INDONESIAN TRAFFIC CONDITIONS IN CONTEXT

KONDISI LALU LINTAS INDONESIA DALAM KONTEKS

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ABSTRACT
This paper is focused on describing Indonesian traffic flows conditions. Each type of road in this country has heterogeneous traffic flow. This article shows the pattern of vehicles composition in several cities in Indonesia and also in developing countries. Besides that, this paper also describes the trend line of traffic accident by age in Indonesia in 5 years and the traffic performance values in Indonesia. The condition of mixed traffic will affect how to manage road network either at road segment or at intersection. Therefore, the Indonesian Government has implemented a facility called School Safety Zone (ZoSS) to manage environment surrounding children school located at major road. These facilities are implemented to improve the safety of pedestrian crossings by controlling and reducing traffic speeds. Based on the literature review, it can be summarized that motorcycle has dominance in the traffic flow and also involved in traffic accidents.
Keywords: heterogenous traffic flow, school safety zone, traffic speed, traffic accident

ABSTRAK
Makalah ini difokuskan pada penggambaran kondisi arus lalu lintas di Indonesia. Setiap jenis jalan di negeri ini memiliki arus lalu lintas yang heterogen. Artikel ini menunjukkan komposisi pola kendaraan di beberapa kota di Indonesia dan juga di negara-negara berkembang. Selain itu, makalah ini juga menggambarkan garis tren kecelakaan lalu lintas di Indonesia berdasarkan usia dalam 5 tahun dan nilai-nilai kinerja lalu lintas. Kondisi lalu lintas campuran akan mempengaruhi bagaimana mengelola jaringan jalan baik di ruas jalan atau persimpangan. Oleh karena itu, Pemerintah Indonesia telah menerapkan fasilitas yang disebut Zona Keselamatan Sekolah (ZoSS) untuk mengelola lingkungan anak sekitar sekolah yang terletak di jalan utama. Fasilitas ini dilaksanakan untuk meningkatkan keselamatan penyeberangan pejalan kaki dengan mengontrol dan mengurangi kecepatan lalu lintas. Berdasarkan tinjauan literatur, dapat disimpulkan bahwa sepeda motor memiliki dominasi dalam arus lalu lintas dan juga terlibat dalam kecelakaan lalu lintas.
Kata-kata kunci: arus lalu lintas heterogen, zona aman sekolah, kecepatan lalu lintas, kecelakaan lalu lintas

INTRODUCTION

Mixed or heterogeneous traffic flow is defined as a traffic stream containing various vehicles-either motorised or non-motorised. In order to help understand what the exact meaning of mixed traffic is, it is important to understand the traffic flow itself. Traffic flow occurs because of the interaction between its components, comprising land use, road infrastructure, and vehicles.

Slinn et al. (2005) defined traffic flow as, 'the movement of pedestrians, cyclists and motorised vehicles along the route'. Moreover, motorised vehicles are classified into five groups: two-wheelers, cars, buses, trams, and commercial vehicles. In contrast to Slinn et al., Transportation Research Board committees classify motorised vehicles into six classes: cars, trucks, vans, buses, recreational vehicles, and motorcycles (TRB 2000).

Based on the above explanation, the definition of mixed traffic is closer to various transport modes or types of vehicles available in the road segment. Different types of vehicle will have different characteristics affected by the environment surrounding the road. Such characteristics play a key role in the analysis of traffic flow characteristics, road capacity (TRB 2000) and road pavement. The characteristics include the physical properties of vehicle (i.e. dimension and weight) and also the operation of the vehicle (i.e. speed, movement and manoeuvring). Therefore, the vehicle standard is needed in the analysis. For example, the passenger car unit is used in the capacity analysis, whilst axle load is used in the pavement analysis.

MIXED TRAFFIC IN INDONESIA

Indonesia is one of the developing countries with a mixed-type of traffic in urban or semi-urban roads. There are motorised and non-motorised vehicles operating in the urban road areas. In addition to the standard vehicles, each type of analysis also uses a different classification of vehicle. BSN (National Standardisation Agency) classifies vehicles based on

dimension into seven classes to be used in the road geometric design analysis (DoHaI 2004). On the other hand, the Directorate General of Bina Marga classifies vehicles based on the type of road, such as urban road and rural road (DGoH 1997). Table 1 shows the type of vehicles used in the Indonesian manual, including road geometric design and road capacity.

Table 1 describes the manual of urban road capacity, which classifies vehicles into four groups, namely light vehicle, heavy vehicle, motorcycle, and non-motorised vehicles. The details of the vehicle type of each class can be seen in Table 2. However in the manual of rural road and freeway capacity, heavy vehicle is still divided into three types of vehicle, including medium heavy vehicles (MHV), light trucks (LT) and light buses (LB).

The definitions of these three vehicles are as follows:

1. MHV is a motor vehicle with 3.5–5 m distance between two axles, including small buses and trucks with two axles on six wheels.
2. LT is a truck with three axles and a combination of less than 3.5 m distance between the first and second axles.
3. LB is a bus with two or three axles with a distance of two axles ranging 5–6 m.

Table 1. Type of Vehicles in Indonesian Manual

Type of analysis	Type of vehicle	Sources
Road geometric design	Cars, single trucks, articulated buses, medium semi-trailer trucks, heavy semi-trailer trucks, school buses, and city transit buses	DoHaI (2004)
Urban road capacity	Light vehicles, heavy vehicles, motorcycles, non-motorised vehicles	DGoH (1993)
Urban road capacity	Light vehicles, heavy vehicles, and motorcycles	DGoH (1997)
Rural road capacity	Light vehicles, medium heavy vehicles, light trucks, light buses, and motorcycles,	
Freeway capacity	Light vehicles, medium heavy vehicles, light trucks, and light buses	

Table 2. List of the Definitions of Vehicle Type in Urban Road by DGoH (1993)

Type of Vehicle	Definition
Light vehicle (LV)	Motor vehicle with two axles on four wheels (including car, oplet, small bus, pick-up and small truck, according to DGoH system)
Heavy vehicle (HV)	Motor vehicle with two or three axles on more than four wheels (including bus, two-axle truck, three-axle truck and combination truck according to DGoH system)
Motorcycle (MC)	Motor vehicle with two or three wheels
Un-motorised (UM)	Non-motorised vehicle (including pedicab, bicycle, horse cart and pushcart)*

Note: *) non-motorised vehicle in DGoH (1997) was not considered as a vehicle but as side friction

Heavy vehicles in urban roads include three types of vehicle as mentioned above. It can be seen in Table 2 that this vehicle is defined as a motor vehicle with two or three axles on more than four wheels. In contrast to heavy vehicles, light vehicles are defined as motor vehicles with two axles on four wheels across the entire Indonesian manual of road capacity. Light vehicles consist of car, oplet, pick-up, trucks, small buses, and small trucks. In Indonesian manual, the definition of the term 'motorcycle' is the same as for the two-wheeled motorcycles, whilst non-motorised vehicles are defined as all vehicles operated by humans with or without animal power, for example: bicycles, pedicab ('becak' in Indonesia, or rickshaw in Bangladesh), and horse cart ('andong' in Indonesia).

In Indonesia, mixed traffic is widely found in urban roads—both major roads and minor roads. Table 3 describes the composition of vehicles in different road segments and cities in Indonesia. This table shows that, although the type of vehicle and vehicle composition at each location (city) are not similar, generally, the highest percentage is attributed to the motorcycle. This condition is related to the superiority of the motorcycle, which is recognised as being more flexible than other vehicles, much less expensive, and consuming less fuel.

Table 3 also shows that, since 2006, the percentage of motorcycles has not fallen below 55%, but rather there has been an increase exceeding more than 70% (2011). The new data from the government shows 70.83% average during 2004–2009 or 68.98%–72.74% of the range value of motorcycle percentage. This type of vehicle only fell below 50% on Sunan Kudus Street and A. Yani Street Surakarta. The first of these is located in a small city and near a traditional market. Pedal cyclists are also popular in this location, which can be seen from 30.57% of its availability in this area. Rahman *et al*. (2004) studied the impact of non-motorised vehicles in this area; thus, the measuring of bicycles was important. In contrast, Hidayati *et al*. (2004) carried out research relating to the traffic noise level caused by motorised vehicles; therefore, non-motorised vehicles were found to be unimportant in their study.

As the highest percentage of vehicles, the feature of motorcycles in several road segments can also be seen in Figure 1. This figure compares motorcycles and light vehicles in an attempt to clearly show that both types of vehicle are dominant amongs such roads. Another illustration of the vehicle's composition in Indonesia can be seen in Figure 2. This figure shows that the sequence composition of vehicles each year during the period 2004–2009 was similar. The order from the highest up ranging to the lowest was motorcycles followed by cars, trucks and buses. Every year, motorcycles increased, trucks declined slightly, whilst cars and buses remained relatively constant.

As mentioned earlier, both Figure 1 and Figure 2 show the percentage of motorcycles. Based on these figures, not all locations can be seen as having the same proportion of motorcycle. For example, in 2004, registered motorcycles were approximately 70%, and on Sunan Kudus Street Kudus, this was close to 50%. This can be seen as registered motorcycles meant all motorcycles were recorded in the SAMSAT by the owner, although Figure 1 shows only part of the road segment. There are many factors potentially affecting the composition of vehicles in each road segment, such as road type, type of land use, and the object of source.

Besides being the highest percentage of vehicles, motorcycles also have the highest percentage involvement in traffic accidents. DGoLT (2011) reports that 60.63% of traffic accidents in Indonesia in 2010 involved motorcycles, followed by 29.85% cars, whilst the remaining percentage was seen amongst buses and trucks. However, if the above percentage is compared to the composition of the number of vehicles registered, then the car is still more dangerous than motorcycles in traffic stream. In addition to the types of vehicle involved, such traffic accidents can also be classified according to the age of the person driving and/or the victim, as Figure 3.

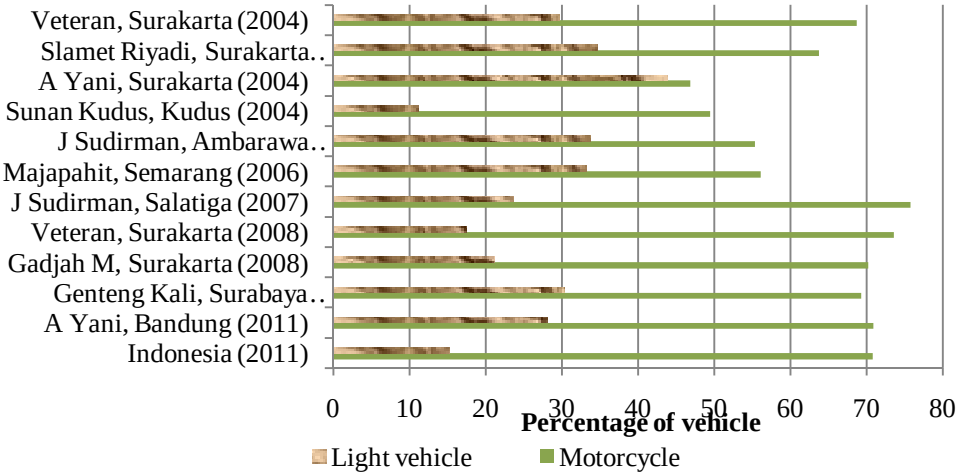

Figure 1. Percentage of Motorcycle and Light Vehicle (2004-2011)
(Source: Hidayati *et. all* 2012)

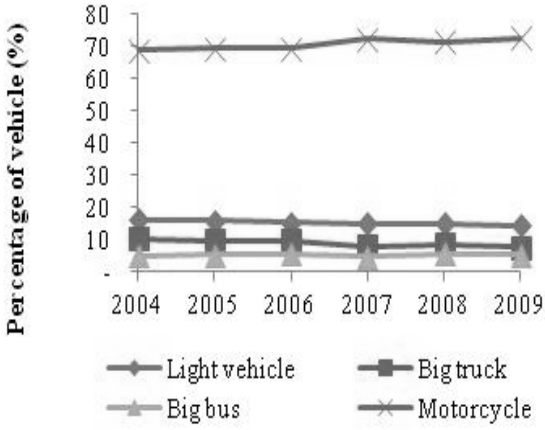

Figure 2. Vehicles Composition in Indonesia during 2004-2009
(*Source*: Hidayati *et. all* 2012)

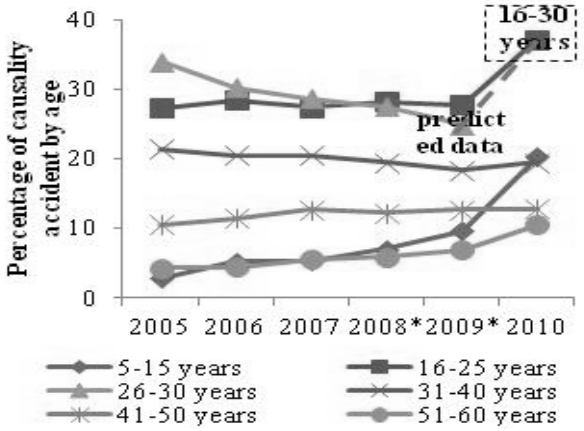

Figure 3. Percentage of Traffic Accident by Age during 2005–2010 in Indonesia
(*Source*: Hidayati *et. all* 2012)

Figure 3 describes the trend line of traffic accidents by age in Indonesia. The data of accidents during 2005–2007 and 2010 were taken from Indonesian Police Department by DGoLT (2011). Owing to the lack of availability, the data during 2008–2009 were predicted by this institution. This picture shows the percentage of accidents amongst children or young people (5–15 years old) increased in this period. However, no details were given in relation to the location of the accident data, although it could be taken to consider the safety activities of children around the street; in this case, around school areas. Therefore, as a consequence of this condition, the Indonesian Government provided ZOSS facilities.

Figure 3 also shows that the numbers of accidents involving productive people (16–25 and 41–50 years old), and the elderly (over 50 years old) have tended to increase. The number of accidents involving persons aged 41–50 years old increased slightly, and has significantly decreased amongst the group of 26–30 years old. In general, this occurrence may be related to the emotional levels of the two last groups, who may be more stable than the other groups. Based on this figure, it can also be seen that the number of accidents amongst those aged 16–25 and 26–30 years old in 2010 experienced a sharp rise. This occurred as the Police Department (DGoLT 2011) combined the groups of 16–25 and 26–30 year olds into the group 16–30 years old. If it is assumed that both groups had the same composition, the percentages of traffic accidents would probably have remained constant during 2009–2010.

In an attempt to facilitate the movement of vehicles, the Directorate General of Bina Marga (DGBM) had the responsibility to provide infrastructures. This responsibility can be divided into two categories: Central Government and Local Government. The implementation of infrastructure depends on the traffic demand in each location—not only the area. In general, the area with a higher population has a higher quantity of infrastructure.

As mentioned earlier, in order to fully support traffic movement, generally the government has the responsibility of providing road infrastructure. The responsibility is divided based on the authority—either national or local authority. Figure 4 describes the length of roads based on the authority of National, Province or Regency constructed throughout 2006–2010.

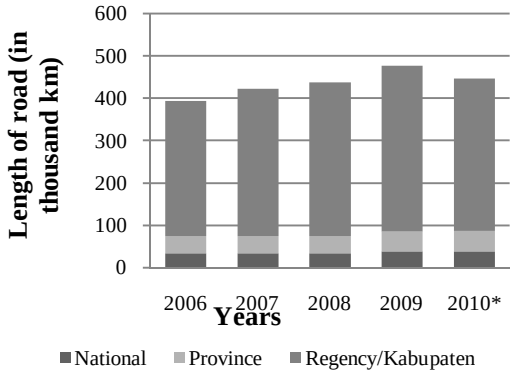

Figure 4. Length of Road in Indonesia during 2006-2010 (in thousand km)
(*Source*: Hidayati *et. all* 2012)

Figure 4 shows the greatest road length is in the regency (Kabupaten) or city level. The total lengths of the national and the province roads have less than 100 (thousand km), whilst the regency road has more than 350 (thousand km). The advantage of this condition is the facilitation of faster system handling if there is a problem at a city level. This le-

vel of authority could use the available budget allocation to complete handling. This figure also explains that the trend line of the length of regency road increased every year during 2006–2009. This data on 2010 was not available on BPS (2010), and so the figure used data from DGoLT (2011). Although the data sources are different, it can nevertheless be used to estimate the reduction of the length in the regency roads during 2009–2010. This reduction was probably related to the number of disasters (earthquakes and landslides) in Indonesia. It occurred during the period August 2008–February 2010 at North and South Sulawesi, Gorontalo, Manokwari, West Java, and West Sumatera.

The performance values in Table 4 were obtained by Indonesian Land Transportation (DGoLT 2011) in just a few sample roads—not in the entire road network. Nevertheless, it can be used to describe traffic conditions in several cities by using the saturation condition. Metropolitan cities in Java (Bandung and Surabaya) have bigger values in the volume capacity ratio (VCR). In regard to the minimum average speed of vehicle, almost all locations have values below 40 km/h, except in the case of Sragen, which reached 45 km/h.

SCHOOL SAFETY ZONE FACILITY: AS PART OF THE URBAN TRAFFIC MANAGEMENT

According to DGoLT (2006b), ZOSS is a time-dependent operation speed control zone, which is recommended for two hours in the morning and two hours in the afternoon during peak hour traffic flow. However, the operation hours can be adjusted to the needs of each school, such as at a full day primary school. This facility comprises road markings (including zebra crossing, dashed lines, the words 'school safety zone' and 'look right-left', as well as red block paving on the road surface), traffic signs (including warning sign and speed limit sign), and other optional supporting facilities (i.e. traffic signals and rumble strips).

This facility was first operated in 2006 across 11 cities in Java and 3 cities in Sumatera. ZOSS is provided so as to improve the safety of pedestrian crossings by controlling and reducing traffic speeds, especially near kindergarten and primary schools. The impact of a school located around the main road is related to the presence of side friction, caused by pedestrians, private vehicles stopped/parked and public transport stops around the school. This condition will affect the traffic flow through the roads, such as by decreasing vehicles' speed.

Table 4. Traffic Performances (as Volume Capacity Ratio and Average Speed of Vehicles) in Indonesian Metropolitan City and Other Cities in 2010

Cities	Islands	Volume capacity ratio (maximum value)	Average speed (km/h) (minimum value)
Metropolitan City			
Medan	Sumatera	0.76	23.40
Palembang	Sumatera	0.61	28.54
Makassar	Sulawesi	0.73	24.03
Surabaya	Java	0.83	21.00
Bandung	Java	0.85	14.30
Semarang	Java	0.72	27.00
Surakarta (big city)	Java	0.68	18.25
Yogyakarta (middle city)	Java	0.86	31.34
Sragen (small city)	Java	0.53	45.00

Source: DGoLT (2011)

Table 5. Types of ZOSS Facilities

Road types	Stopping sight distance (m)	Design speed (km/h)	Speed limits (km/h)	Types of ZOSS	Length of ZOSS (m)
Two-lane undivided (2/2UD)	50-85	>40, ≤60	25	2UD-25	150
	35-50	30-40	20	2UD-20	80
Four-lane undivided (4/2UD)	50-85	>40, ≤60	25	4UD-25	150
	35-50	30-40	20	4UD-20	80
Four-lane divided (4/2D)	50-85	>40, ≤60	25	4D-25	200
	35-50	30-40	20	4D-20	100
More than Four-lane, and/or > 60 km/h				Need pedestrian bridge	

Source: (DGoLT 2006b)

The classification of this facility is derived from the type of road. Table 5 shows the speed limits for vehicles at ZOSS area are 20 km/h or 25 km/h, whilst the design speed of vehicle of each type of road is higher than speed limits. Indonesian Government (DGoLT 2006b) proposes conditions of road segment designated as school safety zones: a) a school has direct access to the road, b) the main entry point of the school is on the main road, and c) there are significant activities in the surrounding streets (i.e. walking, cycling and crossing). This table also shows several types of ZOSS based on the type of road, the number of lanes, speed limit, and view distance of the road. For example, Two-lane undivided with 25 km/h of speed limit (2/2 UD-25, Figure 6) and four-lane divided with 25 km/h of speed limit (4/2D-25, Figure 5).

The data of road traffic accidents is usually provided by the Indonesian Police Department, which has not classified or recorded the locations of accidents by the ZOSS area. The safety impact of these facilities can be described from the traffic conditions at the location. Based on the observations, it is evident that the road segment with ZOSS was used by high volumes of traffic comprising a wide range of vehicle types, including large vehicles. For example, Walisongo Street (location of SD Tugurejo 1 Semarang) and Raya Semarang-Demak Street (location of SD Karangtowo 01-02 Demak) are major roads connecting two cities. Both segments are part of the North Coast lane of Java ('Jalur Pantura'), which is the shortest path from East to West of Java through Central Java. Based on this information, if large and heavy vehicles were passing through the road segments, the ZOSS facilities would then be provided for pedestrian safety around the locations. In contrast, Veteran Street in Surakarta is a different type of road from Semarang. This road could not be categorised as an expressway as there were many access roads (i.e. directly to residential area) on this road. Nevertheless, this segment is also a connecting road of Central Java from East to West Java.

Figure 5. ZOSS at Four-lane Divided with Speed Limit 25 km/h (4/2D-25)

Figure 6 ZOSS Facilities Four-lane Undivided with Speed Limit 25 km/h

The ZOSS comprises road markings, traffic signs, and traffic signals. In detail this facility consist of zebra crossing, dash lines, letters of 'Zona Selamat Sekolah' and 'Tengok Kanan-Kiri', parking restrictions, block marking, rumble strips/speed bars, speed limit signs, operation hours signs and warning signs. Traffic signals would only be provided if needed, such as in Figure 5. The detail design sample of the ZOSS by DGoLT (2006b) can be seen in Appendix 1. This figure shows all supporting facilities placed around the ZOSS area with the main area a zebra crossing on the block marking. The types of supporting facility on both the road-side were similar, although the traffic condition was probably not similar at the same time.

Based on the survey carried out in April 2010, it was known that the ZOSS facility could no longer be found in Demak due to an overlay project on this road. In the past, this facility was controlled by the central government of the Transportation Department, whilst recently it has been supported by the local government. For example, the Local Government of Surakarta continues to inform and explain the programme of ZOSS to schools. More than 50 schools-including high schools-are located around the roads in Surakarta, which require different supporting facilities of school safety (DPS 2009).

COMPARISON WITH OTHER DEVELOPING COUNTRIES

Types of transportation can be divided into two classes based on the condition of the country, i.e. transport in developing countries and developed countries. Both types have different characteristics: for example, driver behaviour and traffic characteristics. In developing countries, such as Indonesia, many activities take place at the road side, especially on urban roads. Such activities affected and reduced the speed of the traffic stream (Marler 1996). Differences between the Western world and developing countries are in regard to vehicles dominating the

traffic stream and traffic discipline. In Western countries, traffic flow operations are commonly dominated by passenger cars with good lane discipline, contrary to developing countries, which are known to have mixed (heterogeneous) traffic with poor lane discipline. Thus, methods developed for analysis in Western countries could not be applied directly to developing countries (Sutomo 1992).

Transportation problems in Indonesia, as a developing country, were also caused by a hierarchical street network that was poor in terms of serving many modes of transportation, with roads commonly used for other activities, such as street vendors and parking. Road capacity was also used inefficiently with the percentage of private cars reaching 86% and with car occupancy of around only 1.5 passengers per car (Kusbiantoro 1998). The comparison of transport systems between Asian and European countries can also be seen from many different aspects: motorcycles dominate traffic streams in Asia, whereas private cars dominate traffic streams in Europe; and public transport is of a higher quality in Europe, although Asia has many types of paratransit (Emberger *et al.* 2005).

Table in Appendix 1 shows the composition of vehicles in Indonesia and several developing countries. In all these countries motorcycles comprise the highest proportion of traffic, and in almost all cases were more than 50% of the total vehicle flow. The comparison of the number of motorcycles and cars can also be seen in Figure 7.

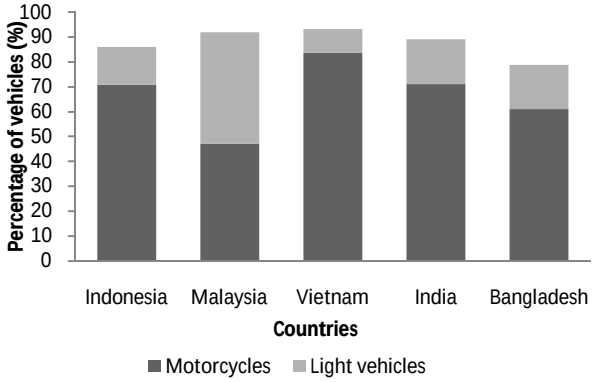

Figure 7. Percentages of Motorcycles and Light Vehicles in Five Countries

Figure 7 illustrates almost all countries as having a significant differentiation between the number of motorcycles and cars, except Malaysia. Both the figure and table can be used to describe the dominant traffic in the respective countries, although the types of data and year are not similar. For example, the data of average registered motor vehicle by the government was taken during 2004–2009 in Indonesia, 2007–2009 in Malaysia, 2001–2006 in India, and 2004–2010 in Bangladesh. In the same order, these three countries have the average motorcycle percentage of 70.83% (Indonesia), 47.16% (Malaysia), 71.23% (India), and 61.21% (Bangladesh).

The predominance of motorcycles in the traffic flow is also revealed by other researchers in Table 6, such as 56.13% (Majapahit Street, Indonesia), and 85.7% (Thai Ha, Vietnam). In the second rank of the highest percentage of vehicle is light vehicles (including cars, taxis, pick-up trucks, small buses, and small trucks), as presented in Figure 7. This figure shows Malaysia as almost having the same value between motorcycles 47.16% and light vehicles 44.89% (including 44.39% car and 0.5% taxi). This feature is also founded in Indonesia—in this case, Ahmad Yani Surakarta—which has 46.91% motorcycles and 43.90% light vehicles. As mentioned earlier, the composition of vehicles is also affected by the location of the vehicles, as can be seen from the percentage of non-motorised vehicles in Table 6. Bicycle has 7.92% on Majapahit Street, 30.57% on Sunan Kudus in Indonesia, whilst in Vietnam it has 8.4% on Nguyen Cong Tru and 4.2% on Thai Ha. This table also describes 11.17% of rickshaws available in Bangladesh.

Another comparison of transport condition between Indonesia and other developing countries can also be seen in Table 6. As mentioned before and also as presented in Appendix 2, motorcycles have been involved in 60.63% of traffic accidents in Indonesia. In India, motorcycles, trucks and cars almost had the same value, approximately 20%, whilst in Malaysia there is the same order of accidents as in Indonesia. Unlike the others, the highest percentage of accidents in Thailand are attributed to cars (32%), followed by motorcycles (21%).

Table 6 Percentages of Traffic Accidents by the Type of Vehicle

Type of vehicles	Percentage of traffic accidents by the type of vehicle (%)			
	Indonesia[1a)]	India[1b)]	Malaysia[1c)]	Thailand[1d)]
Cars	29.85	20.6	15.68	32
Trucks	7.52	22.6	3.44[2)]	14
Buses	2.00	8.7	0.76	6
Motorcycles	60.63	22.4	66.41	21
Rickshaw[3)]	-	6.9	-	-
Other motor vehicles	-	10.9	2.64	-
Others vehicles	-	7.9	11.07[4)]	27

Source: DGoLT (2011), MoRTah (2011), Mustafa (2006), and Mungnimit (2006)
Note: 1) Year data of accident is a) Indonesia in 2010, b) India in 2009, c) Malaysia and d) Thailand in 2005, 2) Lorry and four-wheel drive, 3) Rickshaw same with pedicab, 4) Pedestrians and bicycles

SUMMARY

To summarise, this article has introduced the traffic conditions in Indonesia based on data from the Indonesian Government and other studies. It started by explaining the definition of heterogeneous traffic. It was continued by describing the composition of vehicles types, the percentage of traffic accident, and the traffic performance values in Indonesia. Related to the selected locations of this study, this article has also described the ZOSS facility as part of the urban traffic management. As a developing country, traffic condition in Indonesia has similarity with traffic conditions in other developing countries.

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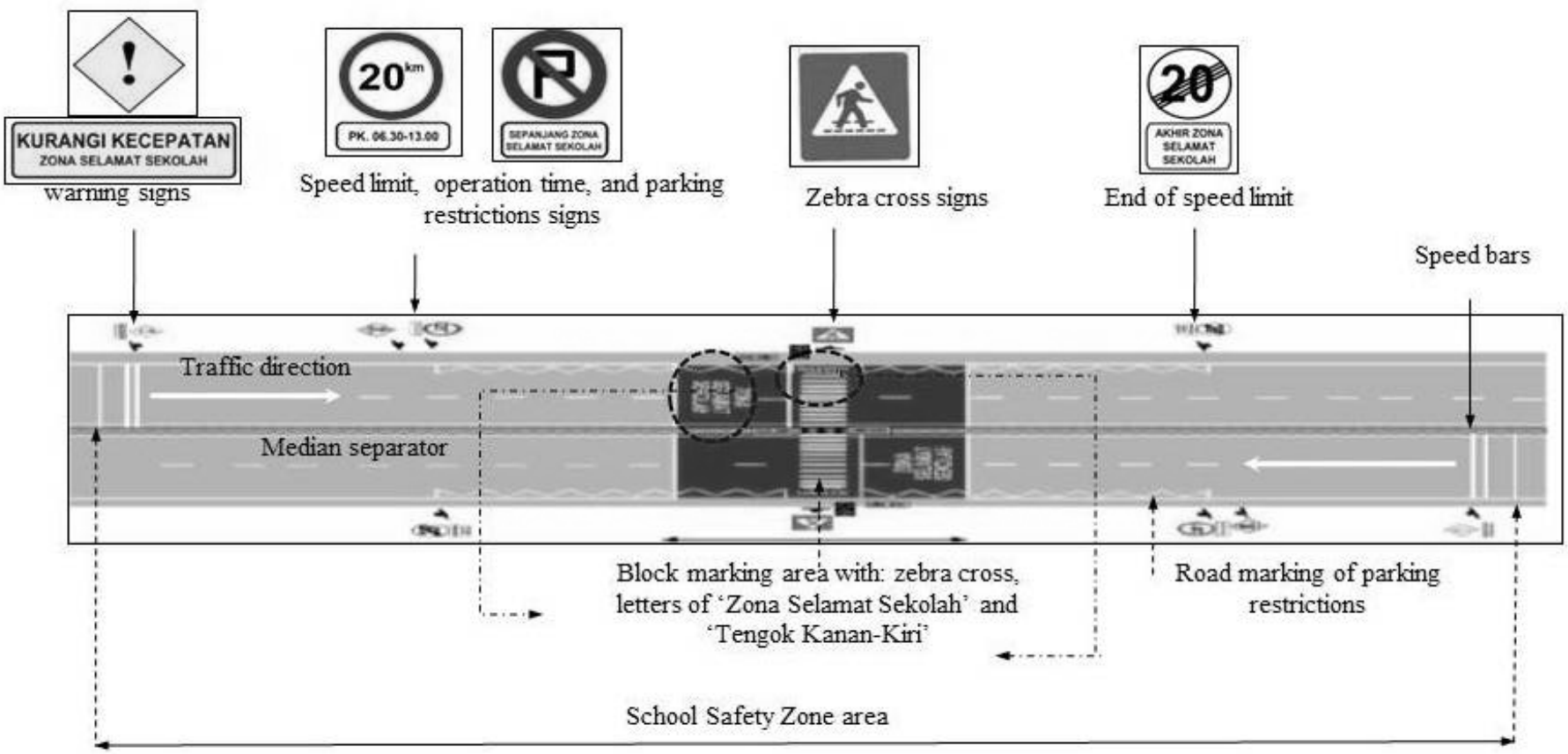

Appendix 1 Example Design of the ZOSS(Four-lane Divided, 4/2D). *Source*: (DGoLT 2006b in Hidayati 2013)

Appendix 2 .Vehicles Composition in Selected Developing Countries

Location		Vehicles Composition (%)										Source
		Motor-cycle	Light Vehicle				Heavy Vehicle		Non-motorised			
Country/City	Road		C	PU	ST	SB	BT	BB	B	P or R[1)]	H	
Indonesian registered motor vehicle		70.83		15.23[2)]			8.89	5.05				DGoLT (2011)
		68.98-72.74		14.47-16.07[3)]			7.62-10.15	4.79-5.43				
Bandung	Ahmad Yani	70.90		28.10			1.00					Putranto and Setyarini (2011)
Surabaya	Genteng Kali	69.30		30.3			0.4					
Surakarta	Gadjah Mada	70.26		21.14						8.63		Susilo *et al.* (2008)
	Veteran	73.62		17.46			1.39			7.53		
Semarang	Majapahit	56.13	26.05		7.22		1.31		7.92	1.11	0.26	Wibowo *et al.* (2006)
Surakarta	Ahmad Yani	46.91		43.90			9.19					Hidayati *et al.* (2004)
	Slamet Riyadi	63.74		34.67			1.59					
	Veteran	68.72		29.60			1.68					
Malaysia[4)]		47.16	44.39	0.5 (taxi)			4.92	0.35	2.48 others			DoS (2010)
India[5)]		71.23	12.85	5.11[7)]			9.71[8)]	1.11				MoRTaH (2011)
Vietnam	Lang Ha	83.8	9.6	1.6 (vans, small buses, and buses)					5			Nguyen (2007)
	Nguyen Cong Tru	91.6							8.4			
	Thai Ha	85.7	7.9	2.2 (vans, small buses, and buses)					4.2			
		89.41	4.56					0.56	5.1	0.37 others		Matshuhasi *et al.* (2005)
Bangladesh[6)]	Dhaka	61.21	11.49	5.81 (jeeps, taxi)	0.44		3.99	1.12		11.17[9)]	4.77 others	BRTA (2011)
Thailand		70	30 others									Rongviriyapanich and Suppattrakul (2005)

Note: C (car), PU (pick-up truck), ST (small truck), SB (small bus/microbus), BT (big truck), BB (big bus), B (bicycle), P (pedicab), R (rickshaw), H (horse cart). Remarks of 1-3) see Table 2.4, 4) Average registered motor vehicles in Malaysia (2007-2009), 5) India (2001-2006), and 6) Bangladesh (2004-2010), 7) Goods vehicle (small truck), 8) Included trailers, tractors, and other vehicles, 9) Rickshaw