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**UNIVERSITI TEKNOLOGI MARA**

**THE ACCIDENT COST RATIO FOR MALAYSIAN  
RAILWAY PROJECTS TOWARDS SUSTAINABLE  
AND SAFE CONSTRUCTION**

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## ABSTRACT

The construction industry is perceived to contribute significantly to national economic growth and offers substantial opportunities for job creation. However, accident in the workplace have continually plagued the industry. Studies on the concept of accident, it contributes to costs typically comprise direct and indirect costs that commonly expressed in the form of a ratio. However, this research argues that accident in Malaysian railway projects affect to direct and indirect accident cost. Other than that, there was a limited study on the accident cost ratio that focused on railway construction projects. The accident situation and works environment in a railway construction projects are unique compared to building construction projects. Hence, further research is required to fill the gap. Therefore, the research aimed to determine the direct to indirect accident cost ratio for Malaysian railway projects. A mixed-method approach was used in this research, where both qualitative and quantitative data was utilized in the methodology phases. Semi-structured interview was carried out for first objective which is face validity involving 10 panels of expert in railway construction field. Then, structured interviews using the questionnaire was carried out for second and third objectives. A total of 70 accident cases reported at the guideway packages projects of the Mass Rapid Transit Sungai Buloh-Kajang Line (MRT SBK Line) and Light Rail Transit Line Extension Project (LRT LEP) were examined. Then, the data were analyzed using MS Excel software. The result showed that the direct accident cost items that are appropriate in railway constructions context were medical cost, hospital cost, rehabilitation cost, damages or repair cost and fines cost. Furthermore, the indirect accident cost items in railway construction projects were accident cost, investigation cost, replacement cost, administration cost, schedule cost, productivity loss cost, victim cost (ex-gratia payment), management cost and corrective action cost. The results from interview found that the total direct cost is RM 1,830,511.00 and total indirect cost is RM 1,881,882.00. So, the accident cost ratio between direct and indirect accident cost in railway construction projects is **1:1.03**. The findings of this research have important implications for safety practitioners and other safety-related professionals in the initial preparation of accident cost estimates.

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# CHAPTER ONE

## INTRODUCTION

### 1.1 Research Background

Compared to other industries, the construction industry is unique because construction activities often takes place in outdoors under conditions not conducive for safety and health. Misnan and Mohammed (2007) argued that people mostly tend to relate construction industry with dangerous activities and high risk of hazard and accidents as compared to other industries. In 2016, a total of 5,190 fatal work injuries recorded in the United States, 7% increase from the 4,836 fatal injuries reported in 2015 (Bureau of Labor Statistics, 2011). Since 2008, this was the first time where more than 5,000 fatalities ever recorded by the Census of Fatal Occupational Injuries (CFOI). However, in this respect, the situation in Malaysia witnessed the fatality rate cases in the construction industries were more than three times compared to other workplaces; it was 3.3% in the construction industry compared to the manufacturing, mining and quarrying workplaces, where the rate was only 1.1% (Marhani *et al.*, 2013). The Department of Occupational Safety and Health (DOSH) reported that among the 71 numbers of fatal injuries cases until April 2018, a total of 32 death cases occurred in the construction sector (DOSH, 2018). The statistics justify Saifullah and Ismail (2012a) argument that the state unsatisfactory of the Occupational Safety and Health (OSH) in the construction industry has turned out to be an issue as it is the most hazardous industry which contributes to the numbers of accidents and fatality to the construction players and the public.

In railway construction projects situation, accidents typically emerge because of critical hazard environment, especially in tunneling works, for example, boring through soft soil profiles, and at the same time trying to minimise the chances of causing any disturbance to the surrounding surfaces (Guo *et al.*, 2014). It was more significant in the case of MRT and LRT projects, where the rail alignments are purportedly constructed along congested roadways as well as within the vicinity of public transport centre. This scenario further exacerbates the occurrence of accidents on site. Moreover, in many instances, workers had to perform rail works on high platform guideways, and transportation of heavy materials such as steel beams in confined spaces.