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An Analysis of Oil and Gas E-Learning CulturePre-Covid-19, During and Post-COVID Era

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Abstract. Since the 1920s, the Oil and Gas industry has adopted numerous approaches in learning. Increased collaborative knowledge management is a crucial effort in retooling the human capital. Remote learning via the digital platform is a win-win situation for the employer and employee. This paper discusses the challenges and recommendations of e-learning.

A qualitative study was conducted with a Malaysian Oil and Gas establishment to study its organizational management trends. The research findings and literature review highlighted three main phenomena of exchanging knowledge in this industry. Due to global expansion, virtual collaboration is a norm even before the COVID-19 pandemic.

The findings suggest the adoption of an operational matrix to dynamic resource management as a digital platform (or technology) that is the catalyst to becoming a sustainable post-Covid organization. In part 2, all the sampling and data analysis will be demonstrated to confirm the e-learning approach to the proposed conceptual framework as described in part 1.

Keywords: Oil and Gas, e-learning, digitalization, COVID-19, governance.

I. INTRODUCTION

Oil and Gas sector is one of the most crucial sectors which contributes to the prosperity of a country. When the oil price plummets, the whole world is affected economically, socially and politically. Hence, its resource management must be robust and agile to withstand any adversity. Dynamic resource management relates to a process or system which is characterised by constant change, activity, or progress (Alam et al., 2019; Bashir et al., 2020). This initiative is a coin with two faces: on one side, it means a higher profit margin for the company, and on the other, it means adopting a leaner organization with reliance on technology (Khaled et al., 2019). Regardless of the circumstances, the organization has to adopt new ways of project management to constantly force its talents to learn, unlearn and relearn to stay relevant.

The Oil and Gas market has been jolted by two major events (Company P, 2020):
•COVID-19 called the Black Swan effect (Investopedia, 2019)
•Collapse of the OPEC+ DEAL known as the Grey Rhino effect (Lall, 2020),

The Oil and Gas industry is facing a double threat of supply glut and demand erosion. Also, it is going through a storm of:

- Territorial disputes
- Access to resources
- Demand destruction
- Natural depletion
- Deepwater
- Energy transition
- Contaminants

Hence, the way projects are planned must be very prudent. The usage of resources must be optimized. Before the COVID-19 pandemic, there was no urgency toward digitalization (Hossain et al., 2020; Alkaabi et al., 2019). By default, Oil and Gas project personnel are always mobile and used to working remotely *via* the internet. It is physical distancing constraints in running facilities and manufacturing setting that contributed to some pressures with issues to be resolved. In this context, the approaches adopted for a sustainable e-learning organization through means of digitalization is discussed.

II. PROBLEM STATEMENT

Resource management is a complex activity in achieving the best business results (Polas et al., 2020). It is the act of attaining the very best talent, in the right roles, and at the right time; and giving the benefit of reduced costs (Baron *et a*l.2010). Lack of or underutilised talents is one of the main culprits of profit loss in the Oil and Gas industry (Bashir et al., 2020). Some department heads take charge of talent management, while others point the responsibility toward Human Resource.

Dynamic resource management highlights the following variables to optimise cost and possibly shorten the duration of the project(s):

•Competency of staff available

•Manpower planning - match skillset and quantity with the requirements (Alam et al., 2019)

•Project management requirements; this means *ad-hoc* solutions to any conflict arising when executing a project.

•Phases of project impact to competency requirement

•Technology to improve human skillsets

•Collaboration between peers, departments, and stakeholders

•Knowledge management - lessons learned from experienced staff

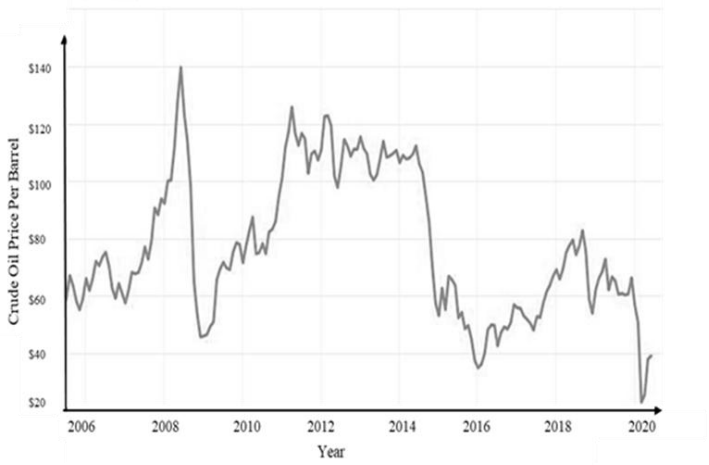
To meet the pressures of supply and demand, current talents have to constantly update their knowledge and internalize related skillset practices regardless of social distancing.

III. LITERATURE REVIEW

Knowledge Management is a platform to develop new ideas. Any technology-driven organisation is forced to leverage on knowledge management process to be effective and competitive. From properly documented data, comes Digital Twinning (Fruhlinger & Shaw, 2019) and other technologicaladvances that is crucial as new learning method.

Various sources were researched to determine current knowledge sharing methods that support the skill sets needed in the Oil and Gas industry. This is to determine if there is a correlation between talents and the instability of the World Oil price.

Figure 1. 15-Year Historical Chart of Crude Oil Prices



Source: Adapted from (Trading Economics, 2020). This figure illustrates the unstable price of crude oil.

One of the research questions in this study asks if the current knowledge-sharing methods are sufficient to support the skill sets needed in the Oil and Gas industry. According to a 2019 survey done by 451 Research, 65%, currently deployed workers in the Oil and Gas industry is undersupply chain optimization and tracking, (Bedell, 2020). Thus, remote working was made necessary even before the COVID-19 outbreak. Collaborative online technology is the new norm to stay relevant during and after this pandemic outbreak. New tools and skills must be learned, especially amongst the older generation who have been jaded by the old school way of working.

Many organizations attribute the source of knowledge management from IT applications:

Table 1:Origins of Knowledge Management in Oil and Gas Companies

Company	Origins of Knowledge Management (KM)
ConocoPhillips	IT support for E&P
Schlumberger	IT applications to drilling
Halliburton	IT applications to drilling and seismic analysis
Marathon Oil, Murphy Oil	IT applications to exploration
BHP Billiton	KM initiated by IT Department - but not adopted company-wide

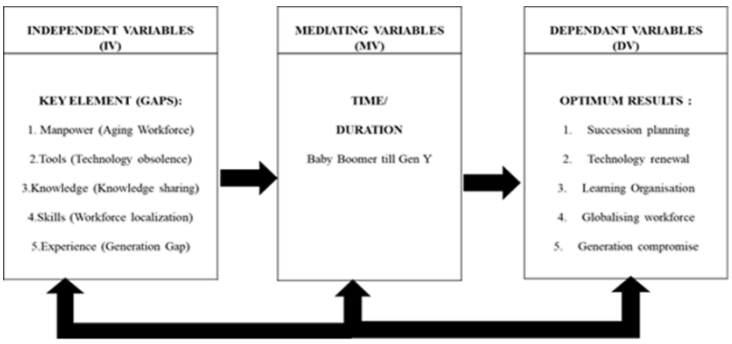
Source: Adapted from Grant (2013), p. 95.

In a survey conducted with Oil and Gas professionals, 16.6% key cause of skills shortage is due to outdated skillsets (Hays, 2015). Adding to this, the Oil and Gas fields create new roles to suit the digital era. Hence, the industry migrates toward digital knowledge renewal to meet the shifting demands.

IV. THEORETICAL FRAMEWORK

As a starting point for this study, the following framework was used:

Figure 2. Summary of IV-MV-DV Relationships in the Study



V. FINDINGS

Data collected from the interviews summarized the e-learning experience as follows:

•X-Boomer Generation (between Generation-X and Baby Boomer age group)

The utilization of experienced professionals could be explored further for a richer e-learning experience

•Technology Transfer

Technology transfer is crucial for the continuity of knowledge sharing in robust industries such as Oil and Gas. This encourages more digital data sharing in the Oil and Gas industry

(San et al., 2020).

•Documenting Knowledge

An online platform makes information available on real-time. Learning becomes more productive when knowledge is easily retrieved (Javed et al., 2020).

•Training & Development

The ageing workforce carries tacit knowledge that is lost when they retire. Hence the idea of having online coaching via online platform is happily accepted.

•The Role of Governance

Governance regulates digital enablers. In order for the e-learning ecosystem to work effectively, the organization must have the right regulatory, technological and social conditions.

COVID-19 pandemic forced the fully adopting of the Internet of Things (IoT), everything became unfazed by time and space. Virtual meetings, remote project management, digital twinning, automation of work processes, saves cost in the long run, avoids HSSE risks, reduces headcount, lesser CAPEX and OPEX. To control the recurrences of the pandemic virus outbreak, the methodology of training and development becomes fully virtual learning experience.

This is made possible by Virtual Reality (VR) learning, holographic technical learning, webinar training, online buddy system and online mentoring. The following highlights the evolution of e-learning in the organization studied:

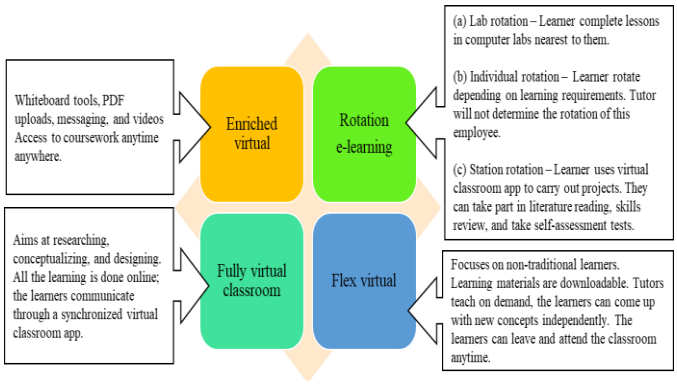
Table 2: Evolution of Learning Methods – The COVID Era

Pre-Covid (up to Feb 2020)	During Covid (Mar 2020-current)	Post-Covid
Class room theory lessons Meeting room sharing sessions Group classes One-on-one practical classes Pairing method Lessons Learned Sessions Teacher:"Show and tell" Student: "Watch and do" *PLATINUM platform	WhatsApp video chats Downloadable modules *PLATINUM platform	Digital twinning Interactive virtual lessons (real-time) Online distance learning Artificial Intelligence WhatsApp video chats *PLATINUM platform

Creating an e-knowledge platform is pertinent, but the user must be more than just data archiving. Every lesson learned is a document that captures issues and good practices that need to be replicated. In the case of the *PLATINUM website, all Oil and Gas contractors in Malaysia benefit from having a comprehensive online guidance system. On top of that, MPM adds complimenting knowledge such as in Health, Safety and Environment (HSSE) tools, Planning tools, Data Management tools, Finance & Accounts tools, and operations tools (San et al., 2020).

The following methods of e-learning are adopted based on the requirements and needs of the learner:

Figure 3. Types of Virtual Classroom Delivery



Challenges of Virtual Learning:

- Infrastructure, tools must be on par with the lesson provider and other students. (e.g.Lesser broadband speed)
- Attitude / Acceptance. Not be a favorable option for the elderly, hearing/ speaking/ eyesight impaired.
- Physical distancing. Not every tacit knowledge can be learned via the internet connection.

Benefits of Virtual Learning:

- Accessible from anywhere and anytime
- Cost-effective (no travel costs, no travel allowance, no need to leave work)
- Reduced overheads and travelling costs
- Prevents COVID virus spread
- Encourages better work-life balance(Hossain et al., 2018)
- Learning takes place at a comfortable pace

The findings suggest that the Oil and Gas industry currently has an optimum method of knowledge management. This is shown below by a summary of keywords derived from using Atlas.ti software, as follows:

Table 3: Evolution of Learning Methods – Key Findings

Keyword	**Findings**
Lessons Learned	Lessons Learned are very valuable to understand the environment and the criteria used. But maturity is needed to interpret the information; it is the key to productivity and key to efficiency to avoid any kind of rework
Documenting Knowledge	When documenting knowledge, an agreed protocol is needed to ensure a systematic recording of what happened when the task was executed. This is so that the future project teams can follow the template easily.
Challenges of Documenting	Documenting knowledge is an issue that is faced

Knowledge	continuously. Some may not have access to the proper platform to store the knowledge, some may have attitude issues, and others may face time constraint.
Best Practices	Lessons learned databases are a very crucial element to create the organization's best-practices
Similarities in opinions	• All participants hold the value of archiving whatever they know to a depository • There has to be a constant passing down and sharing of knowledge • Old knowledge must be linked to new one knowledge regularly • Knowledge prepares the organization for future tasks and emergencies

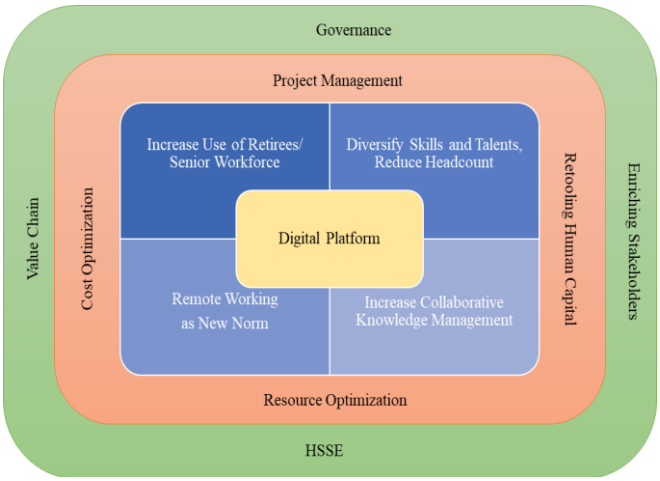
VI. CONCLUSION

Due to the nature of Oil and Gas being an ever-evolving industry, Knowledge Management has been embedded as part of the organisation's culture(Al Qalhati et al., 2020). The key is integrating different tools and programs to support and transform the business workflows and work processes (Polas et al., 2020; Hossain et al., 2018). The organisation has to constantly evaluate old work processes, current and future resources, current trends to ensure a dynamic approach to learning (Akter et al., 2020; Mughairi et al., 2019).

It is crucial to have a practical digital platform that can be used across the board in the organisation(Hossain et al., 2020).

The following Figure 4, showing the matrix to dynamic resource management, provides a summary outcome of the study:

Figure 4: From Matrix to Dynamic Resource Management



Source: A consolidated model of this research findings

At the heart of the matrix is a digital platform that provides the basis of a robust resource

management with three (3) main initiatives:

- Initiative 1: Increase Use of Retirees/ Senior Workforce
- Initiative 2: Diversify Skills and Talents, Reduce Headcount
- Initiative 3: Increase Collaborative Knowledge Management

A combination of Initiative 1 and 2 is the basis to effective workforce management; this addresses the gaps of the ageing workforce, and the lack of new talents entering the industry.
A combination of Initiative 2 and 3 is the basis to retooling the human capital; this addresses the gaps of workforce localisation as knowledge is the key to a multitasking local workforce.

VII. RECOMMENDATIONS

Governance is the basis for effective digital learning. They are the enabler, shaper and regulator of an organisation by setting the tone in accelerating the transition of digitization and automation (Alshamsi, et al., 2019; Alkaabi et al., 2019). Even before the COVID-19 outbreak, the Governance Department had already promoted virtual self-governance and digital self-learning for the following:

- Talent management(Hossain et al., 2018).
- Contractor development
- Digitization of Lessons Learned and tacit knowledge
- Generic guidelines
- Online support and guidance

Further studies are recommended to explore the expansion of governance role in enabling a more robust and flexible digital organization.

VIII. CONCLUSION

As stated in the Matrix to Dynamic Resource Management above, a digital platform is the heart of the organization because it enables and facilitates collaboration of knowledge management which is the catalyst to the retooling of human capital that finally forms the solid governance.

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