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Exploring Logistic Setup Challenges during a Scheduled Offshore Platform Shutdown

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ABSTRACT

The offshore plant shutdown is a process to ensure the reliability of the equipment and to avoid loss of income because of an unplanned shutdown. This process requires proper coordination among the stakeholders involved in offshore operations. The common issue faced during the offshore plant shutdown is mainly associated with the logistic setup process which directly impacting the shutdown cost, loss of revenue, loss of customer trust, and unnecessary claim due to a delay of the shutdown process. Hence, the successful implementation of the offshore plant shutdown depends on the appropriate coordination of the Oil & Gas Company to manage the process. There is limited literature discussing the process of the offshore plant turnaround shutdown for an academic reference. As such, this study is motivated to fill up the gap in the literature by exploring the challenges of logistics setup during a scheduled shutdown process at the offshore platform which turns to be a major problem for oil and gas companies. In this research, a qualitative method was adopted due to the complexity of the process that requires close investigation to understand the real issue. A focus group approach was used to extract the information and established the theme on the challenges faced by the logistics set up. The findings revealed the absence of logistics involvement during the upstream planning which is the major problem that contributes to delay in schedule and increase to the project cost. A proposed framework of logistics scope during the offshore platform shutdown was developed to provide an insight into the proper planning and improvement in the process.

Key words: Supply Chain Management, Upstream Logistics, Logistics setup, Offshore Platform Shutdown.

1. INTRODUCTION

An offshore platform is like a floating 'town' in the middle of the sea used to house crew and machinery for exploration and/ or production of natural resources such as fossil fuels from under the ocean bed. In many cases, this platform is located far away from the onshore supply based and can only be connected using the vessel or the helicopter. As such, logistic is always the biggest challenges for the offshore platform operation.

2. BACKGROUND OF RESEARCH

Shutting down an offshore platform for schedule maintenance is a risky activity that could cost millions of dollars if not properly managed. As an extreme example, Mexico Oil company reported an increase in the production cost by USD 2 per barrel as resulted in delaying operation due to Hurricane Ike in 2008. Hence, the success of offshore platform schedule shutdown is largely depended on the close coordination among the stakeholder of the project including meeting the logistics requirement. In offshore schedule shutdown, logistics play a critical role in the whole process of the shutdown due to restricted working area and location of the platform that away from the onshore supply base is always a major challenge to logistic in term accessibility.

3. PROBLEM STATEMENT

The offshore plant shutdown is a process to ensure the reliability of the equipment to maintain production levels and diminish the loss of income due to unplanned shutdown [1]. It involves the replacement of parts, maintenance of aging machinery, installation of new equipment and refurbishments works. Thousands of manpower will be also required to execute the events as a substantial measure of work to meet the short period in the schedule. The deployment of huge manpower and thousands of parts and equipment required for the shutdown process will be a challenging task that demanding a proper logistics setup due to the limitation of the working space and location of the offshore platform [2]. Thus, the logistics setup play a crucial determining factor that directly impacting the shutdown process in term of additional cost, loss of revenue, loss of customer trust and unnecessary claim due to the delay of the shutdown process logistics [3].

4. RESEARCH OBJECTIVE

The research is aim to explore the logistics setup during the schedule offshore platform shutdown. To facilitate the investigation, the following research question (RQ) were developed as follows:

1) How the logistic setup processes is being developed during the schedule offshore platform shutdown.
2) How the inefficient logistics setup impacting the turnaround shutdown process.

5. PLANNING AND PREPARATION FOR SHUTDOWN

According to [4], offshore platform turnaround shutdown process needs time and effort to execute due to nature of the operation and the existing challenges. Hence, the process of shutdown require comprehensive inputs from all the stakeholder that directly or indirectly involved in the operation of the offshore platform. The task for preparing the shutdown planning is in charge of the project team. There are many aspects to be considered during the planning process apart from the cost and loss of revenue which is the safety and environmental issues.

6. OFFSHORE PLATFORM TURNAROUND SHUTDOWN

Most commonly, the offshore platform involves the activities on the continental shelf which is also could be used in lakes, as well as inshore waters and inland seas. For the oil and gas industry, an effective turnaround shutdown is important to maintain the product levels and reduce the loss of revenue because of unplanned shutdown [1]. The turnaround shutdown process for the offshore platform is a necessity for all the equipment and machines that reached in a certain operating hour to be shut down for repairs and maintenance. It is also known as shutdown maintenance or turnaround maintenance (TAM). On the other side, turnaround shutdown is normally driven by involving the need to undertake the maintenance process for the purposes in the future production to be more efficiency, and also to achieve the requirement set by the Department of occupational safety and health (DOSH) [5]. It is also aimed to minimize the potential hazards of the operation and compliance with the rules and regulation related to the environmental procedure or criteria. The process for planning the turnaround shutdown usually started at least three months before the process of turnaround shutdown officially started.

7. OFFSHORE SHUTDOWN PROCESS

According to [6], the life cycle procedure of the offshore structures contains four different stages which are the arranging and configuration stage, development period, operational and upkeep stages and lastly decommissions periods. The arranging and design stage incorporates every activity from the initial thought, conceptualization, and pre-plan, to the complete design phase of the structure. The development stage incorporates the planning stage, starter reviews and lastly nearby development. The operation and maintenance stage incorporates the operational activities of the facility and the assessment and execution of proper support and repair activities. At last, the re-use stage relates to the end of the provision of life or a lifetime. Based on [6] suggestion, the logistics process is available at the four phases of each offshore structure life cycle.

The planning stage requires recorded long-term data of the related factors to give measurable data required to set outline levels and to set up proper support and repair systems. The construction stage requires short term and occasional estimates. Maintenance or review of the structure (plan life more than 20 years) also need a short term and regular estimate, however, a long-term data is additionally important for the evaluation of potential impacts of environmental change.

8. UPSTREAM LOGISTICS

Upstream logistics can be stated as providing the offshore operation with the essential supplies, [7] to make sure the activities run as planned at the most competitive cost. [8] had said that during the shutdown, the production units have a different kind of support services that are provided by an expert vessel which is offshore supply vessels (OSV), crew boats and standby or rescue vessel. The company usually will charter the vessel rather than own it.

Due to the high levels of risk and uncertainty in the offshore platform shutdown, it is crucial for the logistic to select reliable OSV providers despite a high rental cost [9]. Furthermore, the location where the offshore platform shutdown activities are operating is an important indication of the decision of supply vessel. The factors like weather conditions, the measure of equipment required and the separation from the shores are critical for what properties the vessel should have. Most oil and gas organizations outsource the supply vessel and pay relies upon numerous elements, for example, the structure of the vessel, the charter of the length, the supply or request balance at the time the contract is marked and the area of the vessel. To pay the rent, usually the oil organization pays for fuel, bunkers oil and harbor contribution. Every other expense is secured by the ship-owner.

9. LOGISTICS SCOPE IN OFFSHORE PLATFORM SHUTDOWN

During the process of the shutdown, the logistics are responsible to provide support for the project requirement that includes machine, equipment, parts, etc. It is also responsible to transport all the workers assigned for the shutdown process and secure all the requirement prior officially started the shutdown process.

10. LOGISTICS CHALLENGES DURING THE OFFSHORE PLATFORM SHUTDOWN

Offshore platform shutdown is a risky project that can cause millions of dollars if not properly plan. It is because the cost of shutdown can reach millions per day [10]. During the offshore shutdown, few risks, and challenges impacting the turnaround shutdown process which discussed in the following section:

10.1 Weather

Disruptions are mainly due to adverse weather conditions reducing the ability of Offshore Supply Vessel (OSV) to sail, and making loading operations and offshore installations difficult. In this situation, the shutdown work has to be stopped, and the reassessment of the impact of the weather will be carried out before resuming the shutdown work. This will cause a delayed in the project schedule and incur more cost to the Oil and Gas company.

10.2 Vessel availability

Not all vessels will available when required for the shutdown process., so there are two potential problems that we can see which is the scheduled segment of the risk is the hazard and should be considered in risk assessment [11]. The second issue is the hazard that even though the vessel arrives when contracted, it may not be prepared for it. This has cost suggestions, however, it may also result in intense delays because the vessel will sit tight for the contracted window, after which they would need to sort out another vessel [10].

10.4 Accommodation restrictions

The accommodation restriction is a common issue in the shutdown process. This is because the operator will take a chance to sneak in a different extension which can cause the space zone and accommodation to be more constrained and make the key assets inaccessible if there is someone plan to use that facility. This will give a negative impact to productivity which eventually affects the whole project schedule. [12] suggested that proper coordination between the offshore supply vessel (OSVS) fleet and onshore supply depot on the best routes and timetable will minimize the issue in the accommodation restriction.

10.5 Offshore accidents

The company of oil and gas is recognized as one of the worst areas of the world. According to [13], common accidents occurred during the shutdown process are mainly due to Blast and Fire. In some cases, the accidents occur when struck causing worker stressed by falling pipes, moving, rotating chains, kellies or rotating tables. Occasionally, a careless on evaluation and hazard review increase the likelihood of the incident.

10.6 Space

The deck space areas are often not enough to accommodate most of the equipment from all the vendors. According to [2], deck space management should be organized based on the shutdown schedule or planning. If the delivery of shutdown equipment did not follow the schedule or planning that already planned, it will create a space shortage and contribute to the delay for maintenance work during turnaround shutdown [14]. Hence, concrete logistics planning is required to ensure the deployment of equipment onboard is according to real-time planning which is the solution for the deck space problem. Any delay or mistake in logistics can negatively affect the entire shutdown duration and as a result delay in the start-up of the plant. The logistics plan should be top clearly defined and a back-up plan in place in case of failure of any kind.

10.7 Distances

The distance between the supply base and installation site can be the challenges and also a risk during turnaround shutdown. According to [7], the distance between the base/onshore supply depot and the installation site can cause the delay if they are not well prepared. He explains that if some unexpected equipment is failed to supply on time, even the base is near can cause delays in production.

11. PREVIOUS STUDY ON THE LOGISTICS CHALLENGES IN THE OFFSHORE PLATFORM SHUTDOWN

An extensive review of the previous study related to the logistics challenges in the offshore plant shutdown is summaries in Table 1. Many researchers in the previous study focusing the investigation on the logistics challenges at the downstream stage. As discussed earlier, the logistics involvement should cover all stages in the offshore platform shutdown process [4]. This provides an avenue in this study to explore the subject interest from a different perspective.

Table 1: Summary of Literature Review

No	Author	Finding
1	David Matthews (2005)[5]	The role of a specialist in minimizes plant shutdown time and safety requirements.
2	Ming-Fung & Francis Siu (2014)	Impact of variance work on the project scheduling and cost of overall offshore shutdown.
3	J. J. González (2011) [6]	Information integration for logistics management in offshore operation
4	W. Wallace (2019) [9]	Challenge of vessel routing during the offshore platform shutdown
5	Publish in Energy International (2011)[10]	Risk of weather, vessel availability, and Accommodation restrictions to the offshore platform shutdown schedule
6	Mark J.Kaiser (2007) [3]	Weather challenges in the offshore platform shutdown process.
7	Zawawi (2012)	Impact of weather conditions during the offshore shutdown process.
8	Obinna Kingsley Ejikem (2017) [2]	Impact of unavailability of deck space to the shutdown schedule.
9	Palgrave & Macmillan (2009)	The role of supply vessels in the offshore logistics and impact of weather to the turnaround shutdown process
10	Palgrave & Macmillan (2009)	The role of supply vessels in the offshore logistics and impact of weather to the turnaround shutdown process.
11	Parker (2017)	Information Intergradation during the offshore platform shutdown.
12	Odd Jarl Borch (2018)[11]	Functional demands of offshore service vessels in providing field logistics and safety service for offshore drilling rigs and installation.

12. RESEARCH METHDOLOGY

This research adopted a qualitative method which focuses group interview was employed aimed at enhancing confidence in the research findings [13],[16]. A focus group is a formless, free-flowing interview with a small group focused on a particular topic that facilitated by the moderator which ideally the researcher itself [17]. Findings from previous research studies show that the focus group is very effective in picking up knowledge and investigating the issue to be addressed particularly if there is limited data available [18].

As a requirement in the focus group interview, six (6) respondent from various designations in the logistics team at Petronas have been approached for the focus group discussion which meets the suggestion by [17] that suggest the number of respondents should consist of six (6) to ten (10) people. These respondents were suggested by Petronas management due to their involvement in the logistics preparation in the previous shutdown of their offshore platform shutdown which improves the comprehension of the discussion.

13. RESULT AND DISCUSSIONS

The findings from this study provide significant outcomes to understand the issue of logistics challenges during the offshore platform shutdown process. The summary of the major findings of the research is as follows:

4.2 Findings for Research Question 1

The research question (RQ) 1 attempted to investigate the logistics setup process during the offshore platform shutdown process which spread into the upstream and downstream phase. In the upstream phase, the shutdown process started with the development of Turnaround (TA) scope which is led by the project team that responsible for the whole project management including defining the logistics requirement. However, there is no logistics representative was involved in the development of the TA scope or to provide input for the logistics requirement. The scope of logistics only is known after the finalization of the TA scope. Only then, logistics will start to involve in the project by developing the logistics strategy to execute the requirement. It then followed by planning for logistics requirement which includes Deck space management plan, Material tracking process and Lifting plan for the shutdown process. Lastly, logistic will coordinate resource mobilization & logistic. All the execution of logistic requirement will be handed over to the user for direct coordination with the provider. Upon completion of the shutdown process, logistic will conduct work scope review for future improvement. A summary of logistics involvement is shown in Figure 1.

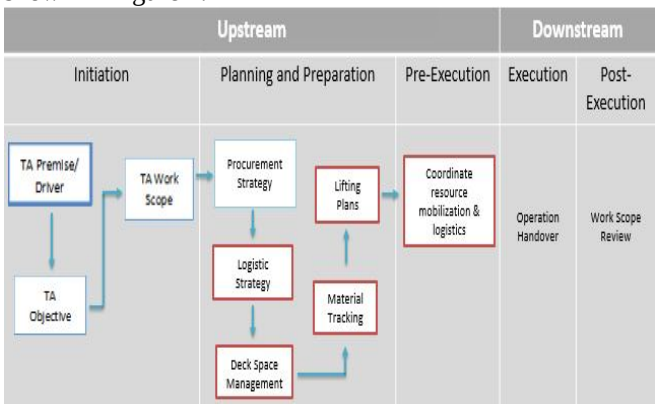

Figure 1: Summary of Logistics scope in the offshore shutdown process.

4.3 Findings for Research Question 2

The second research question aims to investigate the impact of logistics on the offshore platform shutdown process.

The operation of the offshore platform is similar to a 'town' in the middle of the sea. Except transporting personnel from the platform to the mainland, the only feasible mode of transport to transport the operational requirements is only by vessel. Due to the limited choice in a mode of transport, the offshore platform shutdown process faces similar challenges as discussed in the previous study.

However, during the interview session, the research manages to unveil a critical issue that impacting the shutdown process. Because of the logistics scope is developed by the project team, a lot of discrepancy situation between planning and execution occurred such as wrong measurement, wrong quality, wrong delivered equipment and quantity, unsuitable equipment selection and unavailability of the vessel that directly contribute to the delay or increase in the shutdown cost. This is because of no involvement in logistics in contributing to the input or solution during the TA development. As suggested by [6], logistics should involve in the design stage incorporates every one of the activities from the initial thought, conceptualization, and pre-plan, to the complete design phase of the structure. The absent of logistics in the development of TA at the initiation stage has caused inaccurate information to support the development of Logistic strategy and execution which mainly involved in moving thousands of items in different sizes and modes of transport as required by technical teams to perform their activities promptly. In meeting such a complex requirement, a deep understanding and detail planning on the logistics strategy should be addressed at the early stage [4] without compromising the safety, environmental and quality aspects. Hence, it is clear that logistics is very crucial to be involved in the early stage of planning of which failing to address it may potentially affect everyone employed on the shutdown process [19],[20]. As such, the study proposes the refinement of logistic involvement in the offshore platform shutdown as shown in Figure 2. In this suggestion, the logistics work scope should be incorporated during the discussion of TA scope and Logistic expert/team should actively participate in providing input and verify the logistics need based on the requirement from the project scope. The role of logistics in the shutdown process is undoubtedly critical due to the nature operation of the offshore platform that discusses earlier. The early involvement of logistics at the initiation stage will ensure the right logistic strategy is adopted during the shutdown process.

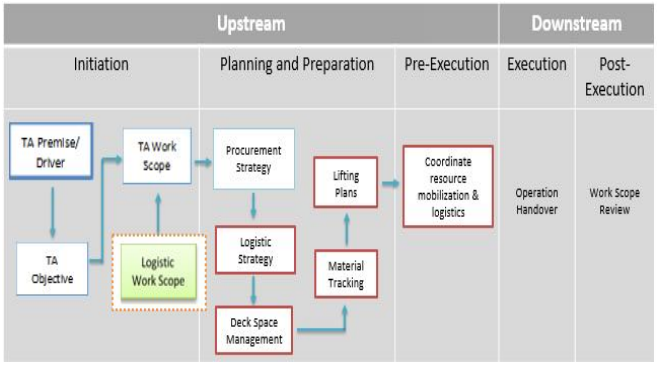

Figure 2: Improvement of Logistics scope in the offshore shutdown process.

14. CONCLUSION

The previous study mainly concentrates to identify and address the challenges of logistics occurring in the downstream process. This approach, however, failed to understand the real issue contributed to the problem at the downstream. This study manages to understand the real problem of the logistics process during the offshore platform shutdown. The result revealed that the absence of logistics participation during the development of TA is the major factor contributing to the challenge to the logistics process in this kind of operation. The finding in this research will provide to the practitioner crucial information for future improvement that could lead to the cost-saving and operation efficiency.

This research is an exploratory study that sheds some light on how the qualitative approaches using focus group interviews can better explore a complicated social phenomenon. It is also providing stronger theoretical foundations in this area which currently is still lacking.

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