

**UNIVERSITI TEKNOLOGI MARA**

**RISK ASSESSMENT CAUSED BY  
DROPPED OBJECTS ON TOPSIDE  
FACILITIES AND SUBSEA PIPELINE**

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## **ABSTRACT**

In the oil and gas industry, offshore operations continue to develop and increase as the oil and gas becoming one of the high demand year by year. This rapid increment of offshore operations has lead towards the expansion of the subsea facilities and offshore structures. From the offshore operations, there are many possibilities of unexpected accidents that can be happen especially that caused by the dropped object. Dropped object are one of the top incident that can cause a serious impact in the oil and gas industry. The impact load from the dropped objects can cause harm towards the subsea equipment as it vulnerable and difficult to repair plus need much cost to repair it and lead to release of inventories. The consequences of the inventories release due to dropped object are including the human fatalities, offshore damages, pollution and economic impact. Safety measures need to be consider in order to mitigate and reduce this dropped object events. Therefore, to avoid these undesirable events, this research presents an assessment and analysis of risk that caused by dropped objects towards the topside facilities and subsea pipelines which including the qualitative and quantitative risk assessment. The aim of this research is to review the lifting operation that can cause risk from the dropped objects and determine the impact energy towards the facilities by using both qualitative and quantitative risk assessment. Other than that, the frequency of dropped object were determined and protection measurement with proper procedure was recommended as the steps to overcome this dropped object accidents. To achieve this aim, methodology includes the qualitative and quantitative risk assessment is proposed. The quantitative risk assessment are divided into two which are frequency analysis to analyse the frequency of dropped object within a certain parameters and consequences analysis by accessing data in terms of human injuries, assets damages and business impact.

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# **CHAPTER ONE:**

## **INTRODUCTION**

### **1.1 Research Background**

Over the past a few decades, we can see that the energy consumption has increased and the energy demand is estimated to continue to be rise. From the situation, the high demand of oil and gas will lead towards the increment of the offshore operations and rapid development of offshore and subsea facilities system. The oil and gas industry continue to develop with more subsea fields been discovered which have significantly increase the number of subsea facilities installed. In the offshore operations, there are possibilities and probability of an accident can occur at anywhere and anytime.

There are three main types of accident that can occur during the offshore operation which are dropped objects, helicopter collision and ship impact. These types of accident cause a lot of impact towards the oil and gas industry. Over the years, these accidents have resulted of lives lost, injuries, environmental catastrophes and immeasurable economic losses. By comparing these three main types of accidents, the dropped objects have the highest threat and add up towards the great majority of potential and actual facilities in the offshore operations. From year to a year, the dropped object accidents at the offshore have been had been reporting to be increasing. According to Drop Object Prevention Scheme (DROPS), approximately about 60%, the dropped object accidents have high potential incidents. Figure 1.1 shows the statistic of activity breakdown of actual and potential incidents between January 2010 and May 2016.