Causes, Trends and Implications of Motorization in Malaysia

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Abstract: Motorization trend has been rising rapidly in many countries including Malaysia. But the level and trend of motorization in each country varies according to major factors such as population, size of the country, economic growth, income level, fuel cost, and public policy on vehicle ownership. The level of motorization has both positive and negative impacts. On the positive side, it provides mobility from a landuse to another landuse to meet various purposes besides increasing trade related to transportation. On the negative side, it increases pressure on the environment by increasing more pollutants into the atmosphere causing global warming, traffic congestion, accidents, and added pressure on the road and rail infrastructure in terms of capacity. Looking at the past trend of motorization, the future appears very bleak. This paper highlights trends and causes of motorization in the past, its likely impact on the environment and possible implications.

Key Words: *Motorization, traffic congestion, environment, energy consumption*

1. INTRODUCTION

The movement of people and goods from one landuse to another landuse is very vital in improving economic benefits of not only the community but also the nation. This movement takes place by different forms of transportation such as road, rail, water and air transport. The increase in motorization especially in the form of private vehicles indicates economic strength of the nation. But the extent to which the level of motorization is acceptable is very much crucial. This aspect is true in many countries with the only exception in the level of motorization, which greatly varies from one country to another. However, one of the important aspects for greater use of vehicles is actually depends on the demand from the users for various purposes. Population is one of the dominant factors for increased motorization in any country. Cities exceeding 1 million populations especially in Asia have also increased to a greater extent. Almost 200 cities with populations over 1 million including 98 cities in China and 35 in India were located in Asia (Singh, 2005). As the population of a city rises, demand for transportation also rises proportionately. To exacerbate further in terms of meeting demand for transportation in the absence of adequate public transportation provisions, most of these cities' roads are congested with two-wheelers and other motorized para-transits which cannot substitute for a mass transit system appropriate to the demand volumes of these cities (Hossain, 2006; Singh, 2005; Hoque

and Hossain, 2004). Cities such as Kuala Lumpur, Bangkok, Beijing and Shanghai are going through rapid motorization at an alarming rate (Hossain, 2006; UN ESCAP, 2005). Though these cities invested heavily on road-based infrastructure, the rate of motorization always outpaces the supply of road network (Hossain, 2006). The purpose of this paper is to address the rate and level of motorization in Malaysia emphasizing on Kuala Lumpur and other important cities. This is followed by analyzing the likely causes for the rate of motorization, its trend over the years and possible implications.

2. MOTORIZATION GROWTH AND TRENDS

Motorization has been increasing at an alarming rate in Malaysia over the years. Although major cities in Malaysia had invested heavily in road-based infrastructure, the rate of motorization always outpaces the supply of road network (Hossain, 2006; UN ESCAP, 2005). As a result, cities in Malaysia have been facing the problems of congestion, safety, traffic-related air and noise pollution, and excessive (80 % to 90% in Asia) commercial energy consumption in the transport sectors (Hossain, 2006; UN ESCAP, 2005).

Table 1 Vehicle registration in Malaysia and Kuala Lumpur, (1995-2004) in Million

YEAR	MALAYSIA		KUALA LUMPUR	
	NUMBER IN MILLIONS	% GROWTH	NUMBER IN MILLIONS	% GROWTH
1995	6.90	-	1.29	-
1996	7.69	11.45	1.53	18.60
1997	8.55	11.18	1.74	13.73
1998	9.41	10.06	1.82	4.60
1999	9.93	5.53	2.00	9.89
2000	10.58	6.55	2.16	8.00
2001	11.30	6.81	2.36	9.26
2002	11.98	6.02	2.54	7.63
2003	12.82	7.01	2.73	7.48
2004	13.75	7.25	2.96	8.42

Source: Road Traffic Volume Malaysia 2004, Highway Planning Unit

Table 1 indicates growth of vehicle registration in Malaysia and Kuala Lumpur. The annual rate of vehicle registration in Malaysia and Kuala Lumpur had been increasing steadily between 1995 and 2004 and beyond. The growth rate of vehicle registration was more than 5% in Kuala Lumpur and Malaysia except for the years 1997 and 1998 for Kuala Lumpur (less than 5%) because of the Asian economic crisis. As usual, motorcar outpaces (58%) other modes of transport not only in Kuala Lumpur (see table 2) but also other major cities in Malaysia. The other important indicator to represent the wealth of the individuals is the vehicle ownership level. The rate of vehicle ownership has been increasing in almost all states in Malaysia. The average number of vehicles owned by an individual is almost one vehicle to one person in the year 2000 (see table 3) and more than one vehicle per person in 2005 in Kuala Lumpur.

Table 2 Breakdown of vehicle registration in Kuala Lumpur, 2003

Types of Vehicle	Number (in millions)	Percentage
Motorcar	1.584	58%
Motorcycle	0.819	30%
Goods and Commercial Vehicle	0.164	6%
Others	0.164	6%
Total	2.73	100%

Source: Road Traffic Volume Malaysia 2003, Highway Planning Unit

Table 3 Vehicle ownership rate for every 1000 persons in Malaysia by States

STATES	1995	2000
Johor	432.9	523.4
Melaka	458.8	555.9
Negri Sembilan	398.4	476.2
Perak	375.3	459.5
Penang	651.8	807.7
Selangor	399.4	367.9
Kuala Lumpur	**616.3**	**985.7**
Kedah	269.7	310.0
Kelantan	180.5	211.9
Pahang	260.8	306.1
Terengganu	181.4	221.0
Perlis	276.4	324.8
Sabah	101.0	111.4
Sarawak	215.0	255.0
Malaysia	339.2	421.9

Source: Eighth Malaysia Plan 2000-2005, Economic Planning Unit

The increasing growth rate of private vehicles in Kuala Lumpur and other major cities has induced tremendous pressure on road network infrastructure. The supply of road network infrastructure is definitely not in equal pace with the growth of motorization. As a result, traffic congestion associated with increased delay time, decrease in speed of the vehicles, noise and air pollution, increase in discomfort and inconveniences of the commuters also in the upsurge. This situation is further exacerbated by decreasing use of public transportation in many major cities including Kuala Lumpur. The present share of public transportation use stands only at 14% of the total daily travel (Structure Plan Kuala Lumpur, 2020). However, the use of public transportation in peak hour is slightly higher than 14% of the total travel. Some of the main reasons for low patronage in pubic transportation include: inadequate coordination of policies concerning public transport and public/private transport modes, less number of bus and train routes serving Kuala Lumpur and surroundings, frequency of bus services, lack of feeder routes from residential areas to the nearest LRT stations, lack of park and ride facilities near the LRT stations at the outskirts of the central area and common ticketing facilitating users from one mode of transport to another (Structure Plan Kuala Lumpur, 2020).

Table 4 shows traffic volume trends along few major roads in Kuala Lumpur. Generally, the total traffic volume along major roads leading to city centre of Kuala Lumpur has been increasing every year. Motorcar (about 60% of total travel) constitutes major mode of transportation than other modes. Thus, it provides a lot of pressure on available road infrastructure and parking facilities at the central area. Clear policy is yet to be formulated to arrest the flow of traffic volume especially by private vehicles into the central areas. On the other hand, the availability and quality of public transportation require major improvements in many major cities especially Kuala Lumpur for a shift from private mode to public mode of transportation.

Table 4 Traffic volume (16 hours) count along few major roads leading to Kuala Lumpur

Location	1998	1999	2000	2001	2002	2003	Average Annual Growth rate (%)
Jalan Damansara	148,443	153,752	186,443	211,801	247,427	239,620	10.42
Jalan Kepong	105,040	101,587	101,048	104,719	102,424	115,144	2.00
Jalan Kuching	160,804	181,669	180,714	157,792	160,445	176,312	1.32
KL-Rawang	135,432	141,407	152,906	143,634	156,842	164,701	4.14
KL-Kajang	42,050	53,095	54,971	65,259	56,695	60,077	8.27
KL-Puchong	23,158	27,206	33,289	61,196	112,231	NA	51.77

Source: Ministry of Work, Highway Planning Unit, Road traffic volume 2003

3. ANALYSIS OF CONTRIBUTING FACTORS TOWARD MOTORIZATION

Almost every city in the world has been undergoing increase in the level of motorization. But the degree and intensity of motorization varies between one city and another. There could be factors responsible for this trend. This section analyses some of the important causes for increase in the level of motorization in Malaysia especially in Kuala Lumpur.

3.1 Population Growth

The population growth is one of the major indicators for increasing motorization in many countries including Malaysia. The population increase of an area will eventually causes an increase in fulfilling the needs of the population by travel. But the question remains to what extent that this travel will be made by public transport or private transport. The location of economic activity centres and residential activity in an urban area will determine the length and mode of travel. Many studies had suggested that as population dispersed from the core economic activity centres, use of private transportation would increases except for those who do not have an option to use private vehicles. In Malaysia, the rate of population growth has been increasing steadily at an annual average of 2.6% between 2000 and 2005 and 2.4% between 1995 and 2000. The population of Malaysia in the year 1995 was 20.68 million, in 2000 was 23.49 million and in 2005 was 26.75 million (Eighth Malaysia Plan, 2000-2005 and Ninth Malaysia Plan, 2005-2010). The population of Kuala Lumpur is also increasing at a rate of 2.4% between 2000 and 2003. Thus, the population of Kuala Lumpur in the year 2000 was 1.40 million and in 2003 was 1.50 million

3.2 Economic Potential, Income Level and Affordability

The rise in the level of motorization is caused by the economic potential of the nation, income level and affordability of an individual. Malaysia has been enjoying a period of stable economic growth rate over the years except during the Asian economic crisis period in 1997. It also experiences credible growth rate despite uncertainties in the global environment arising from the September 11 incident in 2001 in USA, followed by wars in Afghanistan and Iraq, severe acute respiratory syndrome (SARS) in 2003 and crude oil price upsurge in early 2008 (Ninth Malaysia Plan, 2005-2010). The stable economic growth has greatly attributed to increase in the level of motorization. The gross domestic product (GDP) in real term grew at an average rate of 4.5 percent per annum and gross national product (GNP) by 5.7 percent per annum between 2000 and 2005 (Ninth Malaysia Plan, 2005-2010).

The average monthly household income level for Kuala Lumpur has increased from RM (Ringgit Malaysia) 3,371 in 1995 to RM 4,105 in 1999. Compared with the national average of RM 2,472 in 1999, Kuala Lumpur's average household income is higher by 66 percent (Structure Plan Kuala Lumpur, 2020). The average annual growth rate of household income for Kuala Lumpur for the period 1995-1999 was 5 percent and for Malaysia 5.2 percent. The relative affluence of the residents of Kuala Lumpur is evidenced by the fact that 23.5 percent of Kuala Lumpur households earned more than RM 5,000 per month compared to 9.8 percent for Malaysia. The increase in the income level of the residents has a positive impact in terms of increase in the level of vehicle ownership. The registered cars and motorcycles ownership per 1000 population for Kuala Lumpur has increased from 616 to 986 and for Malaysia from 339 to 422 (Structure Plan Kuala Lumpur, 2020). The increase in the vehicle ownership and use has resulted in increase in the level of traffic congestion along major roads in Kuala Lumpur and other cities. It is evident that more than 40 percent of the residents in Kuala Lumpur expressed difficulties in getting to their workplace on time because of traffic congestion (Structure Plan Kuala Lumpur, 2020).

3.3 Urban Growth and Sprawl

The nature, intensity and spread of an urban area will allow people to travel long distance to perform various purposes. It is viewed in two main ways: firstly, the development and availability of existing transportation system in the form of public transportation route or road infrastructure will exert more pressure for physical development at the locations proximity to the existing system. Secondly, the physical development of an urban area will require transportation infrastructure to facilitate movement of people and goods from one developmental area to another. In Malaysia, the influence of expressways and arterial roads on the locations of many new townships can also be seen clearly, such as a series both north (including Bukit Beruntung) and south (such as Bandar Baru Nilai) of the previously built-up area and close to the North-South expressway that was built in the early 1990s (Barter, 2004). The location of these townships close to the expressways has induced more travel especially by private vehicles to the core economic activity centres. Lack of efficient public transportation system adds more pressure on the road infrastructure in terms of catering more travel demand by private vehicles. It is clearly seen as more number of private vehicle use along major roads to the city centre of Kuala Lumpur everyday (table 4).

3.4 Policy Responses to Motorization

Motorization and increasing private motor vehicle travel have been rapid in Kuala Lumpur and other major cities because of strong economic growth (Barter, 2004). The vehicle ownership in

Kuala Lumpur has increased from 616 per 1000 people in 1995 to 986 in 2000. The increase in vehicle sales suggests that the vehicle ownership in Kuala Lumpur is apparently now comparable with levels in many Western European cities (Barter, 2004). Formulation of public policy on motorization is another important crucial factor which determines the degree of vehicle ownership especially private cars and its use. The city of Kuala Lumpur has yet to see policy efforts to reduce the rate of growth of vehicle ownership or usage. Since the 1980s, national policy has actively promoted high vehicle sales, and the national vehicle industry, centred on 'national car' players Proton and Perodua and recently a 'national motorcycle', has been strongly nurtured by the government (Barter, 2004).

Parking in the city centre is a useful indicator of the extent to which cars are welcomed or restricted (Barter, 2004). Travel to core economic urban centres by private cars depends on policies related to parking supply. After the 1970s traffic restraint plan was aborted, parking fees in the city centre were raised slightly but this policy was not maintained (Barter, 2004). By the early 1990s it was reported that central city parking in Kuala Lumpur was under-priced (Barter, 2004). Parking supply in Kuala Lumpur's central business districts, at 298 car-equivalent places per 1000 jobs is higher than the average for Western European cities and is much higher than most other Asian cities (Barter, 2004).

3.5 Other Factors – Fuel Cost, Road Infrastructure

Reduced fuel price is another important indicator for increase in the degree of motorization. Malaysian vehicle users had been enjoying reduced fuel prices until recently because of government subsidies. The price of fuel was only at RM 1.00 per litre of oil during early 1990s and it was modestly increased few times afterwards and increased further to RM 1.92 per litre of oil in early 2006. The price of oil was further fluctuated after 2006 due to global oil price surge and after mid 2008, the price of oil plunges drastically. The recent price of oil in Malaysia was RM 1.80 (US$ = 0.5), a reduction of about 7% from the original price of RM 1.92 which is considered lower compared to other Asian, European and American cities.

Efforts to expand transport capacity and disperse traffic (or supply-side strategies) have been the major collective action shaping urban transport in Kuala Lumpur during a period of rapid economic and population growth and urban expansion since the 1970s (Barter, 2004). The expressway length per person in Klang Valley area (Kuala Lumpur is part of this area) was 68 metres per 1000 people and rated much higher than any other Asian city. Richer Singapore is next with 44 metres per 1000 people (Barter, 2004). The rapid building of expressways in the Kuala Lumpur area since the late 1980s has been facilitated by private sector involvement under build-operate-transfer concessions (Barter, 2004). Although the length of expressway per person is well below levels in most US cities (where figures of 100 to 200 metres per 1000 persons are common), the spatial density of the Klang Valley's expressway network, at 3.9 metres per urban hectare or an average grid spacing of about 5 kilometres, is higher than those found in the US cities (Barter, 2004).

4. IMPLICATIONS

The implications of the upsurge in the degree of motorization are many fold. Looking closely at the negative implications of motorization, appropriate measures are very much needed to protect the society from bad to worse. This section highlights some of the implications of motorization.

4.1 Traffic Congestion

Many studies had reported the severity of traffic congestion as a result of increased traffic volume especially by private vehicles during peak hours. Almost many cities around the world have been facing traffic congestion with different degree of intensity. Tokyo, for example, is facing congestion in the form of public transportation system, London in the form of high private vehicle use, Singapore again in the form of mass transit system, Bangkok and Kuala Lumpur in the form of high private vehicle use. The private vehicle modal share in Kuala Lumpur had increased from 66 percent in 1985 Structure Plan KL (2020) to 80 percent in 1997 and further to 84 percent in 2003 (Hossain, 2006). Figure 1 shows the hourly fluctuation of traffic volume along one of the major arterial road corridors in Kuala Lumpur. The figure illustrates that the private vehicle use (motorcars and motorcycles) is much higher than other mode of transportation. Motorcars and motorcycles combined constitute more than 80 percent of total travel (Kadar Hamsa *et al*., 2005). High use of private vehicles has been adding more pressure on existing and fixed road capacity causing traffic congestion.

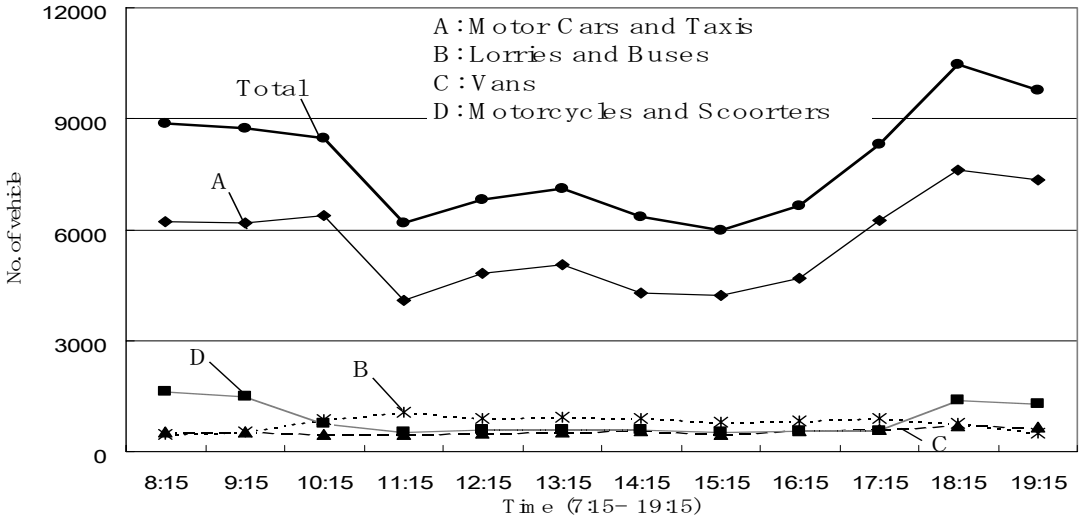

Figure 1. Hourly fluctuation of traffic volume along major arterial road

4.2 Environment

Transportation is one of the major sources affecting the environment. Concern over global climate change has focused attention on emission of pollutants called greenhouse gases. The United States of America accounts for approximately 23 percent of global energy-related carbon emissions, with the transportation sector constituting about 32 percent of this amount (Meyer and Miller, 2001). To deal with global warming, the Kyoto Protocol, an international agreement, has become the framework for international efforts to reduce greenhouse gas emissions (Meyer and Miller, 2001). Increasing number of motor vehicles is the major source of air and noise pollution in Malaysia especially in Kuala Lumpur (Structure Plan Kuala Lumpur, 2020). NO_2

concentration level near the major arterial roads is clearly well above the acceptable standard. One of the studies reported that the NO_2 level along major arterial road was above 0.025 ppm, which is higher than Malaysian acceptable level (0.02 ppm) (Kadar Hamsa *et al*., 2005). High traffic volume (average traffic volume of 8000 vehicles per hour) along the arterial road is the obvious reason for this trend. Another study had indicated that the highest concentration of carbon monoxide (CO), about 17.53 ppm/hour, was recorded and it is again related to the higher traffic volume (Yahya *et al.*, 2002).

The increasing traffic volume along major roads also creates negative impact on noise level. Traffic noise is another important environmental factor arising from increasing motorization trend. Construction of many new highways has produced increased traffic volume resulting high noise level. Higher percentage use of private motorcars (75 percent) and motorcycles (15 percent) has created noise level (L_{eq}) exceeding 70 dB(A) continuously along major road corridors in Kuala Lumpur. Ironically, many of these road corridors run very close (in some cases as close as 2-5 m from the highway) to the residential areas causing disturbances in terms of peace and tranquility of the residents (Yusoff *et al*., 2002; Kadar Hamsa *et al*., 2005). Figure 2 shows that the Leq exceeding 75 dB(A) during most of the time in a day. High traffic volume (about 8000 vehicles per hour), and speed of the vehicles (more than 80 kmph) are the likely contributing factors for this trend (Kadar Hamsa *et al.*, 2005).

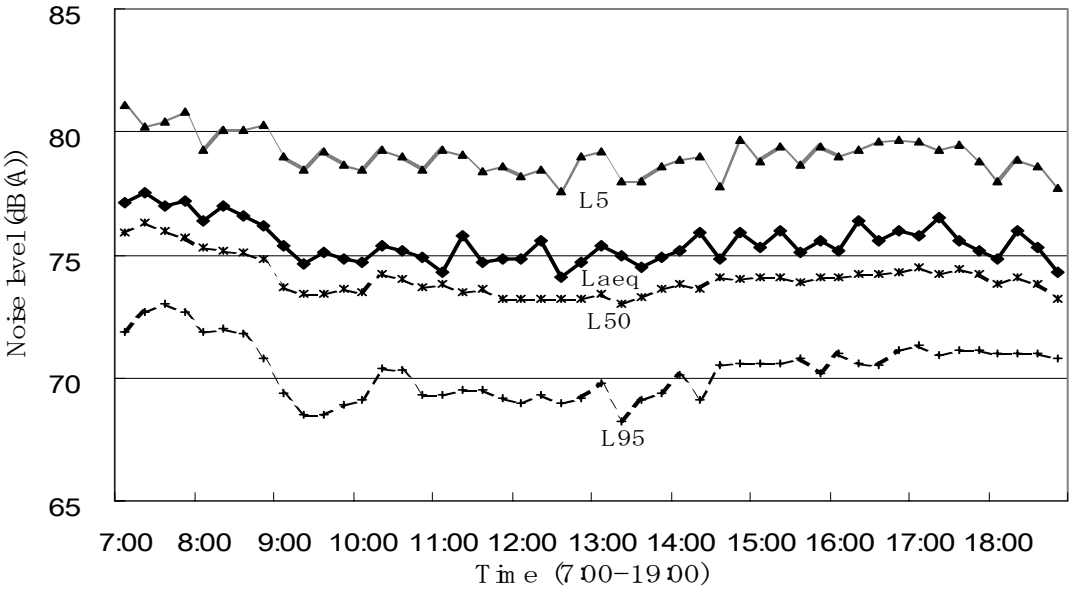

Figure 2. Fifteen-minute noise level fluctuation along a major arterial road

4.3 Road Infrastructure

Increased pressure to accommodate increased traffic volume in and around Kuala Lumpur has been growing steadily over the years. However, increased road capacity has only encourages more private vehicles on the road in the short and long term. The traffic congestion problems still exist despite increasing road capacity in Kuala Lumpur. A total of RM 18.5 billion was expended on road development between 2000 and 2005 (about 8% of the total budget allocation during 2000 and 2005 time period), which had increased the total road length from 66,391 kilometers in

2000 to 77,673 kilometers in 2005 (Ninth Malaysia Plan, 2006-2010). Some of the recently completed highways projects include New Pantai highway, Damansara-Kerinchi-Penchala link, Salak highway, Ampang Elevated highway, East-West link and New Klang Valley expressway (Structure Plan Kuala Lumpur, 2020). The construction of these highways is mainly targeted to ease the existing traffic congestion from outskirts to Kuala Lumpur city. However, without effective measures to decrease the growing number of private vehicles especially by private motorcars in place, the extent to which these highways will reduce traffic congestion is remain to be seen.

4.4 Energy Consumption

The rising motorization in many countries including Malaysia has eventually increased the amount of energy consumed. In the United States, transportation is the only sector that consumed more petroleum in 2000 than it did in 1973 (Meyer and Miller, 2001). In Malaysia, the transport sector was the largest consumer of energy, accounting for 40.5 percent of the total energy demand in 2005 at an average annual growth rate of 5.5 percent between 2000 and 2005 and expected to increase further at 6.6 percent between 2006 and 2010 (Ninth Malaysia Plan, 2006-2010). The transport sector is expected to consume 41.1 percent of the total energy demand in 2010 (Ninth Malaysia Plan, 2006-2010). The efforts to reduce energy consumption by transportation sector are looking bleak because of the rapid increase in the number of private vehicles. There is a growing fear that the global supply of petroleum may get depleted in the future. There is an urgent need to reduce the number of single-occupant vehicles combined with demand management measures for having a positive impact on reducing overall energy use.

4.5 Safety

There exists growing concern in the number of accidents taking place regularly in many major roads in Malaysia. One of the obvious contributing factors is the rise in the level of motorization. The vehicle ownership has been increasing steadily and in Kuala Lumpur, the recent statistics showed that it is more than one vehicle per person. The total number of vehicles involved in road accidents was 294,804 in 1996 and increased to 400,053 in 2000 and further to 549,917 in 2005 at an average growth rate of 7.3 percent (Ministry of Transport, 2006). The number of death was 8 per 100 km of road in 1990 and increased to 9 in 2000 and further to 9.5 in 2000 (Karim and Abdullah, 2002). A new road safety department was established recently under Ministry of Transport to formulate measures and regulations to arrest the growing number of road accidents.

5. CONCLUSIONS

Rapid motorization has been taking place in many Asian countries including Malaysia. As a result of rapidly growing motorization, many cities in Asian region are facing serious problems, including significant levels of traffic congestion, air pollution from transport sources, and high rates of traffic accidents. This paper has highlighted growth and trends in motorization, factors contributing toward motorization and the likely implications it causes to the society. Motorization has both positive and negative impacts. The positive impacts are greater and faster movement of people and goods, greater and better accessibility, and economic growth. The negative impacts are traffic congestion, increase in delay time, environmental impacts, accidents and energy consumptions. There is no argument that motorization brings economic benefits to the country. But, what is more important and needed especially in many Asian countries is to strike a balance

in the use of public and private transportation. In many medium and high income group Asian countries including Malaysia, the ownership and use of private vehicles has been increasing rapidly and to some extent the use of public transport has been declining due to some obvious reasons. The increased use of private transport has exerting tremendous pressure on road capacity expansions, which is not possible always especially in major cities because of cost implications and land requirements. On the other hand, it takes a heavy toll on the environmental aspects, sustainability, and quality of life both in the short and long term.

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