Chapter 5
Positioning Augmented Reality in Oil and Gas Maintenance Support: A Strategic Plan During the COVID-19 Pandemic

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ABSTRACT

High-risk, hazardous, and harsh environments are synonymous with the oil and gas industry. Accidents are inevitable without proper maintenance for equipment installed in any asset. Therefore, maintenance is a critical activity required to operate oil and gas facilities. Existing methods consist of corrective and proactive maintenance, where operators are betting a bottom dollar on original equipment manufacturer (OEM) specialists to assess the functionality of the equipment. Nevertheless, beginning of 2020, the Coronavirus disease (COVID-19) pandemic has hindered most of the yearly turn around (TA) to maintain the assets due to travel restrictions and mandatory quarantine regulations. Therefore, this paper aims to develop a strategic plan during the COVID-19 pandemic to position augmented reality (AR) in the maintenance support of the oil and gas industry. This proposal used literature reviews related to AR and maintenance support as its research methodology. The strategies encourage remote support via suitable AR technology to reduce cost and shorter mean time to repair (MTTR).

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INTRODUCTION

Maintenance of equipment in the oil and gas industry is considered one of the critical activities. Either the end-user operation team usually performs the tasks of maintaining the asset, or it can be seconded to the appointed service contractor. The functionality of the critical equipment is the utmost priority in plant maintenance strategies to protect the asset from unexpected accidents (Al Messabi et al., 2020). The operation team will engage the OEM to assess the inspection findings performed by the operation team. Later on, the field specialist of OEM will advise the required parts and timeframe needed to complete the task. Therefore, the maintenance activity cost should be lower as parts to replace should be cheaper than a like-to-like replacement (Zakaria et al., 2019).

In the second quarter of 2020, the COVID-19 pandemic hit the world hard, and the oil and gas industry are not exempted from this issue. Due to a decrease in revenue from the shortage of demand, refineries are forced to postpone their maintenance activities (GlobalData Energy, 2020). In addition, the authority implemented mandatory procedures that have caused unnecessary additional protocols to the travelers. For example, in the oil and gas industry, the offshore work requirement is to have the Polymerase Chain Reaction (PCR) test be negative before being mobilized to rig. Besides the testing requirements, the person must be quarantined for 14 days before mobilization to the platform (Majlis Keselamatan Negara, 2021). The procedure has caused a significant escalation in the cost of maintaining the equipment (Internal document, unpublished); the mandatory quarantine charges and subsistence fees will be billed to the end-user or contractor. Nevertheless, the 14 days of non-productive days are considered a loss to the OEM since the Field Specialist cannot proceed with their assignments elsewhere, which can be either inspection or training.

Moving on to cater to the requirements of end-users in another area, where a least critical task is needed, such as inspection and replacement of parts, the use of AR devices can be implemented (Jacobs, 2018). These devices can be either via tablet, laptop, or even head-mounted device (HMD). AR is one of many concepts introduced as part of the industry 4.0 (IR 4.0) initiatives. In order to ensure firms execution, IR 4.0 demands a fast and efficient maintenance service. The use of AR for supporting maintenance activities is not a new notion (Masoni et al., 2017) . AR application in the oil and gas industry can be helpful to train the personnel at the site on maintenance and operation of various equipment (Lu, Guo, et al., 2019). Therefore, to achieve the aims of this paper to develop a strategic plan during the COVID-19 pandemic to position Augmented Reality (AR) in the maintenance support of the oil and gas industry. To achieve the aims, the existing maintenance strategies shall be identified. Nevertheless, the challenges faced by end-user to perform maintenance during COVID-19 pandemic will be addressed. Lastly, the strategic plans to implement AR to assist in maintenance support will be proposed.

LITERATURE REVIEW

To administer AR in the maintenance support for the oil and gas industry, this paper will review publications that focus on maintenance strategies in the oil and gas industry and the challenges faced by the oil and gas industry in maintaining the facilities during the COVID-19 pandemic. Finally, strategies to implement AR in remote maintenance support within the oil and gas industry will also be discussed.