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Public transportation development and traffic accident prevention in Indonesia☆☆☆☆

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ABSTRACT

Traffic accidents have long been known as an iceberg for comprehending the discrepancies of traffic management and entire transportation systems. Figures detailing traffic accidents in Indonesia, as is the case in many other countries, show significantly high numbers and severity levels; these types of totals are also evident in Jakarta, the highest-populated city in the country. While the common consensus recognizes that traffic accidents are the results of three different factor types, namely, human factors, vehicle factors, and external factors (including road conditions), human factors have the strongest influence—and figures on a worldwide scale corroborate that assertion. We, however, try to pinpoint the issues of non-human factors in light of increasing traffic accidents in Indonesia, where motorbike accidents account for the majority of incidents. We then consider three important pillars of action: the development of public transportation, improvement of the road ratio, and traffic management measures.

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1. Introduction

Research and statistical figures often conclude that traffic accidents are an iceberg for comprehending the discrepancies of traffic management and entire transportation systems. Figures detailing traffic accidents in Indonesia, as is the case in many other countries, show significantly high numbers and severity levels; these types of totals are also evident in Jakarta, the highest-populated city in the country.

Indonesia now has a population of more than 230 million people, and the country's economic growth has given rise to increases in transportation demand and vehicle ownership. Similar figures are also

evident in Jakarta, the capital, which has a population of almost 10 million people. The figures are even higher in the daytime due to commuters from the outlying areas and some supporting cities (i.e., Jabodetabek). We predict that Jakarta may have a population of around 12 million people during the daytime. With a road ratio of only less than 7%, the high vehicle growth rate and poor public transportation contribute to high-density road use. This problematic situation is hard to resolve as more than 90% of the available transportation modes are road-based.

Fig. 1 shows the numbers of traffic accidents in Indonesia over the last ten years (2004–2013). The table also indicates some classifications of accident severity: fatalities, severe injuries, and light injuries. Although fatalities and severe injuries are much fewer compared to light injuries, their numbers and trends are still high.

2. Traffic accident causes in Indonesia

Traffic accidents are often caused by three different factor types, namely, human factors, vehicle factors, and external factors (including

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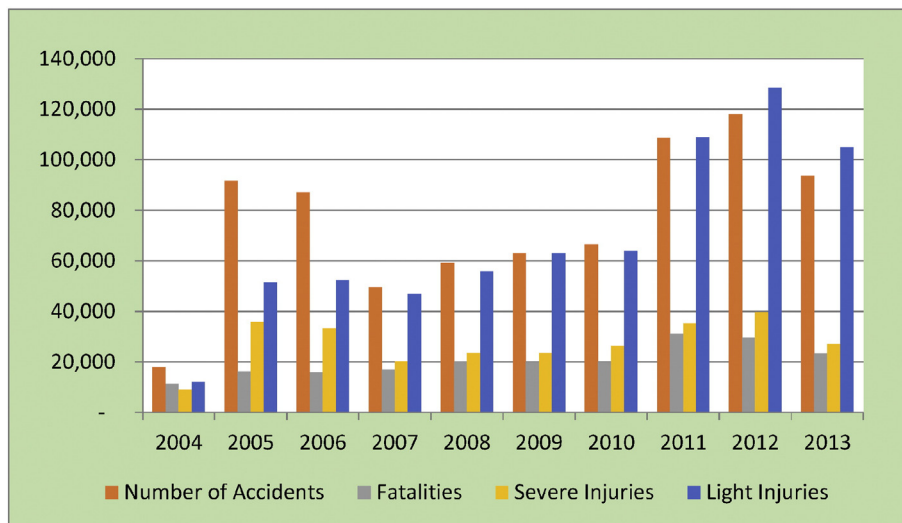


Fig. 1. Numbers of traffic accidents in Indonesia and their classifications.

road conditions). Human factors have the strongest influence, as figures from around the world suggest. Our focus, however, is on non-human factors in Indonesia. We concern ourselves especially with the poor growth of road infrastructure (a reduced road ratio), poor public transportation, and the adverse phenomena of motorbike ownership and use. The road network infrastructure in Indonesia has experienced slow growth for many years, and some cities have demonstrated poor road network maintenance. These conditions produce not only high-density traffic but also higher numbers of traffic incidents and accidents. Table 1 provides some figures on road infrastructure growth at the national, provincial, and county levels.

Furthermore, Fig. 2 illustrates the existing situation and conditions of poor road infrastructure in some areas of the country. Given the poor conditions and maintenance of the pavement, the current state of the roads is one cause of traffic accidents, especially those involving motorbikes.

Another non-human factor suspected to be a cause of the increases in traffic accidents is the country's substandard public transportation service, which continues to worsen in many cases. The most common form of public transportation in most Indonesian cities is the bus, whose systems range from small to large in size. Representing a much smaller proportion are the railway and waterway modes. The low road ratio on one hand and dependency on road-based transportation modes on the other have made the traffic situation worse in the sense of poor traffic performance and safety. Table 2 provides some figures on the modal shares for passengers and freight. The split denotes bus services on similar ratio with road based transportation.

Based on Table 2, one can see that most passenger and freight movement relies primarily on road-based transportation systems. Fig. 3 gives a more detailed illustration of the existing conditions of public transportation in general.

Besides the poor conditions and growth of road infrastructure, the state of Indonesian public transportation services, mainly bus systems,

thus presents an adverse phenomenon. The extremely high growth rates of motorbikes have also created some difficulties in managing traffic due to driver behavior. However, increases in motorbike use are inevitable; the mode has become a "way out" for some travelers due to poor road infrastructure and public transportation services. The rising trend of motorbike use among travelers is not happening only in urban or city trips but also in intercity trips and long-distance trips. Table 3 quantifies the growth of respective transportation modes, showing that the use of motorbikes has virtually exploded.

The chief reasons that people opt for motorbikes as their transportation mode of choice are the mode's ease of ownership and economical operations. Motorbikes are cheap and easy to purchase through a simple credit process. Motorbike operations and maintenance are also economical and affordable for many people in various income layers.

The dramatic increase in the use of motorbikes has given rise to traffic accidents and casualties, as well. As an extreme illustration, Jakarta is still experiencing the massive growth of motorbike use; the number of motorbikes increases by more than 1000 units per day, while its automobile counterparts come to about 300 units per day. The negative impact of motorbikes on traffic accidents contributes to about 2–3 casualties per day. To mitigate traffic accidents, which cost not only human lives but also economic prosperity, something needs to be done to reduce the use of motorbikes. Combating the use of motorbikes is, however, not easy. In addition to being easy and cheap to own and economical to use, motorbikes are also considered an effective mode of transportation on congested roads. Motorbike riders can save on travel time and even make multiple trips a day, giving them luxuries that other modes do not offer. Some surveys have also reported that motorbikers are saving a great deal on travel costs because their expenses are much less than those of public transportation riders—even the cheapest form of public transportation, the bus.

3. Public transportation development

Countermeasures aimed at reducing traffic accidents from the "human factor" standpoint have been implemented for quite some time through traffic law enforcement, strict controls on the issuance of driving licenses, and strong penalties for traffic violators, but these initiatives are insufficient; there is still significant room for improvement in the context of non-human factors such as infrastructure and other means of transportation. Improving public transportation and infrastructure prior to any modal choices by travelers is essential, as doing so would help travelers make rational choices motivated not merely

Table 1
Growth of road infrastructure at the national, provincial, and county levels.

Year	Length of road (km)				Growth (%)
	National	Province	County	Total	
2010	38,570	53,291	395,453	487,314	
2011	38,570	53,642	404,395	496,607	1.91%
2012	38,570	53,642	411,972	504,184	1.53%
2013	38,570	53,872	414,305	506,747	0.51%



Fig. 2. The situation and conditions of road infrastructure.

Table 2
Modal shares for passengers and freight.

Mode	Road transport	Rail transport	Insular transport	Sea transport	Waterways	Air transport
Passenger (%)	84.1%	7.3%	4.8%	1.8%	0.4%	1.5%
Freight (%)	91.3%	0.6%	1.0%	7.1%	0.0%	0.1%

by the simple desire to escape somehow from the tremendously poor conditions of the existing transportation supplies.

Motorbike use has become the wrong choice for the total transportation system. Motorbiker behavior has created substantial traffic congestion and violations, resulting in many traffic incidents and accidents. Since 2004, Jakarta, for example, has implemented “three pillars” of urban transportation solutions: speeding up road infrastructure development, building up more public transportation modes, and implementing more traffic management measures. Fig. 4 summarizes the three pillars of solutions. The growth of travel demand in Indonesia always outstrips supply due to relatively high and stable economic growth. Road infrastructure grows slowly relative to the growth of road-based motorized transportation modes. Motorbikes

have become a popular choice for transportation not only in big cities like Jakarta but also in many other cities in the country. Reducing the number of trips made by motorbikers, then, is one of the ways to improve the overall transportation system and mitigate the adverse impact of motorbikes on traffic accidents.

The general tendency to make trips by public transportation is an inevitable one. Any means of public transportation, for intra- or inter-urban trips alike, needs to at the highest-possible level of development in order to reduce traffic accidents, create more effective and efficient transportation means for people, and comply with environmental issues. It is also important to underline that efforts to develop road infrastructure always encounter issues like land acquisition and social problems. Land is difficult to acquire for any infrastructure as land



Fig. 3. Conditions of public transportation in Indonesia.

Table 3
Growth of transportation modes in Indonesia.

Year	Passenger vehicle (units)	Bus (units)	Truck (units)	Motorbike (units)	Total (units)	Growth (all vehicles)	Growth (motorbike)
2004	4,231,901	933,251	2,315,781	23,061,021	30,541,954	14.8%	15.4%
2005	5,076,230	1,110,255	2,875,116	28,531,831	37,623,432	23.2%	23.7%
2006	6,035,291	1,350,047	3,398,956	32,528,758	43,313,052	15.1%	14.0%
2007	6,877,229	1,736,087	4,234,236	41,955,128	54,802,680	26.5%	29.0%
2008	7,489,852	2,059,187	4,452,343	47,683,681	61,685,063	12.6%	13.7%
2009	7,910,407	2,160,973	4,452,343	52,767,093	67,336,644	9.2%	10.7%
2010	8,891,041	2,250,109	4,687,789	61,078,188	76,907,127	14.2%	15.8%
2011	9,548,866	2,254,406	4,958,738	68,839,341	85,601,351	11.3%	12.7%
2012	10,432,259	2,273,821	5,286,061	76,381,183	94,373,324	10.2%	11.0%
2013	11,484,514	2,286,309	5,615,494	84,732,652	104,118,969	10.3%	10.9%



Fig. 4. The “three pillars” of transportation solutions.



Fig. 5. Some public transportation projects in big cities in Indonesia.

belongs to individuals and not to the government. Limited transportation infrastructure budgets at the national and sub-national levels are also reasons behind the slow growth of road infrastructure. Involving the private sector in transportation infrastructure is a challenge due to the high-risk nature of infrastructure and the minimal economic yield; thus, transportation infrastructure is often left to the government's responsibility as part of the public domain. On the other hand, some strategic financing from the private sector may be sought for public transportation through public-private partnerships such as turnkey arrangements, concessions, BOT, BTO, and availability payments.

Fig. 5 illustrates the development of public transportation in Jakarta. Following Jakarta's lead, other big cities like Bandung, Surabaya, and Jogjakarta have implemented similar initiatives. Some public transportation projects are financed by national or sub-national budget resources and cooperation with private-sector entities. Among others are bus rapid transit (BRT), mass rapid transit (MRT), and light rapid transit (LRT).

BRT in Jakarta has probably been the most aggressive public transportation development project in Indonesia since 2004. The system already has 12 of the 15 corridors stipulated in the plan, with the existing corridors covering 208 km in total length and carrying more than 300,000 passengers a day. Three new corridors are now under construction and being developed as elevated infrastructure, and the Jakarta government has made it a policy to increase the number of vehicles in the service fleet. Not only BRT but also non-BRT bus systems are now being revitalized in terms of their network structures, vehicles, and management.

The first MRT project in Jakarta—the first of its kind in the country—is also under construction for the north-south corridor and being financed by national and sub-national governments through a soft loan from the Japanese government. As overseas loans need to go through national governments, the Indonesian government is extending the financial scheme to the sub-national Jakarta government through granting and lending loans. The first phase of the MRT north-south corridor is about 15 km (Lebak Bulus-Bundaran HI) in length and will be extended up to Kampung Bandan (the northern part of Jakarta). The east-west MRT corridor, now in preparation for detailed engineering design, will serve not only Jakarta but also two other provinces (West Java and Banten).

The most recent public transportation project in Jakarta, an effort being followed also by Palembang City in South Sumatera, is light rapid transit (LRT). LRT technology has more practical advantages than MRT offers, mainly in terms of land acquisition. The LRT being proposed and designed uses the airspace and air rights of the existing road network and, due to its practical maneuverability, enables horizontal and vertical alignments. Jakarta city has a basic 7-corridor LRT design within the city; two of the corridors have been given development priority in an effort to ensure smooth transportation service during the upcoming Asian Games event in 2018. A similar plan has also been introduced in Palembang South Sumatera, as Palembang will be a supporting host city for the Asian Games. Another LRT project currently underway involves establishing two LRT corridors to serve inter-city passengers in Jabodetabek (Jakarta, Bogor, Depok, Tangerang, and Bekasi, or the "greater Jakarta" area). All the LRT projects are using national and sub-national budget funding for infrastructure and private, semi-private, or state-owned company budgets for the required rolling stocks and systems. The participation of non-governmental bodies in the initiative will likely accelerate public transportation development in the country and enhance accessibility and mobility for other private development projects such as properties.

4. Conclusions

Traffic accidents in Indonesia, and mostly in big cities like Jakarta, are exhibiting an upward trend. While human factors have a powerful influence, there is another phenomenon that exacerbates the traffic accident problem: the motorbike mode. The quickly growing preference for the motorbike mode underscores a supply-demand imbalance in transportation systems in many Indonesian cities, in addition to other factors like the lack of sufficient road infrastructure.

Providing sufficient and affordable public transportation is an effective means of combating motorbike use and, by extension, reducing traffic accidents. Development projects for some modes of public transportation have been ongoing in Jakarta and being followed by other big cities in the country with similar aims and targets. It is further expected that various funding schemes involving the private sector—not only national and sub-national budget resources—will accelerate the provision of public transportation and improve overall traffic safety.