that '*core to a project are people and the skills and talents that they bring on. Hence, identifying and enhancing skills is vital to delegation and completion of the project*'. Interviewee F was of the opinion that:

> '*more than any other Agile best practice, working with people who are not skilled enough for their tasks can not only delay the project, but may also lead to the ultimate failure of the entire project. … Placing the right people for different tasks may result not only in faster delivery of better quality projects, but also complement other best practices such as communication and collaboration. If people work together, and they do not match in skills, don't expect great cooperation*'.

Interviewee G emphasised the need for proper HR planning, stating:

> '*There is nothing that can kill a project faster, let alone delaying it, than placing workers who are not fit for the job … identifying skills in each individual can facilitate [and] improve interaction between workers, improve cooperation as well as make teams more efficient. As I said, with efficiency and focus, teams deliver faster and better*'.

Interviewee H also agreed and added, '*There's no way you can deliver and hit deadlines if people are working at tasks that they aren't conversant about. So, identifying and enhancing team skills can, without a doubt, help in the delivery of O&G projects faster*'.

Therefore, team skills also found support among the interviewees, who felt that project managers must identify the appropriate team members and match their skills to the project requirements. Unless team skills are appropriate, projects can be expected to be delayed as leaders search for the resources and talent required to achieve their goals. Moreover, they may be delayed if members must be sent for further training or skill development. This insight is supported by the work of Aniche and de Azevedo Silveira (2011) and Tsoy and Staples (2020), who agree that team skills play a significant role in addressing project complexity and reducing delays.

5.5.7 Iteration Planning

Iteration planning was identified by all interviewees as an important APM method. Interviewee A believed that it allows all project members to be '*on the same page regarding the expected deliverables, the complexity involved, and each persons' responsibility in the delivery of the project*'. Interviewee B connected iteration planning with '*planning ahead, looking at all the possibilities, risks, [and] objectives as well as deliverables that are realistic*'. Interviewee C agreed with these comments and added, '*It allows the team to focus on specific targets, which can really speed up the delivery of different tasks, and eventually, the entire project*'. Interviewee E added another benefit of iteration planning: '*Iteration is core to planning within a team as it allows for improved and seamless delegation. This means that duties can be prioritised, assigned, deferred, and handled in a way that ensures that the project is on schedule*'. Interviewee H summed the iteration planning process and its benefits by stating, '*with waterfall, you meet once in a while to see the progress of the project, but with iteration planning, you have to meet more often and plan ahead on what you should exactly achieve on a particular phase of project development*'.

Serrador and Pinto (2015) and Conforto *et al.* (2014) agree that iteration planning is a useful tool for bringing flexibility and resilience to manage projects and address their complexity. By allowing the opportunity to reassess the needs of the situation, iteration planning allows project managers to deliver optimal quality while not compromising on the speed of delivery (Al-Zubaidi *et al.*, 2018).

5.5.8 Administration of Contractual Issues

Interviewee B was emphatic regarding the importance of resolving contractual issues early on in PM, stating that '*in such a demanding working environment, if your contract management process fails to run smoothly, you will negatively impact not only delivery time, but also your productivity and revenue*'. Interviewee E also supported this notion, commenting '*yes, I'm firmly convinced that all project management elements have to be taken into account early enough. To this end, there should be no contractual loopholes that can delay a project, considering [the] costs and complexities of O&G projects*'. Interviewee F stated, '*If you don't have your resources at the right time and at the right place during project implementation, how do you expect to beat deadlines? How do you ensure that you have these things where you need them to be?*' He further emphasised the early resolution of contractual issues by reiterating that '*every issue relating to contracts should be dealt with early in advance if there is any chance of beating all the deadlines*'. Interviewee G cautioned against neglecting contractual issues, emphasising '*if you don't handle contractual issues, then your project isn't at the risk of delay, but also total collapse*'. Interviewee H added, '*If you need workers to work, their contracts should be taken care of early. If you need equipment delivered, solve contractual issues first and early enough. Else, you won't meet deadlines*'.

The results demonstrate that the administration of contractual issues was also considered to be a best practice with arguably the most emphasis expressed by project managers. Compared to other best practices, contractual issues were a limiting factor, without which projects would not move forward at all. Fernandez and Fernandez (2008) and Olaniran *et al.* (2015) have reported similar results where it becomes clear that, unless contractual issues are resolved, projects cannot move forward, which contributes to delays and creates even greater complexity. Table 5.17 summarises the interviewee opinions on RQ1.

Table 5.17: Summary of Interviewee Opinions on Research Question 1 (APM Best Practices)

	Interviewee							
Code	A	B	C	D	E	F	G	H
Years of Experience	7	12	24	36	8	5	11	4
Iteration planning		*	*		*			*
Retrospective meetings	*	*	*	*	*	*	*	*
Communication and collaboration	*	*	*		*			
Daily stand-up meetings (15–20)		*	*	*		*		*
Daily stand-up meetings (Waste time)		*	*			*		*
Enhancing team skills	*			*	*		*	*
Administration of contractual issues		*			*		*	*

Research Question 2: How can APM enablers and best practices be applied in the TPM framework in O&G capital projects in Kuwait?

Table 5.18: Enablers of APM

Enablers of APM	Number of Interviewees
Defining Agile best practices well	4
Applying the best practices to a traditional framework	4
Identifying weak areas and implementing best practices	8
Reporting, communication, and collaboration	4
Iteration planning	3
Flexibility and adaptability	3
Risk mitigation	2
Team focus	3

Some of the enablers of APM were identified by interviewees and are reflected in

Table 5.18.

Interviewee A opined:

> '*I believe that it is important to first understand what you can really refer to as "Agile best practices". For me, what I can really term as Agile best practices include meetings, planning ahead, simple design, communication, continuous integration, and customer collaboration. I believe iteration planning is one of the most vital elements in APM as it allows the project manager, client, and the rest of the team to be on the same page regarding the expected deliverables, the complexity involved, and each persons' responsibility in the delivery of the project*'.

Interviewee A added that iteration planning made it possible to find a common cadence and establish acceptable boundaries to work. Interviewee B added:

> '*Applying Agile best practices in the traditional management of projects is like picking an element that functions in an Agile framework and placing it directly to the waterfall model. For instance, if you normally don't have retrospective meetings in your project management, you add it as a way of reviewing previous work, plan on the next, and improve as you move. The same thing happens with adding Agile elements such as communication and collaboration*'.

Interviewee C added '*…for instance, you can add best practices, such as communication and collaboration, to a waterfall model that supports the functional specification, a technical architecture technical specification, and well-documented requirements*', while Interviewee E had understanding of the concept without really defining it: '*Absolutely, I believe that it does [best practices] lead to faster and cost-effective delivery of O&G projects. Iteration is core to planning within a team as it allows for improved and seamless delegation*'.

To implement the Agile best practices, Interviewee A suggested that the best practices of *meetings*, *planning ahead*, *simple design*, *communication*, *continuous integration*, *and customer collaboration* were all intuitive and simple-to-understand measures that

could be implemented within a traditional APM framework. Interviewee B was straightforward concerning implementing APM in waterfall frameworks: '*Just implement those Agile elements that you think would really enhance waterfall design*'.

Interviewee C suggested a hybrid framework with the best practices from both Agile and waterfall models. He opined, '*You can add best practices, such as communication and collaboration, to a waterfall model that supports the functional specification, a technical architecture specification, and well-documented requirements*'.

Interviewee E was of the opinion that a hybrid framework should be created because he believed that '*the best practices in APM, such as effective communication, collaboration, and retrospective meetings, can be transferred to waterfall frameworks in O&G capital projects in Kuwait*'. Interviewee G added:

> '*Require analysing your waterfall design, find areas that need improvement, and check on the best practices in Agile frameworks and implement them. For instance, if planning is an issue in your waterfall model, integrate iteration planning and retrospective meetings in your design. I think it's as simple as that*'.

Interviewee H added an important point by stating:

> '*I strongly believe this will depend on the project in terms of size and complexity. In smaller projects, sometimes there is no need to add a lot of Agile features because they may be completed faster regardless. But in O&G, most projects are big and long term and may benefit from Agile aspects of project management*'.

Interviewee A believed that incorporating the best practices of APM in a waterfall methodology was an intuitive and simple-to-implement measure. For him, the hybrid management framework complemented the weaknesses of APM and waterfall, thus introducing no additional weaknesses of its own. He suggested the water-scrum-fall model as one of the best-suited hybrid PM frameworks for the Kuwaiti O&G sector.

Concurrently, some weaknesses of a hybrid framework were also noted. Interviewee B cautioned that hybrid frameworks could suffer from a weakness of implementation. He opined:

> '*The only notable weakness, or rather challenge as far as I'm concerned, is whether project managers can be able to effectively execute the hybrid method. It has been proven that when not executed properly, continuous administrative intervention can result in a waste of time and effort. … A hybrid methodology, while simple to implement on paper, demands experience, and a team that you place in this design should be skilled and collaborative enough to enable smooth and efficient co-existence in the workplace*'.

He further added that hybrid frameworks were the solution for Kuwait's O&G sector, stating that '*the hybrid model can really work well in this sector of O&G because they accept the flexibility of projects and allow for a more nimble and nuanced approach of the work*'. Interviewee C also cautioned against applying a hybrid framework with no experience, as it could backfire. He shared his experience of applying a hybrid framework:

> '*We use a Hybrid Project Management methodology to make teams define what they need and be able to change as their customer's requirements evolve. So, to make these methodologies work harmoniously, I normally take the best from Agile and waterfall and integrate them together. Such a model will retain the clarity of [a] waterfall framework and also its trackability and join it with the ability to adapt and be flexible from [the] Agile framework*'.

He added, '*Blending of both these methodologies should happen at the beginning of a project when, for example, in the Scrum methodologies, a product backlog must be prepared*'. However, the need for an experienced project manager to steer the hybrid framework's implementation was reiterated by Interviewee D, and Interviewee E added that '*poor integration can not only lead to waste of time and resources, it can also lead to project failures*'. The team issue was also raised by Interviewee G. However, Interviewee F asserted that numerous combinations of Agile features may provide confusion, while Interviewee H added that '*the only weakness of a hybrid model that I can think of is maybe confusion that may result in the amalgamation of*

two different models'. Interviewee E additionally emphasised the need for experience and skills:

> '*This integration process requires skills and experience because project managers need to understand what Agile best practices can work best in their projects. Poor integration can not only lead to waste of time and resources, it can also lead to project failures. … With a hybrid methodology, the fluidity of operations can be greatly improved. For example, weigh the cons and pros of each management model and combine strengths while reducing the weaknesses. Project management strategies have to improve and mutate with time, technology, complexities, and other dynamics of the project*'.

Interviewee F was also in support of a hybrid framework: '*A waterfall methodology follows a strict plan with documentation and everything, but adding elements such as iterative planning, retrospective meeting, and stuff like that can go a long way in improving your overall design of project management*'. A potential weakness highlighted by this interviewee was '*the possibility of a mix-up when a lot of Agile features are added into the waterfall framework*'.

For Interviewee G, the only limitations were as follows:

> '*It requires a team that is ready to be collaborative throughout and a manager who is skilful in implementing hybrid methodology. … What I would advise any project manager in this sector is to start implementing Agile best practices in a waterfall model on a small scale, maybe with one department or team, and then expand from there. From my experience, while this integration can bring monumental benefits including reduction of delays, when implemented poorly, it can cause further problems*'.

According to Interviewee H:

> '*The only weakness of a hybrid model that I can think of is maybe confusion that may result in the amalgamation of two different models. This integration requires a project manager who is good with a hybrid model; a lot of time may be wasted when the manager is not experienced enough to take such responsibility*'.

He added:

> '*To implement Agile best practices, project managers need to identify individual areas where certain Agile features may be applicable. For instance, to solve contractual issues, project managers need to deal with contracts before the start of every phase of project implementation, to ensure that before starting any designated stage, that is sorted, and labour and other resources are available in time*'.

To ensure a proper application of the hybrid model the Interviewee D explained:

> '*Precisely what I mean is that iteration planning gives planners a chance to focus, and focus is good for efficiency. Every time you achieve efficiency at every stage of project implementation you are likely to hit your deadlines faster*'.

Moreover, when the interviewee was asked to expand upon his view of '*sets the direction for the team*', he said that '*I mean by giving them a sense of focus, which can really work great in terms of achieving project goals in desired time*'. Finally, Interviewee F showed that an Agile approach could enhance the project delivery: '*I believe every opportunity to bring the team together and ensure that everyone is on board with the objectives of the projects gives a team a renewed focus, which in the long run, enhances the delivery of the project. It is like with the previous two questions, the sense of focus may enable faster delivery of projects*'.

Cooper (2016) has also supported the implementation of a hybrid framework in projects as it facilitates the achievement of complex goals. Coordination and communication in modern projects are increasingly complex and demand greater agility than was possible in traditional frameworks (Karlström and Runeson, 2005). Facilitators like the use of visual tools to envisage the project, which can aid in implementing the hybrid framework in projects (Cooper and Sommer, 2016).

Several interviewees showed that one of the major success factors of Agile hybrid models is its risk mitigation. Interviewee A opined that '*For me, Agile approach is all about being flexible and adaptable, which allows teams to mitigate risks*'. Interviewee D added that:

'Agile is not only about being responsive, it is also about being adaptable and flexible, which is great when it comes to detecting risks and solving them before they can negatively impact your project later on'.

Although many experts in O&G projects showed high agreement on APM best practices, the implementation of these best practices in a hybrid model was not straightforward for them. Experts have a vision for APM enablers, but they are not sure how to go forward due to the complexity of the O&G projects (when compared to IT projects). In IT projects, any project management methodology must first be approved and accredited by the PMO or project excellence departments, which set the guidelines regarding the execution of a PM method. Therefore, setting the hybrid model implementation guidelines remains an open issue. Table 5.19 summarises the interviewee responses to RQ2.

Table 5.19: Summary of Interviewee Responses to Research Question 2 (Enablers of APM)

	Interviewee							
Code	A	B	C	D	E	F	G	H
Years of Experience	7	12	24	36	8	5	11	4
Defining Agile best practices well	*	*	*	*				
Applying the best practices to a traditional framework	*	*	*					*
Identifying weak areas and implementing best practices	*	*	*	*	*	*	*	*
Reporting, communication, and collaboration	*	*	*		*			
Iteration planning	*					*	*	
Flexibility and adaptability	*	*	*					
Risk mitigation	*			*				
Team focus				*	*	*		

Research Question 3: How can a Hybrid Project Management framework deal with project complexity to reduce project delays in O&G capital projects in Kuwait?

5.5.9 Agile Project Management and Project Complexity

Some of the interviewees shared their opinions regarding how APM can address project complexity.

Table 5.20 reflects that it is, in fact, APM's iterative nature—which is its foremost and most universal characteristic—that can reduce the project complexity. The flexible and adaptable nature of APM was frequently mentioned, while related features, such as communication and responsiveness, were also discussed.

Table 5.20: Agile Project Methodology and Project Complexity

APM Features to Address Project Complexity	Description	Number of Interviewees
Phase-wise implementation or iterative implementation	Projects that run in phases or are implied iteratively could reduce project delays.	8
Flexibility and adaptability	The project methodology that allows flexibility in time and adaptability to change are targeted.	6
Communication and collaboration	Increasing communication and collaboration between team members could reduce potential conflicts and increase project success.	3
Responsiveness	Project management that allows the team to respond to changes directly is advisable.	3

Risk mitigation	All risks must be identified and mitigated before they become an issue.	2
Modernistic approach	A modern PM method takes into consideration the complexity of current projects.	2
Priority of client feedback	Early client feedback allows projects to retrofit potential errors early.	2
Smart working	PM that allows managers to follow their project smartly is advisable.	1

Interviewee B defined APM well:

'*I believe that APM is the execution of projects in stages, iteratively, to ensure that tasks are accomplished before moving on to the next stage in project execution. I believe this approach encourages collaboration [more] than rigid processes, where communication is valued*'.

Interviewee C believed that APM could reduce delays and complexity in O&G projects:

'*I think in O&G, iteration planning provides the team a chance to plan ahead realistically. When this is done, it allows the team to focus on specific targets, which can really speed up the delivery of different tasks, and eventually, the entire project*'.

Interviewee C also stated that '*by applying Agile best practices to a waterfall model, you automatically deal with the complexity of delays. That is why it is called Agile, for agility, alertness, and swiftness*'. Interviewee E agreed with this opinion, as he also stated:

'*Iteration is core to planning within a team as it allows for improved and seamless delegation. This means that duties can be prioritised, assigned,*

*deferred, and handled in a way that ensures that the project is on schedule. …
With a hybrid methodology, the fluidity of operations can be greatly improved.
For example, weigh the cons and pros of each management model and
combine strengths while reducing the weaknesses. Project management
strategies have to improve and mutate with time, technology, complexities, and
other dynamics of the project'.*

According to Interviewee F:

*'There are those who define this as being responsive and adaptable, but I take
my understanding further to include being strategic and smart. … A hybrid
method in O&G allows project managers and consumers to agree on the
deliverables at an early stage in the development cycle, which improves both
quality and delivery time'.*

Interviewee G stated, *'This method encourages the project managers and their teams
to plan better, work iteratively, continuously improve, and ensure early delivery'.*
Project complexity is best addressed through hybrid frameworks as per Conforto *et al.*
(2014), who provide extensive evidence showing how a traditional framework can no
longer deal with environmental challenges. Salameh (2014) adds that modern projects
demand flexibility, which is difficult to achieve in the inflexible TPM. Bergmann and
Karwowski (2019) agree that TPM cannot respond to environmental challenges.
Therefore, sufficient evidence exists in the literature to support the need for a hybrid
framework in O&G projects.

5.6 Summary

This chapter has presented the results of the quantitative survey, beginning with the
results of the reliability analysis, which confirmed the reliability of the instrument. The
analysis of individual items has shown the best practices that can be useful for
improving project delays and complexity in Kuwait's O&G sector. Further, findings from
the interview schedule have also been discussed along with the identified common
themes, which show the APM best practices in much richer detail.

As a result, this chapter identifies the APM best practices that could be applied to TPM
to reduce delays in O&G projects: retrospective meetings, communication and

collaboration, daily stand-up meetings, enhancing team skills, and the administration of contractual issues. Moreover, the chapter highlighted the best enablers of APM for O&G projects, which was related to the definition and the application of Agile best practices, effective reporting and communications, and keeping focussed on the specific deliverables of each project.

Chapter 6: Discussion and Conclusion

6.1 Chapter Overview

This chapter presents the findings of this study as they relate to the research questions. The demographic details of the sample are described to understand the type of people who answered the survey questionnaire and participated in the semi-structured interviews. The opinions of the survey respondents regarding Agile values are discussed first. The results indicate that the respondents agreed with all values, with a percentage mean of 85.6%.

The first research question, which explored the causes of project delays, is answered utilising the results from the survey and the interviews. Section 4.4 discusses the findings concerning iteration planning, retrospective and daily stand-up meetings, communication and collaboration, enhancing team skills, and solving contractual issues. All are identified as best practices that have significant relationships with the reduction of project delays. Another topic of discussion is the facilitators for applying a hybrid framework, which identifies the best practices from APM to analyse the weak areas of the traditional framework and directly apply the required best practices. The hybrid framework model is also suggested, which can reduce project delays and address project complexity by adding the APM best practices to the waterfall PM framework.

6.2 Best Practices of APM (Answer to RQ1)

Aside from the analysis provided in Section 5.4.8, this section discusses how the research question was answered. This study aimed to assess the insufficiencies of the existing traditional framework of PM in Kuwait's O&G sector that cause project delays and to determine whether a change to more Agile methods and techniques is needed to address the issue. A questionnaire survey with 106 participants and interviews with eight project consultants who have worked with both TPM and APM frameworks revealed several insights. This chapter concludes the study by describing the results

in light of existing literature and theory while bringing the findings from both quantitative and qualitative methods together.

To begin, the demographic and project-related data collected from the 106 participants in the questionnaire survey revealed that the sample included professionals from different designations who are associated in varying capacities with PM. The inclusion of engineers, coordinators, planners, and project and programme managers working in Kuwait's O&G sector ensured that diverse opinions and roles were incorporated in the study. The demographic of gender analysis indicated that the sample was overwhelmingly skewed toward male participants, who represented 94.3% of respondents. However, field observations, cultural dynamics, and reports indicate that the petrochemical sector in Kuwait has a similar composition, with women currently occupying 12% of supervisory posts in the sector (Menachery, 2019), which is higher compared to other sectors.

The years of experience were nearly equally distributed in the sample, ranging from zero to more than 15 years. All chosen respondents were working in organisations that were employing traditional frameworks: 97.2% had traditional frameworks, 1.9% utilised PMI, and a single respondent worked at a PRINCE2 organisation. As none of the participants had APM implemented in their organisations, their opinions regarding the causes of delays and their relationship with different aspects associated with APM techniques and practices are believed to be useful.

The interviewees were also diversely distributed in terms of all designations of PM consultation and experience levels captured in the small sample of eight participants. All interviewees had experience working with both frameworks, and they were all presently associated with Kuwait's O&G sector.

A MANOVA test was utilised to study whether any of the demographic and project-related details were associated with the study variables. Only the type of framework employed in PM is found to be significantly related to delays, with PMI projects associated with more delays than the other customised and PRINCE2 frameworks. However, as the participants were primarily from the customised traditional framework, with only a few representing the PMI and one representing PRINCE2 frameworks, this relationship should be generalised by future researchers with caution.

The interviewees, when asked to discuss the causes of project delays, reported that contractual problems; communication issues with vendors; poor planning; HR issues, such as inadequate HR planning, labour compliance, coordination, and lack of skill identification among team members; budgeting issues; quality control; equipment maintenance; data; and the usage of a traditional approach in PM all lead to delays. The responses of the interviewees indicate that contractual issues and communication lags are the predominant problems that lead to delays. On reflection, these problems are interrelated to other causes mentioned by the interviewees, and the chosen APM practices can address several of these bottlenecks concurrently. The results of the quantitative survey reveal more insights into the issue.

Among the findings from the questionnaire items, the first section elicited the opinions of the respondents concerning Agile values. The items in the questionnaire were based on the *Agile Manifesto* values (Belling, 2020). The results indicate that the respondents agreed with all values, as the mean values are all above 4. The values that particularly resonated with the respondents include collaboration with customers while negotiating contracts, prioritising humans and relationships over tools and processes, and prioritising working software over documentation. Consequently, the results demonstrate that the respondents recognised the need for and importance of Agile values in improving their current projects.

6.2.1 Iteration Planning

The above results find more support on moving to the analysis of the results for specific APM practices and techniques. Iteration planning, which found support from survey respondents, was also recognised by all interviewees as beneficial. Interviewee B defined APM:

> '*I believe that APM is the execution of [the] project in stages iteratively to ensure that tasks are accomplished before moving on to the next stage in project execution. I believe this approach encourages collaboration [more] than rigid processes, where communication is valued*'.

Similarly, all items in the survey scale received a moderate-to-high Cronbach alpha agreement. In fact, 87.7% of respondents either agreed or strongly agreed that iteration planning is useful to increase project flexibility. The highest level of agreement

was received for the items which state that iteration planning improves planning and scheduling and that it leads to better risk management. An additional aspect that found strong agreement is the positive impact of iteration planning on the faster incorporation of changes, which reduces delays. The correlation of iteration planning was found to be significant with all other variables, with solving contractual issues (Pearson coefficient r = .482) and team skills (r = .476) demonstrating the strongest relationships, which means that iteration planning could help resolve contractual issues.

In the qualitative analysis, the common themes identified from the interviewees' responses were improving planning, bringing project members together, improving team focus on specific targets, improving delegation of activities, simplifying progress measurements through iterative milestones, and improved identification and mitigation of risk. Figure 6.1 illustrates the identified common themes for iteration planning and its relation to PM.
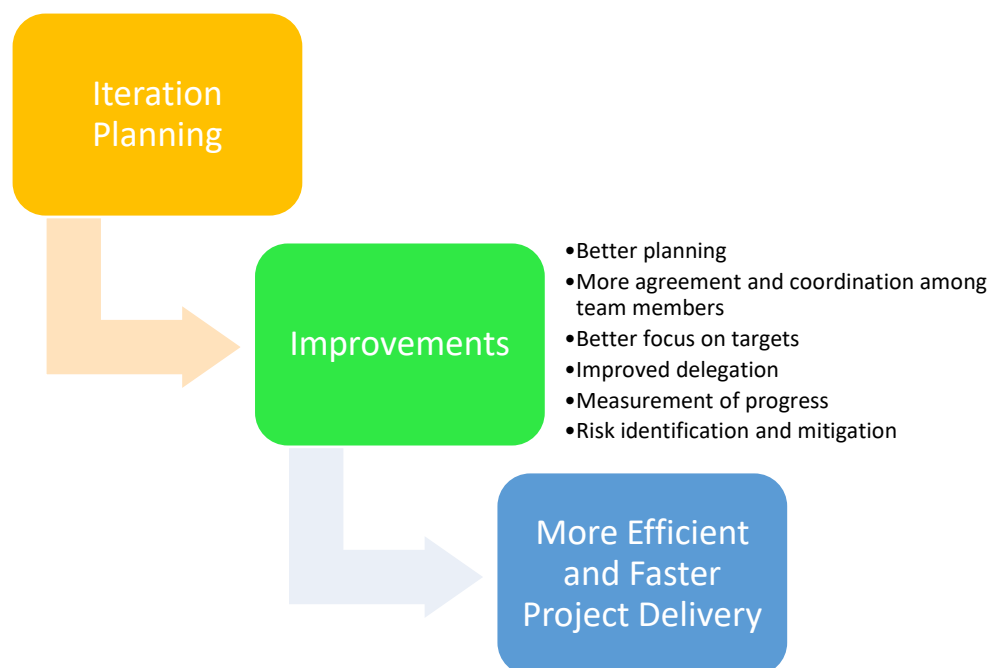
Figure 6.1: Iteration Planning and Project Management (Created by the Researcher)

The results from both surveys and interviews coincide with several scholars' arguments regarding the importance of iteration planning in PM. For instance, Sharp and Ryan (2011) report that the fundamental goal of iteration planning is to determine

the features and functionalities that will be included in the next iteration. This allows project managers to identify and reduce the risks and errors that could halt a project's progress.

Serrador and Pinto (2015) claim that integrating iteration planning as an Agile best practice is vital as it enables project managers, their teams, and customers to receive timely feedback while reviewing the progress of project implementation. This is critical in PM because it allows the team to entirely focus on each iteration, thus delivering the optimal quality in a rapid manner (Al-Zubaidi *et al.*, 2018). Conforto *et al.* (2014) agree that iteration planning can provide the capability of project reconfiguration and recovery during development, which is important to deliver a project that meets the clients' needs in quality and delivery speed. Therefore, as evidenced by the survey, interview results, and existing literature, introducing iteration planning to a TPM model can lead to faster delivery of O&G projects. Consequently, Hypothesis 1, *Introducing Agile iteration planning in a TPM framework can reduce project delays,* is proven.

6.2.2 Retrospective Meetings

Retrospective meetings are another highly rated APM practice that respondents felt should be included in the traditional waterfall framework. Enabling project managers to adapt more effectively to changes (M = 4.69, SD = .575) and involving clients in project planning (M = 4.45, SD = .571) received the highest ratings in the survey, which indicates that flexibility and client engagement was considered to be important. Concurrently, the other items regarding adjustment, risk management, and flexibility were also rated above 4. The correlation matrix has demonstrated that retrospective meetings are significantly related to all study variables, with daily project meetings (r = .286) and preventing project delays (r = .263) exhibiting the strongest relationships in terms of influence, which means the significance of retrospective meetings increases alongside an increase in the frequency of daily meetings.

Similarly, all eight interviewees agreed that retrospective meetings are an important APM best practice that can reduce project delays. The responses of the interviewees suggest that retrospective meetings were associated with opportunities to inspect and reflect on project status, improve planning and implement those improvements, prevent errors, improve focus on project goals and direction, identify and mitigate risks,

and hence, provide a more efficient and quicker project delivery. These common themes are represented in Figure 6.2.
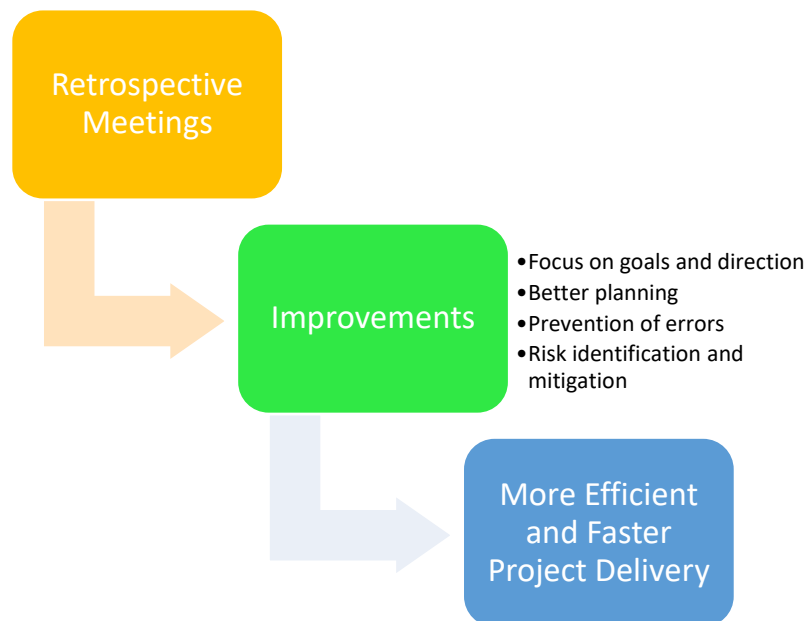
Figure 6.2: Retrospective Meetings and Project Management (Created by the Researcher)

By improving project planning, risks that lead to issues and cause later delays in the projects can be solved. According to the participants, the facilitation of frequent adjustments of processes can lead to the faster delivery of projects in the O&G sector. This observation is consistent with several scholars who argue that retrospective meetings are Agile best practices that lead to the swifter delivery of projects. For example, Matthies *et al.* (2019) posit that the integration of retrospective meetings is vital to the success of any project. Similarly, Drury-Grogan (2014) notes that retrospective meetings and iteration planning are fundamental for achieving quality, team knowledge and satisfaction, schedule management, and functionality, which ultimately lead to faster and better delivery. Andriyani (2017) introduces the practice of 'inspect and adapt' whenever the concept of retrospective meetings arises, arguing that the main objective is to improve product quality by working on processes and quickly adapting them to meet the project goals. The importance of retrospective meetings is further noted by other scholars (Conforto *et al.*, 2014; Dehaghi, 2019; Przybylek and Kotecka, 2017), all of whom note the importance in allowing teams to make changes and adapt to the project's needs while asserting that such meetings facilitate improved project delivery. Therefore, based on the results from the

quantitative survey and the qualitative interviews, Hypothesis 2, *Introducing Agile retrospective meetings in a TPM framework can reduce project delays*, is proven.

6.2.3 Daily Stand-Up Meetings

The majority of the participants (47.2%) were unsure whether the integration of daily stand-up meetings would provide an opportunity to develop an action plan that identifies areas of improvement—nevertheless, the respondents who agreed and strongly agreed outweighed those in disagreement. In the qualitative results, six interviewees agreed that daily stand-up meetings are an essential APM practice; however, four among them cautioned against extending the meetings beyond a short duration. The remaining two considered the meetings to be a waste of time. In the desirable features of APM identified by the interviewees, responsiveness, flexibility, and adaptability were mentioned; these features require daily stand-up meetings to be operationalised.

Daily stand-up meetings were found to be correlated with all other variables, with contractual administration ($r = 0.454$) and team skills ($r = 0.414$) demonstrating the strongest influence. The regression analysis also identified them as the second-most influential factor in the model, with a partial coefficient of 0.22.

Interviewee E was one respondent who argued for daily stand-up meetings:

> '*In managing complex projects such as those in the O&G sector, a lot of coordination and cooperation is needed—more than what virtual meetings can offer. Thus, the need [is] for daily stand-up meetings but limited to a few minutes, which keeps them focussed to the immediate goals of the project*'.

Several interviewees were concerned about the waste of time and effort spent organising and attending daily stand-up meetings. Interviewees B, C, D, E, and G believed that daily meetings help but should be limited to a short duration. The benefits of daily stand-up meetings that were identified as common themes include a discussion of daily targets, improvement in coordination and communication, assurance of all team members being made aware of each other's progress, renewed focus toward targets, and team building. Some weaknesses were also identified, such as the difficulty to find experienced project managers who can steer such meetings as

well as the risk of further contributing to project delays if meetings are allowed to meander.

These findings correspond to researchers' findings, including those of Stray *et al.* (2016) and Cervone (2011). Daily stand-up meetings are identified as crucial because project managers, leaders, teams, and customers are made aware of the project status, and the meetings allow managers to resolve design issues early (Stray *et al.*, 2016). Congruently, McHugh *et al.* (2012) argue that daily stand-up meetings are vital for Agile teams because they can positively impact teams and enable them to function more cohesively. Dorairaj *et al.* (2012), who studied daily stand-up meetings in dynamic teams, report that the practice fosters team interaction and builds a 'one team' mindset, which is fundamental for the improved delivery of complex projects. Demir *et al.* (2014) further agree that these meetings are vital in evaluating a project's feasibility. This may also relate to increasing the speed of the process, bringing improvements, and fostering coordination. Considering the support of the quantitative and qualitative findings as well as the existing literature, Hypothesis 3, *Introducing daily stand-up meetings in TPM can lead to faster delivery of O&G projects,* is believed to be proven.

6.2.4 Communication and Collaboration

The APM tenet of communication and collaboration was the predominant contributor in the regression analysis toward reducing project delays. The regression analysis of all dependent variables of APM practices with project delays reports that communication and collaboration is the primary contributor to reducing project delays (Part Coefficient .37). The individual survey item analysis further supports this conclusion; furthermore, the survey question regarding the impact of communication and collaboration on reducing delays in decision-making was the highest-rated (M = 4.62; SD = .593) in this section. All other items in the scale were also rated above a mean value of 4. When individually correlated with the other variables, the dominant relationship was found with the reduction of project delays (r = .483), followed by iteration planning (r = .371).

All relationships were significant. Six interviewees named communication issues as the cause of project delays, and the lack of feedback and coordination was identified

separately. Interviewee A was of the opinion that '*there are very poor interactions between vendors, especially in engineering and procurements stages*'. Other interviewees also blamed communication as a barrier, and many correlated it with contractual issues. Communication and collaboration were identified by three interviewees as important APM features, and another two commented on the ability to incorporate client feedback in PM. All interviewees agreed that incorporating communication and collaboration can improve project deliveries and reduce delays.

Some common themes identified in this variable are enabling teamwork, encouraging faster and more frequent communication, engaging stakeholders, and removing bottlenecks. Another common theme is the relationship between retrospective meetings and iteration planning with communication and collaboration. These common themes are represented in Figure 6.3.
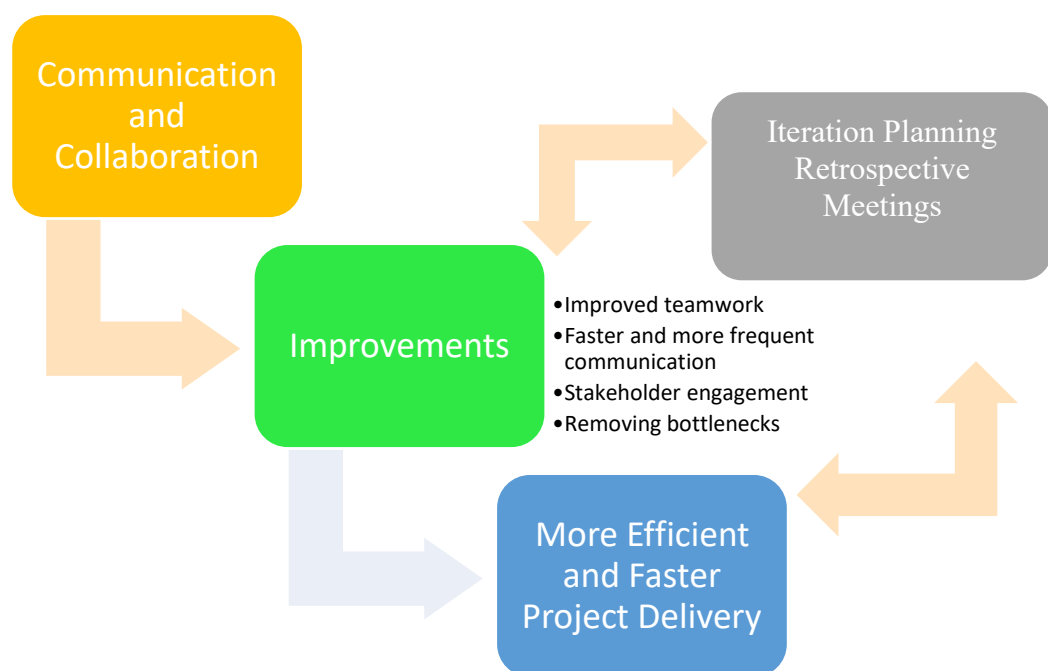
Figure 6.3: Communication and Collaboration and Project Management (Created by the Researcher)

A considerable number of studies identify communication and collaboration as vital to the Agile execution of projects. Conforto and Amaral (2015) note that a key enabler of APM is the usage of continuous team feedback and collaboration, which are not often available in TPM-based projects. Without such communication and collaboration,

scholars argue that there is a significant probability for omissions and delays, which can result in poor change management, low quality decision-making, and even failure. As noted in the literature review, Salazar-Aramayo *et al.* (2013) also believe that well-developed teams with effective communication and collaboration can influence the scope of the project.

Mishra *et al.* (2012) note that effective communication and collaboration can allow team members to develop workable solutions to complex issues in the project as they arise, which eliminates the potential of vacillation and ultimately leads to the faster delivery of projects. According to Sharp and Robinson (2010), coordination is a key element, especially in teams working together on large projects. Congruently, Alt-Simmons (2015) and Demir and Theis (2016) agree that, with coordination and effective communication, teams can move different aspects of the business more quickly and with fewer errors than if individuals are allowed to work independently. Based on this study's research findings, as well as the views of previous researchers, the integration of effective communication, feedback, and collaboration leads to the faster delivery of O&G projects. Consequently, Hypothesis 4, *Introducing Agile communication and collaboration in a TPM framework can reduce project delays*, is proven.

6.2.5 Enhancing Team Skills

All items in the team skills scale received a significant level of agreement from the respondents to the survey. All were rated above a mean value of 4, while the items regarding the facilitation of interaction and support as well as improved productivity and focus from team members were the highest rated, with mean values of 4.39. As expected, the correlation was found to be significant with all other variables, although solving contractual issues ($r = .993$) and iteration planning ($r = .476$) were the strongest predictors. In the qualitative results, a number of HR issues were found to be responsible for project delays, ranging from poor HR planning (in which project managers either did not find a person with appropriate skills and knowledge for a role or underutilised their potential) to ineffective coordination and the lack of skill identification among team members.

Seven of the eight interviewees mentioned team skills as an important feature of APM. The common themes that have been identified in team skills were choosing the appropriate people for the project, matching tasks with skill proficiency, improving communication and collaboration, and appropriately delegating tasks. The majority of responses cautioned against choosing the wrong team (due to unskilled managers) as that could delay the projects by creating a skill gap, which could affect cooperation among team members and team efficiency. These common themes are represented in Figure 6.4:

Figure 6.4: Enhancing Team Skills and Project Management (Created by the Researcher)

These results extend the findings of other researchers, who view team skills in Agile projects as key to a project's success. For instance, Moe *et al.* (2010) argue that Agile teams are better than those that adopt TPM because the identification and enhancement of skills lead to increased productivity and the faster delivery of high-quality products that satisfy customers consistently. Aniche and de Azevedo Silveira (2011) mention that Agile teams are more productive and efficient in quality and

delivery because they are encouraged to seek new information consistently. Shaye (2008) reports that teams execute projects faster and more efficiently when they are proficient in tasks that have been delegated to them. By managing teams and their skills effectively, Tsoy and Staples (2020) further note that project managers are more likely to achieve success when they invest in building team skills, even when faced with the complexity of large projects. Therefore, the evidence from the quantitative and qualitative findings as well as the literature contribute to proving Hypothesis 5: *Identifying and enhancing team skills in a TPM framework can reduce project delays*.

6.2.6 Solving Contractual Issues

The survey results indicated a considerable level of agreement that solving contractual issues is an important area of PM because of its relationship with project delays. All items were rated above a mean value of 4, exhibiting that this variable is found to be important. Solving contractual issues was significantly related to all other variables, with team skills (r = .993) and iteration planning (r = .482) being the strongest predictors of its scores.

When asked to discuss the causes of project delays, seven interviewees cited contractual issues, while six reported communication problems between vendors. All interviewees mentioned the administration of contractual issues as an important APM best practice. Interviewee A summarised the opinions expressed by others: '*There are very poor interactions between vendors, especially in engineering and procurements stages. Once there are issues with contracts, you can never expect to execute your project in time*'. The qualitative data from the interviews reveal through thematic analysis that contractual issues were identified as the primary cause of project delays. This variable is also found to be intricately related to communication and collaboration, iteration planning, retrospective and daily stand-up meetings, and team skills, as these variables contribute to solving contractual problems. All interviewees agreed that solving contractual issues early is a prerequisite not only to completing projects on time but also to completing projects well.

Olaniran *et al.* (2015) believe that approximately 60% of large projects face challenges, such as delays and failures, because they fail to address contractual

issues early during PM. This is often caused by cost overruns, which ultimately lead to deadline failures. Congruent to the results of this study, the researchers argue that solving such issues can result in faster delivery and better quality of projects worldwide. In an Iranian study, Fallahnejad (2013) notes that large projects fail because of poor management of contractual items, such as payments, which may ultimately lead to project delays or failures. According to Fernandez and Fernandez (2008), the nature of Agile projects, which are often executed in stages, allows project managers to obtain the necessary resources for each stage to avoid cost overruns. Thus, iteration working complements and enables the faster delivery of projects.

Therefore, the results from the quantitative survey, the interviews, and the literature review support Hypothesis 6.

6.3 Facilitators for the Application of a Hybrid Project Management Framework (Answer to RQ2)

The identification of the APM best practices that should be integrated into the traditional project framework reveals the type of hybrid framework that should be created for Kuwait's O&G projects. The thematic analysis of interviewee responses demonstrates that interviewees were concerned about the experience and expertise of project managers chosen to implement the hybrid framework. Some even suggested that the implementation of a hybrid methodology should be operationalised in a stepwise manner, beginning with pilot projects on a small scale. They felt that without these criteria, the hybrid framework could lead to additional delays. Therefore, it is crucial to identify and report the enablers or facilitators that can simplify the implementation of the hybrid framework in O&G projects.

Accordingly, the first interviewee suggested that the best practices of APM should be defined well so that they are understood by all team members when applied in the traditional framework. The second interviewee opined that there was no need for facilitation and that the best practices should simply be identified and applied: '*Just implement those Agile elements that you think would really enhance waterfall design*'. Interviewee C supported this merge of hybrid and TPM frameworks, illustrating his point with an example: '*For instance, you can add best practices, such as communication and collaboration, to a waterfall model that supports the functional*

specification, a technical architecture technical specification, and well-documented requirements'. Interviewee G suggested that the weak areas in the existing framework should be explored and answered with best practices. For Interviewee H, the nature of O&G projects require APM best practices to improve their effectiveness.

Therefore, the most commonly referenced facilitators for applying the hybrid methodology were choosing the best practices—communication, iteration, flexibility, risk mitigation, and focus on weak areas—and applying them directly. Defining these practices well further ensures that the hybrid model can improve the efficiency of PM.

Cooper (2016) supports the notion of hybrid frameworks that combine the benefits of the stability, familiarity, and acceptance of the traditional waterfall framework with the advantages of the Agile framework, which allows managers to address far more varieties of circumstantial demands than has previously been possible. The primary support for hybrid methodology derives from the fact that the projects are subsystems within organisations, which further increases the complexity of coordination and communication and cannot be satisfied by the traditional waterfall framework alone (Karlström and Runeson, 2005). The implementation of a hybrid framework is enabled through the application of visual tools that facilitate prioritisation, management, and adaptation to change (Cooper and Sommer, 2016). Such visual tools can allow managers to plan, implement, and evaluate their decisions while allowing all team members to agree on project requirements, current progress, and changes in the external and internal environments. The degree of project complexity and global pressures increase the importance of O&G project managers to adopt such tools to allow them to become more adept at recognising and adapting to changes while also improving their competitiveness.

The ability to recognise environmental changes has also been noted by Conforto *et al.* (2014), (see Table 6.1,Table 6.2,Table 6.3) who stress that the organisational climate provides a critical context for the project. Researchers have proposed that four types of enablers exist, these being the project type, project team, process, and organization. These categories are now applied to the results of the interviews to suggest which enablers can allow project managers of Kuwait's O&G projects to apply the hybrid framework in a better way.

Table 6.1: Organisational Facilitators for Kuwait's O&G Projects' Implementation of a Hybrid Framework **(**Adapted from Conforto *et al.*, 2014)

Organisation	Description
Organisational Culture	The top management, existing policies, and practices must be conducive to the hybrid framework.
Acceptance of Agile Methodology	Project managers and team members must accept the need for a hybrid framework and agree on its implementation action plan.
Adequate Reward	All team members must be rewarded for their initiative and support in applying the hybrid framework.
Performance Measurements	Team members' performances must be acknowledged and rewarded. Interviewees indicated that performance measures are inadequate in their present PM frameworks.
Learning Organisation	Interviewees noted that many teams are delayed or fail because members do not possess the needed skills.
Decentralised Decision-Making	Team leaders must encourage delegation and decentralisation so that all members are provided with the required authority to fulfil their duties. Such delegation will further build communication and collaboration and enhance team skills, which are two crucial APM best practices identified in this study.

Table 6.2: Process Facilitators for Kuwait's O&G Projects' Implementation of a Hybrid Framework **(**Adapted from Conforto *et al.*, 2014)

Process	Description
Possibility to Reconfigure	Project managers should possess the ability and experience to reconfigure the framework or best practices if they do not perform as desired. This was a primary concern of interviewees, who felt that existing project managers in Kuwait's O&G sector might not be able to handle a hybrid framework.

Process Modularity	The interviewees in this study suggested that project managers must approach a hybrid framework in a stepwise manner.
Easy Access to Information	Project managers must provide simple access to information to encourage knowledge sharing and enhance teamwork skills. Moreover, decentralising decision-making powers, communicating and collaborating, and iterating are dependent on the free flow of information within project teams.
Frequent Development Milestones	Retrospective meetings and daily stand-up meetings, communication and collaboration, and performance measurements are connected to progress measurements through frequent milestones.
External Integration	All Agile best practices identified in this study must be incorporated in the traditional waterfall methodology while understanding and harmonising external conditions.

Table 6.3: Project Team's Facilitators for Kuwait's O&G Projects' Implementation of a Hybrid Framework (Adapted from Conforto *et al*., 2014)

Project Team	Description
Self-Directed Teams	All Agile best practices assume the need for a team that is fully equipped with the necessary knowledge, skills, attitude, and resources.
Team Leadership	Decentralisation of authority, knowledge sharing, iterative planning, and enhancement of team skills require the expertise and experience of project leadership.
Team Knowledge Regarding a Hybrid Framework	The identified best practices must be shared in a formal mechanism with team members so that they embrace the change and agree with its implementation. If any team member is not comfortable or remains doubtful regarding a best practice, then discussions should be held until the team achieves consensus.

Team and Project Leader Experience	As the combined experience with a hybrid framework and APM best practices grows among team members and the leader, the implementation of the same will improve, reducing project delays in a successive fashion. Experienced teams should be encouraged to share their expertise with others who are beginning the process.
Multidisciplinary Teams	Multidisciplinary teams are more likely to succeed in discharging a hybrid framework as they are better equipped with team skills. However, communication can be a limiting factor, which can affect collaboration unless project leaders steer their teams well.

Table 6.4: Project Type's Facilitators for Kuwait's O&G Projects' Implementation of a Hybrid Framework (Adapted from Conforto *et al.,* 2014)

Project Type	Description
Succession Planning	Succession planning is imperative for proper team formation, without which the necessary team skills cannot be furnished, and the project suffers.
Required Project Pace	Projects that require an urgent pace benefit from daily stand-up meetings, frequent but quick communication, a fully skilled team, and the efficient solving of contractual issues. Projects with a more accommodating pace that require no compromise on quality benefit from retrospective meetings, iterative planning, and collaboration.
Goal Clarity	Goal clarity can be achieved through iterative planning, daily stand-up meetings, and communication and collaboration to allow all members to remain in sync.
Project Complexity	More complex projects must be analysed to assess whether they can benefit from the familiarity and standardisation of the waterfall methodology or the uncertainty, appetite, and responsiveness of the hybrid framework.

Customer Involvement	The more a customer desires to be involved in the project, the higher the need to communicate and remain responsive.
Project Newness	New projects benefit from additional communication through meetings and closer inspection of milestones; as time passes, team and system maturity grow toward the project requirements, and the need for retrospective meetings, solving contractual issues, and collaboration evolves.

The above tables detail a list of enablers identified within this study as well as through a literature review (Conforto *et al.*, 2014). For instance, if the project is complex because the customers' demands are ever-changing, then daily stand-up meetings, iterative planning, solving contractual issues, and communication and collaboration are compulsory practices. Customers globally are becoming more aware and demanding; thus, the need to incorporate customer feedback has given rise to the Agile methodology. For instance, the current COVID-19 pandemic has pressurised the O&G sector by driving crude prices to unprecedented rates. This development will affect the delivery of projects and should be included in iterative planning.

A prepared team is the ideal judge of decisions in their work purview, which implies that they must be supported by top management and project leaders, who allow them to function as self-directed teams. Stepwise application of the hybrid methodology is important; for instance, applying one best practice and focussing on it or implementing all identified best practices in a single project will allow managers to assess and adjust accordingly. A culture of knowledge sharing and constant learning must be taught to ensure that teams possess the skills, knowledge, and experience to meet customers' requirements.

The identified insights reflect that project leaders must be active in ensuring that the project team is constructed well and provided with the required resources. Moreover, the leader must facilitate the injection of all identified best practices within the team's existing framework and ensure that its iterative and responsive nature remains functional. Further, daily stand-up meetings, retrospective meetings, and iterative

planning require a skilled leader to conduct them appropriately. For instance, some interviewees noted that daily stand-up meetings could cause further delays in the project if they are allowed to stall.

The iteration of Agile methodology requires project teams to remain responsive and vigilant regarding environmental changes and customer requirements so that the project is delivered faster and can incorporate feedback as soon as it is shared. A skilled leader can avoid this situation by ensuring that daily stand-up meetings focus on facts and last only 15–20 minutes. Therefore, all identified best practices of APM, which are included in the hybrid framework, are interconnected as a model; it is difficult to achieve them in isolation. If a project leader organises retrospective meetings, this can improve communication and collaboration with ease and manage the iteration of requirements. Therefore, the hybrid framework must be implemented as a model in its entirety for its success. Such a model features the best practices acting as facilitators in their own right, thus enabling the achievement of the objectives of reducing project delays.

6.4 Hybrid Project Management Framework and Project Complexity (Answer to RQ3)

The hybrid framework utilises the identified best practices to manage project complexity and address issues that cause bottlenecks. The answers provided by the interviewees regarding which APM features they felt are useful to increase PM efficiency in Kuwait's O&G sector illuminate this issue. Phase-wise implementation of the projects was the primary answer given by all interviewees, which indicates that the iterative nature of project planning and implementation allows project managers to reduce the complexity of projects by breaking them into measurable milestones that are simpler to quantify and communicate among team members and contractual vendors. Consequently, the deliverables make a complex project more manageable.

Salameh (2014) comments that complex projects are difficult to execute utilising a TPM framework as it is inflexible towards intangible and ever-changing customer demands, making it ineffective. The iterative and incremental process offered by the APM addresses this gap and increases the responsiveness and effectiveness of the hybrid framework.

Fernandez and Fernandez (2008) report that APM focusses on simplicity, which allows it to address project complexity and iteration. Bergmann and Karwowski (2019) add that the traditional framework alone remains unresponsive to environmental factors and customer requirements, which makes it inflexible and unable to deal with complexity. However, APM utilises iterative planning to respond flexibly and keep customers in close consultation with project managers. Therefore, the unanimous opinions of the interviewees and the support from existing literature demonstrate that the iterative implementation of APM, when applied in a hybrid framework, addresses project complexity.

The second-most commonly cited feature of APM to manage project complexity is flexibility and adaptability, which was identified by six interviewees. According to Interviewee B, '*The hybrid model can really work well in this sector of O&G because they accept the flexibility of projects and allow for a more nimble and nuanced approach of the work*'. Interviewee C defined APM as '*Agile, for agility, alertness, and swiftness*', indicating that these virtues make it the ideal solution for addressing project complexity.

Other interviewees remarked that communication and collaboration remain the backbone of APM, which enable control over the complexity of projects. According to Interviewee D, '*constant communication, collaboration, and planning can greatly enhance the delivery of a project because mistakes and issues such as contracting are taken care of early and continuously*'. Participant E further supported this notion, saying that complexity is optimally addressed through frequent communication. He added:

> '*With a hybrid methodology, the fluidity of operations can be greatly improved. For example, weigh the cons and pros of each management model and combine strengths while reducing the weaknesses. Project management strategies have to improve and mutate with time, technology, complexities, and other dynamics of the project*'.

Sonneveld (2018) reports that communication and collaboration are useful APM features that enable the management of the complexity of projects when customer requirements change during the course of the project.

Interviewed experts identified additional factors in the hybrid framework that would enable it to provide for the complexity of projects: its responsive nature, ability to mitigate risks, modernistic approach to PM, priority to client feedback, and smart working of managers.

Therefore, this study reiterates that utilising APM with TPM to create a hybrid framework can not only reduce project delays but also manage project complexity. This is a significant result for Kuwait's O&G sector, in which environmental changes and customer demands rapidly increase project complexity. By utilising the best practices identified in this study, the projects can be managed in a simplified, responsive, flexible, iterative, and modern manner.

Yusuf *et al.* (2014) note that the O&G sector has added complexity from the need to capitalise on the energy and environment-related challenges. They suggest that organisations must respond to this complexity through the Agile values of responsiveness, resilience, and reliability. Sheel *et al.* (2020) further comment that the Agile values emanate from the need to adjust to the market and the supply chain for downstream O&G companies. Consequently, Piya *et al.* (2020) identify critical factors for designing Agile supply chains for O&G projects. These include strategic alignment with the organisation's aims and strategies as well as operational plans. The top management's commitment, internal collaboration with organisation members, and external liaison with other stakeholders are additionally identified and were named in this study and described in the previous section. The integration of IT and emerging technologies is suggested to enable the alignment and updates of the organisational systems.

Management competence is a key factor that has been explored in this study, and the interviewees mentioned the need for experienced project managers as critical for implementing the hybrid framework. Employee competence was further mentioned, as was organisational culture, both of which are crucial to ensure that Agile values are implemented practically. These critical factors are not only the enablers of a hybrid or Agile framework, but they are also the mediators for impacting the complexity of O&G projects.

Figure 6.5 depicts the proposed hybrid framework and the expected outcomes of faster, more efficient, and improved project quality by utilising the identified best practices.
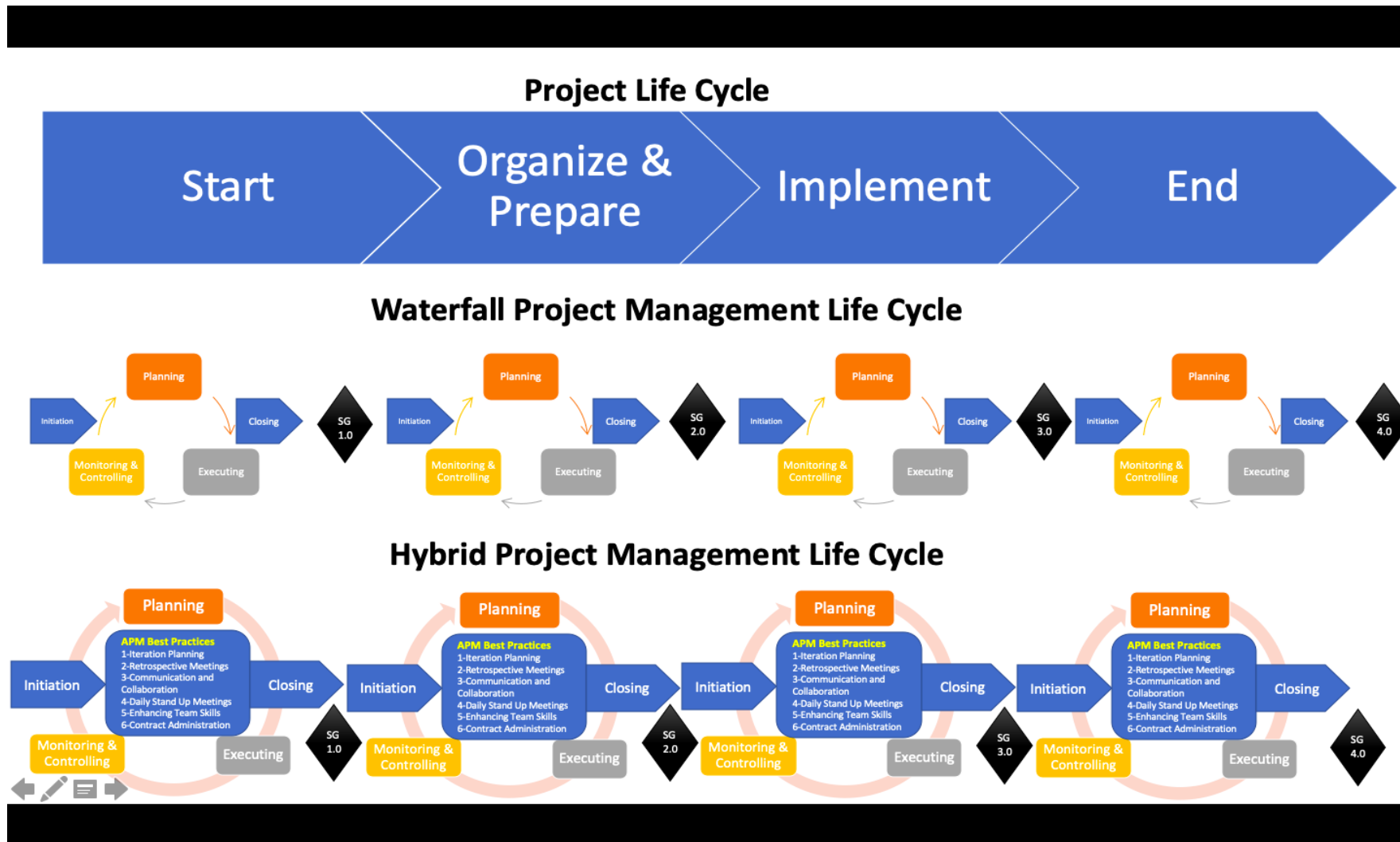
Figure 6.5 : Hybrid Project Management Framework (Created by the Researcher)

In this hybrid framework, certain differences are identified between the traditional and Agile methodologies, as outlined in Table 6.5.

Table 6.5: Differences between Traditional and Agile Contracts

Traditional Contract	Agile Contract
1. Requests are predefined according to a fixed scope, and any changes are meticulously managed.	1. Requests change frequently in response to buyer's needs, a change in requirements or market changes.
2. The solution is defined from the offset, including what is in the scope of the project, when it will be delivered, and the total cost of the contract.	2. The solution is a working entity that changes over time. The hypothesis forms the foundation for the work, and a solution is reached via an incremental process. The requirements are agreed upon during brief planning meetings between the seller and the buyer during each iteration.
3. Typically associated with large-scale, intermittent releases.	3. Value is delivered on a frequent basis through ongoing releases. It is possible for each of the end products that contribute to the end solution to be released within just weeks.
4. Based on a compliance foundation.	4. Rely heavily on trust and open communication.
5. Quality is assured and monitored via a process of inspection and governance. Assessments and validation are generally performed upon project completion or when key milestones are met.	5. Quality is achieved through a process of cooperation and development. The seller shares the aspects of the project that have
6. Only when a contract term is achieved can the definition of **done** be agreed upon.	

	been completed at the close of each iteration. 6. A definition of ***done*** is achieved at the point at which a minimum viable product is generated.

Therefore, all best practices of APM identified in this study were found to be relevant by the questionnaire survey respondents and the interviewees. This study's findings are important for the Kuwaiti O&G sector, which continues to utilise the TPM framework. The interviewees and the responses to the survey reveal that project managers are well aware of the benefits of APM as well as the potential issues that may arise during its implementation in this context. Their strong agreement and acknowledgement of the APM best practices indicate that the sector is ready to embrace the hybrid framework; therefore, it is now the onus of the leadership who must implement the new framework and its practices.

6.5 Limitations

This section describes the limitations related to data collection and the generalizability.

6.5.1 Limitations to Data Collection

This study's critical limitation is that it is limited to one industrial sector with a sample of one location only. This study's scope was limited to Kuwait's O&G sector, which may affect the generalisability of the findings, limiting applicability to the O&G sector and Kuwait's geographical location. The collection of data depended upon obtaining permission from the company where the case study took place. Some of the data that could have been vital for this study was confidential and could not be obtained; however, this research was designed to consider this limitation. As a result, missing information was not vital to the results of this work. The current limitations may have additionally impacted various aspects of the findings, including generalisability, scope, and depth. Similarly, involving human participants in qualitative and quantitative data collection methodologies allows room for subjectivity, which, as noted by Kothari

(2018), can impact the validity and reliability of outcomes. However, a mixed-methods research design was adopted to allow validation and triangulation to improve outcomes' validity and reliability.

6.5.2 Limitations to Generalizability

There are several limitations to the generalizability as applied to this academic study. The quantitative method allows some generalizability to find the issues related to project delays and the set of standard agile best practices. For example, the following best practices are applicable in other industries other than the case study of Oil and Gas: Retrospective Meetings, Iteration Planning, Daily Project Meetings, Communication and Collaboration, Team Skills, Solving Contractual Issues. However, since a complete systematic literature review has not carried out , researchers might add new factors that emerged from non-discovered related works.

The generalizability is limited in terms of the case study. The case study was applied only to a single company in Kuwait for Oil and Gas industry. Therefore, other insights such as whether contractual issues are valid in other countries may need to be investigated. Moreover, the proposed framework was not applied in practice due to Oil and Gas Capital projects' duration time, which might take more than a minimum of five years.

6.6 Implications to Theory and Practice

This study analyses the root causes of Oil and Gas capital projects' delays. Consequently, a list of technical and business enablers was developed to employ the APM in Kuwait's O&G capital projects. To this end, practitioners are now aware of why Oil and Gas projects get delayed, and they can prepare action plans to resolve the issues. They can also utilize the list of best practices gradually in their daily project management activities. Practitioners should be able to (1) Introduce Agile retrospective meetings and iteration planning in their current project management frameworks to reduce project delays, (2) work to increase team collaboration and communication, (3) work to enhance team skills, and (4) plan to solve contractual issues.

In terms of theory, this study utilises a positivist philosophical position based upon the onion research model. The role of Agile best practices that are commonly used in IT-based projects is expanded to be used in a new hybrid model. The hybrid methodology improves the manageability and trackability of materials and increases the flexibility and adaptablity of projects. In IT projects, any project management methodology must first be approved and accredited by the PMO, which should apply to the proposed hybrid project management. Therefore, the new hybrid framework could add to project management theory in the context of Oil and Gas Capital projects.

6.7 Conclusion

The execution of O&G projects is often subject to extreme delays due to their complexity. This study utilises an explanatory sequential mixed-methods approach with a questionnaire survey of 106 project management professionals and in-depth interviews with eight experienced consultants. The research found that contractual problems dominate the delays, communication issues between vendors, poor planning, poor HR planning, compliance labour challenges, and budget inaccuracies. Currently, Kuwait's O&G projects are implemented based on TPM approaches; for example, the KOC implemented the project gate system (PGS) framework in its surface facility projects. The PGS method includes a 'go-no-go' process from the first step of the project to the next step through a gatekeeper method. The model has five stages: Identification, Concept Selection, Project Definition, Project Execution, and Operate and Monitor. The PGS is believed to enhance risk management by prioritising effectively, improving project execution, and ensuring the coordination of multifunctional activities. However, it was applied in surface facility projects, which is one business cluster of O&G projects. The traditional projects management vary across countries; for example, the phase-gate model has been applied in Bahrain, and the schedule model in Korea; however, all of them are based on the waterfall model.

This research hypothesises that (1) Introducing Agile iteration planning in a TPM framework can reduce project delays, (2) Introducing Agile retrospective meetings in a TPM framework can reduce project delays, (3) Introducing daily stand-up meetings in TPM can lead to the faster delivery of O&G projects, (4) Introducing Agile communication and collaboration in a TPM framework can reduce project delays, (5) Identifying and enhancing team skills in a TPM framework can reduce project delays,

and (6) Solving contractual issues in a TPM framework can reduce project delays. The results suggest six best practices of iterative planning: retrospective meetings, daily stand-up meetings, communication and collaboration, enhancement of team skills, and solving contractual issues to reduce project delays and address project complexity. The results further indicate that the identified best practices can reduce these delays by correcting their weaknesses. This study looked for a model to improve the clarity and trackability of the waterfall methodology with flexibility, smooth functioning, and adaptability. There was no evidence to reject the previous hypotheses.

This thesis analysed the root causes of O&G capital project delays utilising a positivist philosophical position based upon the onion research model. This research borrowed and investigated the role of Agile best practices that are commonly used in IT-based projects. Consequently, a list of technical and business enablers was developed to employ the APM in Kuwait's O&G capital projects. Therefore, the obtained knowledge of APM is utilised to supplement and support the applicability of hybrid PM methodologies involving APM and TPM in Kuwait's O&G capital projects. To this end, a hybrid APM over the current TPM is developed.

The hybrid methodology improves the manageability and trackability of materials and increases the flexibility and adaptability of O&G projects. An empirical contribution is made to O&G capital projects by suggesting the best suited APM practices in the traditional waterfall PM framework to address delays. By identifying and implementing practical best practices, this study enables Kuwait's O&G companies to improve the efficiency of their projects by reducing delays and addressing complexity. Therefore, the hybrid model is recommended for Kuwait's O&G sector. However, potential challenges include project managers who do not possess the experience and expertise to apply the hybrid framework.

6.8 Future Directions

This study has suggested a hybrid framework for O&G project managers to address their project delays and better manage project complexity. The best practices that should be implemented by the project managers have been identified, as well as their enablers and potential challenges; however, many aspects of this problem remain out

of the purview of this research design. These areas need further research and reflection by the practitioners to identify solutions which can smooth and simplify the progression of existing projects to more Agile frameworks.

This study assumed a macro view of the O&G sector with a questionnaire survey guiding the data collection and interviews to elucidate the findings. Qualitative studies with a grounded theory approach better assess the factors in team dynamics, leadership styles, organisational politics and culture, communication patterns, and customer demands to allow project managers better to prepare themselves for the demands of the situation.

Moreover, further information is required regarding the other factors in the immediate environment of the projects, such as the organisational differences and the environmental facilitators to guide the success of hybrid frameworks in other contexts. The enablers identified in this study need additional evidentiary support, such as data obtained through practice, to guide future project managers who implement the hybrid framework. Since O&G projects are highly complex, they are usually lengthy in time due to their broad scope; therefore, the new hybrid model could work better for this situation. However, the same framework could be applied to short-term projects like those in the IT field.

6.8.1 Scope of Future Work

6.8.1.1 The hybrid framework impact

 Future researchers should study the impact of the hybrid framework on the outcomes of a project. This study has considered the O&G sector as a whole with no consideration of individual differences between various firms with respect to their management, clientele, the scale of operations, or organisational structures and processes. These aspects impact how well the hybrid framework influences the outcomes of reducing project delays, improving the efficiency of work, and increasing quality of output.

6.8.1.2 Best practice identification

There is a need to identify best practices with more detailed instructions for project leaders. For a country such as Kuwait, in which the Agile framework has not yet seen widespread practice, project managers and leaders will need additional support to adopt practices that can enable them to deliver the required agility. For instance, if project managers prescribe daily stand-up meetings, bi-weekly retrospective meetings, succession planning and performance management for team members, and solving contractual issues at the beginning of the study, then they will be in a better position to understand client expectations. It is also important to mention here that these practices are not exhaustive, and it is necessary to identify, apply, and assess the influence of other APM practices on the management of projects. Moreover, more facilitators, like the role played by organisational culture, market conditions, and the type of projects also need to be explored.

6.8.1.3 Transitioning to the Proposed Hybrid Agile Project Management

The obtained knowledge of APM in this thesis includes the use of Agile best practices to enhance the performance of O&G projects. The issue of how the hybrid agile project management (HPM) will be implemented includes various facilitators that should be included: organisational facilitators, process, team, and project types facilitators. Organisational facilitators include organisational culture, acceptance of Agile methodology, adequate reward, performance measurements, learning organisation, and decentralised decision-making. The process facilitators include the possibility to reconfigure, easy access to information, process modularity, frequent development milestones, and external integration. The team facilitators are comprised of: self-directed teams, team leadership, team knowledge regarding a hybrid framework, team and project leadership experience, and multidisciplinary teams. The project facilitators include: succession planning, required project pace, goal clarity, project complexity, customer involvement, and project novelty. This research provides a list of guidelines that could be used to implement the new HPM, listed below.

1. Create an organisation entity/authority to implement the new methodology.
   The new entity should have experts from various domains, including senior engineers, contract managers, senior programme managers, and project

excellence managers. Experts will build a set of guidelines on how projects should be initiated and closed using the new framework. Introducing a new entity brings with it risk management and change management processes. Above all, it is an awareness of the new methodology, especially for executives who decide when they plan to start the implementation of the new framework. Therefore, the overall goal of such an entity is providing a place where project managers and engineers come for a consultation, sharing project progress, audits, and inspections. The creation of the new entity (unit) includes harmonising the HAPM objectives with the organisation objectives and strategic objectives. The organisation will also show the steps that could be followed by a project manager to identify Agile team roles, user scenarios, sprints, and identifying the scrum master (or coach). The major artefact that will be produced by this entity is the transition plan. Ultimately, project managers will hire team members either in a projectised or functional environment, with cross-functional or T-shaped members.

2. The next highest level portfolio managers create intuitive programme roadmaps based on many factors, which include higher-level dependencies and costs. Later, as the scrum master/coach is assigned to a project, they will start their Agile activities which include:

   a. Project planning: project planning includes scoping, identifying scenarios and backlog size, how to measure quality and change and risk management. The product features are broken down based on project constraints and stakeholder needs. The new sprints accumulate the overall product backlog

   b. Sprint planning and project execution: Each project cycle is scheduled before the project kicks off. Once the project is started, the tasks are assigned to team members efficiently. A team collaboration environment should be enhanced with transparency, shared understanding and removing potential issues ahead of time. Moreover, daily stand-up meetings should be conducted daily to assess whether any changes need to be made.

   c. Sprint review and retrospective: After the end of each sprint, the team reviews the sprint with the project stakeholders to show the project progress and to solve issues early. Once the release of the product is ready, the team reviews the product, with the stakeholder keeping open communication with stakeholders. The retrospective meeting discusses what went well during the

sprint, what could have been better, team task levelling, and reporting the accomplishment in the sprint.

3. Increase team capabilities: According to the interviews, there was a lack of the APM practices; therefore, there should be an awareness for educating Agile teams on how the new process will be expanded in their current roles.

4. Once the organisational entity establishes the transition steps, they will circulate these steps to project managers. Thereby, the project manager and project teams should become comfortable with the new style of work. At the early stages of the transition, teams may struggle and be resistant to change; therefore, issues should be resolved early to make sure stories' and sprints' statuses are updated regularity.

5. During execution tracking, the new Agile team's progress should provide confidence for the success of the new changes. It is practical to have Agile metrics for measurement purposes. For example, they provide metrics for similar projects that were run in the waterfall.

6. The communication with contractors and suppliers has to be maximised to provide a better environment for project execution and to solve contractual issues early. The assigned project /scrum master should be fed with helpful material to conduct daily meetings and reviews of sprints. Documents should also allow teams to identify areas that need improvement.

7. The project manager should pay close attention to phase-gates because if any phase-gate were not successful, the upcoming phase would be delayed. Since the HPM does not have full planning, the delay of any sprint due to pitfalls in daily stand-up meetings or retrospective meetings will inherit delays in the overall project.

References

Abdulla, H., Alhashimi, M., Hamdan, A.M. (2019) The impact of project management methodologies on project success. *Journal of Engineering, Project, and Production Management*. **9**(2), 418–437.

Abdullah, A.A., Rahman, H.A., Awang, M.S. (2011) Identification of the major project management issues in oil and gas industry in Malaysia. *International Journal of Business and Social Science*. **2**(11), 182–194.

Abdullah, O. (2020) *Impacts of construction material delay in Iraq. (PhD Dissertation)*. The University of Texas at Arlington.

Abu Nadi, I.K. (2012) *Influence of culture on e-government acceptance in Saudi Arabia. (Doctoral Dissertation)*. Griffith University.

Adeleke, A. (2017) *Linking effective project management to business strategy in oil and gas industry through decision-making processes. (Doctoral Dissertation). Available from ProQuest Dissertations & Theses Global database. (Accession Order No. AAT 10605776)*. North Central University.

Adenowo, A.A., Adenowo, B.A. (2014) Software engineering methodologies: a review of the waterfall model and object-oriented approach. *International Journal of Scientific & Engineering Research*. **4**(7), 427–434.

Agile Business Consortium (2014) Introduction to the DSDM Principles. In *The DSDM agile project framework*. Kent, UK: Agile Business Consortium.

Ahern, T., Leavy, B., Byrne, P.J. (2014) Complex project management as complex problem solving: a distributed knowledge management perspective. *International Journal of Project Management*. **32**(8), 1371–1381.

Ahmad, M.O., Dennehy, D., Conboy, K., Oivo, M. (2018) Kanban in software engineering: a systematic mapping study. *Journal of Systems and Software*. **1**(137), 96–113.

Ahmed, M. (2011) Project management: Factors critical for success of projects in oil

& gas sector of Kuwait. *SSRN 2061014*.

Al-Hajji, H., Khan, S. (2016) Keeping oil & gas EPC major projects under control: strategic & innovative project management practices. In *Society of Petroleum Engineers - Abu Dhabi International Petroleum Exhibition and Conference, 2016*. Abu Dhabi: Society of Petroleum Engineers.

Al-Hazim, N., Salem, Z.A., Ahmad, H. (2017) Delay and cost overrun in infrastructure projects in Jordan. *Procedia Engineering*. **182**, 18–24.

Al-Salem, M., Al-Shehab, N., Decena, J. (2018) Design and implementation of the well delivery project gate system. In *Proceedings of the SPE/IADC Middle East Drilling Technology Conference and Exhibition, 2018*. Abu Dhabi: Society of Petroleum Engineers.

Al-Sobai, K.M., Pokharel, S., Abdella, G.M. (2020) Perspectives on the capabilities for the selection of strategic projects. *Sustainability*. **12**(19), 8191.

Al-tabtabai, H. (2002) Causes for delays in construction projects in Kuwait. *Engineering Journal of Qatar University*. **15**, 19–37.

Al-Zubaidi, W.H.A., Dam, H.K., Choetkiertikul, M., Ghose, A. (2018) Multi-objective iteration planning in agile development. In *25th Asia-Pacific Software Engineering Conference (APSEC),2018*. Nara, Japan: IEEE, pp. 484–493.

Alaa, G., Fitzgerald, G. (2013) Re-conceptualizing agile information systems development using complex adaptive systems theory. *Emergence: Complexity & Organization*. **15**(3), 1–23.

AlAmir, N., AlMarar, M. (2019) Spotlight on oil and gas major projects – shall we continue investing? In *SPE Gas & Oil Technology Showcase and Conference*. Dubai, UAE: Society of Petroleum Engineers, p. 8.

Albuquerque, F., Torres, A.S., Berssaneti, F.T. (2020) Lean product development and agile project management in the construction industry. *Revista de Gestão*. **27**(2), 135–151.

Alghais, N., Pullar, D. (2018) Projection for new city future scenarios – A case study

for Kuwait. *Heliyon*. **4**(3), 35.

Alhajri, A., Alshibani, A. (2018) Critical factors behind construction delay in petrochemical projects in Saudi Arabia. *Energies*. **11**(7), 1652.

Ali, K. (2017) A Study of software development life cycle process models. *International Journal of Advanced Research in Computer Science*. **8**(1), 15–23.

Alsaghier, H.M. (2010) *An investigation of critical factors affecting citizen trust in e-government: empirical evidence from Saudi Arabia. (PhD Doctorate Thesis)*. Griffith University.

Alt-Simmons, R. (2015) *Agile by design: An implementation guide to analytic lifecycle management*. 1st ed.. Hoboken: John Wiley & Sons.

Ambler, S.W. (2005) *A Practical Guide to Feature-Driven Development*. 1st Editio. New Delhi: Prentice Hall.

Amlani, R.D. (2012) Advantages and limitations of different SDLC models. *International Journal of Computer Applications & Information Technology*. **1**(3), 6–11.

Anderson, D.J. (2010) *Kanban: successful evolutionary change for your technology business*. Illustrate. Washington: Blue Hole Press.

Andrei, B.-A., Casu-Pop, A.-C., Gheorghe, S.-C., Boiangiu, C.-A. (2019) A study on using waterfall and agile methods in software project management. *Journal of Information Systems & Operations Management*. **13**(1), 125–135.

Andriyani, Y. (2017) Knowledge management and reflective practice in daily stand-up and retrospective meetings. In H. Baumeister, H. Lichter, & M. Riebisch, eds. *Agile Processes in Software Engineering and Extreme Programming*. Cham: Springer International Publishing, pp. 285–291.

Andy, C., David, A. (2015) *Essential Kanban*. Seattle: Lean Kanban University Press.

Aniche, M.F., De Azevedo Silveira, G. (2011) Increasing learning in an agile environment: Lessons learned in an agile team. In *Proceedings - 2011 Agile*

Conference, Agile 2011. New York: IEEE, pp. 289–295.

Anwer, F., Aftab, S., Waheed, U., Muhammad, S.S. (2017) Agile software development models TDD FDD DSDM and crystal methods: a survey. *International journal of multidisciplinary sciences and engineering*. **8**(2), 1–10.

Arditi, D., Nayak, S., Damci, A. (2017) Effect of organizational culture on delay in construction. *International Journal of Project Management*. **35**(2), 136–147.

Ariza, H.M., Mozo, V.R., Quintero, H.M. (2018) Methodology for the agile development of software based on a guide for the body of knowledge of SCRUM (SBOK TM Guide). *International Journal of Applied Engineering Research*. **13**(14), 11479–11483.

Asrilhant, B., Meadows, M., Dyson, R.G. (2004) Exploring decision support and strategic project management in the oil and gas sector. *European Management Journal*. **22**(1), 63–73.

Astuti, R.D., MArtdianty, F. (2012) Conflict approaches of effective project manager in the upstream sector of Indonesian oil & gas industry. *The South East Asian Journal of Management*. **6**(2), 65–142.

AXELOS (2019) What is PRINCE2®? *AXELOS*. [online]. Available from: https://www.axelos.com/best-practice-solutions/prince2/what-is-prince2 [Accessed January 1, 2020].

Babones, S. (2016) Interpretive quantitative methods for the social sciences. *Sociology*. **50**(3), 453–469.

Badiru, A.B., Osisanya, S.O. (2016) *Project management for the oil and gas industry*. Cleveland: Taylor & Francis , CRC Press.

Balaji, S. (2012) Waterfall vs v-model vs agile : a comparative study on SDLC. *International Journal of Information Technology and Business Management*. **2**(1), 26–30.

Banerjee, U., Narasimhan, E., Kanakalata, N. (2011) Experience of executing fixed price off-shored agile project. In *Proceedings of the 4th India Software Engineering*

Conference. ISEC '11. New York: Association for Computing Machinery (ISEC' 11), pp. 69–75.

Beck, K. (1999) *Extreme programming explained: embrace change*. 2nd Editio. Boston, US: Addison Wesley.

Beck, K., Beedle, M., Bennekum, A. Van, Cockburn, A., Cunningham, W., Fowler, M., Grenning, J., Highsmith, J., Hunt, A., Jeffries, R., Kern, J., Marick, B., Martin, R.C., Mellor, S., Schwaber, K., Sutherland, J., Thomas, D. (2001) Manifesto for agile software development. *The Agile Alliance*.

Belling, S. (2020) Agile values and practices. In *Succeeding with Agile Hybrids*. Springer, pp. 47–61.

Benediktsson, O., Dalcher, D. (2005) Estimating size in incremental software development projects. *IEE Proceedings - Software*. **152**(6), 253–259.

Bergmann, T., Karwowski, W. (2019) Agile project management and project success: a literature review. In *Advances in Human Factors, Business Management and Society*. Cham: Springer, pp. 405–414.

Binder, J., Aillaud, L.I. V, Schilli, L. (2014) The project management cocktail model: an approach for balancing agile and ISO 21500. *Procedia - Social and Behavioral Sciences*. **119**(C), 182–191.

Blanc, A. (2011) Introduction to risk management for project management. In *Candian Socierty of Value Analysis*. Toronto: Candian Socierty of Value Analysis.

Blaskovics, B. (2016) The impact of project manager on project success--the case of ict sector. *Society and Economy*. **38**(2), 261–281.

Bočková, K., Škoda, M., Lengyelfalusy, T. (2019) Project management and its strategies in global organisation: case study. In *International Conference On Innovations In Science And Education*. Prague, Czech Republic: WWW.ISEIC.CZ.

Bosch-Sijtsema, P.M., Henriksson, L.H. (2014) Managing projects with distributed and embedded knowledge through interactions. *International Journal of Project Management*. **32**(8), 1432–1444.

British Petroleum (2020) *Statistical review of world energy*. British Petroleum.

Bryde, D., Unterhitzenberger, C., Joby, R. (2018) Conditions of success for earned value analysis in projects. *International Journal of Project Management*. **36**(3), 474–484.

Bryman, A. (2011) Triangulation. In M. S. Lewis-Beck, B. A., & L. T. F, eds. *Encyclopedia of Social Science Research Methods*. Thousand Oaks: Sage, pp. 1–5.

Bryman, A., Bell, E. (2015) *Business research methods*. 4th ed. Oxford: Oxford University Press.

Cavana, R.Y., Delahaye, B.L., Sekaran, U. (2001) *Applied business research: Qualitative and quantitative methods. Singapore*. Milton: John Wiley & Sons Inc.

Cervone, H.F. (2011) Understanding agile project management methods using scrum. *OCLC Systems & Services: International digital library perspectives*. **27**(1), 18–22.

Chapram, S.B. (2018) An appraisal of agile DSDM approach. *International Journal of Advance Research*. **4**(3), 512–515.

Chow, T., Cao, D.-B.D.B. (2008) A survey study of critical success factors in agile software projects. *Journal of systems and software*. **81**(6), 961–971.

Close, D. (2006) Building the high-performance E&P company. *Journal of Petroleum Technology*. **58**(9), 1–4.

Cockburn, A. (2004) *Crystal clear: a human-powered methodology for small teams*. 1st Editio. Boston: Addison Wesley.

Cohen, J. (2013) *Statistical power analysis for the behavioral sciences*. 2nd ed. New York: Routledge.

Conforto, E.C., Amaral, D.C. (2016) Agile project management and stage-gate model—A hybrid framework for technology-based companies. *Journal of Engineering and Technology Management*. **40**, 1–14.

Conforto, E.C., Amaral, D.C., da Silva, S.L., Di Felippo, A., Kamikawachi, D.S.L.

(2016) The agility construct on project management theory. *International Journal of Project Management*. **34**(4), 660–674.

Conforto, E.C., Salum, F., Amaral, D.C., Da Silva, S.L., De Almeida, L.F.M. (2014) Can agile project management be adopted by industries other than software development? *Project Management Journal*. **45**(3), 21–34.

Conroy, R. (2015) Sample size: a rough guide. *Sample Size: Resources on the intenet*.

Cooke-Davies, T. (2002) The 'real' success factors on projects. *International Journal of Project Management*. **20**(3), 185–190.

Cooper, R., Hinks, J., Aouad, G., Kagioglou, M., Sheath, D.M., Sexton, M., M. (1998) *A generic guide to the design and construction process protocol*. University of Salford.

Cooper, R.G. (2016) Agile–stage-gate hybrids: the next stage for product development blending agile and stage-gate methods can provide flexibility, speed, and improved communication in new-product development. *Research-Technology Management*. **59**(1), 21–29.

Cooper, R.G., Edgett, S.J., Kleinschmidt, E.J. (2002) Optimizing the stage-gate process: what best-practice companies do—I. *Research-Technology Management*. **45**(5), 21–27.

Cooper, R.G., Sommer, A.F. (2016) Agile-stage-gate: new idea-to-launch method for manufactured new products is faster, more responsive. *Industrial Marketing Management*. **59**, 167–180.

Creswell, J. (2018) *Research design: qualitative, quantitative, and mixed methods approaches*. 5th ed. Thousand Oaks: Sage.

Creswell, J., Clark, V. (2017) *Designing and conducting mixed methods research*. 3rd ed. Thousand Oaks: Sage.

Creswell, J.W. (2005) *Educational research: planning, conducting, and evaluating quantitative*. New Jersey: Prentice Hall Upper Saddle River.

Cronbach, L.J. (1951) Coefficient alpha and the internal structure of tests. *Psychometrika*. **16**(3), 297–334.

Dehaghi, M.R. (2019) Enhancing employee's capability maturity level in Iran's oil company. *European Journal of Business and Management Research*. **4**(6).

Demir, S.T., Bryde, D.J., Sertyesilisik, B. (2014) Introducing agilean to construction project management. *Journal of Modern Project Management*. **1**(3), 28–39.

Demir, S.T., Theis, P. (2016) Agile design management--the application of scrum in the design phase of construction projects. In *24th Annual Conference of the International Group for Lean Construction,*. Boston, USA, pp. 13–22.

Dey, P.K. (2012) Project risk management using multiple criteria decision-making technique and decision tree analysis: a case study of Indian oil refinery. *Production Planning and Control*. **23**(12), 903–921.

Dikert, K., Paasivaara, M., Lassenius, C. (2016) Challenges and success factors for large-scale agile transformations: a systematic literature review. *Journal of Systems and Software*. **119**, 87–108.

Dima, A.M., Maassen, M.A. (2018) From waterfall to agile software: development models in the IT sector, 2006 to 2018. Impacts on company management. *Journal of International Studies*. **11**(2), 315–326.

Dingsøyr, T., Dybå, T., Gjertsen, M., Jacobsen, A.O., Mathisen, T.-E., Nordfjord, J.O., Røe, K., Strand, K. (2019) Key lessons from tailoring agile methods for large-scale software development. *IT Professional*. **21**(1), 34–41.

Dorairaj, S., Noble, J., Malik, P. (2012) Understanding team dynamics in distributed Agile software development. In *International conference on agile software development*. Berlin, Heidelberg: Springer, pp. 47–61.

Dörnyei, Z., Csizér, K. (2012) How to design and analyze surveys in second language acquisition research. In A. Mackey & S. M. Gass, eds. *Research Methods in Second Language Acquisition: A Practical Guide*. Thousand Oaks: Sage, pp. 74–94.

Drury-Grogan, M.L. (2014) Performance on agile teams: relating iteration objectives and critical decisions to project management success factors. *Information and Software Technology*. **56**(5), 506–515.

Dudziak, T. (2000) Extreme programming an overview. In *Methoden und Werkzeuge der Softwareproduktion WS*. pp. 1–28.

Dzamashvili Fogelström, N., Gorschek, T., Svahnberg, M., Olsson, P. (2010) The impact of agile principles on market-driven software product development. *Journal of Software Maintenance and Evolution: Research and Practice*. **22**(1), 53–80.

Easterby-Smith, M., Thorpe, R. (2018) *Management and business research*. 6th ed. Thousand Oaks: Sage.

El-Reedy, M. (2016) *Project management in the oil and gas industry*. 1st ed. Hoboken: John Wiley & Sons.

Emam, H., Farell, P., Abdelaal, M.A. (2014) Causes of delay in GCC construction projects. *Smart, Sustainable and Healthy Cities*, 607.

Etikan, I., Musa, S.A., Alkassim, R.S. (2016) Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*. **5**(1), 1–4.

Fallahnejad, M.H. (2013) Delay causes in Iran gas pipeline projects. *International Journal of Project Management*. **31**(1), 136–146.

Farrington, D.P. (2003) Methodological quality standards for evaluation research. *The Annals of the American Academy of Political and Social Science*. **587**(1), 49–68.

Fernandez, D.J.D.J., Fernandez, J.D.J.D. (2008) Agile project management - agilism versus traditional approaches. *Journal of Computer Information Systems*. **49**(2), 10–17.

Field, M., Keller, L.S. (2015) *Project management*. Andover, Hants.: The National Center for Public Policy and Higher Education.

Fincham, J.E. (2008) Response rates and responsiveness for surveys, standards,

and the Journal. *American journal of pharmaceutical education*. **72**(2).

Fogelström, N.D., Gorschek, T., Svahnberg, M., Olsson, P., Dzamashvili Fogelström, N., Gorschek, T., Svahnberg, M., Olsson, P. (2010) The impact of agile principles on market-driven software product development. *Journal of Software Maintenance and Evolution: Research and Practice*. **22**(1), 53–80.

Franklin, T. (2008) Adventures in agile contracting: evolving from time and materials to fixed price, fixed scope contracts. In *Agile 2008 Conference*. New York: IEEE, pp. 269–273.

Gallicano, T. (2013) An example of how to perform open coding, axial coding and selective coding. *The PR Post*.

Gambatese, J.A., Pestana, C., Lee, H.W. (2017) Alignment between Lean principles and practices and worker safety behavior. *Journal of Construction Engineering and Management*. **143**(1), 04016083.

Ghandi, A., Lin, C.-Y.C. (2014) Oil and gas service contracts around the world: a review. *Energy Strategy Reviews*. **3**, 63–71.

Golafshani, N. (2003) Understanding reliability and validity in qualitative research. *The Qualitative Report*. **8**(4), 597–606.

Goldsmith, H., Boeuf, P. (2019) Digging beneath the iron triangle: the chunnel with 2020 hindsight. *Journal of Mega Infrastructure & Sustainable Development*. **1**(1), 79–93.

Goyal, S. (2007) Feature driven development agile techniques for project management software engineering. In *Agile Techniques for Project Management and Software Engineering*. Munich: Technical University Munich, pp. 1–19.

Gray, D. (2018) *Doing research in the real world*. 4th ed. Thousand Oaks: Sage.

Gray, D. (2009) *Doing research in the real world*.

Guest, G., Namey, E., Chen, M. (2020) A simple method to assess and report thematic saturation in qualitative research. *PLoS ONE*. **15**(5), e0232076.

Guetterman, T.C., Fetters, M.D. (2018) Two methodological approaches to the integration of mixed methods and case study designs: a systematic review. *American Behavioral Scientist*. **62**(7), 900–918.

Gupta, S.K., Gunasekaran, A., Antony, J., Gupta, S., Bag, S., Roubaud, D. (2019) Systematic literature review of project failures: Current trends and scope for future research. *Computers & Industrial Engineering*. **127**, 274–285.

Gustavsson, T. (2016) Benefits of agile project management in a non-software development context - A literature review. In *Project Management Development – Practice and Perspectives: Fifth International Scientific Conference on Project Management in the Baltic Contries April 14-15, 2016*. Riga, University of Latvia: Latvijas Universitate, pp. 114–124.

Hannevik, M.B., Lone, J.A., Bjørklund, R., Bjørkli, C.A., Hoff, T. (2014) Organizational climate in large-scale projects in the oil and gas industry: a competing values perspective. *International Journal of Project Management*. **32**(4), 687–697.

Hanssen, G.K., Stålhane, T., Myklebust, T. (2018) What is agile software development: a short introduction. In *SafeScrum®-- Agile Development of Safety-Critical Software*. Cham: Springer, pp. 11–15.

Hatmoko, J.U.D., Khasani, R.R. (2019) Mapping delay risks of EPC projects: a case study of a platform and subsea pipeline of an oil and gas project. In *IOP Conference Series: Materials Science and Engineering*. p. 12095.

Hoda, R., Noble, J., Marshall, S. (2012) Developing a grounded theory to explain the practices of self-organizing agile teams. *Empirical Software Engineering*. **17**(6), 609–639.

Hughes, D.L., Rana, N.P., Dwivedi, Y.K. (2020) Elucidation of IS project success factors: an interpretive structural modelling approach. *Annals of Operations Research*. **285**(1), 35–66.

IBM Corp. (2019) IBM SPSS Statistics for Windows. *IBM Corp.*

Immerwahr, J., Johnson, J., Gasbarra, P. (2008) *The iron triangle: College*

presidents talk about costs, access, and quality. National Center Report #08-2. The National Center for Public Policy and Higher Education.

Ivankova, N. V, Creswell, J.W., Stick, S.L. (2006) Using mixed-methods sequential explanatory design: From theory to practice. *Field Methods*. **18**(1), 3–20.

Ivanov, V., Masyagin, S., Rogers, A., Succi, G., Tormasov, A., Yi, J., Zorin, V. (2018) Comparison of agile, quasi-agile and traditional methodologies. In *International Conference in Software Engineering for Defence Applications*. Berlin: Springer, pp. 128–137.

Jalali Sohi, A., Bosch-Rekveldt, M., Hertogh, M. (2019) Practitioners' perspectives on flexible project management. *IEEE Transactions on Engineering Management*, 1–15.

Jamali, G., Oveisi, M. (2016) A study on project management based on PMBOK and PRINCE2. *Modern Applied Science*. **10**(6), 142–146.

Jergeas, G.F., Ruwanpura, J. (2009) Why cost and schedule overruns on mega oil sands projects? *Practice Periodical on Structural Design and Construction*. **15**(1), 40–43.

Jergeas, G.F., Ruwanpura, J. (2010) Why cost and schedule overruns on mega oil sands projects? *Practice Periodical on Structural Design and Construction*. **15**(1), 40–43.

Johnson, S.L., Gray, P., Sarker, S. (2019) Revisiting IS research practice in the era of big data. *Information and Organization*. **29**(1), 41–56.

Jørgensen, M. (2018) Do agile methods work for large software projects? In J. Garbajosa, X. Wang, & A. Aguiar, eds. *Agile Processes in Software Engineering and Extreme Programming*. Cham: Springer International Publishing, pp. 179–190.

Joyner, R.L., Rouse, W.A., Glatthorn, A.A. (2018) *Writing the winning thesis or dissertation: A step-by-step guide*. Corwin Press.

Kannan, V., Jhajharia, S., Verma, S. (2014) Agile vs waterfall : a comparative analysis. *International Journal of Science, Engineering and Technology Research (IJSETR*. **3**(10), 2680–2686.

Karami, M., Samimi, A., Ja'fari, M. (2020) Necessity to study of risk management in oil and gas industries (case study: oil projects). (Short Communication). *Progress in Chemical and Biochemical Research*, 239–243.

Karlström, D., Runeson, P. (2005) Combining agile methods with stage-gate project management. *IEEE Software*. **22**(3), 43–49.

Kassem, M.A., Khoiry, M.A., Hamzah, N. (2019) Evaluation of risk factors affecting on oil and gas construction projects in Yemen. *International Journal of Engineering & Technology*. **8**(1.2), 6–14.

Kerzner, H. (2017) *Project management: a systems approach to planning, scheduling, and controlling*. 12th Editi. John Wiley & Sons.

Khaleel, T.A., Hadi, I.Z. (2017) Controlling of time-overrun in construction projects in Iraq. *Engineering and Technology Journal*. **35**(2 Part (A) Engineering), 111–117.

Kotaiah, B., Khalil, M. (2017) Approaches for development of software projects: Agile methodology. *International Journal of Advanced Research in Computer Science*. **8**(1), 237–242.

Kotb, M., Abdel, M., Ibrahim, R., Al-olayan, Y.S. (2018) A Study of the cash flow forecasting impact on the owners financial management of construction projects in the state of Kuwait. *Asian Business Research*. **3**(1).

Kothari, C.R. (2018) *Research methodology-methods and techniques*. New Delhi: New Age International.

KPMG, AIPM, IPMA (2019) The future project management global outlook -project management survey. *KPMG*.

Kramer, M. (2018) Best practices in systems development lifecycle: an analyses based on the waterfall model. *Review of Business & Finance Studies*. **9**(1), 77–84.

Kvale, S. (2011) *Doing interviews*. Thousand Oaks: Sage.

Kvale, S. (1989) *Issues of validity in qualitative research*. Lund, Sweden: Studentlitteratur.

Labelle, R., Gargouri, R.M., Francoeur, C. (2010) Ethics, diversity management, and financial reporting quality. *Journal of Business Ethics*. **93**(2), 335–353.

Lappi, T., Karvonen, T., Lwakatare, L.E., Aaltonen, K., Kuvaja, P. (2018) Toward an improved understanding of Agile project governance: a systematic literature review. *Project Management Journal*. **49**(6), 39–63.

Larman, C. (2004) *Agile and iterative development: a manager's guide*. 1st Editio. Boston: Addison-Wesley.

Leslie, J. (2015) Agile project management software user report. *Software Advice*.

Liberda, M., Ruwanpura, J., Jergeas, G. (2003) Construction productivity improvement: a study of human, management and external issues. In *Proceedings of the Congress Construction Research Congress, Winds of Change: Integration and Innovation in Construction*. Reston: ASCE, pp. 1–8.

Likosky, M. (2010) Contracting and regulatory issues in the oil and gas and metallic minerals industries. *Transnational corporations*. **18**(1), 1–42.

Longhurst, R. (2003) Semi-structured interviews and focus groups. *Key Methods in Geography*. **3**(2), 143–156.

Marcelino-Sádaba, S., González-Jaen, L.F., Pérez-Ezcurdia, A. (2015) Using project management as a way to sustainability. From a comprehensive review to a framework definition. *Journal of Cleaner Production*. **99**(C), 1–16.

Martikainen, A. (2017) *Front end of innovation in industrial organization: Constructive research. (Master's Thesis in industrial management)*. University of VAASA.

Martin, H., Lewis, T.M., Petersen, A. (2016) Factors affecting the choice of construction project delivery in developing oil and gas economies. *Architectural Engineering and Design Management*. **12**(3), 170–188.

Mathar, H., Assaf, S., Hassanain, M.A., Abdallah, A., Sayed, A.M.Z. (2020) Critical success factors for large building construction projects. *Built Environment Project and Asset Management*. **10**(3), 349–367.

Matković, P., Tumbas, P. (2010) A comparative overview of the evolution of software development models. *International Journal of Industrial Engineering and Management (IJIEM)*. **1**(4), 163–172.

Matos, S., Lopes, E. (2013) Prince2 or PMBOK – a question of Choice. *Procedia Technology*. **9**, 787–794.

Matthies, C., Dobrigkeit, F., Ernst, A. (2019) Counteracting agile retrospective problems with retrospective activities. In A. Walker, R. V O'Connor, & R. Messnarz, eds. *Systems, Software and Services Process Improvement*. Cham: Springer International Publishing, pp. 532–545.

Maxwell, J.A. (2017) The validity and reliability of research: a realist perspective. In D. Wyse, N. Selwyn, E. Smith, & L. E. Suter, eds. *The BERA/SAGE handbook of educational research*. Thousand Oaks: Sage, pp. 116–140.

Mbala, M., Aigbavboa, C., Aliu, J. (2019) Causes of delay in various construction projects: a literature review. In *Advances in Intelligent Systems and Computing*. Berlin: Springer, pp. 489–495.

McConnell, S. (1996) *Rapid development: taming wild software schedules*. 1st Editio. Redmond, Wshaington: Microsoft Press.

McHugh, O., Conboy, K., Lang, M. (2012) Agile practices: the impact on trust in software project teams. *IEEE Software*. **29**(3), 71–76.

Menachery, M. (2019) Women leaders in the Kuwait oil sector. *Refining & Petrochemicals*.

Mills, A., Durepos, G., Wiebe, E. (2013) Mixed methods in case study research. In *Encyclopedia of Case Study Research*. Thousand Oaks: SAGE Publications, Inc., p. 1152.

Mills, Albert, Durepos, Gabrielle, Wiebe, Elden (2010) Contribution, theoretical. In A Mills, G Durepos, & E Wiebe, eds. *Encyclopedia of case study research*. Thousand Oaks: SAGE Publications, Inc., pp. 237–239.

Mishra, D., Mishra, A., Ostrovska, S. (2012) Impact of physical ambiance on

communication, collaboration and coordination in Agile software development: An empirical evaluation. *Information and Software Technology*. **54**(10), 1067–1078.

Misra, S.C., Kumar, V., Kumar, U. (2009) Identifying some important success factors in adopting agile software development practices. *Journal of Systems and Software*. **82**(11), 1869–1890.

Moe, N.B., Dingsøyr, T., Dybå, T. (2010) A teamwork model for understanding an agile team: a case study of a scrum project. *Information and Software Technology*. **52**(5), 480–491.

Mohammed, R., Suliman, S. (2019) Delay in pipeline construction projects in the oil and gas industry: part 1 (risk mapping of delay factors). *International Journal of Construction Engineering and Management*. **8**(1), 24–35.

Mohammed, S., Jasim, A. (2018) Examining the values and principles of agile construction management in Iraqi construction projects. *Journal of Engineering*. **24**(7), 114–133.

Mollahoseini Ardakani, M.R., Hashemi, S.M., Razzazi, M. (2018) Adapting the scrum methodology for establishing the dynamic inter-organizational collaboration. *Journal of Organizational Change Management*. **31**(4), 852–866.

Moniruzzaman, A.B.M., Hossain, D.S.A. (2013) Comparative study on agile software development methodologies. *arXiv preprint arXiv:1307.3356*.

Morris, P. (2013) Reconstructing project management reprised: a knowledge perspective. *Project Management Journal*. **44**(5), 6–23.

Murray, C.D., Sixsmith, J. (1998) E-mail: a qualitative research medium for interviewing? *International Journal of Social Research Methodology*. **1**(2), 103–121.

Nafisah, S.R., Suzianti, A., Ardi, R. (2019) Risk analysis of agile framework in project management exploration drilling in oil and gas sector. In *IOP Conference Series: Materials Science and Engineering*. p. 12010.

Noll, J., Beecham, S. (2019) How agile is hybrid agile? an analysis of the HELENA data. In X. Franch, T. Männistö, & S. Martínez-Fernández, eds. *Product-Focused*

Software Process Improvement. Cham: Springer International Publishing, pp. 341–349.

Nowotarski, P., Pasławski, J. (2016) Lean and agile management synergy in construction of high-rise office building. *Archives of Civil Engineering*. **62**(4), 133–147.

Olaniran, O.J., Love, P.E.D., Edwards, D., Olatunji, O.A., Matthews, J. (2015) Cost overrunsin hydrocarbon megaprojects: A critical review and implications for research. *Project Management Journal*. **46**(6), 126–138.

OPEC (2020) Kuwait facts and figures. *OPEC*.

Osorio, J.A., Chaudron, M.R. V, Heijstek, W. (2011) Moving from waterfall to iterative development: An empirical evaluation of advantages, disadvantages and risks of RUP. In *37th EUROMICRO Conference on Software Engineering and Advanced Applications,30 Aug.-2 Sept. 2011*. Oulu, Finland: IEEE Computer Society, pp. 453–460.

Owen, R., Koskela, L., Henrich, G., Codinhoto, R. (2006) Is agile project management applicable to construction? In *Proceedings IGLC14, July 2006*. Santiago, Chile, pp. 51–66.

Pacagnella, A.C., da Silva, S.L., Pacífico, O., de Arruda Ignacio, P.S., da Silva, A.L. (2019) critical success factors for project manufacturing environments. *Project Management Journal*. **50**(2), 243–258.

Pace, M. (2020) A correlational study on project management methodology and project success. *Journal of Engineering, Project, and Production Management*. **9**(2), 56–65.

Pall, G.K., Bridge, A.J., Gray, J., Skitmore, M. (2020) Causes of delay in power transmission projects: an empirical study. *Energies*. **13**(1), 17.

Palmer, S.R., Felsing, M. (2001) *A practical guide to feature-driven development*. illustrate. New Jersey: Prentice Hall.

Penttinen, M., Mikkonen, T. (2012) Subcontracting for Scrum teams: Experiences

and guidelines from a large development organization. In *Proceedings - 2012 IEEE 7th International Conference on Global Software Engineering, ICGSE 2012*. New York: IEEE, pp. 195–199.

Piya, S., Shamsuzzoha, A., Khadem, M., Al-Hinai, N. (2020) Identification of critical factors and their interrelationships to design agile supply chain: special focus to oil and gas industries. *Global Journal of Flexible Systems Management*. **21**(3), 263–281.

PM Solutions (2013) *The state of project management - annual survey*. Project Management Solutions, Inc.

PMI (2019) PMI talent triangle.

PMI (2017) *Project management body of knowledge: A guide to the project management body of knowledge (PMBOK® Guide)*. Sixth Edit. Newtown Square: Project Management Institute.

PMI (2018) *Success in disruptive times*. Project Management Institute.

Poppendieck, M. (2007) Lean software development. In *Companion to the proceedings of the 29th International Conference on Software Engineering*. IEEE Computer Society, pp. 165–166.

Poppendieck, M., Poppendieck, T. (2003) *Lean software development: an agile toolkit: an agile toolkit*. Boston: Addison-Wesley.

Postali, F.A.S.S., Picchetti, P. (2006) Geometric Brownian motion and structural breaks in oil prices: A quantitative analysis. *Energy Economics*. **28**(4), 506–522.

Prasad, K. V, Vasugi, V., Venkatesan, R., Bhat, N. (2019) Analysis of causes of delay in Indian construction projects and mitigation measures. *Journal of Financial Management of Property and Construction*. **24**(1), 58–78.

Przybylek, A., Kotecka, D. (2017) Making agile retrospectives more awesome. In *Proceedings of the 2017 Federated Conference on Computer Science and Information Systems, FedCSIS 2017*. New York: IEEE, pp. 1211–1216.

Qabazard, A.M. (2019) Risk management practices in project activities at north Kuwait oil fields. In G. Passerini, F. Garzia, & M. Lombardi, eds. *WIT Transactions on The Built Environment*. Boston: WIT, pp. 121–130.

Radujković, M., Sjekavica, M. (2017) Project management success factors. *Procedia Engineering*. **196**(June), 607–615.

Ramesh, E., Babu, D.R., Rao, P. (2018) The impact of project management in achieving project success-empirical study. *International Journal of Mechanical Engineering and Technology*. **9**(13), 237–247.

Rasnacis, A., Berzisa, S. (2017) Method for adaptation and implementation of agile project management methodology. *Procedia Computer Science*. **104**, 43–50.

Rasnacis, A., Berzisa, S. (2016) Method for adaptation and implementation of agile project management methodology. *Procedia Computer Science*. **104**(2016), 43–50.

Reason, P., Bradbury, H. (2008) The SAGE Handbook of Action Research. *The SAGE Handbook of Action Research*, 49–64.

Remenyi, D., Williams, Money, B. and, Arthur and Swartz, E. (2000) *Doing research in business and management: an introduction to process and method*. Sage.

Ribeiro, F.L., Fernandes, M.T. (2010) Exploring agile methods in construction small and medium enterprises: a case study. *Journal of Enterprise Information Management*. **23**(2), 161–180.

Richards, K. (2007) *Agile project management: running PRINCE2 projects with DSDM atern*. London: The Stationery Office.

Rodríguez, P., Mäntylä, M., Oivo, M., Lwakatare, L.E., Seppänen, P., Kuvaja, P. (2019) Advances in using agile and lean processes for software development. In *Advances in Computers*. Elsevier, pp. 135–224.

Ruqaishi, M., Bashir, H.A. (2015) Causes of delay in construction projects in the oil and gas industry in the Gulf Cooperation Council countries : a case study. *Journal of Management in Engineering*. **31**(3), 5014011–5014017.

Ruqaishi, M., Bashir, H.A. (2013) Causes of delay in construction projects in the oil and gas industry in the gulf cooperation council countries: a case study. *Journal of Management in Engineering*. **31**(3), 5014017.

Al Saeedi, A.S., Karim, A.M. (2019) An evaluation of the causes of time over runs in oil and gas mega projects: sultanate of oman perspective. *Australian Academy of Business and Economics Review*. **4**(4), 214–222.

Salameh, H. (2014) What, when, why, and how? a comparison between agile project management and traditional project management methods. *International Journal of Business and Management Review*. **2**(5), 52–74.

Salazar-Aramayo, J.L., Rodrigues-da-Silveira, R., Rodrigues-de-Almeida, M., De Castro-Dantas, T.N. (2013) A conceptual model for project management of exploration and production in the oil and gas industry: The case of a Brazilian company. *International Journal of Project Management*. **31**(4), 589–601.

Saunders, M.N.K., Lewis, P., Thornhill, A. (2019) *Research methods for business students*. 8th ed. London: Pearson.

Schwaber, K. (2004) *Agile project management with Scrum*. Redmond, Wshaington: Microsoft Press.

Schwaber, K., Sutherland, J. (2017) *The definitive guide to scrum: the rules of the game, the scrum guide*. London: Scrum Alliance.

Sekaran, U., Bougie, R. (1993) Research methods for business: A skill building approach. *Long Range Planning*. **26**(2), 136.

Serrador, P., Pinto, J.K. (2015) Does agile work? - a quantitative analysis of agile project success. *International Journal of Project Management*. **33**(5), 1040–1051.

Shariatfar, M., Beigi, H., Mortaheb, M.M. (2019) Assessing lifecycle success of petrochemical projects–based on client's viewpoint. *KSCE Journal of Civil Engineering*. **23**(1), 21–28.

Sharp, H., Robinson, H. (2010) Three 'C's of agile practice: Collaboration, co-ordination and communication. In *Agile software development*. Berlin, Heidelberg:

Springer, pp. 61–85.

Sharp, J., Ryan, S. (2011) Best practices for configuring globally distributed agile teams. *Journal of Information Technology Management*. **22**(4), 56–63.

Shaye, S.D. (2008) Transitioning a team to agile test methods. In *Proceedings of Agile Conference,2008*. New York: IEEE, pp. 470–477.

Sheel, A., Singh, Y.P., Nath, V. (2020) Managing agility in the downstream petroleum supply chain. *International Journal of Business Excellence*. **20**(2), 269–294.

Singgih, M.L., Suwignjo, P., Baihaqi, I. (2014) The impact of power distance and individualism on total quality management: an empirical research on indonesian manufacturing firms. In *Proceeding of Industrial Engineering and Service Science,10-12-2014 - 12-12-2014*. Denpasar, Bali - Indonesia.

Sliger, M. (2008) Agile project management and the PMBOK®guide. In *PMI®Global Congress*. North America, Denver, CO. Newtown Square, PA: Project Management Institute.

Smith, J. (2015) *The project management triangle: A hidden framework? A qualitative study of ERP implementations in Sweden. (Bachelor thesis)*. Gothenburg, Sweden, May 2015: University of Gothenburg.

Snijders, T.A.B. (1992) Estimation on the basis of snowball samples: how to weight? *Bulletin of Sociological Methodology/Bulletin de Méthodologie Sociologique*. **36**(1), 59–70.

Söderland, J., Geraldi, J. (2012) Classics in project management: Revisiting the past, creating the future. *International Journal of Managing Projects in Business*. **5**(4), 559–577.

Sohi, A.J., Hertogh, M., Bosch-Rekveldt, M., Blom, R. (2016) Does lean & agile project management help coping with project complexity? *Procedia - Social and Behavioral Sciences*. **226**(July), 252–259.

Solaimani, S., Veen, J. van der, Sobek, D.K., Gulyaz, E., Venugopal, V. (2019) On

the application of Lean principles and practices to innovation management. *TQM Journal*. **31**(6), 1064–1092.

Soliman, E. (2017) Recommendations to mitigate delay causes in Kuwait construction projects. *American Journal of Civil Engineering and Architecture*. **5**(6), 253–262.

Sonneveld, J. (2018) Building agile teams: Enhancing project team performance by applying agile project management aspects in the engineering industry. (Master Thesis). *Delft University of Technology*.

Špundak, M. (2014) Mixed agile/traditional project management methodology - reality or illusion? *procedia-Social and Behavioral Sciences*. **119**, 939–948.

Srivastava, Apoorva, Bhardwaj, S., Saraswat, S. (2017) SCRUM model for agile methodology. In *Proceeding - IEEE International Conference on Computing, Communication and Automation, ICCCA 2017*. IEEE, pp. 864–869.

Srivastava, Priyank, Khanduja, D., Agrawal, V.P. (2017) A framework of fuzzy integrated MADM and GMA for maintenance strategy selection based on agile enabler attributes. *Mathematics-in-Industry Case Studies*. **8**(1), 5.

Stapleton, J. (1999) DSDM: dynamic systems development method. In *Proceedings Technology of Object-Oriented Languages and Systems. TOOLS 29 (Cat. No. PR00275)*. p. 406.

Stettina, C.J., Hörz, J. (2015) Agile portfolio management: an empirical perspective on the practice in use. *International Journal of Project Management*. **33**(1), 140–152.

Stoica, R., Brouse, P. (2013) IT project failure: a proposed four-phased adaptive multi-method approach. *Procedia Computer Science*. **16**, 728–736.

Stray, V., Sjøberg, D.I.K., Dybå, T. (2016) The daily stand-up meeting: a grounded theory study. *Journal of Systems and Software*. **114**, 101–124.

Sunner, D. (2017) Agile: Adapting to need of the hour: Understanding Agile methodology and Agile techniques. In *Proceedings of the 2016 2nd International Conference on Applied and Theoretical Computing and Communication Technology,*

iCATccT 2016. Bangalore, India: IEEE, pp. 130–135.

Sylvester, D., Rani, A., Shima, N. (2010) Theoretical framework: factors for project success in oil & gas companies & contractors in Miri, Sarawak, Malaysia. In *International Conference on Information and Finance-Proceeding,2010*. New York: IEEE, pp. 100–103.

Sylvester, D.C., Shima, N., Rani, A., Shaikh, J.M. (2011) Comparison between oil and gas companies and contractors against cost, time, quality and scope for project success in Miri, Sarawak, Malaysia. *African Journal of Business Management*. **5**(11), 4337–4354.

Talebbeydokhti, A., Sedghi, M.H. (2015) Studying the effect of project schedule and control role and determining their most important tools on oil projects (The case study of EPD projects in southern oil-rich areas company). *Advances in Environmental Biology*. **9**(2), 158–162.

Thillaisthanam, N. (2010) Agile methodology when processes clash with principles. *Siliconindia*. **13**(9), 38–39.

Van Thuyet, N., Ogunlana, S.O., Dey, P.K. (2007) Risk management in oil and gas construction projects in Vietnam. *International journal of energy sector management*. **1**(2), 175–194.

Tirumala, S., Ali, S., Babu, A. (2016) A hybrid agile model using SCRUM and feature driven development. *International Journal of Computer Applications*. **156**(5), 1–5.

Toledo-Pereyra, L.H. (2012) Research design. *Journal of Investigative Surgery*. **25**(5), 279–280.

Toor, S.-R., Ogunlana, S.O. (2010) Beyond the 'iron triangle': Stakeholder perception of key performance indicators (KPIs) for large-scale public sector development projects. *International Journal of Project Management*. **28**(3), 228–236.

Tsoy, M., Staples, D.S. (2020) Exploring critical success factors in Agile analytics projects. In *Proceedings of the 53rd Hawaii International Conference on System Sciences*. HICSS, pp. 984–9983.

Turner, R., Zolin, R. (2012) Forecasting success on large projects: developing reliable scales to predict multiple perspectives by multiple stakeholders over multiple time frames. *Project Management Journal*. **43**(5), 87–99.

Vijay Anand, R., Dinakaran, M. (2016) Popular agile methods in software development: review and analysis. *International Journal of Applied Engineering Research*. **11**(5), 3433–3437.

Vinekar, V., Slinkman, C.W., Nerur, S. (2006) Can agile and traditional systems development approaches coexist? an ambidextrous view. *Information Systems Management*. **23**(3), 31–42.

Wake, W.C. (2002) *Extreme programming explored*. illustrate. Boston: Addison-Wesley Reading.

Walliman, N. (2017) *Research methods: the basics*. London: Routledge.

Wu, P., Wang, X., Beng, Q.T., Kamran, S., Hamzah, A.-R. (2019) Deepwater oil and gas project performance: a study of cultural intelligence. *Innovative Production and Construction*, 405–427.

Wysocki, K.R. (2009) *Effective project management - traditional, agile, extreme*. 7th Editio. Hoboken: John Wiley & Sons Inc.

Yi, D., Lee, E.-B., Ahn, J. (2019) Onshore oil and gas design schedule management process through time-impact simulations analyses. *Sustainability*. **11**(6), 1613.

Yin, R.K. (2014) *Case study research : design and methods*. 5th Editio. Thousand Oaks, CA: Sage.

Yusuf, Y.Y., Musa, A., Dauda, M., El-Berishy, N., Kovvuri, D., Abubakar, T. (2014) A study of the diffusion of agility and cluster competitiveness in the oil and gas supply chains. *International Journal of Production Economics*. **147**, 498–513.

YuTeck, C., CCE, P. (2007) Project estimate reviews for oil and gas projects. *AACE International Transactions*. **23**, 71–73.

Zidane, Y.J.T., Andersen, B. (2018) The top 10 universal delay factors in

construction projects. *International Journal of Managing Projects in Business*. **11**(3), 650–672.

Appendix

Research Survey

Application of Agile Project Management in Kuwait Oil and gas Capital Projects

This survey will provide a solid basis of primary data to evaluate Agile Project Management (APM) best practices, and to explore the key enablers that may be implemented in a traditional project management framework. Its goal is to reduce project overruns in oil and gas capital projects in Kuwait.

Please Note: The questionnaire is presented in two parts (A & B) and should take about 20 minutes to complete. Please note that completion and return of the questionnaire imply consent. All data in this survey will be collected anonymously and securely. Cookies and personal data stored by your web browser are not used in this survey. The questionnaire data will be coded and anonymised so that no individuals can be identified in future reports and in the publication of the findings.

Participants have the right to decline to answer any particular question. (Where appropriate, mark the correct answer or your closest opinion in the box ⊠ or ☐. Where applicable, please provide a brief explanation.)

By completing this survey, you are granting me your informed consent to use the information provided in this study.

Survey Questions

Part A: General Information

1. What is your gender?	◯ Male ◯ Female ◯ Other
2. How many years of experience do you have in your role?	◯ 0–5 years ◯ 5–10 years ◯ 10–15 years ◯ 15+ years
3. What is your job title?	◯ Consultant ◯ Specialist ◯ Senior Engineer ◯ Senior Planner ◯ Engineer ◯ Planner ◯ Other
4. What type of project(s) are you currently dealing with in your company?	◯ Oil & Gas process related facilities ◯ Flow Lines (Piping) ◯ Power Facility (Substations) ◯ Building ◯ Other
5. What type of project management framework do you currently use?	◯ Traditional Project Management Framework (Customised) ◯ Traditional Project Management Framework (PMI) ◯ Traditional Project Management Framework (PRINCE2) ◯ Agile Project Management Framework. ◯ Hybrid Framework (Agile/Traditional) ◯ Other

6. **(If Agile is selected) What type of Agile methodology do you use?**	◯ Agile Scrum ◯ Kanban ◯ Lean ◯ Extreme Programming ◯ DSDM ◯ Feature Driven Development ◯ Crystal ◯ Other ◯ N/A
7. **What is the average length of your current or previous project life cycle?**	◯ 1–2 Years ◯ 3–4 Years ◯ 5–6 Years ◯ 7–8 Years ◯ More than 8 years
8. **How many people were/are involved in the project from your company (not including contracts)?**	◯ 1–20 ◯ 20–40 ◯ 40–60 ◯ 60–80 ◯ 80–100 ◯ 100 or more
9. **What is the size of your current project?**	◯ Small Scale Project (typically less than KD 50 million) ◯ Medium Scale Project (between KD50 and KD100 million) ◯ Large Scale Project (more than KD 100 million) ◯ Other
10. How would you describe the way your team mostly works	◯ Virtual [team members interact virtually from different locations] ◯ Same Building ◯ Same Site ◯ Same Room
11. Based on your experience in project management, please indicate the extent to which you agree that:	

Individuals and interactions are prioritised over tools and processes.	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree

Collaborating with customers is prioritised over contract negotiation?	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
Working software is prioritised over comprehensive documentation	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
Responding to change is prioritised over following a plan	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree

12. Please rank the following in order of importance to the timely completion of projects, where 1 is most important and 6 is least important	Importance	Rank
	Effective Communication	
	Choosing Appropriate Project Management Framework	
	Resource Availability	
	Team Competency	
	Scope Change Flexibility	
	Swift Decision Making	

Part B: Agile Best Practices

13. Please indicate your agreement with the following statements.

If the company were to implement evaluation of projects through <u>retrospective meetings</u>, this would:

	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
(13.a) Facilitate the frequent adjustment of processes	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
(13.b) Help to involve clients in project planning	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
(13.c) Enable project managers to adapt more effectively to changes.	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree

(13.d) Enable project managers to mitigate risks before they become issues.	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree

14. Please indicate your agreement with the following statements.

If the company were to implement iteration planning (dividing the project into smaller iterations), this would:

(14.a) Increase flexibility	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
(14.b) Increase the frequency of acceptance of project changes	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
(14.c) Dividing the project into smaller iterations could reduce unidentified risks	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
(14.d) Improve planning and scheduling processes	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree

15. Please indicate your agreement with the following statements.

If the company were to implement daily project meetings, this would:

(15.a) Emphasise the importance of self-organising teams	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
(15.b) Reduce the potential for misguided objectives and ensure that deliverables are linked with objectives.	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
(15.c) Reduce conflicts among the project's essential players	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
(15.d) Enable teams to evaluate and discover ways to adjust their processes in a frequent manner	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
(15.e) Provide an opportunity for the development of an action plan that identifies areas of improvement	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree

16. Please indicate your agreement with the following statements.

If the company were to implement a procedure to facilitate more frequent communication and team collaboration, this would:					
(16.a) Reduce delays in decision making	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
(16.b) Facilitate improvements in the definition of the project's scope	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
(16.c) Facilitate improvements in risk planning	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
(16.d) Help project personnel to better understand client requirements	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
(16.e) Facilitate improvements in coordination between project teams	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
17. Please indicate your agreement with the following statements. If the company were to implement strategies and processes to improve the skills levels of the team (including training and hiring skilled contractors and managers), this would:					
(17.a) Facilitate improved interaction and support between team members	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
(17.b) Improve team leadership and coordination	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
(17.c) Enable the team to better identify and mitigate risks	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
(17.d) Make project teams more productive and focused	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
18. Please indicate your agreement with the following statements. If the company were to implement changes to the administration of contracts, the following processes would help to reduce delays in project completion:					
(18.a) Timely payment of contractors	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
(18.b) Setting and adhering to deadlines governing how new equipment is delivered	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree

(18.c) Setting and adhering to deadlines governing how quickly land acquisition issues are solved	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
(18.d) Setting and adhering to deadlines governing how quickly decisions are made	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
19. To what extent do you agree with the following statements?					
(19.a) Delays to the completion of projects are unavoidable	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
(19.b) Delays to the completion of projects are caused by the approach to project management we use	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
(19.c) A different approach to project management could help reduce delays to project completion	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree
(19.d) Delays to the completion of projects are within our control	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly Agree

Ethic Forms

Participant Information Sheet

Study title
Application of Agile Project Management in Kuwait Oil and Gas Capital Projects

Why have I been invited?
You have been asked to take part in the study "The Application of Agile Project Management in Kuwait Oil and Gas Capital Projects" because you are one of the main project stakeholders and are a member of the Major Project Group. Prior to deciding whether you wish to participate, it is important for you to understand why the study is being conducted and what your participation will involve. Please take time to carefully review the information detailed below and discuss it with others if you wish. If there is anything that is not clear or if you would like more information, please address your questions to the below contact information.

What is the purpose of the study?
This study aims to reduce capital project delays among Kuwait oil and gas companies. It will critically investigate the key agile project management enablers and best practices that can be applied to existing project management frameworks (i.e. waterfall).

Why have I been chosen?
You have been asked to take part in the study because you are one of the main project stakeholders and part of the Major Project Group.

Do I have to take part?
Taking part is entirely voluntary. If you decide to take part, you will be asked to sign a consent form to confirm that you understand the project scope and that you agree to participate. If you decide to take part and then change your mind, you are free to withdraw from the study at any time, and you can withdraw any data you have provided within 2 weeks of participating.

What will my participation involve?
Once you have agreed to take part in the study, the data collected will be de-identified, stored in a confidential location, and completely anonymised. No personal information will be shared, other than your demographic and age, which will be used only for data analysis. You will be asked questions that will not take more than 60 minutes of your time to respond to.

What are the possible benefits of taking part?
Taking part in this study will not bring you any direct benefits. However, the data collected may yield insights about how to reduce delays in oil and gas capital projects by identifying and implementing practical business recommendations. In this way, this project can help oil and gas companies in Kuwait to improve their on-time completion rates.

What are the possible risks or disadvantages of taking part?

There are no apparent risks to taking part in this study. Neither you nor your organisation will be identifiable in any reports. Further, if you decide you want to retract a statement, clarify, or add anything after our Q & A, you will be able to do so by contacting us.

What if something goes wrong?
If you have any concerns about any aspect of the way you have been approached or treated during this study, then please contact Dr. Luai Jraisat email: and Dr. Hala Mansour email:

Will my information be kept confidential?
All the information that we collect about you during the research process will be kept strictly confidential. You will not be identifiable in any reports or publications. Your institution will also not be identifiable.

What will happen to the results of the study?
The results of this research will be analysed, interpreted, and will contribute to the advancement of Kuwait's oil and gas sector by helping companies deliver their projects according to targeted timeframes. You will not be identified in any report or publication. Your institution will not be identified in any report or publication if you wish to be given a copy of any reports resulting from the research.

Who has reviewed the study?
This study has been reviewed and approved by the University of Northampton Research Degrees Board, Research Degrees Committee, and the Research Ethics Committee.

Contact for further information

MOHAMMAD ALYATAMA
Postgraduate Researcher
University of Northampton
Mohammad.alyatama@northampton.ac.uk

Thank you for considering taking part in this study.

Consent form

Project Title: Application of Agile Project Management in Kuwait Oil and Gas Capital Projects

Please read each statement below and then confirm that you agree or disagree by placing your initials in the appropriate box.

	Yes (Initial)	No
I have read and understand the information provided to me in the invitation letter, information sheet, and consent form.		
I have had an opportunity to ask questions about this research and to decline to answer any question.		
I agree to the interview being audio-recorded.		
I understand that I can withdraw my answers (in part or full), anytime up to 2 weeks after data is collected.		
I agree to anonymised quotations being used in any academic presentations or publications of this work.		
I agree to the information I provide being used in subsequent work that builds on this current project, for example: academic articles or book chapters.		

Signature and date of person giving consent (the participant).

Signature and date of person obtaining consent (MOHAMMAD ALYATAMA).

Mohammad Alyatama
Doctorate Researcher
University of Northampton, UK
Email: Mohammad.alyatama@northampton.ac.uk

Ethics Application Form

University of Northampton

Faculty of Business and Law
Postgraduate Taught Research Ethics Application Form

Title of Project	Application of Agile Project Management in Kuwait Oil and Gas Capital Projects
Name of Researcher	MOHAMMAD ALYATAMA

SECTION A

		YES	NO	N/A
1	Will you describe the main research procedure to participants in advance, so that they are informed what to expect?	☒	☐	☐
2	Will you tell participants that their participation is voluntary?	☒	☐	☐
3	Will you obtain consent from participants?	☒	☐	☐
4	If the research is observational, will you ask participants for their consent to being observed.	☐	☐	☒
5	Will you tell participants that they may withdraw from the research at any time and for any reason?	☒	☐	☐
6	With questionnaires will you give participants the option of omitting questions they do not want to answer?	☒	☐	☐
7	Will you describe the main research procedure to participants in advance, so that they are informed what to expect?	☒	☐	☐

If you have ticked No to any of questions 1-7, then your project is NOT low risk

8	Will your project involve deliberately misleading participants in any way?	☐	☒	☐
9	Is there any realistic risk of any participants experiencing either physical or psychological distress or discomfort?	☐	☒	☐
10	Will it be possible to link identities or trace information back to individual participants in any way?	☐	☒	☐
11	Will the study involve discussion of sensitive topics (e.g. sexual activity, drug use, ethnicity, political behaviour, potentially illegal activities)?	☐	☒	☐
12	Will financial inducements (other than reasonable expenses, compensation for time or a lottery / draw ticket) be offered to participants?	☐	☒	☐

If you have ticked Yes to questions 8-12, then your project is NOT low risk

		YES	NO	N/A
13	Does your project involve work with animals?	☐	☒	☐
14	Do participants fall into any of the following special groups? If they do, please outline on page 2 how you will take account of their needs. **Note that you may also need to obtain satisfactory Disclosure and Barring Service (DBS) clearance**			

		YES	NO	N/A
	a) School Children?	☐	☒	☐
	b) People with learning or communication difficulties	☐	☒	☐
	c) Patients	☐	☒	☐
	d) People in custody	☐	☒	☐
	e) People engaged in illegal activities (e.g. drug-taking)	☐	☒	☐

SECTION B

Please provide full details of your project below
(if insufficient detail is provided and the precise nature of the study is not clear your supervisor will NOT approve the project and your form will be returned)

State the aims and objectives of this research:

Research Aim

This research project aims to critically investigate the key Agile Project Management (APM) enablers and best practices that can be applied in Kuwait oil and gas companies' project management framework (waterfall) to reduce capital project delays.

Research Objectives

- To conduct an extensive literature review and determine the APM key enablers and best practices that can be applied in a traditional project management framework.
- To critically examine the current methodology and critical factors in managing oil and gas capital project delays.
- To conduct a survey with oil and gas project and program managers, planners, coordinators and engineers to investigate and rank the most appropriate APM best practices to apply in this field.
- To conduct interviews with an organisation's senior management and its project and program managers to undertake an in-depth analysis of how best practices and enablers can be applied in the current framework.
- To critically analyse and validate all key findings in order to provide a hybrid APM framework.
- To contribute to the literature on project management, to define clear managerial implications for companies in the oil and gas industry, and to provide recommendations to decision-makers.

How will participants be recruited? Who will they be (i.e. number, age, and gender?):

The survey will be distributed to participants at their workplace. Each survey will take approximately 15 to 20 minutes. The total population of the study will be the oil and gas capital project stakeholders who are affected by the project outcomes: project and program managers, planners, coordinators, and engineers. This will include around 300 individuals aged between 24 and 55 years, both male and female.

The interviews will be conducted with an organisation's senior management and its project and program managers to undertake an in-depth analysis. This will include around 8 to 10 individuals aged between 24 and 55 years, both male and female.

Details of the informed consent process (If required, use the Informed Consent and Participant Information Sheet templates provided and submit with this form):
The details of the Informed Consent and Participant Information Sheet are attached.

Description of the method (please submit your research instrument (survey questionnaire, interview questions that you will be using to collect data with this form if relevant):
A sequential explanatory mixed-methods design will be utilised to answer the research questions. The research project will use a cross-sectional survey as its quantitative data collection method and semi-structured case study interviews as the qualitative data collection method for an in-depth examination of the phenomenon in an organisation.

Where will this research be conducted?
This research will be conducted in one of the oil and gas companies in Kuwait.

What steps have been taken or will be taken to ensure appropriate permissions are obtained? (N.B. provide a copy of correspondence i.e. letter, emails granting you permission must be submitted with your ethics submission):

The permission for conducting the surveys and interviews has already obtained and attached to this form.

Name (Caps) MOHAMMAD ALYATAMA	Signature of Student	Date: Thursday, April 18, 2019

This project has been

☐ approved in its current form

☐ declined and will need to be revised and resubmitted

The following **required** revisions are stipulated.

Print Name Supervisor: or Module Leader:	Signature	Date:

Interview Transcripts

Participant A

Interviewer: Please tell me a little bit about experience in project management

→ *Participant A: Okay, I have been working as a project consultant in the company for, nearly seven years now. working in different departments, but mostly handling O&G projects. Given the nature of projects in O&G industry, especially in Kuwait I can say I have experience working in both agile and waterfall models.*

Interviewer: What do you think are the causes of delays in O&G sectors in general and in Kuwait?

→ *Participant A: From my experience, I believe what really is the challenge in this industry, in term of causing delays and issues with failures in projects is the fact that most managers continue to use traditional approaches to project management.*

Interviewer: What do you mean by that?

→ *Participant A: What I mean is that there are very poor interactions between vendors, especially in engineering and procurements stages. Once there are issues with contracts, you can never expect to execute your project in time. The other issue from my perspective I think relates to poor planning.*

Interviewer: Please clarify it out

→ *Well, in most of these big projects, project managers are unable or rather unsure of every deliverable in the projects. They fail to factor in the unforeseen circumstances in the management of project, which eventually impact the delivery speed of these projects. Besides, lack of communication, lack of better planning, lack of skills identification and enhancement, things like that can cause delays in these projects*

Interviewer: Do you think there is any way that these delays can be mitigated?

→ *Participant A: Absolutely, I do believe that many causes of the delays are avoidable.*

Interviewer: Mmmm, and how is that?

→ *Actually, there are certain measures that can be undertaken to improve the issues such as delays while implementing these projects. For instance, by using modern project management methods such as agile.*

Interviewer: Okay, now can you tell me What do you think about Agile? What does Agile Project Management (APM) mean to you as a leader and to your projects?

→ *Participant A: For me, APM relates to the process of executing a project in short phases or stages, ensuring that you are done with a particular task before*

moving on to the next. In software development, they refer this as an iterative, flexible approach to managing projects.

Interviewer: Right, So for you APM entails being flexible?

→ *Participant A: Absolutely. For me, agile approach is all about being flexible and adaptable, which allows teams to mitigate risks.*

Interviewer: Okay so, Does the introduction of iteration planning in Traditional Project Management (waterfall) lead to faster delivery of O&G projects?

→ *Participant A: I believe iteration planning is one of the most vital elements in APM as it allows the project manager, client, and the rest of the team in to be on the same page regarding the expected deliverables, the complexity involved, and each persons' responsibility in the delivery of the project, among other things.*

Interviewer: I understand your point, but for clarity, do you believe that when this is added to a waterfall model in O&G it can lead to faster delivery?

→ *Participant A: Yes. I believe when iteration planning is added into the basic management of O&G projects, it can solve the usual delay issues because such meetings can enforce a common cadence and create boundaries for work.*

Interviewer: All right, moving on to the next question, do you think the introduction of retrospective meetings in Traditional Project Management (waterfall) can lead to faster delivery of O&G projects?

→ *Participant A: Like iteration planning, I also believe that retrospective meetings or what we normally call sprint retrospective gives the team the chance to really inspect itself and create a plan for improvements to be implemented in the next sprint. So, to answer your question, yes… I believe that introducing retrospective meetings in traditional project management can lead to faster delivery of O&G projects.*

Interviewer: Please elaborate more what you mean by sprints.

→ *Participant A: Basically, sprints are just short, time-boxed stages when teams that are implementing a project works to complete a set amount of work before moving to the next stage.*

Interviewer: Okay. Does the introduction of communication and collaboration in Traditional Project Management (waterfall) lead to faster delivery of O&G projects?

→ *Participant A: In any project, whether executed traditionally or in agile, demands great communication and collaboration. When this element misses, there is a great chance for chaos and failure of the project in the long. I believe that collaboration and communication are major factors for ensuring successful projects.*

Interviewer: How? please explain more?

→ *Mainly, one of the major causes of project failures or delays in O&G projects is that most of communication and collaboration is conducted through the written word, and often at the start of the project. What agile can bring to project*

management is this feature of improved communication, especially through stand-up and retrospective meetings. For me, this is one of the fundamental benefits of APM.

Interviewer: Okay. I understand. So, do you think the introduction of daily stand-up meetings in Traditional Project Management (waterfall) can lead to faster delivery of O&G projects?

→ *Participant A: Yes, as I've highlighted previously, I believe that meetings, whether retrospective sprints or itineration planning, can critically speed up the delivery of O&G projects. This is beneficial to the teams as they will be able to ~~can~~ organize better, strategize, and remain united to fulfill the goals of the project.*

Interviewer: How long do you think day stand-up meetings should last?

→ *Participant A: To avoid wasting time and loss of interests, I believe that daily stand up meetings should not exceed 15-20 minutes. They are just meant to ensure that everyone is briefed on the day's deliverable, and then quickly allow everyone to get back to work.*

Interviewer: Oh, I see…so, do you think identifying and enhancing team skills in Traditional Project Management (waterfall) can lead to faster delivery of O&G projects? How?

→ *Participant A: definitely, Agile visionaries like myself believe that teamwork is vital in delivering great projects and that great agile teams embody 'we' rather than 'I.' When building such teams, it is vital to first identify team competencies to ensure that you have the right people working on the project, where tasks are matched with proficiency.*

Interviewer: What do you mean by matching tasks with proficiency?

→ *Participant A: What I mean basically is that if an individual is good at task A, they should be allowed to work on task A and not be placed on task B where there aren't proficient, to ensure getting the maximum benefits of the available resources.*

Interviewer: Great. Does solving contractual issues in Traditional Project Management (waterfall) lead to faster delivery of O&G projects?

→ *Participant A: I believe, as a project manager, you have to figure out what kinds of contracts for you project and solve all issues that are involved. So, yes, once you solve your contractual issues early in project management, you can be able to deliver results in a faster manner than when you let such issues impact project development in between tasks.*

Interviewer: Okay. Moving on to the next question, how can the APM best practices and enablers be applied in the waterfall framework?

→ *Participant A: To answer this question better, I believe that it is important to first understand what you can really refer to as 'Agile best practices.' For me, what I can really term as Agile best practices include meetings, planning ahead, simple design, communication, continuous integration, and customer collaboration. To integrate such best practices should be a simple endeavor*

because they come without much complications into a normal traditional project management model.

Interviewer: So what you are saying is that one should identify the best practices and simply apply them to their waterfall model?

→ *Participant A: Yes. That's exactly what I mean.*

Interviewer: What do you think are the strengths and weaknesses of integrating Agile best practices in a Traditional Project Management (waterfall)?

→ *Participant A: Essentially, what we have been talking about. I think most of your questions are revolving around the various best practices in agile that can be applied in waterfall models, such as the ones we currently use in our O&G projects. These best practices can not only help in faster delivery of projects, but also ensure that tasks are executed in the best way possible. To be honest, I don't think there can be too many weaknesses in this approach, because such a hybrid method will complement each other in terms of solving the weaknesses of both approaches.*

Interviewer: Okay. On to the last question, how can a hybrid PM (traditional + Agile) deal with project complexity to reduce project delays in O&G capital projects in Kuwait?

→ *Participant A: I believe every experienced project manager can be able to successfully integrate agile values and principle and practice in a waterfall environment to improve project predictability. One model that can really work in this industry is the water-scrum- fall model. But the idea is taking the best of agile and mix it with the best in waterfall.*

Interviewer: Would like to add any information to this discussion?

→ *Not really. I think we've covered basically everything about what your topic revolves around. But maybe just to add something, both methodologies are usable in the O&G sector, but a hybrid approach can really bring a lot of benefits especially in terms of reducing delays and other bottlenecks. But this also warrants experience in the use of hybrid methodology. So yes, that's basically it.*

Participant A: Okay, thank you very much for you time and contribution to this interview, I highly appreciate it.

→ *Participant A: You're welcome.*

Participant B

Interviewer: Please tell me a little bit about yourself and experience in project management.

→ *Participant B: I work with XYZ- Company for the past eight years as a project consultant in this industry for the past 12 years or so. And having worked in this country, one of the major oil suppliers and a member of the OPEC consortium, I think I have considerable experience running a project in O&G.*

Interviewer: Great. What do you think are the causes of delays in O&G sectors in general and in Kuwait?

→ *Participant B: Personally, I think the delays in projects, especially in O&G genesis from issues such as contract problems, lack of effective communication and coordination, compliance labor challenges, and other things such as budget inaccuracies.*

Interviewer: I see. So, do you believe that there is any way that such delays can be reduced?

→ *Participant B: If companies in this industry adopt methodologies that are efficient, I think we can overcome issues such as late delays and even collapse of projects.*

Interviewer: Speaking of such methodologies, what do you think about Agile? What does Agile Project Management (APM) mean to you as a leader and to your projects?

→ *Participant B: In simple terms, I believe that APM is the execution of project in stages, iteratively to ensure that tasks are accomplished before moving on to the next stage in project execution. I believe this approach encourages collaboration than rigid processes, where communication is valued.*

Interviewer: please explain, how is this different than waterfall methodology?

→ *Participant B: well, in the waterfall method, project managers' value following a plan while in contrast, APM values responding to changes and project requirements as they appear in the project, which I think makes all the difference in terms of faster delivery of projects and adapt for changes.*

Interviewer: Mmmm okay, and do you think the introduction of iteration planning in Traditional Project Management (waterfall) can lead to faster delivery of O&G projects?

Participant B: Yes, I believe it does.

Interviewer: and how is that? Please clarify

→ *For me, iteration planning is about planning ahead, looking at all the possibilities, risks, objectives, as well as deliverables that are realistic. For every manager in projects, it is vital to consider the purpose of this planning session.*

Interviewer: And what is that purpose exactly?

→ *Participant B: In my view, the purpose of the iteration planning is for the team project to arrive at an agreement about the key elements that I've just mentioned. The objectives, risks, deliverables, and stuff like that.*

Interviewer: understood…Can the introduction of retrospective meetings in Traditional Project Management (waterfall) lead to faster delivery of O&G projects?

→ *Participant B: I believe the reason why agile projects work very well is because of the meetings and planning. Retrospective meetings give the team a chance to implement improvements, reflect on the previous work, and identify the key elements that worked. Therefore, introducing such an element to an ordinary O&G project management will definitely lead to faster delivery of projects.*

Interviewer: Please elaborate how reflection on improvement can lead to faster delivery of O&G projects?

→ *Participant B: What I mean is that when you reflect on the past work, and areas that you can improve going forward, you eliminate chances of errors that can ruin the project going forward. When you identify these risks, you give your project ground for efficiency and faster delivery.*

Interviewer: Perfect, So, do you think that the introduction of communication and collaboration in Traditional Project Management (waterfall) can lead to faster delivery of O&G projects?

→ *Participant B: In any kind of professional work, communication is vital. This is especially fundamental in complex projects such as O&G, which demands a lot of coordination and teamwork. Adding this agile feature into the normal waterfall framework can lead to faster delivery of large, complex projects because it allows the team a chance to anticipate issues.*

Interviewer: Well understood. Do you think the introduction of daily stand-up meetings in Traditional Project Management (waterfall) can lead to faster delivery of O&G projects?

→ *Participant B: Not necessarily. In complex working environments such as O&G, I believe that the daily 'scrum' just doesn't work. In fact, I believe that such meetings can become really tedious as a sit-down meeting. The main problem with such a meeting format is how irrelevant so much of the discussion can be. I'm good with iteration planning and retrospective, but not so much with the daily stand-ups.*

Interviewer: So, in another word, you don't think daily stand-up meetings can lead to faster delivery of O&G projects.

Participant B: That is exactly my point. I believe the opposite is true. Daily stand-ups will just waste time.

Interviewer: Okay. Moving on to the next question, do you think identifying and enhancing team skills in Traditional Project Management (waterfall) can lead to faster delivery of O&G projects? If yes, how?

→ *Participant B: I think this is an important agile feature that can really improve and help speed up waterfall models in O&G. You really can't operate these projects if you don't first identify skills and aptitudes, and then keep on improving them. Having a team that perfectly fits the demands of a project can really ensure not only faster delivery but also improved end product.*

Interviewer: So, you believe that project managers in O&G projects should be able to identify and enhance team skills if they are to improve the delivery of their projects?

→ *Participant B: Absolutely yes.*

Interviewer: Does solving contractual issues in Traditional Project Management (waterfall) lead to faster delivery of O&G projects? If so, how?

→ *Participant B: These are some of the project management elements that need to be taken care of at early stage of the project to avoid delays that may come with contractual issues. In such a demanding working environment, if your contract management process fails to run smoothly, you will negatively impact not only delivery time, but also your productivity and revenue.*

Interviewer: Great. So, how can the APM best practices and enablers be applied in the waterfall framework in O&G capital projects?

→ *Participant B: Applying Agile best practices in the traditional management of projects is like picking an element that functions in an agile framework and placing it directly to the waterfall model. For instance, if you normally don't have retrospective meetings in your project management, you add it as a way of reviewing previous work, plan on the next, and improve as you move. The same thing happens with adding agile elements such as communication and collaboration.*

Interviewer: So, it's basically about adding agile elements that you feel your waterfall design really needs?

→ *Participant B: Yes. Just implement those agile elements that you think would really enhance waterfall design.*

Interviewers: Okay. What do you think are the strengths and weaknesses of introducing Agile best practices in traditional project management (waterfall) model?

→ *Participant B: I believe that the key strengths of introducing Agile best practices in a waterfall model lie in the fact that they can speed up the processes in project execution. For instance, as I said earlier the introduction of retrospective meetings can give the team a chance to implement improvements, reflect on the previous work, and stuff like that which can work a long way in improving the delivery time of these projects. The only notable weakness or rather challenge, as far as I'm concerned is whether project managers can be able to effectively execute the hybrid method. It has been proven that when not executed properly, continuous administrative intervention can results in a waste of time and effort.*

Interviewer: All right, in conclusion, how can a hybrid PM (traditional + Agile) deal with project complexity to reduce project delays in O&G capital projects?

→ *Participant B: The hybrid model can really work well in this sector of O&G because they accept the flexibility of projects and allow for a more nimble and nuanced approach of the work. If you're weighing the pros and cons of both management models, the best alternative is a combination, which I think can really improve the performance of O&G projects in terms of faster and high-quality delivery.*

Interviewer: Well understood, is there anything else you would like to add to this discussion?

→ *Participant B: Well maybe I would only like to point out that a hybrid methodology, while simple to implement on paper, demands experience and a team that you place in this design should be skilled and collaborative enough to enable smooth and efficient co-existence in the workplace.*

Interviewer: Okay. Thank you very much for taking part in this interview. I appreciate a lot.

$\rightarrow$ *Participant B: I'm happy to help*

Participant C

Interviewer: Please tell me a little bit about your experience in project management.

→ *Participant C: During the last 20 years with the XYZ-Organization, I progressed through positions to O&G programs manager. Before that, I had worked with construction for four year.*

Interviewer: impressive. So, what do you think are the causes of delays in O&G sectors in general and in Kuwait?

→ *Participant C: To make it simple/to simplify, I think most waterfall models are too slow because of lack of communication, coordination, better planning, as well as issues such as the 'one-solution-fits-all' syndrome, neglecting quality control, and expansion of functionality. Contractual issues can also lead to delays in TPM projects.*

Interviewers: Can you please clarify with an example how any of these can lead to delays in these projects.

→ *Participant C: Sure, When you look at all those issues I've just mentioned, they are trouble for your project. For example, if you neglect quality control, expect that you will have issues later that will delay delivery.*

Interviewer: So, What do you think about Agile? What does Agile Project Management (APM) mean to you as a leader and to your projects?

→ *Participant C: In my opinion, I think agile is a modernistic approach to project management where a working strategy is chosen than following a rigid and documented plan. This kind of management has often been used in IT, but recently I've seen it being applied in various industries including construction and management of projects such as the ones we do in this O&G industry. Agile basically concentrates in management of projects in various stages, where communication, interactions, collaborations, continuous releases, and client feedback are given priority.*

Interviewer: Mmmm I see, So, do you think the application of agile methodology in oil and gas can improve projects performance?

→ *Participant C: I think that. The entire purpose of APM is to make everything efficient and responsive.*

Interviewer: And, does the introduction of iteration planning in Traditional Project Management (waterfall) lead to faster delivery of oil and gas projects? How?

→ *Participant C: I do believe in every serious work, planning ahead is a must.*

Interviewer: Please elaborate.

→ *Generally, I think in oil and gas, iteration planning provides the team a chance to plan ahead realistically. When this is done, it allows the team to focus on specific targets, which can really speed up the delivery of different tasks, and eventually, the entire project.*

Interviewer: On the same note, do you think the introduction of retrospective meetings in Traditional Project Management (waterfall) lead to faster delivery of oil and gas projects?

→ *Participant C: Well, just like iteration planning, retrospective meetings can really be an important introduction to a waterfall project management system. While iteration planning will give you a chance to plan ahead towards achieving manageable targets, retrospective meetings will give you a chance to look back at their achievements and reflect on how to improve.*

Interviewer: Please explain how you think this leads to faster delivery of oil and gas projects.

→ *Participant C: This is very simple. By continuously improving and dealing with different tasks at different stages of the project, allows you to avoid errors in the future that can not only delay the project but also may lead to project failure.*

Interviewer: Understood. So, does the introduction of communication and collaboration in Traditional Project Management (waterfall) can lead to faster delivery of oil and gas projects?

→ *Participant C: I strongly believe communication in every aspect of work, or even life, is key. When it comes to collaboration, especially in large projects such as O&G, it is very fundamental that you get teams to work together. This can not only improve the delivery of the projects, but also ensure harmony which is critical to accomplishing great work.*

Interviewer: Please elaborate furthermore on how this enables faster delivery of projects.

→ *Participant C: For me, I believe that reporting, communication, and coordination should embody the tenets of a successful project management in O&G. This is the only way to get teams working together towards achieving project goals and also an opportunity to explain the project details and progress to external stakeholders.*

Interviewer: Great. Do you think the introduction of daily stand-up meetings in Traditional Project Management (waterfall) can lead to faster delivery of O&G projects? How?

→ *Participant C: That's interesting. These meetings give project managers a chance to distribute relevant and critical information and make quick decisions. But also believe that these meetings should be done in a quick manner to avoid instances of delay. These are basically a chance to 'go round the room' and get everyone to present their results and daily targets before work starts.*

Interviewer: On the same subject, do you think identifying and enhancing team skills in Traditional Project Management (waterfall) can lead to faster delivery of O&G projects? If yes, how?

→ *Participant C: Well, I think so far, it clear that I'm pro agile. Adding these principles, including the identification and enhancement of team skills, can really improve the delivery and performance of projects in O&G. When you are working on these kinds of projects, you have to work with people with the right skill sets. This is not only for faster delivery but also for the quality of the delivery.*

Interviewer: Mmmm and what about solving contractual issues in Traditional Project Management (waterfall). Do you think this can lead to faster delivery of O&G projects? If yes, how?

→ *Participant C: Without a doubt. You have to manage your contracts for smoother project execution. The old truth states that an ounce of prevention is*

better than a pound of cure. This is especially true when it comes to contracting in large and complex projects such as O&G. Unnecessary contractual issues should be addressed early in the project management process.

Interviewer: Okay so, we have looked at some Agile best practices. Now, how can the APM best practices and enablers be applied in the waterfall framework in O&G capital projects in Kuwait?

→ *Participant C: In my point of view, I think The best way to look at it is by merging the best of agile and integrating with the best from the waterfall. For instance , you can add best practices such as communication and collaboration, to a waterfall model that supports the functional specification, a technical architecture technical specification, and well-documented requirements.*

Interviewer: And what do you think are the strengths and weaknesses of applying Agile best practices in Traditional Project Management (waterfall) model?

→ *Participant C: I believe the key strength of application of Agile best practices in traditional models is the ability to bring agility and improved quality in such project. The application of these practices, as we had discussed earlier is pretty straightforward because it entails bringing the best qualities directly into the waterfall model without having to change the project design entirely. The key challenge is determining what Agile best practices are beneficial to your project, because if they are not integrated correctly into the waterfall model, issues of time wastage can result, and may end up harming your project rather than improve it.*

Interviewer: So, what are you implying by this?

→ *Participant C: What I'm trying to say is that you have to be experienced to conduct this integration.*

Interviewer: Before we conclude, how can a hybrid PM (traditional + Agile) deal with project complexity to reduce project delays in O&G capital projects in Kuwait?

→ *Participant C: It's quite simple. By applying Agile best practices to a waterfall model, you automatically deal with the complexity of delays. That's why it's called agile, for agility, alertness, and swiftness.*

Interviewer: Great. Would you like to add anything to this discussion?

→ *Participant C: Mmmh… Basically what I would love to add is that times are changing, and companies that continue to embrace waterfall methodologies in large projects such as O&G are missing out on the great possibilities that some features of agile methods are bringing to the table. Yes, I think that's what I would like to add to this talk.*

Interviewer: Okay. I would like to thank you very much for taking part in my inquiry. I really do appreciate.

→ *Participant C: My pleasure*

Participant D

Interviewer: Please tell me a little bit about your experience in project management.

→ *Participant D: I joined this petroleum corporation in 1983, and have held various positions before being appointed as general superintendent for project management. I've been working in this position now for over 36 years, dealing with various aspects of project management, managing various projects through various models.*

Interviewer: That's great. So, what do you think are the causes of delays in O&G sectors in general and in Kuwait?

→ *Participant D: Actually, delays in O&G, especially those that adopt waterfall methods, may happen due to a number of reasons such as equipment failures, contract issues, missing or incorrect data, labor shortages, conflicts, and project mistakes, to name a few.*

Interviewer: So to make it explicit, you think that the use of waterfall models in O&G may result in those issues you just stated?

→ *Participant D: Take this for instance, if there are conflicts that relate to contracts or mistakes that are not diagnosed early in the project development, there is a high chance that issues will occur and the project get delayed.*

Interviewer: Okay. What do you think about Agile? What does Agile Project Management (APM) mean to you as a leader and to your projects?

→ *Participant D: I am aware that the agile method represents an iterative way of approaching the design and guidance of how a project should be implemented. However, there is more to it than that. It is an element of cutting-edge development approaches to project management, with a focus on the organisation of the tasks and schedules of a project in individual stages frequently known as "sprints". Every sprint has a preset time frame and a set of targets that must be achieved prior to commencing the subsequent sprint.*

Interviewer: So, do you think this method of project management can solve the issues that lead to delay you stated earlier?

→ *Participant D: Agile is not only about being responsive, it is also about being adaptable and flexible, which is great when it comes to detecting risks and solving them before they can negatively impact your project later on.*

Interviewer: So, in relation to agile methodology, do you think the introduction of iteration planning in Traditional Project Management (waterfall) can lead to faster delivery of O&G projects?

→ *Participant D: I think it depends on the size of the project, but I think for any project, planning will definitely improve project management. Such meeting may not be vital or necessary for smaller projects, but for complex, large, and high-value projects in this industry, iteration planning can definitely improve not only the delivery but also the quality of the end results.*

Interviewer: And How can that be accomplished, to be precise?

→ *Participant D: Precisely, what I mean is that iteration planning gives planners a chance to focus, and focus is good for efficiency. Every time you achieve*

efficiency at every stage of project implementation you are likely to hit your deadlines faster.

Interviewer: Okay, Going further, can the introduction of retrospective meetings in Traditional Project Management (waterfall) lead to faster delivery of O&G projects? How?

→ *Participant D: Yes. It's just like with iteration planning. Retrospective meetings gives you a chance to look back on your progress to improvements going forward. When you improve going forward you eliminate unnecessary errors which can really delay your project going forward. I think this also gives you a sense of focus and direction towards achieving project targets.*

Interviewer: Well understood. Does the introduction of communication and collaboration in Traditional Project Management (waterfall) lead to faster delivery of O&G projects?

→ *Participant D: Definitely. I believe that communication and collaboration are interpersonal skills that allow people work together symphonically, and thus accomplish more, faster.*

Interviewer: In your experienced opinion, how is that achieved?

→ *From my experience, O&G project management teams that are able to communicate and collaborate every day, both personally and professionally, perform better. This communication should also extend to include all stakeholders to ensure that everyone is on board and in tune with the projects demands and targets.*

Interviewer: In relation to communication, do you think the introduction of daily stand-up meetings in Traditional Project Management (waterfall) can lead to faster delivery of O&G projects?

→ *Participant D: For me, these are not really necessary because you already have the normal iteration planning and retrospective meetings. I feel like for me having to wake up every day and hold a meeting, regardless of whether they are stand-ups or sit-downs. Again from my experience, only about 8% of managers can be able to effectively handle stand-meetings without delaying. The goal is to minimize delay.*

Interviewer: So, what you're trying to say is that, you have to be experienced to handle stand-up meets or else you will waste time more?

→ *Participant D: Yes, exactly my point.*

Interviewer: Okay, great. And do you think identifying and enhancing team skills in Traditional Project Management (waterfall) can lead to faster delivery of O&G projects? If yes, how?

→ *Participant D: I think that, as a project manager you have to bring in the best skills on board in order to accomplish you project management goals in better and swifter manner. If you bring in people who don't know what they are doing, you'll be look at much more problems than just delays.*

Interviewer: Please elaborate on this point.

→ *Participant D: What I'm trying to say is that identifying and managing team skills is where you draw the line between perfect and mediocre outcomes.*

Interviewer. Okay. to pursue the subject , do you think solving contractual issues in Traditional Project Management (waterfall) lead to faster delivery of O&G projects? If yes, how?

→ *Even giving contracts and hiring people in projects such as O&G are common occurrences, there are many things that can go wrong in contraction. The goal for any project manager should be about dealing with these issues early enough to avoid project delays and failures. So, to answer your question, yes I believe solving contracting issues can result in faster delivery of projects in O&G. This is the only way to ensure that you get your fundamentals exactly when you need them.*

Interviewer: Having looked at various Agile best practices, how do you think they can best be applied in waterfall framework in O&G capital projects in Kuwait?

→ *Participant D: Effectively the chief purpose of hybrid project management methodologies is to allow teams to recognise what is required and to use feedback continuously to accommodate any changes necessary. In order to have a smooth working method, I generally take the optimal aspects of waterfall and agile and blend them. This gives me a model that is clear and effective in tracking like the waterfall system, but also incorporates the ability of the agile system to be adaptable and flexible.*

Interviewer: Okay. So, what do you think are the strengths and weaknesses of applying Agile best practices in Traditional Project Management (waterfall) model?

→ *Participant D: I think the key benefit or strength of a hybrid method for managers is that it gives you the best or both worlds, and as we have seen previously, this can solve a lot of setbacks that we normally experience in the traditional waterfall method. The key weakness of this approach is that not every manager knowns how to integrate these best practices in the waterfall method, which may result in a lot of confusion and wastage of time.*

Interviewer: Before we conclude this interview, please clarify on how a hybrid PM (traditional + Agile) deal with project complexity to reduce project delays in O&G capital projects?

→ *Participant D: As mentioned previously, various best practices from agile such as constant communication, collaboration, and planning can greatly enhance the delivery of a project because mistakes and issues such as contracting are taken care of early and continuously. Blending of both these methodologies should happen at the beginning of a project when, for example, in the Scrum methodologies, a product backlog must be prepared.*

Interviewer: Okay, great. Is there anything you would like to add?

→ *Participant D: What I would like to add is may be the consideration of how technology can be applied in such a framework, especially in the management of records, transactions, and scheduling. Other than that, I believe that best practices of agile can fit seamlessly into a waterfall model.*

Interviewer: Thank you very much for your time.

→ *Participant D: You are welcome. Thank you. You got it*

Participant E

Interviewer: Please tell me a little bit about your experience in project management.

→ *Participant E: I work as a portfolio manager at XYZ-Company for the last eight years*
during this time, I have had the opportunity to work in various project which has considerably improved my personal skills. I can say at the moment I have considerable project management experience.

Interviewer: Great. Based on your experience, what do you think are the causes of delays in O&G sectors in general and in Kuwait?

→ *Participant E: There are several challenges, barriers and limitations that causes delays in TPM. In O&G sector, I think that the complexity of contracts is a major issue. As such, the time that it takes for a contract to be drafted, agreed upon and implementation work to start is extremely punitive and adds to significant cost issues within the project. There is also the issue of dealing with projects' consequences later rather than addressing such mistakes and errors as you go/on the fly.*

Interviewer: Given what you just mentioned regarding these delays, do you think they can be mitigated?

→ *Participant E: Yes, I believe that such delays can be mitigated.*

Interviewer: please elaborate.

→ *that could be possible by maybe a change in the way project leaders approach the management of the project.*

Interviewer: Talking of project management approaches, what do you think about Agile? What does Agile Project Management (APM) mean to you as a leader and to your projects?

→ *Participant E: My understanding of agile is the ability to iterate processes in project management to allow for teams to address different deliverables at different stages in implementation. This iterative approach allows project managers to instil collaboration, communication, and feedback into the management process, which goes a long way to enhance faster delivery of projects that are of high quality.*

Interviewer: Mmmm, To delve deeper into Agile best practices and enablers, do you think that the introduction of iteration planning in Traditional Project Management (waterfall) can lead to faster delivery of O&G projects?

→ *Participant E: Absolutely, I believe that it does lead to faster and cost-effective delivery of O&G projects. Iteration is core to planning within a team as it allows for improved and seamless delegation. This means that duties can be prioritized, assigned, deferred and handled in a way that ensures that the project is on schedule. Therefore, the essence of iteration is to provide an approach framework which sets the direction of the team.*

Interviewer: What do you mean by the "sets the direction for the team"?

→ *Participant E: I mean by giving them a sense of focus, which can really work great in terms of achieving project goals in desired time.*

Interviewer: Okay, I get it. Now do you think that the introduction of retrospective meetings in Traditional Project Management (waterfall) can lead to faster delivery of O&G projects? And if yes, how?

→ *Participant E: Core to agile project is efficiency in a team. As such, team collaboration and coordination is tied to effectiveness of communication within teams. Thus, the introduction of retrospective meetings in TPM allows for faster delivery of O&G projects. As such, retrospective meetings allow for the team to reflect on the current progress, improve areas of weakness, reflect and identify strategies to keep O&G projects at optimum levels.*

Interviewer: Okay, so in relation to retrospective meetings, do you think that the introduction of communication and collaboration in Traditional Project Management (waterfall) can lead to faster delivery of O&G projects?

→ *Participant E: Indeed, it has, core to TPM's are the men and women who make everything possible. To that end, how effective these agile teams collaborate and communicate is of outmost importance.*

Interviewer: So what I'm gathering from your perspective is that introduction of meetings such as iteration planning, retrospective meetings, and such are important for building communication and collaboration?

→ *Participant E: Indeed, O&G projects are fundamentally complex and the stakes are considerably high. Hence, teams have to communicate, collaborate and coordinate more effectively at every chance and on a regular basis.*

→ *Effective communications and collaboration are the key play major role in project success.*

Interviewer: Mmmm, Could you please elaborate this with an example?

→ *Participant E: Okay. For example, adding this agile feature into a waterfall framework is exactly what a team would need to work faster thus delivery on milestones of the project at an enhanced pace. Besides, the biggest problem in projects are bottlenecks which can be overcome by introduction of effective communication and collaboration strategies within the O&G projects.*

Interviewer: In relation to the past discussion on meetings, do you think the introduction of daily stand-up meetings in Traditional Project Management (waterfall) can lead to faster delivery of O&G projects?

→ *Participant E: Communication is critical to teams and projects that they are entrusted to carry out. While technology has made communication simpler and efficient. However, in managing complex projects such as those in the O&G sector a lot more coordination and cooperation is needed more than what virtual meetings can offer. Thus, the need for daily stand-up meetings but limited to a few minutes which keeps them focused to the immediate goals of the project.*

Interviewer: All right, ~~Okay~~. And do you think identifying and enhancing team skills in Traditional Project Management (waterfall) can lead to faster delivery of O&G projects? How?

→ *Participant E: It is critical for managers in TPM to identify and enhance team skills which supports the overall delivery of the O&G projects. Core to a project are people and the skills and talents that they bring on. Hence, identifying and enhancing skills is vital to delegation and completion of the project.*

Interviewer: Just for clarity, do you think that this identification and enhancement can lead to faster delivery of O&G projects? In simple word, you do think that identification and enhancing team skills would lead to a faster/better quality delivery

→ *Participant E: Yes, I strongly believe in that.*

Interviewer: Okay. Does solving contractual issues in TPM lead to faster delivery of O&G projects?

→ *Yes. In my opinion, contractual issues create significant delays in project which increases the overall cost of the project. So, my answer is Yes, I'm firmly convinced that all project management elements have to be taken into account early enough. To this end, there should be no contractual loopholes that can delay a project considering costs and complexities of O&G projects.*

Interviewer: Given what we've talked about, how can the APM best practices and enablers be applied in waterfall framework in O&G capital projects in Kuwait?

→ *Participant E: I think the best practices in APM such as effective communication, collaboration and retrospective meetings can be transferred to waterfall framework in O &G capital projects in Kuwait. In this case, for example, retrospective meetings can be added which allows for improvements in the course of the project.*

Interviewer: Great. And what do you think are the strengths and weaknesses of applying Agile best practices in Traditional Project Management (waterfall) model?

→ *Participant E: The key strengths of this approach lies in the fact that both methodologies can complement each other to allow a better and more efficient execution of projects. As discussed, integrating various aspects of agile in a waterfall method can be a key solution in reducing delays and allowing better quality end products. However, this integration process requires skills and experience, because project managers need to understand what Agile best practices can work best in their projects. Poor integration can not only lead to waste of time and resources, it can also lead to project failures.*

Interviewer: Before we wrap, please opine how a hybrid PM (traditional + Agile) can deal with project complexity to reduce project delays in O&G capital projects in Kuwait?

→ *Participant E: The traditional project management approach is filled with bottlenecks that affect delivery of projects. However, with a hybrid methodology the fluidity of operations can be greatly improved. For example, weigh the cons and pros of each management models and combine strengths while reducing the weaknesses. Project management strategies have to improve and mutate with time, technology, complexities and other dynamics of the project. Hence, I strongly believe that are hybrid PM model will give Kuwait O&G projects the agility they need hence faster delivery.*

Interviewer: Okay. In conclusion, would you like to add something regarding the application of Agile best practices in a waterfall model in O&G capital projects?

→ *Participant E: Yes. Although were currently witnessing mass adoption of agile methodologies in most sectors such software development and healthcare, this has not been the case in O&G capital projects, and I think we're are missing out on taking this advantage, especially in a hybrid framework. This will not only improve the delivery of these projects in terms of reducing delays, but will also boost the quality of the end product and as well reduce project failures.*

Interviewer: Okay, great. Thank you very much for taking part in this discussion. I really do appreciate you taking your time.

→ *Participant E: No problem. Cheers. I'm happy to help*

Participant F

Interviewer: Please tell me a little bit about your experience in project management.

→ *Participant F: I have been working at this company for the past five years in various areas in project management as a specialist. Having been in this industry for so many years and having majored in project management, I can say that my experience in this area is considerable, and I'm well accomplished in a variety of project management approaches.*

Interviewer: Excellent. Given your experience, what do you think are the causes of delays in O&G sectors in general and in Kuwait?

→ *Participant F: I believe what really delays project implementation in large and complex sectors such as O&G is lack of proper planning, lack of effective communication, and inability to deal with contracts as early as possible to ensure that every resource that is needed be it material or labour, is there where the project is being executed. For projects to run smoothly, these aspects are some of the most important as far as faster delivery is concerned.*

Interviewer: So, do you think this delays can be mitigated?

→ *Participant F: Absolutely. I believe this is about being flexible to change and applying methods in management that work, instead of remaining static.*

→ **Interviewer: Speaking of management methodologies, what do you think about Agile? What does Agile Project Management (APM) mean to you as a leader and to your projects?**

→ *Participant F: As its moniker suggests, to be agile is to be able to implement things faster. Having agility in effecting things. Therefore, APM entails executing products faster, but to implement things faster means working smart and strategically. Agile management is performed in iterations, allowing teams to execute different tasks at different stages and dealing with every improvement requirements before moving to the next stage.*

Interviewer: Mmm Just to add more clarity to you point, for you agile methods are about fast delivery as well as working smart and strategically?

→ *Participant F: Yes, exactly. There are those who define this as being responsive and adaptable, but I take my understanding further to include being strategic and smart.*

Interviewer. Okay. Do you think the introduction of iteration planning in current Traditional Project Management (waterfall) can lead to faster delivery of O&G projects?

→ *Participant F: As previously mentioned, the fundamental idea of being agile is to work iteratively. Introducing iteration planning allows project managers to consolidate the project efficiently and establish achievable deliverables for the project. The team then recapitulates the work as a set of commitment to iteration goals, which not only improves focus, but also faster delivery of projects at different stages.*

Interviewer: So for simplicity, how do you think this leads to faster delivery of O&G projects?

→ *Participant F: I believe that the progress in this kind of iterative design is made easy and measurable, allowing teams to test and rectify issues and risks as they go, to avoid issues later in the project development. So, to answer your question yes, I think the introduction of iteration planning in the waterfall can result in faster delivery of projects in the O&G industry.*

Interviewer: Understood. Can the introduction of retrospective meetings in Traditional Project Management (waterfall) lead to faster delivery of O&G capital projects?

→ *Absolutely. Like iteration planning, retrospective meetings give project managers a chance to look back to the previous work and be able to adapt changes more effectively and avoid a mess later in the project development. In this way, the team will be able to look for ways to improve as they move forward, giving them a chance to deliver projects faster, but also in better quality.*

Interviewer: Can you Please elaborate.

→ *Participant F: Well, integrating retrospective meetings in a waterfall method may facilitate the frequent adjustment of processes for better end product. With fewer errors and need for adjustments, projects can be delivered faster.*

Interviewer:excellent. So, does the introduction of communication and collaboration in Traditional Project Management (waterfall can lead to faster delivery of O&G capital projects?

→ *Participant F: Yes definitely. Ask anywhere in any industry, communication and collaboration are two key tools that allow better results.*

Interviewer: Can you explain how ?

→ *Well, when teams communicate and collaborate, there is less room for error, which means no need to go back and forth fixing things, which also means faster delivery of projects. So, the answer is your, yes, I do believe that bringing collaboration and effective communication may lead to faster delivery of projects in waterfall models in O&G.*

Interviewer: To clarify, How can this be achieved?

→ *Participant F: My experience in project management has shown me than with communication, decisions are made faster, and when this happens, projects are completed faster.*

Interviewer: Moving on to the next question. Do you think the introduction of daily stand-up meetings in Traditional Project Management (waterfall) can lead to faster delivery of O&G capital projects? How?

→ *Participant F: Yes, I really do. I believe every opportunity to bring the team together and ensure that everyone is on board with the objectives of the projects gives a team a renewed focus, which in the long run, enhances the delivery of the project. It is like with the previous two questions, the sense of focus may enable faster delivery of projects.*

Interviewer: Okay. And do you think identifying and enhancing team skills in Traditional Project Management (waterfall) can lead to faster delivery of O&G capital projects?

→ *Participant F: Yes, more than any other Agile best practice working with people who are not skilled enough for their tasks can not only delay the project but may also lead to the ultimate failure of the entire projects.*

Interviewer: Please elaborate more.

→ *Participant F: What I mean is that by placing the right people for different tasks may result, not only in faster delivery of better-quality projects but also complements other best practices such as communication and collaboration. If people work together and they do not match in skills, don't expect great cooperation.*

Interviewer: perfect. So, Do you think solving contractual issues in Traditional Project Management (waterfall) can lead to faster delivery of O&G capital projects?

→ *Participant F: Without a doubt, yes. If you don't have your resources at the right time and at the right place during project implementation, how do you expect to beat deadlines? How do you ensure that you have these things where you need them to be?*

Interviewer: how do you think we can achieve that?

→ *By ensuring that every contract, be it for materials or workforce, is taken care of early. Every issue relating to contracts should be dealt with early in advance if there is any chance of beating all the deadlines.*

Interviewer: Great. Now could you explain, how can the APM best practices be applied in the Traditional Project Management waterfall framework in O&G capital projects in Kuwait?

→ *Participant F: It's simple. By adding components from an agile methodology that you think will work best for your project. It's just like we've discussed here, a waterfall methodology follows a strict plan with documentation and everything, but adding elements such as iterative planning, retrospective meeting, and stuff like that can go a long way in improving your overall design of project management.*

Interviewer: and what do you think are the strengths and weaknesses of applying Agile best practices in Traditional Project Management (waterfall) model?

→ *Participant F: The strength of applying agile features of agile lies in the fact that the strengths of agile can bring so much into a waterfall model. Key strengths is that it enables better planning, faster delivery, better focus, and better communication and feedback. The only limitation I can think of is the possibility of a mix-up when a lot of agile features are added into the waterfall framework.*

Interviewer: And in your opinion as an expertise, how can a hybrid PM (traditional + Agile) deal with project complexity to reduce project delays in O&G capital projects in Kuwait?

→ *Participant F: A hybrid method in O&G allows project managers and consumers to agree on the deliverables at an early stage in the development cycle, which improves both quality and delivery time. Other features such as communication, collaboration, and planning add to these affordances.*

Interviewer: To conclude, is there anything else you would like to add this discussion?

→ *Participant F: Not really, unless you need clarification for anything else.*

Interviewer: I think we've covered everything regarding my area of examination. Thank you so much for your time.

→ *Participant F: You are welcome, and good luck in your investigation.*

Participant G

Interviewer: Please tell me a little bit about your experience in project management.

→ *Participant G: Well, I work here at the XYZ-Company for the past three years, after having worked at the ABC-Organization for five years. I've worked as project manager for a total of eleven years. I am a holder of a Bachelor's Degree in Managing Project Quality from AUK (American University of Kuwait) My background is Management of Project Quality.*

Interviewer: Good, based on your experience, what do you think are the causes of delays in O&G sectors in general and in Kuwait?

→ *Participant G: I think many projects in this industry fail because of a lack of proper planning.*

Interviewer: please continue.

→ *Actually, with proper planning, I mean lack of a clear of deliverables, expected resources, management of risks, and stuff like that. Other than poor planning, I also believe that delays in these projects are also brought about by other factors such as poor handling of contracts, which is part of what I think is poor planning, poor communication, lack of prompt feedback, placement of people with insufficient skills in handling complex projects, and others, but I believe these are the major ones.*

Interviewer: So, do you believe that these issues can be resolved?

→ *Participant G: Yes, with proper management of course.*

Interviewer: Right. Concerning, project management, what do you think about Agile? In another words, what does Agile Project Management (APM) mean to you as a leader and to your projects?

→ *Participant G: As you've probably learnt in your studies, agile methodology was popularized by the Manifesto for Agile Software Development. The general idea of this approach in any sort of project management is approaching the implementation of project requirements, which is often orientated through collaborative working design. This method encourages the project managers and their teams to plan better, work iteratively, continuously improve, and ensure early delivery.*

Interviewer: So, as a project manager/leader you are ruling in favour of APM? If I have understood you correctly, you are in favour of APM?

→ *Of course, basically, when compared to the waterfall method, it facilitates flexible responses to change on project management.*

Interviewer: Speaking of agile, do you think the introduction of iteration planning in current Traditional Project Management (waterfall) can lead to faster delivery of O&G projects?

→ *Participant G: Yes. I suppose you have done your homework on the various elements of agile management, and for me, I believe that iteration planning is*

one of the key components of this framework in management of projects. In everything that you do, planning a head gives you a sense of purpose, which can translate to faster and better-quality delivery.

Interviewer: Please elaborate more on how this can lead to faster delivery of O&G capital projects.

→ *Participant G: I think in this case, Iteration planning will allow the teams in the O&G project to plan and determine the amount of work they can deliver, and work towards delivering the deliverables desired outcomes as fast as possible.*

Interviewer: Okay, going forward do you think the introduction of retrospective meetings in Traditional Project Management (waterfall) can lead to faster delivery of O&G capital projects?

→ *Participant G: I believe so. Iteration planning allows you to plan ahead, while retrospectives will allow you to look back on areas where teams can improve. This not only helps you speed up the process of implementation going forwards because of the reduction of errors, it also allows teams to plan better and produce outcomes that are of high quality. As a matter of fact, my experience in this area has shown me that retrospectives are a great chance for project managers and their teams to mitigate risks before they become problematic later in the project management process.*

Interviewer: Great, so do you think that the introduction of communication and collaboration in Traditional Project Management (waterfall) can lead to faster delivery of O&G capital projects?

→ *Participant G: Absolutely. You see, one of the key benefits of effective communication and team collaboration is that it allows teams to work better, more efficiently, and teams that work together efficiently solves problems faster, and deliver projects quicker. This is because team collaboration and constant feedback improve flexibility in the way the workforce executes different tasks during project implementation. Idea generation, team effort, and other elements of collaboration will come into play, which ultimately ensures faster delivery of projects, even large ones such as in the O&G.*

Interviewer: Very well. So, do you think the introduction of daily stand-up meetings in Traditional Project Management (waterfall) can lead to faster delivery of O&G capital projects? How?

→ *Participant G: Yes, but I believe it depends on how the team leader implements such meetings as well.*

Interviewer: Can you provide an example to make it clearer?

→ *To be honest, my experience in this industry has demonstrated that most project managers do not know how to effectively implement daily stand-ups. These meetings are supposed to be very short, just a small window before starting day's work to mention the days deliverable and give the team a renewed focus on the project.*

Interviewer: Please elaborate.

→ *Participant G: When implemented correctly, I believe this can allow faster delivery of projects that are executed in a waterfall framework, but when done poorly, it can lead to a wastage of time. The key takeaway here is giving the team focus and highlighting that certain objectives must be achieved before the work day ends. If this is done well and consistently, I don't see why the team cannot hit deadlines faster.*

Interviewer: Got it. Do you think identifying and enhancing team skills in Traditional Project Management (waterfall) can lead to faster delivery of O&G capital projects?

→ *Participant G: Let me tell you, there is nothing that can kill a project faster let alone delaying it, than placing workers who are not fit for the job. So, yes, it is vital to identify and enhance team skills if you are to deliver faster delivery of O&G capital projects.*

Interviewer: And how does this enable faster delivery of O&G capital projects exactly?

→ *Participant G: I believe identifying skills in each individual can facilitate improve interaction between workers, improved cooperation, as well as make teams more efficient. As I said, with efficiency and focus, teams deliver faster and better.*

Interviewer: Well understood. So, Do you think solving contractual issues in Traditional Project Management (waterfall) can lead to faster delivery of O&G capital projects? If yes, how?

→ *Participant G: Yes, definitely, I think that is purely self-explanatory. If you don't handle contractual issues, then your project isn't at the risk of delay, but also total collapse.*

Interviewer: Great. So, how can the APM best practices be applied in the Traditional Project Management waterfall framework in O&G capital projects in Kuwait?

→ *Participant G: I believe such an implementation just require analysing your waterfall design, find areas that need improvement, and check on the best practices in agile framework and implement them. For instance, if planning is an issues in your waterfall model, integrate iteration planning and retrospective meetings in your design. I think it's as simple as that.*

Interviewer: And what do you think are the strengths and weaknesses of applying Agile best practices in Traditional Project Management (waterfall) model?

→ *Participant G: The key strengths that application of Agile best practices can bring to a waterfall model a great sense of focus, planning, communication and feedback, and a better way of handling the skills in the team. All these can work a long way to improve project delivery both in terms of speed of delivery as well as product quality. The key weakness of this approach is that it requires a team that is ready to be collaborative throughout, and a manager that is skilful in implementing hybrid methodology.*

Interviewer: Before I ask the last question, give me your opinion on how can a hybrid PM (traditional + Agile) deal with project complexity to reduce project delays in O&G capital projects in Kuwait?

→ *Participant G: It's just like I stated previously in our discussion, by taking the best of agile and implementing in areas that you think need improvement in your waterfall model. This can improve both project delivery and quality.*

Interviewer: Excellent. So, Do You Want to Tell Us Anything Else/ would you like to add any information to this discussion?

→ *Participant G: Mmmh. Maybe, what I would advise any project manager in this sector is to start implementing Agile best practices in a waterfall model on a small scale, maybe with on department or team, and then expand from there. From my experience, while this integration can bring monumental benefits including reduction of delays, when implemented poorly, it can cause further problems.*

Interviewer: Great Thank you very much for taking part in this study. I really do appreciate.

→ *Participant G: Sure thing. You are welcome.*

Participant H

Interviewer: Please tell me a little bit about your experience in project management.

→ *Participant H: Okay. I've worked here at XYZ-Company for the past three years, having graduated from Kuwait University two years ago. In school, I majored in project management and procurement, and I'm currently undertaking an online course on the management of project costs to enhance my skills in this area. In terms of experience, I can say that I have about four years of working experience in project management in O&G because before I joined this company, I had previously worked for one year in ABC-Organization*

Interviewer: That's great. So, what do you think are the causes of delays in O&G sectors in general and in Kuwait?

→ *Participant H: I believe that the majority of project delays and failures result from projects being executed poorly in terms of planning, handling contracts, identifying employee capabilities, and other issues such as lack of communications not only between team members but also between the client and project managers.*

Interviewer: what do you think about Agile? What does Agile Project Management (APM) mean to you as a leader and to your projects?

→ *Participant H: I believe that being agile means that one can move swiftly and with ease, but there is rather more to that in the context of project management. I believe, on the basis of the widely accepted definition within project management circles, that APM refers to a way of managing a project by dividing tasks into short bursts and frequently reassessing and adapting plans as required.*

Interviewer: So, to specify do you think that this approach can solve the issues you described prior?

→ *Participant H: Absolutely. This is a modern way of managing projects, particularly designed for this kinds of problems.*

Interviewer: having said that, do you think that the introduction of iteration planning in current Traditional Project Management (waterfall) can lead to faster delivery of O&G projects?

→ *Participant H: Yes, I think so. To me, iteration planning is one of the key elements that make APM so effective when compared to waterfall models. With waterfall, you meet once in a while to see the progress of the project, but with iteration planning, you have to meet more often and plan ahead on what you should exactly achieve exactly on a particular phase of project development.*

Interviewer: Please provide details.

→ *Participant H: Okay, let me ask you this, ~~So,~~ how does this impact the implementation in terms of faster delivery? And the answer is so/very Simple. As it improves planning and allows the team to identify risks and mitigate them. This will ensure that the team will not have to deal with unforeseen issues later*

in the implementation, which results in a lot of time and effort saving. that saves a lot of time.

Interviewer: So to move further, do you think the introduction of retrospective meetings in Traditional Project Management (waterfall) can lead to faster delivery of O&G capital projects? And if so, how?

→ *Participant H: by all means. Just like with iteration planning, the retrospective meetings allow the teams to interact better and communicate. But most importantly, it allows for room for refection, which gives a chance to improve moving forward. In terms of delivering projects faster, mitigating risks through project improvement as well as improvement of schedule management, the team can be able to hit deadlines much faster.*

Interviewer: Okay, so in your opinion, Does the introduction of communication and collaboration in Traditional Project Management (waterfall) can lead to faster delivery of O&G capital projects?

→ *Participant H: Without a doubt, this question clearly highlights what I'm trying to emphasize on the affordances that Agile best practices can bring to a waterfall model. With iteration planning and retrospectives, an added way of communication and feedback is brought to the management process. But project managers can foster this further by allowing teams to work together because there is nothing that can delay a project than allowing individuals to work alone. This way, project problems are solved at a slower pace than when this is done collaboratively and with effective communication.*

Interviewer: Well understood. So, do you think the introduction of daily stand-up meetings in Traditional Project Management (waterfall) can lead to faster delivery of O&G capital projects? If yes how?

→ *Participant H: Yes, certainly. It is all about ensuring that everyone is on the same page regarding what needs to be delivered. Again, communication is key for faster delivery of projects, especially in large projects such as O&G. People need to talk and be reminded of the project goals at every phase of implementation, and daily stand-ups are perfect for that. It is a great tool to improve communication between the teams.*

Interviewer: Please elaborate/outline on how this can lead to faster delivery of O&G capital projects?

→ *Participant H: These meetings give project managers a chance to recommunicate the objectives with the aim of reducing misguided objectives and ensure that the daily tasks are linked to daily objectives. When this is done consistently, There will be a very good chance for the team to successfully achieve the deadline as there is a daily measure/monitor.*

Interviewer: Great. And do you think identifying and enhancing team skills in Traditional Project Management (waterfall) can lead to faster delivery of O&G capital projects?

→ *Yes, absolutely, I think at this point, you have already realized that I'm a pro agile. I'm very enthusiastic about this project management method because it*

emphasizes efficiency, and you can achieve efficiency if you cannot be able to place people who are qualified, experienced, and skilled in various aspects of the project. There's no way you can deliver and hit deadlines if people are working at tasks that they aren't conversant about. So, identifying and enhancing team skills can, without a doubt, help in the delivery of O&G projects faster.

Interviewer: Yes, I've already figured that you prefer agile over waterfall, but to keep the discussion going, do you think that solving contractual issues in Traditional Project Management (waterfall) can lead to faster delivery of O&G capital projects?

→ *Participant H: Yes certainly, I do believe that for projects to be delivered efficiently, each resource must be sourced prior to the start of the project during different stages of implementation. Of you need workers to work, their contracts should be taken care of early. If you need equipment delivered, sought contractual issues first and early enough. Else, you won't meet deadlines.*

Interviewer: So, how can the APM best practices be applied in the Traditional Project Management waterfall framework in O&G capital projects in Kuwait?

→ *Participant H: I strongly believe this will depend on the project in terms of size and complexity. In smaller projects, sometimes, there is no need to add a lot of agile features because they may be completed faster regardless. But in O&G, most projects are big and long term and may benefit from agile aspects of project management. If it's planning, incorporate iteration planning, if it's about continuous improvement, incorporate retrospective meetings, like that, like that.*

Interviewer: Perfect. And, what do you think are the strengths and weaknesses of applying Agile best practices in Traditional Project Management (waterfall) model?

→ *Participant H: As we've been discussing here, one of the key strengths of implementing agile in a waterfall framework is the ability to enhancing planning, communication, feedback, retrospection, collaboration, and stuff like that which can work towards not only improving project delivery but also delivery in terms of quality. The only weakness of a hybrid model that I can think of is maybe confusion that may result in the amalgamation of two different models. This integration requires a project manager that is good with a hybrid model; a lot of time may be wasted when the manager is not experienced enough to take such responsibility.*

Interviewer: To conclude, how can a hybrid PM (traditional + Agile) deal with project complexity to reduce project delays in O&G capital projects in Kuwait?

→ *Participant H: In my point of view, to implement Agile best practices, project managers need to identify individual areas where certain agile feature may be applicable. For instance, to solve contractual issues, project managers need to deal with contacts before the start of every phase of project implementation, to ensure that before starting any designated stage, that is sorted and labour and other resources are available in time.*

Interviewer: To conclude, would you like to add anything regarding our discussion today?

> → *Participant H: To finish maybe, I will move a little bit more out of the discussion just to tell you that you are doing great work tying to investigate the applicability of Agile best practices and enablers in a waterfall model in capital projects in O&G. This is because this industry, particularly here in Kuwait, has been hit with lots of problems, that span beyond delays and overruns. It is my belief that agile methods or at least a hybrid method can really be beneficial in the successful implementation of this projects.*

Interviewer: Thank you for your kind words. And I also want to pass my appreciation for you taking your time to participant in this study. I really appreciate.

> → *Participant H: You are welcome. wish you all the best in your re-search*