

Covid-19 Impact Evaluation and Time & Cost Mitigation Strategy for Oil & Gas EPCI Project

M P B Arisman¹, M A Berawi² and M Sari³

Civil Engineering Department, Engineering Faculty, University of Indonesia, Depok, 16424, Indonesia.

Abstract. The outbreak of COVID-19 pandemic at the end of 2019 has impacted all social, cultural, and economic sectors. As part of the outbreak, oil and gas industry in Indonesia is also experiencing the impact of COVID-19, especially in the upstream sector. The study will discuss the implications of COVID-19 as a case study of the development project in the upstream oil and gas sector by identifying specific impacts in each project phase and their relationship to time & cost overrun. Through the research questions, specific impacts of each phase of the project (Engineering, Procurement, Construction & Installation) are obtained, including overrunning in labor cost, cancellation cost due to early termination of the chartered vessel, extension cost for material storage, and remobilization for the marine spreads on next offshore campaign. Based on the research, there is 8-14 months impact on the project schedule and 25% - 27.5% overrun oncost impact.

1. Introduction

The world health polemic that has occurred in the past year has become the attention of scientists, professionals and state leaders. The outbreak of COVID-19 cases at the end of 2019 began in the city of Wuhan, China and was later designated by the World Health Organization (WHO) as a Public Health Emergency of International Concern (PHEIC) in January 2020 due to a significant increase in cases and confirmed cases in other countries. On March 11, 2020 WHO declared COVID-19 as a global pandemic [1]. As of June 2021, the Government of the Republic of Indonesia has reported 1,963,266 confirmed positive COVID-19 cases and 54,043 deaths (CFR: 2.8%) related to COVID-19 were reported and 1,779,127 patients have recovered.

The Merakes – EPCI 4 Project is an East Sepinggan oil and gas block development project located in the Kutai basin area, East Kalimantan with a total area of 2,913 m². The Kutai area is one of the main oil and gas producers in Indonesia with more than 45 Tcf (trillion cubic feet) and 4,000 MMbbls (million barrels).

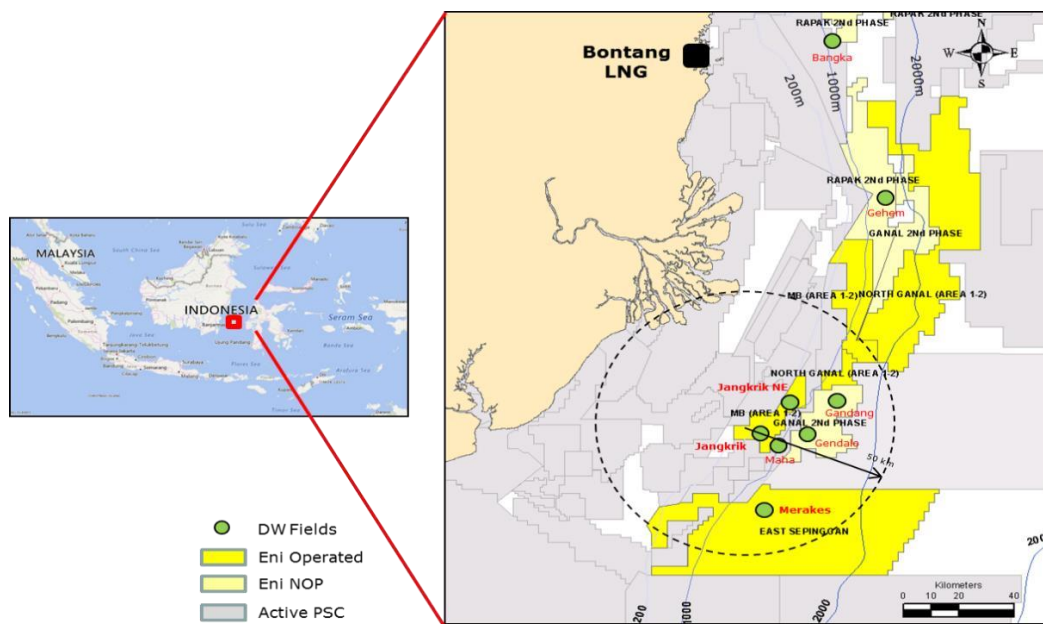


Figure 1. Merakes EPCI 4 Project Location

Scope of Merakes EPCI 4 Project includes Engineering, Procurement, Fabrication, Installation and Commissioning of seabed facilities in the for subsea pipelines, subsea structures from wells to Jangkrik FPU for processing. The general description of the project is as follows.

Table 1. Project Summary.
Project Summary

Project Owner	Eni East Sepinggan Ltd
Contractor	Timas Sapura Offshore JV
Project Location	East Sepinggan Block
Project Scopes	Engineering, Procurement, Construction, Installation for Offshore Pipeline System and Subsea Structures.
Contract Type	Lump sum contract
Project Effective Date	October 2018
<i>Offshore Campaign</i>	<i>Effective Date + 11.5 month</i>
Completion Target	<i>Effective Date + 15.6 month</i>
Project Value	USD 144,232,984,00

The Merakes EPCI 4 Project is in the Installation phase for some sections of the pipeline. The Project Owner instructs the contractor to stop work and demobilize the existing installation vessel and crew due to the outbreak of COVID-19.

The objectives to be achieved from this research are as follows:

1. Evaluation of the impact on each phase of the project (Engineering, Procurement, Construction & Installation).
2. What are the corrective actions and risk mitigation that can be used to restart the project which suspended due to COVID-19?

2. Methods

A literature review is defined as a methodical, explicit, and repeatable procedure for identifying, evaluating, and interpreting previously published documents. In "Early Impacts of the COVID-19 Pandemic on the United States Construction Industry [2] states that the construction industry has experienced many impacts in the form of delays in material delivery, delays in permits, low levels of productivity, poor cash flow, project suspension, price escalation and potential contract disputes. But despite these challenges, there are opportunities that can be explored as a result of the pandemic such as lower loan interest rates and abundance of skilled labor.

According to Hansen in "Does the COVID-19 Outbreak Constitute a Force Majeure Event? A Pandemic Impact on Construction Contracts" identifies Covid 19 as a force majeure event, this is in line with the issuance of Presidential Decree No. 12 of 2020 concerning the Determination of Non-Natural Disasters Spreading Corona Virus Disease 2019 as a National Disaster. [3]

Table 2. Descriptive Summary of COVID-19 Impacts on Project

No	Author	Title	Research Summary
1	Ghandour (2020)	The Impact of COVID 19 in Project Delivery: A Perspective from the Construction Sector in the United Arab Emirates.	The study findings revealed that there is a statistically significant effect of the COVID-19 pandemic on the number of days taken to complete projects in the construction industry in the UAE. The findings of the study revealed that the pandemic resulted in a lack of access to raw materials and labor, thereby leading to a delay in the completion of projects.
2	Gamil (2020)	The Impact of Pandemic Crisis on the Survival of Construction Industry: A Case of COVID-19	Statically proven that the most impacting factors are the suspension of projects, labor impact and job loss, time overrun, cost overrun, and financial impact. From the interviews, it was highlighted that the economic impact is significant to all the project stakeholders and the workforce.
3	Alsharif et al (2020)	Early Impacts of the COVID-19 Pandemic on the United States Construction Industry	The study findings identified that the construction industry experienced a number of adverse effects. These included material delivery delays, shortage of material, permitting delays, lower productivity rates, cash flow-related challenges, project suspension, price escalations, and potential conflicts and disputes. Despite the number of challenges, there were a number of new opportunities that were experienced in the construction industry as a result of the pandemic. These included opportunities that resulted from lower interest rates; demand increase in the medical, transportation, and residential sectors; and the ability to recruit skilled workers etc.
4	FTI Consulting (2020)	COVID-19 Impacts on the Construction Industry in Latin America	Depending on the restrictions, construction projects have seen severe productivity impacts, or in most cases, the complete suspension of all construction activities. Some of the new protocols and restrictions require construction to continue only if the project is considered critical, while others limit how to operate day-to-day, such as reducing work hours, implementing shorter shifts, increasing distances between workers, disinfecting tools and equipment between shifts, not having site visits, and having high risk employees stay at home, among others.
5	Delloite (2020)	COVID-19 Impacts; A proactive response to a shifting planning, design, and construction landscape.	There will be delays, loss of efficiencies, and cost impacts because of COVID-19 and related regulatory responses, and there is little to no precedent to help companies understand what the potential future impacts may be or when restrictions may end. Work will likely be more costly, and take more time.
6	Hansen (2020)	Does the COVID-19 Outbreak Constitute a Force Majeure Event? A Pandemic Impact on Construction Contracts.	This research has investigated the potential of COVID-19 outbreak as a force majeure event. In addition, it also proposes a force majeure decision model to assist parties in exercising their force majeure provision. Future research recommendations may include investigation related to the impact of an epidemic outbreak on the growth of construction industry, the consequences of an epidemic outbreak on the implementation of work on project sites, and quantitative research related to the impact of an epidemic outbreak on project overhead costs and cashflow.

No	Author	Title	Research Summary
7	IDB (2020)	Guidance for Infrastructure Project on COVID-19: A Rapid Risk Profile and Decision Framework	<ol style="list-style-type: none"> 1. Asses Project's Management for COVID-19 response. 2. Asses Context Risk and Project Risk. 3. Determine Project's Risk Profile & Follow Recommendations.
8	Protiviti (2020)	Impact of Covid-19 on Construction Project	<p>The construction industry has been bit hard and is being challenged by many obstacles regarding contractual obligations, availability of resources, deliverables, health and safety measures, and project delays or cancellations.</p> <p>Impacts Assessment:</p> <ol style="list-style-type: none"> 1. Under development projects are the worst hit with a minimum impact of two to three months, which may be controllable with measures outlined in the recommendations section. 2. Due to a delay in the construction period from the lockdown, there would be an additional interest cost on the working capital loans taken, which will be bomb by the developers or the contractors depending upon the risk sharing mechanism. 3. The labor cost for skilled workers was expected to rise by 20% to 25% while that for the semi-skilled and unskilled workers are expected to rise by 10% to 15%. 4. Revised standard operating procedures duly incorporating social distancing, personal protective equipment and hygiene would drive up project cost in the short term. 5. Implementation costs may not vary much for linear projects like irrigation canals, pipeline, transmission lines, roads, etc, but for non-linear projects the costs may rise by 2% to 5%. 6. The Projects dependent on specialized equipment, electronics and specialized materials are more likely to be hit by disruption to the supply chain largely due to the force majeure clauses. The recovery of liquidated damages would not be possible for the developers unlike certain sectors, such as solar projects where the pandemic as a part of Force Majeure Clause is not included in the Power Purchase Agreements with some of the major solar power developers in India.
9	KPMG (2020)	COVID-19: Assessment of Economic Impact on Sector in India	

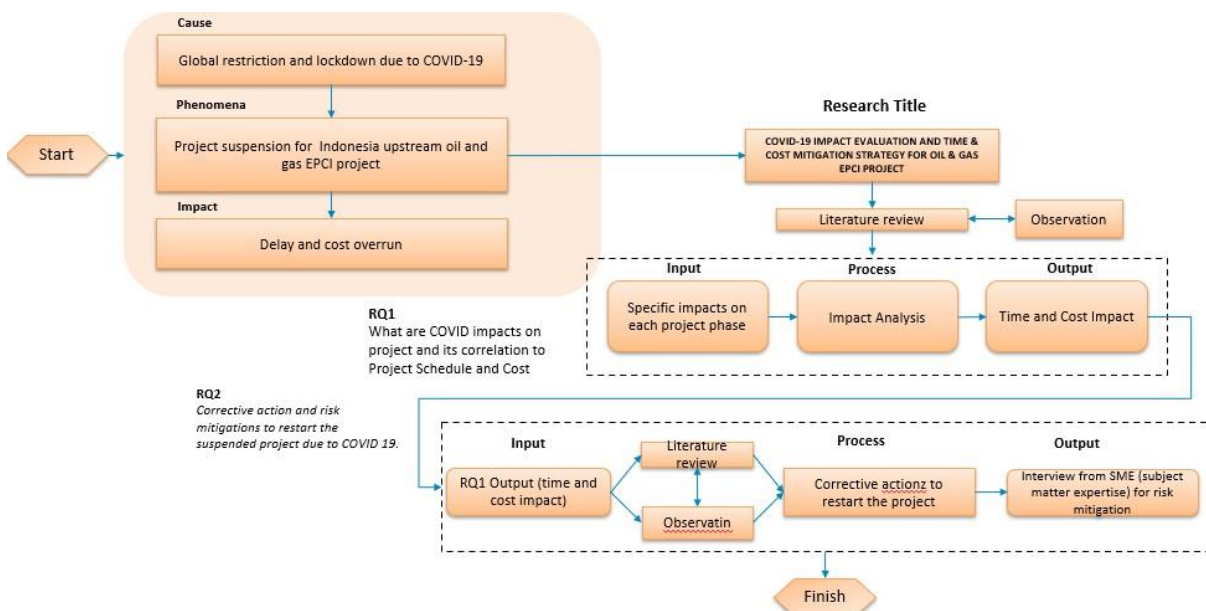


Figure 2. Research Methodology

To answer RQ1, a problem identification process carried out as the initial stage of the research process with objectives to see the impacts on the project generally and specifically on the project that appointed as a case study. The identification of impacts is generally obtained through a literature study of

construction projects affected by Covid, based on the data obtained, the impact variables for each project phase are as follows:

Table 3. COVID-19 Impacts on Each Project Phase

No	Project Phase	Impacts	Consequence impacts
1	Engineering	Project suspension, productivity [3] [4] [5] [6] [7]	1. Overrun on labor cost, 2. Delayed on documents submission 3. Time extension for office facilities
2	Procurement	Project suspension, permit [3] [5]	1. Cancellation cost, 2. Vendor warranty extension, 3. Handling and preservation cost 4. Material storage extension
3	Fabrication	Project suspension, permit [3] [5]	1. Handling and preservation cost 2. Material storage extension
4	Installation	Project suspension, permit, travel ban [5] [7]	1. Installation and material barge standby 2. Early termination cost 3. Performance bond and insurance extension 4. Remobilization marine spread for second campaign

Referring to the correspondence between the Project Owner and the Contractor in responding to the impact of Covid on the project with the uncertainty of when will the project resume, simulations are carried out with several scenarios, 6 months, 9 months, and 12 months.

Based on the impact analysis study conducted by the author, the summary impact on time and cost is obtained as follow:

Table 4. COVID-19 Impacts on Each Project Phase

No	Scenario	Schedule Impact	Cost Impact
1	6 months	8 months	25.51%
2	9 months	11 months	26.50%
3	12 months	14 months	27.49%

Based on literature review as the output for RQ2 on corrective action to restart suspended project as follow:

1. Issue notifications to all contractually bound parties as soon as possible that there are indications of COVID-19 that may impact the project.
2. Identification of impacts that have occurred.
3. Prepare the Project Continuity Plan.
4. Evaluation of project risks and response capacity to risks due to COVID-19.
5. Mapping risks in the form of threats/opportunities, mitigated and monitored.
6. Require involved contractors to prepare Prevention and Response Plans.
7. Prepare different scenarios and possibilities in predicting the impact of COVID-19.

8. Require recorded evidence and acknowledged by both parties for claims submission due to COVID-19.
9. Contract addendum to capture deviations in the contract.
10. To conduct a lesson learned workshop at the end of the project, so changes that occurred during the project can be captured and considered during contract preparation for future projects.

Risk mitigation recommendation during interview as follow.

Table 5. Risk mitigation recommendations

No	Project Phase	Impacts	Risk Mitigations
1	Engineering	<ol style="list-style-type: none"> 1. Overrun on labor cost, 2. Delayed on documents submission 3. Time extension for office facilities 	<ul style="list-style-type: none"> - Acceleration on document review cycle - Documents categorization based on priority
2	Procurement	<ol style="list-style-type: none"> 1. Cancellation cost, 2. Vendor warranty extension, 3. Handling and preservation cost 4. Material storage extension 	<ul style="list-style-type: none"> - Commercial negotiation for cancellation cost - warranty period extension for purchased material. - Include free storage option in certain period in the contract - Prepare preservation plan
3	Fabrication	<ol style="list-style-type: none"> 1. Handling and preservation cost 2. Material storage extension 	<ul style="list-style-type: none"> - Commercial negotiation for cancellation cost - warranty period extension for purchased material. - Include free storage option for certain period in the contract - Prepare preservation plan
4	Installation	<ol style="list-style-type: none"> 1. Installation and material barge standby 2. Early termination cost 3. Performance bond and insurance extension 4. Remobilization marine spread for second campaign 	<ul style="list-style-type: none"> - Collect evidence and claim to project owner for additional cost impact occurred during the project. - Commercial negotiation for cancellation cost - Performance bond dan insurance extension - Monitor government regulation periodically and finalize negotiation to project owner prior to remobilization. - Contract addendum to capture deviations in the contract.

3. Conclusion

In accordance with the research, researchers conclude that there are impacts on project from schedule and cost perspectives as reflected in Table 3. Handling the COVID-19 pandemic case requires commitment from both parties, whether Project Owner or Contractor with full management support and project financial strengthening. This research can be continued by adding the number of impacted projects in upstream oil and gas industry sector so the data output can be more accurate and can be helpful in decision making for similar cases.

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5. Authors' Note

Authors' declare that there is no conflict of interest with regard to article publication and confirmed that the paper is plagiarism free.

6. References

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