

**ANALYSIS OF MATRIX ON DYNAMIC RESOURCE  
MANAGEMENT FOR MANPOWER  
SUSTAINABILITY  
IN AN OIL AND GAS COMPANY  
IN THE UNITED ARAB EMIRATES**

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**ASIA e UNIVERSITY  
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## ABSTRACT

Companies comprising of clients, consultants or contractors, in trying to execute multiple projects concurrently, face the challenge of getting the right people for the job or risk cost over-run due to mismanaging resources. Cost, time and quality of the finished product seems to be governed by the project management techniques, policy changes unstable demand and supply in this industry.

The objective of this study is to identify and propose a matrix for organizations to manage projects with limited resources and changing policies, focused on the human capital. The basic design of this study uses extracted experiential information and cross-references it with reviewed literature. Secondary data will assist in further triangulating the hypothesis towards the process gap which leads to resource wastage.

This study analyses five key elements in resource management; namely the aging workforce, working tools, knowledge management practices, workforce localisation , and policy shifts effecting the generational gap. Findings indicate that the five elements have an equal correlation in producing optimal results.

Research question 1 found a big value to retain the retirees and senior employees for their skills sets, knowledge, patience and experience leading to a sustainable productive project management. Research question 2 found that the digital tools and technology is sufficient but needs continuous training to optimise the use. Research question 3 highlighted that tacit knowledge is best shared via mentorship and internal working groups, intrinsic knowledge is best attained via e-learning. Research question 4 indicates a high importance of assessing the efforts of workforce localization as the robust working environment and requirements of the Oil and Gas industry in not matching the expected productivity outcome and skillsets of the local talents. Research

question 5 found that the project governance and organizational policies must be aligned to facilitate generational inclusiveness.

Project management systems need to address continuity issues. Digitalization of the organization is the heart of the dynamic resource management. From the Matrix of Dynamic Resource Management, four initiatives are proposed towards better human capital development. Remote working regardless of time is the new norm after the COVID-19 pandemic. Innovation in communication, documentation and learning encourages company growth and benefits to everyone. Technology has helped reduce human error, save time and manpower costs. Strategic actions such as re-tooling the Human Capital, and optimising the knowledge of the aging workforce will ensure better practices for the industry.

## APPROVAL

I certify that I have supervised / read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in quality and scope, as a thesis for the fulfillment of the requirements for the degree of Doctor of Philosophy.

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## **DECLARATION**

I hereby declare that the thesis submitted in fulfilment of the PhD degree is my own work and that all contributions from any other persons or sources are properly and duly cited. I further declare that the material has not been submitted either in whole or in part, for a degree at this or any other university. In making this declaration, I understand and acknowledge any breaches in this declaration constitute academic misconduct, which may result in my expulsion from the programme and/or exclusion from the award of the degree.

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*Farha*

**Signature of Candidate:**

**Date: 1 January 2021**



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## LIST OF ABBREVIATIONS

ADNOC	Abu Dhabi National Oil Company
AI	Artificial Intelligence
Brownfield	Urban sites for potential building development that have had previous development on them.
CAPEX	Capital Expenditure
CEO	Chief Executive Officer
COVID-19 pandemic	It is an ongoing pandemic of the coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This outbreak was first identified in Wuhan, China, in December 2019 and has spread to more than 188 countries taking more than 500,000 lives. (World Health Organization, 2021)
Custody Transfer	Transactions involving transporting physical substance from one operator to another. This includes the transferring of crude and refined petroleum between tanks and tankers, tankers and ships and so forth.
DCS	Distributed Control System; a computer system that is widely used to manage Oil and Gas activities such as fluid flow, volume, and temperature.
Documents	Writing produced by client and contractor, i.e. drawings, specifications, manufacturing records, user manual. Documents can be either from client to contractor (vice versa); or contractor to their vendors (vice versa).
DPSC	Development and Production Service Contract;
DRM	Dynamic Resource Management
EMNC	Emerging Market Multinational Company
EPCC	Engineering, Procurement, Construction, and Commissioning; The engineering and construction contractor will carry out the detailed engineering design of the project, procure all the equipment and materials necessary, and then construct to deliver a functioning facility or asset to their clients.
EPCIC	Engineering, Procurement, Construction, Installation, and Commissioning; this is similar to EPCC, but used for offshore projects. The constructed material needs to be brought to the designated spot in the ocean and installed before being commissioned.
EPCM	Engineering Procurement and Construction Management; how the resources are managed within the timeline to construct and Oil and Gas facility
ESD	Emergency Shutdown. It is a safety system that is designed to immediately stop activity in the event of an emergency that may cause harm.
FEED	Front End Engineering and Design; basic engineering design used as the basis for the construction execution phase. The FEED is often divided into separate packages covering different portions of the project bid. The FEED packages are used as the basis for bidding on when the client offers the EPC work to the contractors.

FEL	Front-End Loading; also known as pre-project planning (PPP), front-end engineering design (FEED), feasibility analysis, conceptual planning, programming/schematic design and early project planning, is the process for conceptual development of projects in Oil and Gas processing industries such as upstream, petrochemical and refining.
FEL-1	Front End Loading Stage 1; also known as Prefeasibility Stage. This stage includes 1.Material balance · 2.Energy balance · 3.Project charter
FEL-2	Front End Loading Stage 2; also known as Scope Selection. This stage includes 1. Preliminary equipment design 2.Preliminary layout 3.Preliminary schedule 4.Preliminary estimate
FEL-3	Front End Loading Stage 3; also known as Scope Definition. This stage includes 1. Purchase-ready major equipment specifications 2.Definitive estimate 3.Project execution plan 4.Preliminary 3-D model 5.Electrical equipment list 6.Line list
FLNG	Floating Liquified and Natural Gas
Greenfield	Previously undeveloped sites for Oil and Gas commercial development or exploration.
HAZOP	Hazard and Operability study; is a structured and systematic examination of a complex planned or existing process or operation to identify and evaluate problems that may represent risks to personnel or equipment.
HUC	Hook-Up and Commissioning; the process of preparing for the start-up of an asset for oil and gas production.
ITB	Invitation-To-Bid; An oral or written invitation to prospective suppliers or contractors to submit a bid on materials or services. ITB only serves as a solicitation and is not an offer because the binding agreement only comes after a contract of agreed terms and conditions is signed.
IoT	Internet of Things
LCR	Local Content Requirements; a policy to encourage recruitment of local manpower
Microsoft Project	A type of Project Management computer software
MPM	Malaysia Petroleum Management; the governance body of PETRONAS
Offshore	Oil and Gas project situated at sea some distance from the shore.
Onshore	Oil and Gas project situated or occurring on land.
PDMS	Plant Design Management System; as it is known in the 3D CAD industry, is a customisable, multi-user and multi-discipline, engineer controlled design software package for engineering, design and construction projects in offshore and onshore.
PETRONAS	Petroliam Nasional Berhad; Malaysia's National Oil and Gas company.
S	
PMC	Project Management Consultant
PMT	Project Management Team
PPGUA	PETRONAS Procedures and Guidelines for Upstream Activities, a guideline produced for standardised upstream company activities
Primavera	A type of Project Management computer software.
Reservoir	A place where fluid or Gas collects.

RFB	Request for bids (see ITB; same meaning)
Rigs	A device or constructed equipment designed for extracting Oil and Gas.
TA	Technical Assistant; usually refers to contract staffing for a particular non-executive role such as project administration
Tank farms	An area of Oil or Gas storage tanks.
Terminals	An installation where Oil or Gas is stored at the end of a pipeline or a port.
TS	Technical Specialist; usually refers to contract staffing for a particular task due to his/her specialised skills.
UAE	United Arab Emirates, a country in the Middle East and North Africa
4IR	Fourth Industrial Revolution
WL	Workforce Localization; refers to recruiting local labour

*Italic text = used when directly quoting interview participants.*

## **CHAPTER 1.0 INTRODUCTION**

In the Oil and Gas industry, the oil producers constantly struggle to meet the demands of global users, lower the costs of production while reducing the environmental effects. The project managers face the challenge to meet the host country's goals, offer job opportunities to the local citizens, engage policy makers to create long-term strategies for optimum output value, while promoting best practices that help local industries meet global standards. The organization has to balance the resources they have in order to make the best out of their activities.

Dynamic is defined as continuous and productive activity or change, resource means a source of supply or support while management means judicious use of means to accomplish an end (Merriam-Webster, 2021). Resources refer to manpower, technology, tools and knowledge. Management refers to the four basic business activities that contribute to an organization's dynamics, namely planning (such as project scheduling, revenue forecasts and expense management), goal execution (which includes implementing, evaluating and following up with expected deliverables), leadership, governance and resource control (such as manpower and machinery). To accomplish these tasks, project managers must allocate working tools and responsibilities to employees based on the skillset and schedules. Hence, Dynamic Resource Management (DRM) refers to a continuous process and source of supply chain of productive engagements as a means to accomplish an objective.

DRM is about maintaining a robust organization which constantly adapts to the current state of the economy, technology, competitiveness, competence and so on. This is crucial for the survival and sustainability of an organisation which relies on knowledge workers, especially after the COVID-19 pandemic outbreak (World Health Organization, 2021), starting late 2019, which forced the human race to adopt physical distancing. High

productivity, multi-tasking or cross-functionality as well as utilising the right tools are among the key success factors of sustaining a project. The success of DRM translates to a higher-yielding profit for the organisation, hence promoting sustainability in the long run, and the rates of resource use are equal to or smaller than the rates at which the resources are regenerated or recycled. (Freedman, 2018). This definition focuses on the manpower-related aspects of sustainability. The business world is currently in the Fourth Industrial Revolution (4IR) phase which is characterized by Disruptive Technologies and Trends such as Internet of Things (IoT), Virtual Reality, Artificial Intelligence (AI) and Robotics (Shastri, 2020, p. 41). It is a way to decrease human errors and increase profit, especially in handling high valued resources.

Five elements in Oil and Gas resource will be discussed in this study; namely, aging workforce, digital working tools, knowledge management, workforce localization and policies affecting generational gap. Oil and Gas projects are not constant throughout; it has a case-to-case decision-making outcome. The industrial era has seen three generations of workers: the Baby Boomers, Generation X and Generation Y. In the case study organization, the Baby Boomers are working on contract basis regardless of their physical capacity to close the gap of skilled manpower. The senior workers play a crucial role of imparting knowledge to juniors and the local employees, an uphill but necessary task. However, the organizational and project governance philosophy does not match with the ensuing results. Some key determinants therefore such as geographical, cultural, education and experience are discussed subsequently in the development of the research hypotheses.

## **1.1 Background of the Study**

Since the dawn of Oil and Gas exploration, drilling and production plants have used common industry knowledge and standards to churn rough estimation of men-on-deck at any given time (Micotan,2018). However, entering the age of globalisation and open market, this massive industry have become heavily reliant on supply and demand. Making fast decisions is a big challenge when decision makers face urgent uncertainty, high risks and huge pressure (Dwivedi et al., 2020). Oil manufacturers have turned to machinery and technology evolution to reduce costs and increase output. With machinery, the Oil producers are also able to reduce output when the global supply experiences a surplus, causing the price per barrel to drop. Unlike human workers, the machines do not require monetary compensation, medical benefits, travelling. They are programmed to do identical tasks with very minimal deviation. Hence the liquidity of cash is better improved.

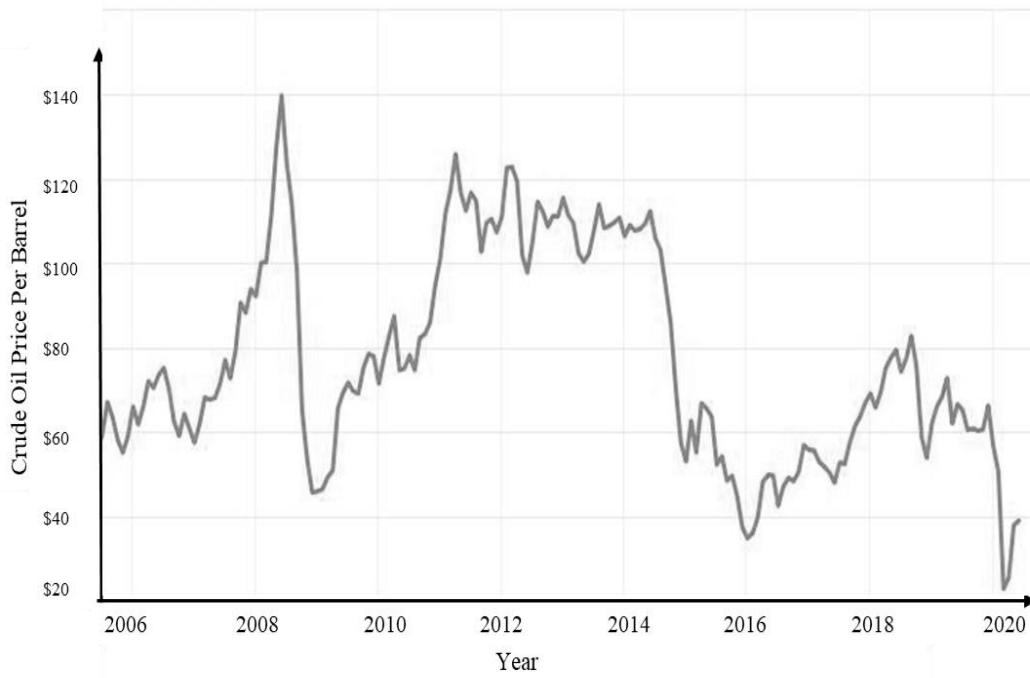
The Oil and Gas market has been jolted by two major events, as follows:

1. COVID-19 virus pandemic, which is also called the Black Swan effect (Bier, 2017). No one saw this pandemic coming and the effects were devastating to the global economy with full impact yet to be quantified. Oil and Gas is one of the hardest hit industries by the pandemic (Aruvian Research, 2020).
2. The collapse of the OPEC deal, which is also called a Gray Rhino effect (Wucker, 2016). This came after a series of warnings and visible evidences, with profound impact on the Oil and Gas market. It is known that Oil and Gas construction is substantial and can easily break the budget of millions of dollars (Lall, 2020). This industry is facing a double threat of supply glut and demand erosion. Also, it is going through a perfect storm of (a) territorial disputes, (b)

access to resources, (c) demand destruction, (d) Natural depletion of resources, (e) deepwater exploration difficulty, (f) energy transition from natural to new energy, and (g) refuse disposal issue. Hence, the way projects are planned must be dynamic. The production of oil and natural gas resources must be optimised by leveraging on the right amount of human capital, tools and finances.

Project managers have a heavy responsibility to balance expenditure to bring home a higher profit margin. An inexperienced project team can run a project capital expenditure (CAPEX) way above the limit line, causing an instant total loss. Even if the project team is highly skilled, a small glitch in global health issues can quickly snowball into a pandemic causing the whole work to halt indefinitely. A lot of scenarios may result from the Oil price. After World War 2, the global economy has faced global recessions in 1975, 1982, 1991, and 2009 (Kose, Sugawara, & E. Terrones, 2020).

Figure 1.1 illustrates the dip of Oil price in 2009, 2016 and 2020. In the high peak tides, the price soared at \$143.95 in June 2008. Due to the COVID-19 pandemic (World Health Organization, 2021), crude Oil prices plunged to as low as USD20.37 per barrel in April 2020. With the new norm of the post-COVID world, the world has to figure new ways to do work, run businesses and manage projects. Innovative management of the (aging) knowledge workers in the organization is one of the key efforts to for the organization to stay afloat (Shastri, 2020, p. 39).



**Figure 1.1: 15-Year Historical Chart of Crude Oil Prices**

Source: Trading Economics (2020).

Primary data for this study is derived from the interviews and secondary data from literature. Although many scholars have done research on the manpower resource issues in Oil and Gas field, existing literature does not highlight approaches to manage the human capital in international Oil and Gas organization in the United Arab Emirates. However, in this study tests the device of an organizational management matrix of managing the stakeholders and optimising the available sources despite the rapid change of policies surrounding Oil and Gas project management has been utilized, but much more detailed analysis of this model can be reviewed and revised to improve its' application efficacy for the mature development of DRM in Oil and Gas project management.