Remote Operations in Oil and Gas Industries During Pandemic Era Case

Ajeng Oktaviani[1], Ludovika Jannoke[2], Wenny Astuti[3]

{ajeng.ppo@universitaspertamina.ac.id[1], ludovika.jannoke@universitaspertamina.ac.id[2], weny.astuti@universitaspertamina.ac.id[3]}

Universitas Pertamina Jl. Teuku Nyak Arief, RT.7/RW.8, Simprug, Kec. Kby. Lama, Kota Jakarta Selatan, Daerah Khusus Ibukota Jakarta 12220, Indonesia[1,2,3]

Abstract. COVID-19's pandemic condition affects various industries, including energy and the upstream industry. One of the many negative consequences of this circumstance is that it forces the organization to come up with new strategies to cut employee number while maintaining full site operations. Many service and oil firms have successfully implemented operations wells around the world, improving not just wellsite efficiency but also cost optimization and safety. During the implementation, it is observed that remote operations are good solution even though it is challenging. This paper describes the development of remote operations in the oil and gas industry and also recommendations regarding the implementation process hopefully can add more value to Oil and Gas Industries for the future while facing difficult situation. Lastly Opportunities and Threats analysis is done to conclude how remote operations will help operators to add more value to operations.

Keywords: Remote Operation, Covid-19, human factors, oil and gas, pandemic.

1 Introduction

The COVID-19 pandemic has reached almost every country in the world. A few years ago, around a difficult year for job applicants, many peoples lost their job, and unemployment rate increased. Today, many governments are intensely focused on managing the COVID-19 pandemic and mitigating the effect on economics, which is distracting attention from the energy transition. Oil and gas companies will have to prove that they can handle this kind of situation. To adapt and thrive, organizations or companies must accelerate and become resilient and agile.

Safety is something that oil and gas industry takes very seriously, also providing valuable services related to well productivity, operational efficiency, and cost optimization. Many oil and gas companies as yet maintaining to ensure these factors are achieved.

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According to Timeline Figure 1 [1], the evolution of remote operations already begin in 2006, when wellsite experts turns to full remote operations. Personnel-free operations for directional drilling companies are now a reality and can be performed anywhere worldwide.

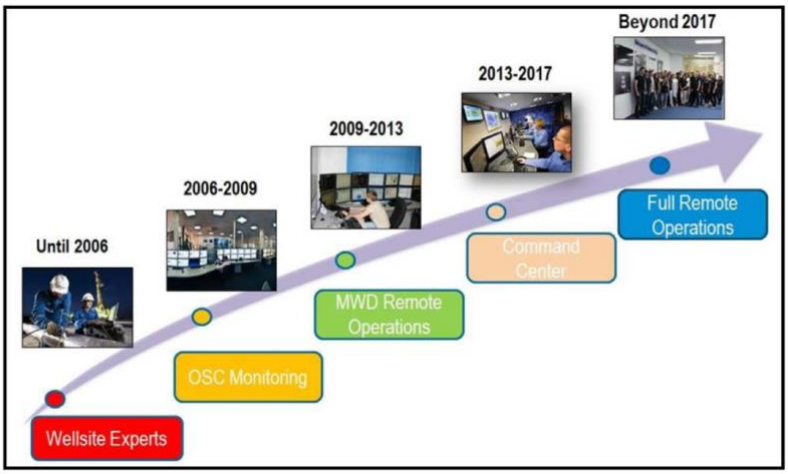

Fig. 1. Evolutional of remote operations for directional services [2].

2 Study cases

2.1 Groove gas field in the North Sea

With numerous data collecting systems, technological advancements have enabled greater monitoring and management of advanced well-testing equipment. Well testing are also performed employing multiphase flow metering with separators for greater accuracy in highly dynamic test situations. Specifically, specialists are now able to validate and review data in real-time 24/7, with the flexibility to adjust acquisition and test programs.

During the clean-up process, Well G4 was opened and closed many times, increasing the possibility of hydrate development during the initial test phase. To show a slug flow regime, the flow generation regime was simulated and monitored.

Well G6Z was drilled in 2006 and was producing at a sub-commercial rate at the time. The surface pressure was analyzed after the interpretation result revealed a high-positive skin, and it was concluded that the well is not communicating with and has been drained less than predicted by simulation models. The well was opened on a fixed choke and the slotted liner was perforated to reduce skin impact. After 6 hours of preparation, it was determined that the well does not match the criteria.

A production logging tool was run in the hole during the well test of the sidetrack dug. Domain specialists monitored surface flow rate data and delivered it to wireline engineers after validation for PLT (production logging tool) interpretation.

Cross-discipline experts who support significantly improve real-time data, quick and open communication systems between remote experts and field crews have successfully demonstrated the application of real-time well testing services, including fast clean-up operations and the capabilities of carrying out real-time well test interpretation [3].

2.2 Drilling surveilance in North Sea Field

The use of remote monitoring allows for important drilling surveillance on platforms with limited area, such as mud logging and surveillance, which were critical for improving safety in the North Sea Field. The link enables real-time two-way exchange of drilling parameters, geological data, and comments and recommendations using specifically created process workflows. Fluid gains were replicated multiple times without warning to test the system. The technology collected all occurrences remotely without fail, giving the operators increased confidence in the operation's reliability. The use of a real-time data network allowed for full rig sensor monitoring.

Critical metrics such as mud pit volumes, mud flow rate and weight, return flow rate, and return mud weight were continuously monitored in real time by Geoservices experts. Drilling events were examined, and recommendations were sent to the company.

2.3 Lake Maracaibo, Venezuela

The onshore team used Schlumberger's InterACT technology to monitor and collaborate with the wellsite team during a major CT (coiled-tubing) intervention on Lake Maracaibo in Venezuela. At a depth of 10,478 feet, the well had a collapsed screen section. The goal was to install a permanent bridge plug and eliminate the lower interval. To ensure accurate depth control, a CT depth correlation log was used. During the job, an unanticipated stumbling block arose, causing the intervention program and its goals to change. The onshore crew was able to optimize and facilitate the decision-making process by having real-time access to the CCL (casing collar locator) log and CT operational parameters using the InterACT system. As a result, operational efficiency and effectiveness have improved.

By supplying real-time data to specialists situated anywhere in the world, InterACT system offers remote access to technical expertise, enhances efficiency, communication, and collaboration, and lowers costs [1].

2.4 Reynosa Field northern part of Mexico

The Burgos project is located in the La Cuenca de Burgos region, which includes a Wilcox reservoir trend field (roughly 50.000 Sq km). For more than a decade, Schlumberger has had a significant presence in the Burgos basin. Wells, primarily S-shaped wells, require directional services such as build-up, tangent, and drop-off to vertical while preserving the trajectory inside the desired reservoir. In different wellbore sections, the majority of wells require either motors or rotary steerable systems (RSS). RSS is used for performance drilling in predetermined portions where the penetration rate can be enhanced over traditional mud motors by eliminating slide drilling.

There was a lot of directed activity in the area when the pilot project was conceived. The number of rigs increased from 5 to 11. The time was appropriate for the introduction of remote drilling

operations [4], with OSC infrastructure in place and staffed since 2004 and fundamental processes and workflows previously established.

3 Transition Technologies

It's more crucial than ever to be able to work remotely and manage data over long distances. Engineers are no longer necessary on the rig site, as a precise data network that merges technology and a digital network that automates basic processes has replaced them. As a result, engineers may concentrate more on enhancing performance. As a result, new technology to support distant activities is required. The number of patent applications in the oil and gas sector after the covid-19 outbreak is relatively high, according to patent ownership statistics. This technological change eliminates siloed procedures and workflows that impede or slow data delivery to decision makers, as well as logistical and related expenditures for staff on board, as well as wasteful journeys to the wellsite or other places.

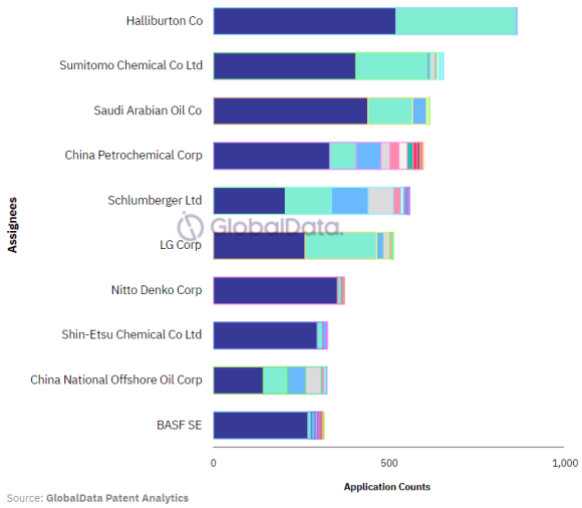

Fig. 2. Application after Covid-19 pandemic for oil&gas sectors [5].

The emergence of digital era such as the Internet of Things (IoT), artificial intelligence (AI), machine learning (ML) frameworks and the broader advancement of hardware and software will give benefit to oil and gas companies. Because it has allowed us to capture massive data sets that require expert analysis. Collecting broad data sets can provide real-time data ready for analysis. Based on survey conducted by OpenText [6] show that digital transformation should prioritize on predictive analytics and intelligent automation. This transformation will benefit to all oil and gas value chain especially to asset integrity and maintenance, field development, and drilling sectors.

This are multiple services that are supported and managed through remote services:

1. Logging while Drilling (LWD)
2. Measurement While Drilling (MWD)
3. Mud Logging Services
4. Pressure Management Services
5. Reservoir Navigation services
6. Drilling Opimization and Advice
7. 24/7 Technical Support
8. Geoscience Support
9. Application Engineering Support
10. Wireline Logging Monitoring
11. Chemical Automation
12. Artificial List Service
13. Fracturing and Stimulation
14. Expert Advice
15. Workshop Support

Not only IoT, AI, and ML, drone and robotics technologies have quickly become a go-to tool for industries across the globe, because it provides unique access to areas where it is too dangerous or too expensive for humans to venture. The oil and gas sector has been a pioneer in subsurface drones or remote operated vehicles (ROVs) – allowing offshore operators the ability to assess drilling equipment, pipelines, wellheads and a range of other deep-sea infrastructure with advanced monitoring equipment, cameras, scanners and various robotic arms. In doing so, the cost of offshore exploration operations has fallen significantly over the past decade, and now is an essential tool for operators.

Some of the more advanced 'heavy' work-class ROVs can "reach depths of up to 3,000 meters and come with lifting capabilities of up to 5,000 kg". Similarly, the 'high capability' observational ROVs can reach depths of up to 6,000 meters. Such depths are near impossible for human labour, expanding the potential for development of deep offshore drilling.

Since the beginning of the year, Baker Hughes has confirmed that 40% of the customers of its remote operations services have been first-time consumers. In what is becoming the new normal for the sector, Schlumberger stated that it intends to significantly expand its digital operations. Last month, Halliburton signed a deal with Microsoft and Accenture to improve its digital capabilities.

Several initiatives were developed to ensure the success of new operations:

1. Perform a pilot test.
2. Ensure connecting signal and communication systems,

3. Create new standard procedures considering remote operations,
4. Design training related remote operations,
5. Define job description of all personnel.

Oil and gas corporations are also establishing a growing number of tech labs in order to accelerate the industry's digitalization and attract fresh talent. The major three are making the switch to digital. Many of jobs will be lost, but thousands more may be created.

4 Opportunities and threats

Since 2004, the growth of remote operations in the oil and gas industry has progressed at different rates in different parts of the world. Because of reluctance to change at the rig site, it took longer to reach the US land market. The drop in oil prices in 2014, on the other hand, drove remote operations into existence as a cost-cutting measure. Due to obstacles such as oilfield culture, corporate strategy, human factors, and legal issues. Forward to 2020, when the COVID-19 epidemic sends the oil industry into yet another recession, and service firms are being forced into the world of remote operations. We discuss remote operations' opportunities and threats to better comprehend this implementation. Remote operations are a good way to prepare for a pandemic like this.

Opportunities:

a. HSE exposure at the wellsite is reduced.
b. Reduces the number of people on board, as well as the associated expenses, logistics, carbon footprint, and emissions.
c. Improves the consistency, efficiency, and flexibility of service delivery.
d. Accelerates the adoption of innovative technology.
e. Allows for company continuity in the event of unanticipated incidents.
f. Controls wellsite operations in real time.
g. Real-time data is networked for informed judgments.
h. Handle regional or seasonal activity changes and improve contigency to reduce the impact of unforeseen events like weather.
i. Wellsite crew illness can be managed without jeopardizing their health and safety.

Threats:

a. It is critical to establish guidelines for how the operation should be carried out between rig site employees and the remote center/office. To enable teams to plan, operate, communicate, and collaborate, detailed procedures must be developed.
b. A critical component of remote operations is communication infrastructure. It is necessary to maintain improved and sophisticated connectivity via fiber optics and wifi.

c. Real-Time Data must be easily accessible, yet the servers must be capable of high performance.

d. As the operational environment digitizes and the risk of sophisticated cyber-attacks grows, the necessity to increase the security and resilience of operational infrastructures against cyber threats grows [5]. This is accomplished by using a secure IT integration to transform disconnected networks.

5 Developing talent program

The graduates need to know how to integrate the digital technologies of today and tomorrow, and be flexible enough to move into new application areas of their expertise. Industry and governments have intersecting roles in the successful and sustainable management of our natural resources and the security of our energy supply system. Besides the fundamental training in Data Science areas, the schools need to include components that help the graduates to realize the value of their expertise in other fields, such as environmental safety, subsurface storage, and groundwater hydrology. An expansion of this employment pathway could also aid in the stabilization and diversification of careers for petroleum engineers and geoscientists also to ensure their critical capabilities are maintained for the benefit of society.

The cross-disciplinary training program for a group of students from different domains working on a unique project is new to cover all the disciplines. The future of work is evolving, and new technologies are changing how talent is acquired, developed, and retained. Automation in the oil industry has achieved outcomes that go beyond human capabilities. While the industry will never entirely lose its human touch, AI will be the foundation of the workforce of the future.

An organization needs to boost its resilience so that it becomes more flexible, focused on long-term goals, and adaptable to sudden or gradual changes. Talent Development departments should then make sure their workflows also adapt rapidly and remain flexible to cope with the times and with the evolving profile of the workforce. Perhaps, the most important emphasis should be placed on their own leaders of talent development as well as the organization leaders at large. The recently experienced global COVID-19 pandemic triggered step-changes in the corporate world of oil and gas, smashing paradigms like the continuous and scheduled presence at the office or operational sites of all personnel, favoring instead remote working for the majority of employees. This forced exercise of prioritization revealed some aspects needed to facilitate remote training, like availability of personal laptops provided by the organization, to ensure security concerns were properly addressed, and human resources policies pertinent to approvals of timesheets, performance evaluations, and peer reviews of results. As a preliminary observation, the impact of remote working was shown more importantly in the training of new hires and inexperienced personnel, as it became clear the workflows at upstream and downstream organizations required experienced personnel for decisions and leadership.

Some recommendations are extracted, applicable to training people remotely and on-site:

a. Ensure all your employees have a laptop provided by the organization, with IT security filters,

b. Substitute some learning formal courses for Coaching /mentoring and expand on mentoring programs,

c. Update frequently your learning portfolio of e-learning or online offerings. Old materials need to be discarded, and not for content but for style or for how appealing it is,

d. Monitor and reward progress in individual learning paths, to promote self-motivated autonomous learners,

e. Expand on leadership, multiculturalism, and soft skills offerings online.

f. Use cross-postings as learning paths and value change and mobility.

6 Conclusion

Within the oil and gas industry, changes in business dynamics motivate advancements of technology. The delivery and learning models are changing while the technologies advance simultaneously. Some of the technologies provide real-time systems, the Internet of Things (IOT), sensors, cloud computing, and cloud communication, but also a revolution in the drilling process with robotics, automation, artificial intelligence, and deep cognitive science.

Upcoming days, we will deal with more advance computers, machines, robots, are going to do repetitive jobs with heavily interconnected devices, and this will dramaticallly alter the trend in energy industry. Disruptions and advances in drilling wisdom have started happening. Ready or not, the technology will make it all possible and human labour will fall behind.

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