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Integrated Occupational Safety Health and Environmental Management

Case Study

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CASE STUDY – HEAVY VEHICLES ACCIDENT IN MALAYSIA

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I. INTRODUCTION

Globally, road traffic injuries become a major cause of death, with approximately 1.2 million mortalities and the number of injuries could be as high as 50 million worldwide annually. Road traffic injuries is the eighth leading cause of death throughout the world and the leading cause of death for young people aged between 15 to 29 years old as reported by global status report on road safety (Organization, 2004).

As heavy vehicle transportation continues to grow within Malaysia, crash rates among heavy vehicle remain high, and the risk of injury and fatality continues to extend to all road users. Every year more than 6000 people are killed in road accidents in Malaysia. Approximately 1000 of these fatalities are car occupants and motorcyclists, killed in collision involving rigid and articulated type's trucks.

Crash compatibility is one of the main contributing factors that lead to high level of severity in heavy vehicle crashes. The large dimension and heavy mass of these heavy vehicles contribute enormously to the severity of an impact with another vehicle. On top of that, heavy vehicles often travel in lower speed as compared to other vehicles. Thus, this high-speed differential between heavy vehicles and the rest of the vehicles may lead to potential rear end collisions. In this type of crashes configuration, conspicuity plays a significant role especially involving night crashes.

II. OVERALL STATISTICS

Each year the number of road accident fatalities and casualties are increasing until 2016 as per Figure 1. Surprisingly the road accident decreasing on 2017. Based on the report from Traffic Investigation and Enforcement Department, Royal Malaysia Police Bukit Aman, Figure 2 shows that Selangor has one of the highest traffic fatalities rates in the Malaysia followed by Johor and Kuala Lumpur relative to its population (Malaysia, 2017). This road accidents involves all types of vehicle such as motorcycle, motorcar, van, bus, lorry, four-wheel drive, taxi, bicycle and others. However, a statistical analysis as per Figure shows that the fatalities of accidents involving death, severe and minor injuries decreasing each year.

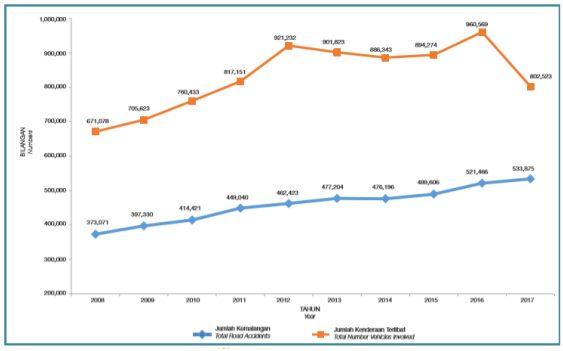

Figure 1: Total Motor Vehicles Involves in Road Accidents, Malaysia 2006 – 2017

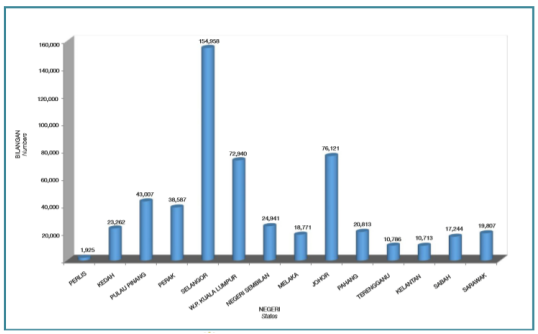

Figure 2: Total Road Accidents by States, Malaysia, 2017

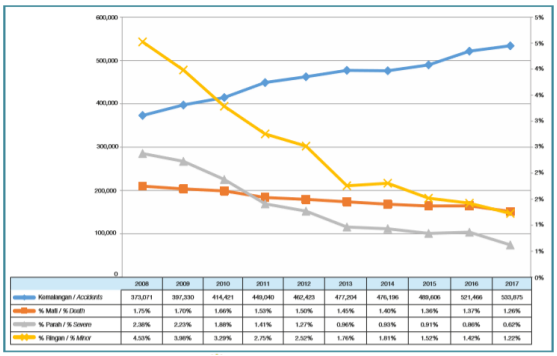

Figure 3: Total Accidents, Percentage and Deaths Caused by Road Accidents, Malaysia, 2008 – 2017

A heavy vehicle is defined in the Heavy Vehicle National Law (HVNL) as a vehicle that has a gross vehicle mass (GVM) or aggregate trailer mass (ATM) of more than 4.5 tonnes. From the table 1, heavy vehicle i.e. bus and lorry have become a serious menace that threaten life and properties at an alarming rate particularly in developing nation such as Malaysia. The number of fatalities in traffic accidents has

become relatively high as car ownership increases. Statistics shows that the total number of bus accidents increasing from year 2008 until 2013 and decreasing until now. Meanwhile the total number of lorry accident increasing from 2008 until 2012 and decreasing afterwards.

Although bus represents only 0.009% of the total number of registered vehicles in Malaysia, the number of its casualties are always high due to the high number of passengers involved (Oluwole, A. M., Rani, M. R. A., & Rohani, J. M..2015). Whereby, accidents involving lorries have contributed to the third highest statistic after accidents involving motorcycles and cars. The large number of lorry accident also increase the number of casualties.

TAHUN Year	MOTOSIKAL Motorcycle	MOTOKAR Motocar	VAN Van	BAS Bus	LORI Lorry	PEMACU 4 RODA Four Wheel Drive	TEKSI Taxi	BASIKAL Bicycle	LAIN-LAIN Others	JUMLAH Total
2008	111,819	435,665	20,392	9,356	48,250	22,793	8,769	2,463	11,571	671,078
2009	113,962	472,307	19,220	9,380	46,724	23,581	8,669	2,486	9,294	705,623
2010	120,156	511,861	18,788	9,580	50,438	25,777	9,899	2,178	11,756	760,433
2011	129,017	546,702	17,916	9,986	53,078	30,828	11,197	2,033	16,394	817,151
2012	130,080	655,813	15,143	10,617	42,158	32,891	11,680	1,310	21,540	921,232
2013	121,700	632,602	17,148	10,123	39,276	52,512	11,651	1,370	15,441	901,823
2014	125,712	617,578	15,041	9,193	37,481	41,464	10,856	1,275	27,743	886,343
2015	123,408	625,758	14,565	8,804	34,942	46,163	9,591	1,119	29,924	894,274
2016	135,181	670,935	14,470	9,462	35,064	48,907	8,399	1,318	36,833	960,569
2017	108,221	564,491	13,347	7,258	34,747	44,297	5,328	787	24,047	802,523

Table 1: Total Motor Vehicles Involves in Road Accidents by Type of Vehicles, Malaysia 2006 - 2017

Crash compatibility is one of the main contributing factors that lead to high level of severity in heavy vehicle crashes. The large dimension and heavy mass of these heavy vehicles contribute enormously to the severity of an impact with another vehicle. On top of that, heavy vehicles often travel in lower speed as compared to other vehicles. Thus, this high-speed differential between heavy vehicles and the rest of the vehicles may lead to potential rear end collisions. In this type of crashes configuration, conspicuity plays a significant role especially involving night crashes.

In depth road crash investigation conducted by the Malaysian Institute of Road Safety Research (MIROS) on high profile cases revealed that head on and rear end collisions were the highest crash configuration with 32.8% and 28.4% (Odero, 2011) as shown in Figure 4.

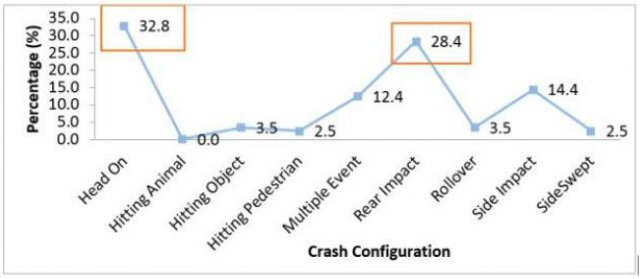

Figure 4: Crash Configuration.

In rear end crashes, the proportion of fatal crashes showed an approximate trend between daytime (51%) and nighttime (49%) as shown in Figure 5. However, during nighttime, approximately 55.1% of crashes occurred at area without lighting. This indicated that poor visibility due to poor lighting could be the main crash causation factors to rear end crashes.

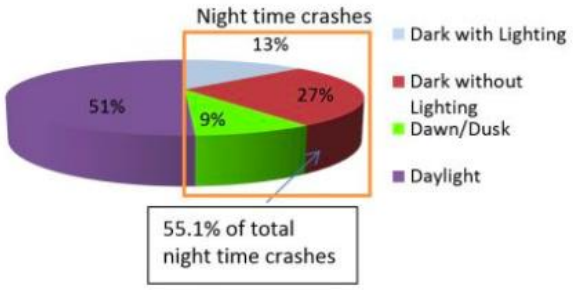

Figure 5: Time Crash.

Based on a study conducted in Australia, crashes that occur during nighttime are more severe compared to daytime crashes (Ramli, 2013). In the dark, many heavy vehicles do not become visible to other road users until they are dangerously close. Thus, one of the essential elements of heavy vehicles safety is a good visibility in traffic.

III. FACTORS THAT CAUSE ACCIDENTS IN HEAVY VEHICLES IN MALAYSIA.

Heavy vehicle accidents have become a serious menace that threaten life and properties in the developing nation such as Malaysia. The number of fatalities involving heavy vehicles accidents have become relatively high over the years. Statistics shows the total number of heavy vehicle accidents increased from xxx in 2013 to xxx in 2018. Although heavy vehicles only represent approximately xx% of the total number of vehicles in Malaysia.

Study conducted on the recent and past accidents has identified 6 major factors; management, manpower, method, mother nature, machine, and material that could lead to life threatening accident involving heavy vehicles. The 6M factors are elaborated further in the below discussions.

I. Management/Maintenance

As given in police annual road traffic accident reports, there are more than 10 types of road defects that caused road accident. One of the road defects that caused accident is lack of street lighting especially in night time. The lack of lighting caused the driver cannot see other nearby transportation clearly. Furthermore, this factor also makes the driver to use high beam and this will be cause the other driver experienced astigmatism. In eye with astigmatism, light fails to come to a single focus on the retina to produce clear vision.

Besides that, loss of signage on the road also one of the poor road maintenances. For example, the old signage was damage due to car crash, and road management organization did not install new signage to replace the old one. This also can cause accident due to lack of information provided especially for deadly curves and animal crossing area. Furthermore, potholes also one of the big factors for the road accidents. Potholes occurred when the road was regularly used by truck and other heavy vehicles, especially if the road itself was a result from poor engineered. Other vehicles will tend to avoid the potholes and they will be on the wrong lane.

Just imagine if there is another lorry that speeding in that lane, crash will occur due to the potholes.

However, we also need to consider cost factor in maintaining road infrastructure since the budget permission must be obtained by authorities and cost of materials, outsourcing vendor to conduct the maintenance job, time allocation must be considered. Road maintenance job create inconvenience to the drivers since large amount of traffic will be occur. Besides, there is an issue of inconsistency in road works since road works are normally a priority occasions such as in preparation of general elections (politics game)

II. Manpower

When we talked about human error, we can sum up that our local drivers have an attitude problem and lack of awareness. One of them is distracted Driving and Fatigue driving. Human loves multitasking especially in driving. According to seriousaccident.com website, the common mistakes of drivers are texting or talking on the mobile phone during driving, reaching for moving objects in the vehicle such as baby or pets. There are also fatigue driving problem when we can see this is one of our main issue due to long working hour, not enough sleep and many more. Fatigue drivers have a difficult time perceiving and processing information. For instance, a driver may not recognize that he or she has drifted into the wrong lane until it is too late, and a serious car accident happens.

Speeding and tailgating are also one human error that can cause road accident. Many drivers ignore the speed limits sometimes more than 30km/h and sometimes they also tailgating front vehicle with high speed. The faster you drive, the slower the reaction to stop the vehicle if anything happens especially when the driver chose to drive very close to another car that they cannot react in time if the car in front of them brakes suddenly.

Drunk driving and Driving under Drug influence are also contributed high percentage for human error factor. It is because drunk driver will lose the availability to focus and function properly. Same goes with driver under drug influence. Drunk driver and under drug influences driver are not allowed to drive at all on the road, but there are also some people that want to drive even under that condition.

III. Method

In Malaysia, we have only seasonal law enforcement such as OPS SIKAP and OPS SELAMAT which is only enforced during Hari Raya Eid Fitr festival holiday. According Perception of Being Caught (POBC), rate among Malaysian road users is low which is 25 percent rate on regular days and a 50 percent rate during the festive seasons when there are road safety operations. However, average for POBC rate for other developed country is 80 to 90 percent which is far higher compare to Malaysia. Traffic law enforcement supposedly cannot be seasonal; it must be on-going for the whole year. According to the WHO, the enforcement of laws in Malaysia related to speed limits, drink-driving, motorcycle helmets and seat belts was ranked between 4 to 5 in a range of 0 to 10 which is very low.

Besides that, our local drivers are not fear to be caught as traffic summonses are often no paid, can be cancelled through corruption, even end year discounts can be officially given. Our AES system also is not function due to internal issue. Minimal police patrol also one of the issues here since police patrol more focusing on famous area for traffic such as federal highway, NKVE highway and ELITE highway. According to research from Department of Statistics Malaysia, one of the hot spots for accident is Tanjung Malim to Bukit Lanjan. Northern PLUS highway has very minimal police patrol and accidents usually occurred in this area since heavy vehicle drivers always over speed and stay on right lane.

IV. Mother Nature

Malaysia is known as country that enjoy tropical weather year around, with average temperature ranges from a mild 20ºC to 30ºC. Due to the nature of its climate and its proximity to water, Malaysia weather often humid and varies depending on the destination. According to (MET, 2018), the south-west experiences monsoon season from May to September while November-March is the wettest in the North-East.

Investigations conducted on few cases of heavy vehicles accidents in Malaysia shows that most of the accidents occurs during the monsoon season and heavy rain. High winds, heavy rain, thunderstorm and flood can easily turn a familiar route into a hostile and possible life-threatening-ordeal.
There are quite a number of difference opinion stating that bad weather should never be an excuse for accident. However, experts have proven that bad weather conditions are dangerous for heavy vehicles. The high center of gravity and the heavy, unstable load the vehicles carry make it vulnerable to changes in the weather.

Weather conditions such as high wind would increase the chances of the truck tipping over. The stronger the wind, the greater the chances of the truck to be tipping over on the road which could be a devastating event to the heavy vehicles' driver and other road users.

Besides that, heavy rain also has similar negative effects on the road, as they tend to make the road surfaces slippery and this could affect the heavy vehicles' traction.

Therefore, it could be concluded that mother nature is one of the factors contributing to heavy vehicles accidents in Malaysia.

V. Mechanical System

Today, most heavy vehicles are manufactured to adhere to safety standards, however there are certain mechanical faults that are known to cause accidents.

One of the common mechanical system defects is the tire failure. This problem is one of the most common types of problems involving tire blowouts and worn tires. Most of the investigations conducted on heavy vehicles' accidents shows that the failure in maintaining the tyre's conditions are often the causes of accidents. Study conducted identify the two most common problems with tire failure are tire blowouts and worn tires.

Blowouts can happen due to many reasons such as worn-out, under or over-inflated tire as well as tires being punctured by debris in the road. Tire blowouts could drastically reduce the ability to control the heavy vehicle, hence lead to crash.

Besides that, worn tyres could happen over time as tyres will tend to experience thinning and losing their thread. This is a major problem as it affected the grip of the tyre especially on slippery road. Worn tyres are more likely cause the vehicle to slip, take more distance to brake which contribute to accidents.

The other common mechanical system defects is the failure of the braking system. According to study conducted, the failure of the braking system accounted for about xx% of accident involving heavy vehicles. The failure in the braking system will lead to rear-end collisions as the car experience inability to stop in time. The common contributing failure in the braking system are the faulty/worn brake lines, ABS malfunctions, worn brake pads and discs.

Other than that, as cited in the report written by (NHSA, 2016) the third most critical reason due to failure of mechanical system are the combination of steering & suspension problems. Steering & suspension problem could lead to the cause of loss control over vehicle at inopportune moments.

VI. Mechanical Design

All vehicles can be potentially dangerous but large and heavy vehicles are prone to experience accidents and fatal crashes due to its mechanical design.

Some of the heavy vehicles, especially those with longer bodies or detached front and back body part often have bigger blind spots. These blind spots make it difficult for drivers to see vehicles, especially smaller vehicles.

Besides that, the body of the lorry are sometimes construct using poor materials. This phenomenon causes them to experience major damage and sometime lead to fatality as the body could not stand the impact of the crashes. This are confirmed by the recent accident that happen in North-South highway, the body of the lorry was badly damage as it hits the divider and cause the lorry to experience serious damage that lead to fire which affected the driver as well as the other road users.

The sheer weight of the heavy vehicles also could be one of the major factors contributing to accidents. The sheer weight causes the vehicle unable to travel on certain road, highways and bridges. Some of the heavy vehicles are too high and unable to over passes or go through under the bridges, besides some carry heavier load than what it is design for. Unforeseen phenomenon and obstacles often lead to disaster such as accidents and crashes.

IV. Mitigation and Recommendation to Reduce Heavy Vehicle Accidents

The involvement of many parties needed to reduce road accidents among heavy vehicles such as company, driver, public authority, and public.

Company

The company should play an important role to educate and guide the drivers to prevent accidents upon driving. The person in charge or supervisor need to conduct routine or non-routine check for the vehicles and drivers. The routine for vehicle consists of physical and system check such as tyre, lighting, body structure, braking system and maneuvering system. For the drivers, the supervisor could conduct spot check among drivers like drugs and alcohol test. The check of list and standard operating procedure must be provided from the company as the guideline before the heavy vehicles leave the depot or station.

Company also should provide devices to help drives during on the road such as navigation aid, communication device and camera. By this alternative, the navigation and communication aid could help the drivers to choose the best route and current traffic situation to avoid fatigue due to the long time driving or traffic problems.

Besides, the company should provide training and assessment from time to time as the monitoring performance among drives. As result, these could enhance the driver's competency and skills.

Since, the vehicles operate for long time on road to transport goods or passengers, mandatory routine maintenance need to be followed to avoid any defects on the vehicles that may cause accident. The company must realize that no compromising in lack of maintenance of the vehicles.

I. Driver

One of the factors of accidents among heavy vehicle accidents were due to fatigue. Fatigue could cause unconsciousness or even sleeping while driving. This situation is very dangerous for the drivers or the other road user. The drivers must always prepare themselves ready to drive. Enough sleep and mentally preparation need to be done to ensure they are always fresh upon driving.

Another factor of accidents was alcohol and drug abuse. Drivers must avoid those while driving. These are also one of the road faults that may cause to be charged in court.

II. Local Authority

Steps to be taken for preventing road accidents. Most important method to bring down accidents is strict enforcement of speed limits. The accidents can be avoided by strict enforcement of speed limits. Heavy penalty should be imposed on all those who cross speed limits. If this is strictly implemented, nobody will dare to go at high speed. Existing speed limits should be brought down further. Heavy penalty should be imposed for those who cause accidents.

Local authority also can promote campaign and accident prevention awareness. Advertisement in local media and road show seem to be effective. The awareness among road user and heavy vehicle driver is very important.

Figure 6: Road Safety Advertisement

III. Public

Public also has role to influence in reducing heavy vehicle accidents. Public can be a whistle blower or reporter for any road wrong doing among heavy vehicle drivers. Some company will put contact detail on the rear side for public make report for the wrong doing done by the drivers.

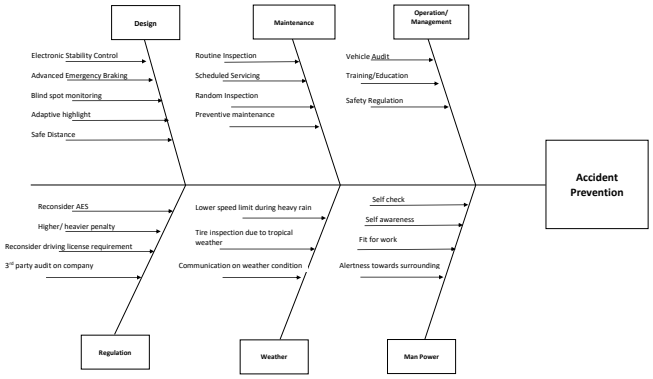

Figure 7: Fishbone Diagram Template

V. CONCLUSIONS

This essentially statistical study highlights the variety factors that involve heavy vehicles accidents. Therefore, it can be concluded that a significant percentage of accidents are caused by human error. Accordingly, this paper presents a number of short-term and long-term strategies that can reduce the number of heavy vehicles accidents.