

SAFETY MEASURES IN CONSTRUCTION LOGISTICS

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To my father, mother, sister and partner.

All of you hold my heart forever!

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Praise be to God.

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ABSTRACT

Construction logistics is really important as one of the enablers to support rapid development and economy in Malaysia. Heavy trucks used in construction logistics provide the ability to move more and bigger materials for development and manufacturing. However, it caused many problems, particularly in safety aspects, to the community. This study was done to investigate the safety measures practised in construction logistics activities by using indicators from construction safety and health programs, the current state and recommend suggestion for improvement in construction logistics activities. Comprehensive literature review has been carried out to gather the information and deeper understanding on stakeholders in construction logistics, impact of the activities and the concept of construction logistics safety and health. Qualitative study was chosen because in depth opinion and information of the related stakeholders needed to be discussed and clarified, which can only be obtained from one to one interview. Interview sessions were held with construction logistics related authorities such as MBIP, CIDB and JKJR, as well as the industry players, KOMEJ and CRESCENDO, and also representatives from the concerned communities from Ulu Choh and Lima Kedai. Data obtained were transcript, coded and interpreted into results and findings. Results from the study shows that it is proven that Johor Bahru experienced some negative impacts from construction logistics activities, and to lessen those problems, several improvements of safety programs are needed, in term of enforcement, information sharing and employees training. In conclusion, this study has successfully achieved its objectives, and recommendation for future study were included for better contribution to knowledge in the future.

ABSTRAK

Logistik pembinaan sangat penting sebagai salah satu pembolehubah bagi menyokong perkembangan ekonomi yang pesat di Malaysia. Trak muatan berat yang digunakan dalam logistik pembinaan memberikan keupayaan untuk memindahkan lebih banyak bahan dalam skala besar bagi sektor pembinaan dan pembuatan. Walau bagaimanapun, aktiviti ini menyebabkan banyak masalah, terutamanya dari aspek keselamatan kepada masyarakat. Kajian ini dijalankan untuk menyiasat langkah-langkah keselamatan yang diamalkan dalam aktiviti logistik pembinaan, dengan menggunakan penanda aras program keselamatan dan kesihatan pembinaan, selain untuk mengkaji keadaan terkini aktiviti ini dan seterusnya mencadangkan penambahbaikan kepada masalah yang ditemukan dalam kajian ini. Kajian literatur yang komprehensif telah dijalankan untuk mengumpul maklumat dan memberikan pemahaman yang lebih mendalam tentang pihak yang berkenaan dengan logistik pembinaan, impak daripada aktiviti ini dan konsep keselamatan dan kesihatan logistik pembinaan. Kajian kualitatif dipilih kerana pendapat dan maklumat yang mendalam daripada pihak yang berkenaan perlu dibincangkan dan dijelaskan, dan ia hanya dapat diperolehi daripada temuramah bersemuka bersama pihak-pihak ini. Sesi temuramah diadakan dengan pihak berkuasa yang berkaitan dengan logistik pembinaan seperti MBIP, CIDB dan JKJR, serta pemain utama industri seperti KOMEJ dan CRESCENDO, dan juga wakil masyarakat dari Ulu Choh dan Lima Kedai. Data yang diperolehi telah di transkrip, dikodkan dan diterjemahkan kepada hasil dan penemuan. Hasil dari kajian menunjukkan bahawa Johor Bahru terbukti mengalami beberapa kesan negatif daripada aktiviti logistik pembinaan, dan bagi mengurangkan masalah tersebut, beberapa penambahbaikan dalam program keselamatan diperlukan, iaitu penambahbaikan dari segi penguatkuasaan, perkongsian maklumat dan latihan serta kursus keselamatan jalan raya kepada pekerja. Kesimpulannya, objektif kajian ini telah berjaya dicapai dan beberapa cadangan bagi kajian seterusnya disertakan untuk memberi sumbangan ilmiah yang lebih baik di masa akan datang.

TABLE OF CONTENT

CHAPTER	TITLE	PAGE
	DECLARATION	ii
	DEDICATION	iii
	ACKNOWLEDGEMENT	iv
	ABSTRACT	v
	ABSTRAK	vi
	TABLE OF CONTENT	vii
	LIST OF TABLES	x
	LIST OF FIGURES	xi
	LIST OF ABBREVIATIONS	xiii
	LIST OF APPENDICES	xiv
1	INTRODUCTION	1
	1.1 Research Background	1
	1.2 Problem Statement	3
	1.3 Research Questions	7
	1.4 Aim	8
	1.5 Research Objectives	8
	1.6 Scope of Research	8
	1.7 Research Assumptions	9
	1.8 Limitation of Research	9
	1.9 Significance of Research	9
	1.10 Thesis Outlines	10

1.11	Chapter Summary	11
2	LITERATURE REVIEW	12
2.1	Construction Logistics	13
2.2	Stakeholders in Construction Logistics Activity	15
2.2.1	Authority	16
2.2.2	Developers and Contractors	22
2.2.3	Community	23
2.3	Impact of Unsafe Construction Logistics Activities to Community	25
2.3.1	Road Accidents	26
2.3.2	Noise	30
2.3.3	Vibration	31
2.3.4	Dust	32
2.4	Construction Logistics Safety and Health	33
2.4.1	Current Practices	33
2.4.2	Building Safety Construction Logistics Program	40
2.5	Chapter Summary	45
3	RESEARCH METHODOLOGY	46
3.1	Literature Review	47
3.2	Interview	48
3.2.1	Interviews Appointments and Respondents' Profile	49
3.3	Data Analysis	53
3.4	Chapter Summary	64
4	ANALYSIS AND FINDINGS	65
4.1	Introduction	65
4.2	Overall Findings	65

4.2.1	Content Analysis	66
4.2.2	Template Analysis	76
4.2.2.1	Effects of Construction Logistics Activities	76
4.2.2.2	Rules and Regulations	77
4.2.2.3	Communications	80
4.2.2.4	Training	81
4.2.2.5	Accident Investigation	83
4.2.2.6	Evaluation	86
4.3	Chapter Summary	89
5	CONCLUSION AND RECOMMENDATION	90
5.1	Introduction	90
5.2	Achievement of Study's Aim and Objectives	90
5.2.1	Objective 1: Investigate current state of construction logistics in Johor Bahru	91
5.2.2	Objective 2: Determine the safety measures practised for construction logistics activities	92
5.2.3	Objective 3: Recommend suggestion to improve current situation of construction logistics activities that possessed danger to communities	93
5.3	Recommendation for Future Study	95
5.4	Conclusion	96
	REFERENCES	97
	APPENDICES	104

LIST OF TABLES

TABLE NO.	TITLE	PAGE
Table 1.1:	General road traffic accident data in Malaysia 1997-2016	6
Table 2.1:	Occupational Accidents by Sector until June 2018	41
Table 2.2:	Quick review sheet for safety and health programs	44
Table 3.1:	Interview's sessions detail	49
Table 3.2:	Themes, Categories and Evidence of Interview Analysis	56
Table 3.3:	Summary of Interview Result	59
Table 4.1:	Summary of interview	66

LIST OF FIGURES

FIGURE NO.	TITLE	PAGE
Figure 1.1	Mutiple factors in heavy trucks crashes	5
Figure 2.1	Construction Logistics industry structure	14
Figure 2.2	Examples of heavy vehicles in construction logistics	15
Figure 2.3	Authorities involved	17
Figure 2.4	MBIP's complaint solution process	22
Figure 2.5	Residents blocking sand trucks in Kampung Sungai Redan, Ulu Tiram Source: Sinar Harian online	24
Figure 2.6	Bar steel barrier in Taman Perling Source: Sinar Harian online	25
Figure 2.7	Heavy trucks using residential area road Source: Sinar Harian online	27
Figure 2.8	Cement truck crashed into a house Source: Utusan online	28
Figure 2.9	Construction truck park in residential area, Taman Sri Gombak Source: Utusan online	29
Figure 2.10	Truck noise	30
Figure 2.11	Traffic vibration scenario	32
Figure 2.12	Government regulation to ensure road safety	34
Figure 3.1	Research Design	47
Figure 3.2	Methods used in this study	53
Figure 3.3	Data Analysis Procedure in Qualitative Research	54
Figure 4.1	Process to obtain GDL License	82

Figure 4.2	Findings	88
Figure 5.1	Summary of Objectives' Achievement	91

LIST OF ABBREVIATIONS

CIDB	-	Construction Industry Development Board
DOSH	-	Department Occupational Safety and Health
GDL	-	Goods Driver's License
HOD	-	Head of Department
IPD	-	<i>Ibu Pejabat Polis Daerah</i> (District Police Headquarters)
JKJR	-	<i>Jabatan Keselamatan Jalan Raya</i> (Road Safety Department)
JPJ	-	<i>Jabatan Pengangkutan Jalan</i> (Road Transport Department)
KEJARA	-	<i>Kesalahan Jalan Raya</i> (Road Traffic Offences)
KOMEJ	-	Konsortium Kontraktor Melayu Johor Berhad
MBIP	-	<i>Majlis Bandaraya Iskandar Puteri</i> (City Council)
MIROS	-	Malaysian Institute of Road Safety Research
MOT	-	Ministry of Transportation
OSHA	-	Occupational Safety and Health Administration
PDRM	-	<i>Polis Diraja Malaysia</i> (Royal Police of Malaysia)
PUSPAKOM	-	<i>Pusat Pemeriksaan Kenderaan Berkomputer</i> (Computerized Vehicle Inspection Centre)

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
A	INTERVIEW TRANSCRIPTIONS	
T1	Majlis Bandaraya Iskandar Puteri (MBIP)	105
T2	Construction Industry Development Board (CIDB) Johor	108
T3	Jabatan Keselamatan Jalan Raya (JKJR) Johor	110
T4	Ulu Choh Community	113
T5	Lima Kedai Community	115
T6	Konsortium Kontraktor Melayu Johor Berhad (KOMEJ)	117
T7	Crescendo Corporation Berhad	121

CHAPTER 1

INTRODUCTION

The purpose of this chapter is to provide brief introduction to the research including the research background, problem statement, research questions, aim, research objectives, scope, assumptions, limitations, significance and lastly the research design. Thesis outlines will be given to give insight on the contents of the next chapters' discussion. Chapter summary will also be provided to conclude the chapter.

1.1 Research Background

Malaysia strong economic growth has surpassed the expectation by quite significant margin. Based on the Department of Statistics Malaysia Press Release Gross Domestic Product Fourth Quarter 2017, for year 2017, Malaysia's economy accelerated at a faster pace with the GDP grew 5.9%. One of the major contributors was the construction services. It grew to 5.8% in 2017. Construction is needed in order to fulfil one of the objectives in the Government Transportation Programme (GTP), which is to move Malaysia forward to become an advanced society, united and fair with high standard of living for all (NKRA - UPT, 2009). There are 6 national key result areas (NKRA). There are reducing crime, fighting corruption, improving student outcomes, raising living standards of low-income households, improving rural development and improving public transport. Development was mentioned, so construction logistics is one of the enablers to ensure that the development can achieve the objectives.

Parallel to this, Johor Bahru is also rapidly developing. The development in Johor Bahru should be the start of a whole new world to the residents. It opens plenty of job opportunities, hence strengthen the economy of Johor Bahru and increase the buying power of its people. The people of Johor Bahru can depend on the strong economy and working here is more stable and safer compare to Singapore. Various projects in Johor Bahru, such as Forest City Johor, Country Garden Danga Bay and Iskandar Malaysia Development ramp up the development in Johor Bahru. Besides that, the growth of mining and quarrying to 15.1% in Johor, with the development of Refinery and Petrochemical Integrated Development (RAPID) Johor also contributed to the escalation of construction activities (CIDB, 2017). It is very important nowadays as it is one of the pillars in the country's economy.

The most common development everywhere is residential, as shelter is one of basic human need. Based on the study by the Property Guru Malaysia, 92% from the respondents of '*Kaji Selidik Sentimen Pengguna*' prefer to own a house rather than rent it. Home symbolizes stability and safety, and is a major asset classification for wealth through increased capital and rental revenue (Fernandez, 2018). Hence, it can also be seen in Johor Bahru that there are loads of new residential area arise, whether regular housing or *Rumah Mampu Milik Johor*.

With the increment of demand in construction to support the economy and housing growth, the demand on construction logistics has also increased. Construction logistics can be defined as a network of organisations linked by material and information flows bounded with a product (project) life cycle (from the procurement of raw materials through processing and handling the products and the final product, distribution and sales to the end-user and finally, to waste utilisation) (Sobotka et.al, 2005).

Construction logistics usually requires the use of heavy truck to carry all the construction materials such as rock, sand and cement. Because of that, heavy trucks are very common sight in Johor Bahru. However, the developments do not only bring with them benefit and prosperity but also concern. The effect of the increasing volume

of heavy trucks on road safety are quite alarming. For example, in the United State, 8% of all road deaths have been attributed to heavy vehicle crashes (NHTSA, 2006) whereas in Singapore, there were more heavy vehicle driver deaths than motorcar driver deaths (Wong et al., 2002).

As in Johor Bahru context, along the way, before reaching the destination, these heavy trucks also can cause danger to the road users, especially if they used roads in residential areas. Sand and rocks are flying away from the truck and hit other vehicles, causing crack and break to the front mirror that can hurt the driver and passengers. Heavy trucks park at the road side causing difficulties for other drivers to exit junction because they cannot see if there are other vehicles coming from the main road as the truck already make it worse and add to existing blind spots. Empty truck will move so fast and full truck will move so slow, make it dangerous not only to road users, but also pedestrians, especially in school areas where students usually roaming around on the road side waiting to be pick up. All these reasons can cause accidents, or worse, death.

Therefore, safety measures should be taken to ensure that people life can be save. One of the ways is to enforce strong law and regulation, and also educate the public and all the parties involved. However, even with all the regulation and education, accident fatalities never decrease from time to time (Gan, 2017).

1.2 Problem Statement

Users speculate that the benefit of travelling outweighed the risk during the journey (Glendon, 2011), especially in road transportation where the risks are the highest among transportation modes, particularly for heavy trucks. Nevertheless, nowadays, road transportation is beneficial to everyone. It provides access to any destinations, for education, employment and healthcare. As for heavy vehicles, it provides the ability to move more and bigger materials for development and

manufacturing. However, it can cause many problems to the community (Hadi, 2002), apart from its crash's compatibility. There are various safety problems caused by the construction logistics heavy vehicles to the community, in term of health (Luther, Wigmore, & Baas, 2003) (Mindell & Karlsen, 2012) such as noise (Hadi, 2002) (Mindell & Karlsen, 2012) (Luther, Wigmore, & Baas, 2003) and dirt (Hadi, 2002), residential structure risk from vibrations (Hadi, 2002) (Luther, Wigmore, & Baas, 2003), risk from irresponsible parking (Hadi, 2002) (Nurain, 2015), and risk from increased traffic (Hadi, 2002).

In the urban world nowadays, new residential area has been built in the same area as the existing ones. This is because of demand and easy access (Fernandez, 2018) that can lower developers' cost and maximize the profit. Based on the few cases in the local newspapers, heavy trucks used existing road in residential areas because of short distance, convenience, or simply because there is no other road for them.

The most worrying issue about heavy trucks using road in residential area is its crashes compatibility, as the consequences are drastic and on the spot. There are various reasons of heavy vehicles crashes. The most cited is because of poor driving behaviour (Smith, 2016) (Lori, Grzebieta , Williams, Oliver , & Friswell , 2014) (Nævestad, Phillips, & Elvebakk, 2015), fatigue (Smith, 2016) (Lori, Grzebieta , Williams, Oliver , & Friswell , 2014) (Brodie , Bugeja , & Joseph Elias, 2009) and road condition (Bj, Bj, & Eriksson, 2008)(Masuri, Isa, Pozi, & Tahir, 2017). It is almost certainly many other factors that might influence heavy vehicle crashes have simply not been studied. This factor should be taken seriously because it is actually one of the underlying factor of heavy vehicle crashes (Nævestad et al., 2015)(Lisa, Lyndal, & Elias, 2009). (Knipling, 2011) has come out with good summary for factors in heavy truck crashes, as shown in Figure 1.1. The detail is as follows:

- i. Enduring driver factors (eg. knowledge / skill / medical).
- ii. Temporary driver factor (eg. time on task / sleep / moods / drugs / local familiarity).
- iii. Vehicle (safety technology / mechanics).

- iv. Roadway and environment (design / intersection / traffic / weather).
- v. Management (safety focused practises / pay rates / training opportunities).
- vi. Government (licensing / regulation / enforcement).

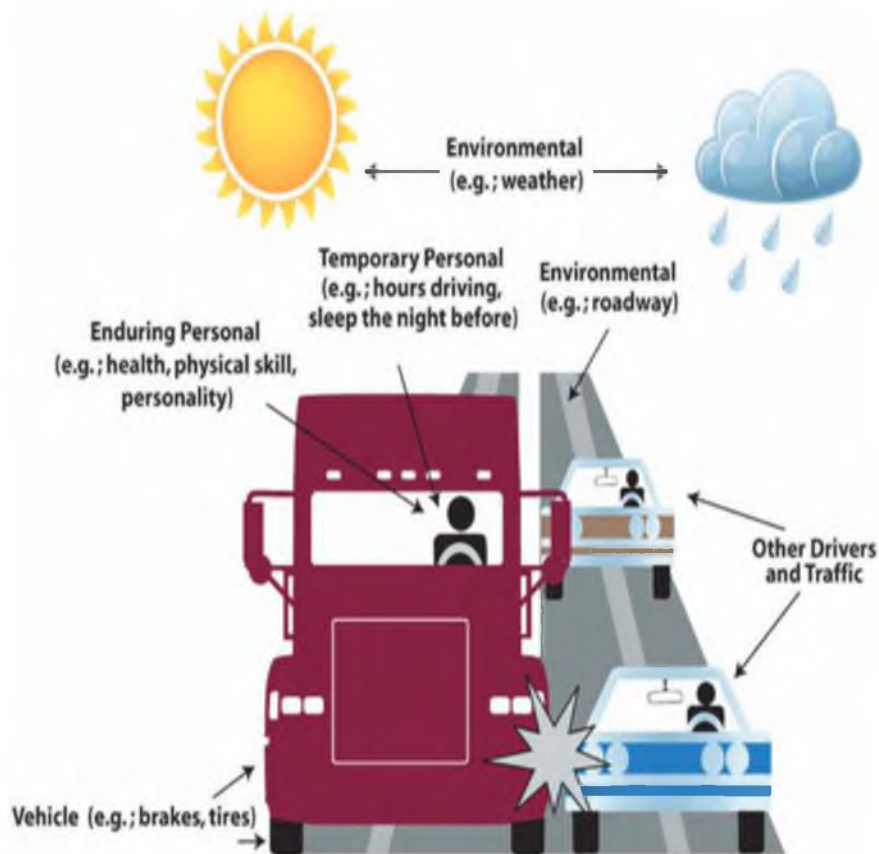


Figure 1.1 Mutiple factors in heavy trucks crashes

In Malaysia, the number of road crashes and deaths are increasing every year. Table 1.1 shows the general road traffic accident data in Malaysia. This data was released on the Malaysian Institute of Road Safety Research (MIROS) website. For instance, as shown in Table 1.1, in 2015, there were 489, 606 crashes reported with 6706 fatalities. This number increased in 2016, with 521, 466 crashes and 7152 deaths reported. According to Datuk Seri Liow Tiong Lai, quoted from The Star, this road traffic accidents cost Malaysia an estimated RM 9.21bil on 2016. Based on the latest report from the Malaysian Institute of Road Safety Research (MIROS), the former

Transport Minister said this was an increase of RM581.3mil compared with 2015. MIROS estimates that a death causes the country an average of RM1.2mil, RM120,000 for severe injury and RM12,000 for light injury in medical cost, productivity loss and other pay-outs. In the heavy trucks context, as it 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 (MIROS, 2018). As mentioned by Datuk Seri Liow Tiong Lai, former Malaysia's Transportation Minister, regulations and education were set and given by the government, but the number of road traffic accidents still increasing (Gan, 2017). The same scenario can be seen in Johor Bahru, as the number of fatal accidents is alarming too, with trucks involved in 35064 cases (Ministry of Transport, 2017).

Table 1.1: General road traffic accident data in Malaysia 1997-2016

Year	Registered Vehicles	Population	Road Crashes	Road Deaths	Serious Injury	Slight Injury	Index per 10,000 Vehicle	Index per 100,000 Population	Indeks per billion VKT
1997	8550469	21665600	215632	6302	14105	36167	7.37	29.1	33.57
1998	9141357	22179500	211037	5740	12068	37896	6.28	25.8	28.75
1999	9929951	22711900	223166	5794	10366	36777	5.83	25.5	26.79
2000	10598804	23263600	250429	6035	9790	34375	5.69	26	26.25
2001	11302545	23795300	265175	5849	8680	35944	5.17	25.1	23.93
2002	12068144	24526500	279711	5891	8425	35236	4.9	25.3	22.71
2003	12819248	25048300	298653	6286	9040	37415	4.9	25.1	22.77
2004	13828889	25580000	326815	6228	9218	38645	4.52	24.3	21.1
2005	15026660	26130000	328264	6200	9395	31417	4.18	23.7	19.58
2006	15790732	26640000	341252	6287	9253	19885	3.98	23.6	18.69
2007	16813943	27170000	363319	6282	9273	18444	3.74	23.1	17.6
2008	17971907	27730000	373071	6527	8868	16879	3.63	23.5	17.65
2009	19016782	28310000	397330	6745	8849	15823	3.55	23.8	17.27
2010	20188565	28910000	414421	6872	7781	13616	3.4	23.8	16.21
2011	21401269	29000000	449040	6877	6328	12365	3.21	23.7	14.68
2012	22702221	29300000	462423	6917	5868	11654	3.05	23.6	13.35
2013	23819256	29947600	477204	6915	4597	8388	2.9	23.1	12.19
2014	25101192	30300000	476196	6674	4432	8598	2.66	22	10.64
2015	26301952	31190000	489606	6706	4120	7432	2.55	21.5	9.6
2016	27613120	31,660,000 ^e	521466 ^a	7152 ^a	NA	NA	2.59	22.6	NA

Therefore, it is such an important issue to emphasize safety for both the trucking industry and community (Raftery , Grigo, & Woolley, 2011), especially in

Johor Bahru where residential development is very vibrant with 100, 000 affordable housing program (*Rumah Mampu Milik Johor*) by 2023, and 6 717 public housing project (*Projek Perumahan Rakyat*) by 2021 (Sarday, 2018), not included any other development from other private developers.

Building of a safe social environment is very necessary to facilitate the raising of children by families (NHTSA, 2006). There are guidelines in safety and health program to practise safe construction logistics activities in Malaysia such gazetted by DOSH and city councils. However, issues in regards with safety in construction logistics activities are still recurring and complaints from local community still coming to city council. Hence, it is crucial to investigate more on the current guidelines that has been implemented to identify what is lacking in the safety and health program measurements taken in construction logistics activities so that fatalities and problem cost caused by the accidents, and also risks faced by the communities can at least be lessen, because everyone will know their responsibilities and also efforts in practising road safety.

1.3 Research Questions

- i. Who are the stakeholders involved in construction logistics activities?
- ii. How is the current state of construction logistics effect in Johor Bahru?
- iii. What are the problems of construction logistics in Johor Bahru?
- iv. What are the safety measures applied for construction logistics activities?
- v. Is there any suggestion to make an improvement to ensure sustainability of the safety measures?

1.4 Aim

To study the safety measures practised in construction logistics activities from the scope of construction safety and health.

1.5 Research Objectives

Through observation and study, researcher found out that quite number of heavy trucks for construction logistics still possess great danger to people, even with the effort from the authority to educate and to set regulations to be follow by all parties involved. For researcher to suggest improvement for this situation, these objectives need to be fulfilled:

- i. Investigate current state of construction logistics in Johor Bahru.
- ii. Determine the safety measures practised for construction logistics activities.
- iii. Recommend suggestion to improve current situation of construction logistics activities that possessed danger to communities.

1.6 Scope of Research

The boundaries of this study are as follows:

- i. The study target respondents are community facing the problem, the related government agencies, contractors and developers.
- ii. Reports and cases limited to Majlis Bandaraya Iskandar Puteri (MBIP) administrative area.
- iii. Information will be obtained through primary data (interview) and secondary data obtained from the authorities and literatures.

1.7 Research Assumptions

In this study, several assumptions were made. The assumptions are:

- i. All the problems were properly reported to MBIP and investigated, and final reports were released.
- ii. The report was conducted with integrity and honesty.
- iii. No important information was hidden in the interview.

1.8 Limitation of Research

The limitations in this study are:

- i. Not all stakeholders involved were interviewed because of time limitation and cooperation issues.
- ii. The data will only cover certain period of time.
- iii. The authority law and regulations will not be interpreted in detail.

1.9 Significance of Research

The authority will stand to benefit in knowing and understanding the safety measures particularly involving construction logistics and decide whether those measures are still applicable in current circumstances or amendment is required.

The study will also benefit the construction logistics industry player because they can see whether the safety measures are enough, or amendment is needed.

From this study, the community will be assured to what extent their right is, and the steps they should take to ensure safety in their residential areas.

The study will suggest and recommend comprehensive ways to ensure that all safety measures are still valid with today's situation and improvement that can be taken to ensure sustainability of those measures. It will promote more efficient urban logistics, the element wanted by Malaysia government itself, mentioned in the economic planning unit report and also by Johor Bahru government, mentioned in Iskandar Malaysia Transportation Blueprint 2010-2030.

1.10 Thesis Outlines

This report consists of 5 chapters. There are:

- Chapter 1: The purpose of this chapter is to provide brief introduction to the research including the research background, problem statement, research questions, aim, research objectives, scope, assumptions, limitations, significance and lastly the research design.
- Chapter 2: This chapter provides discussion on the claims, conclusions and findings to construct theoretical foundations for the study, and implement it by outlining the important concepts, theories and framework that contribute to the design and implementation of the research.
- Chapter 3: This chapter will discuss the research design and methodology of the research.

Chapter 4: This chapter provides discussion on data analysis, findings and result that researcher gained.

Chapter 5: This last chapter will provide the recommendation and conclusion of the research.

1.11 Chapter Summary

This chapter has provided brief introduction to the research including the research background, problem statement, research questions, aim, research objectives, scope, assumptions, limitations, significance and lastly the research design. The next chapter will discuss more on the claims, conclusions and findings to construct theoretical foundations for the study, and implement it by outlining the important concepts, theories and framework that contribute to the implementation of the research.

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