

IMPACT OF MINERALS FREIGHT AND
LOGISTIC OPERATION TOWARDS
TRAFFIC SAFETY IN KUANTAN ROAD
NETWORK

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I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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ABSTRAK

Sumber mineral merupakan implikasi utama dalam pertumbuhan ekonomi di Malaysia. Mineral dibahagikan kepada dua kategori utama iaitu logam dan bukan logam. Kajian ini menumpukan pada mineral logam khususnya bauksit kerana Malaysia, terutama di Kuantan, Pahang merupakan salah satu pengeluar bauksit di dunia dengan perlombongan terbesar di antara tahun 2014 dan 2016. Kerajaan Pahang menghadapi pelbagai isu pengangkutan berkaitan dengan operasi perlombongan mineral terutamanya dalam aspek keselamatan jalan raya termasuk peningkatan jumlah kemalangan jalan raya yang melibatkan pengangkutan barang galian. Dalam menentukan kawasan kemalangan yang berkaitan dengan pengangkutan kenderaan galian, statistik kemalangan lalu lintas yang melibatkan kenderaan berat di sepanjang perlombongan mineral dan Pelabuhan Kuantan diperoleh dari Unit Lalu Lintas, Pasukan Angkatan Tentera Malaysia Pahang. Senarai semak audit telah disenaraikan untuk mengaudit kawasan kemalangan di jalan terpilih dengan menggunakan Buku Panduan Audit Lalu Lintas dan Keselamatan Jalan Raya (Metra). Kajian menunjukkan bahawa keadaan infrastruktur lalu lintas daripada keadaan permukaan jalan, penanda jalan dan papan tanda di pelbagai lokasi didapati tidak memenuhi keperluan piawaian standard di mana pengguna jalan raya sering terlibat dalam kemalangan lalu lintas. Oleh itu, langkah pemulihan yang sesuai adalah dicadangkan untuk meningkatkan keselamatan tahap jalan raya.

ABSTRACT

Mineral resources are the key implications in the economic growth in Malaysia. Minerals are divided into two major categories namely metallic and non-metallic. This study focuses on metallic mineral specifically bauxite as Malaysia, particularly Kuantan, Pahang was one of the world's top bauxite producer with the biggest mining pits in between year 2014 and 2016. Pahang government faced various transportation issues related to minerals mining operations especially in road safety aspect which includes an increase in the number of road traffic crash involving minerals vehicle's freight. In defining the crash prone area related to mineral vehicle's freight, traffic crash statistics involving heavy vehicles along mineral's mining pits and Kuantan Port were obtained from Traffic Unit, Royal Malaysia Force Pahang. Audit checklist was developed for auditing the crash prone area at selected road stretches using Guidebook for Traffic and Road Safety Audit (Metra). The results show that the condition of traffic infrastructures from surface distress, traffic sign and marking analysis at various locations were found to be inadequate where the road users tend to involve in traffic crash. Thus, suitable remedial measures are suggested to improve the road's level safety.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Malaysia is one of the largest mineral resource industry where the total value of mineral production is 3.9 billion in 2010 (Malaysia M. a., 2010). It come in different shape and size where it consist of metallic mineral and non-metallic mineral. One of the metallic mineral productions is bauxite. Bauxite is an aluminium ore and the world's main source of aluminium. Bauxite is a mineral discovered for the most part in a belt around the equator that contains 15-25 percent of aluminium and it is the only ore used for commercial extraction of aluminium nowadays (Brandtzaeg, 2016). In Malaysia, starting from early 2013 the biggest bauxite mines is located at Kuantan, Pahang. It began with small mining in Balok and then expanded to other areas in Bukit Goh, Bukit Sagu and Sungai Karang (Malaysia A. S., Dec 2016). By knowing the potential of bauxite industry in Pahang is moving towards blooming era, the state has taken steps to meet the high demand of bauxite in the market by increasing its supply to top China buyer. As in 2015, the shipment of bauxite mineral was valued at nearly 3.5 million. (Chow, 2017)

Open cast bauxite mining is one of the boons for Pahang's economy. Based on Bernama (2016) reported there are nine mining bauxite activities still remain at Kuantan, scattering around the area of Bukit Kuantan, Tanjung Pasir, Kampung Padang, Taman Datuk Rashid, Shahpadu, Bukit Pengorak, Sungai Ular and Jabor. Bauxite ore are mainly transport the mineral from the mining sites to the stockpiles using Kuantan main road network via Federal Road 3. This situation brought out several issues to Pahang's province since the transportation ore was affecting current transportation system for years.

Bauxite freight and logistic operations are one of the reasons why the crash rate increases at Kuantan. Tones of bauxite transported from mine sites to Kuantan port daily, resulting the roads to be jam-packed with heavy vehicles, harmed by potholes and covered by red residues from ores. Most bauxite lorries are carrying bauxite more than the permissible weight because the driver are racing for “trips” which can cause damage to road structures and danger to other road users (New Straits Times, 2015). Otherwise, the crash might occur because of cracks and potholes when the drive tends to lose control of the vehicle while driving especially to motorcyclist. Potholes can worsen the condition practically when driving at night because the road users might not notice the sudden change of roadway and possibly injuries to anyone who involved.



Figure 1.1: Road damage by bauxite lorries.

Source: New Straits Times (2015)

Road signs are one of the traffic communication methods in terms of delivering information on road condition and regulations to drivers. Due to the transportation of bauxite ore, red dust starts to accumulate at the road furniture and road signs made the signs invisible and hardly be seen by drivers. Not only that faded paint markings are also invisible from the driver’s seat because the roadways turn into red. Therefore, the non-functional of traffic signage could cause severe risk to the drivers driving at night because of limitation of vision. Mostly, road user used road safety devices such as barrier, road marker, roadway reflector and signage as a guideline to avoid from the crash. That means if the sign not properly posted or a damage sign in not replaced promptly, risk of crash could be higher.

In light of that, the study on the effect of bauxite freight and logistic operation towards traffic safety was proposed so that, the impact of bauxite logistic transportation toward Kuantan traffic safety could be quantified. Furthermore, potential safety guidelines on interaction between heavy vehicles carrying bauxite and other road users also will suggested.

1.2 Problem statement

In general, vehicles related injuries are the most critical worries to all parties in the mining industry especially bauxite mining. National Truck Accident Research Centre (2011) reported that the rising of traffic crash rate on the increase in road transport necessitated by the booming mining industry where the large number of heavy vehicles using the road. The heavy vehicles crashes normally occurred when the driver were pushing the limits of fatigue especially at the end of long days.

Since year 2013, when Malaysia became the largest bauxite supplier to China top buyer massive damages to resident and traffic safety around bauxite sources and stockpile have been recorded (The Star Online, 2017). The level of safety for all roads used by bauxite transporter have experience tremendous drops since number of crash cases and near miss cases have been highly recorded. Lorry drivers mainly paid according to either tonnage or trips. These situations have encouraged the drivers to either overloading the truck or disobeying the traffic speed to catch more trips. Overloaded heavy truck will produce spillage of bauxite objects dropped from the lorries and in any unfortunate events, it might hit other road users that leads to fatal cases.

In light of bauxite mining debacle, the residents of Felda Bukit Goh state that the recovering process to change the road condition back to its normal condition can be achieved through long bauxite moratorium period. Due to bauxite mines activity, the road surface condition along the bauxite freight and logistic routing was terrible since the heavy truck was reducing the lifespan of road system and damaging the road that may lead to unwanted traffic crash. From early observation, the lorry carrying bauxite highly gives negative impact to road condition where the ruts and unevenness pavement was occurring.

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