ROAD SAFETY IN SOUTHEAST ASIA
FACTORS AFFECTING MOTORCYCLE SAFETY

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ABSTRACT

The purpose of this paper is to give an overview of the road safety situation in the 10 ASEAN countries. In 2004, we carried out an Asian Development Bank/SIDA financed project to improve road safety in these ASEAN countries, using Information and Communication Technologies (ICT) as the means of education. The focus of this paper is on the safety of motorcyclists, which is analysed using data collected during this project as well as other information and experience gained during this project. This paper also looks into the behaviour and risks concerning motorcyclists.

INTRODUCTION

The majority of road accident victims (injuries and fatalities) in developing countries are the vulnerable road users (VRUs), pedestrians, cyclists, motorcyclists and non-motorised vehicle (NMV) occupants), whereas car occupants account for most of the victims in high-income countries since there are many people who own cars. The VRUs are more exposed to the risk of traffic accident than other road users, and the consequences of road accidents are much more serious for the VRUs than for those who travel in cars. The use of motorcycles has become a passion or even a way of life in many ASEAN countries, as they are easy to use in towns and to cover short distances between e.g. home and place of work. There is a difference in risks between the types of vehicles, for instance motorcyclists are generally associated with a high involvement of casualties. The risk for the VRUs (foot, cycle and motor-cycle/moped) is 80-200 times more than for those travelling in buses. Motorised two-wheelers have the highest risk among all other modes.

This study aims to give an overview of the road safety situation in the 10 ASEAN countries. In 2004, we carried out a project financed by the Asian Development Bank/SIDA to improve road safety in these ASEAN countries, using Information and Communication Technologies (ICT) as the means of education. The focus of this paper is on the safety of motorcyclists, which is analysed using data collected during this project as well as other information and experience gained during this project. This paper also looks into the behaviour and risks concerning motorcyclists.

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1 The members of the ASEAN region are Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam
WEB-BASED E-LEARNING FOR IMPROVING TRAFFIC SAFETY

Since the 1990s, the Information and Communication Technologies (ICT) have brought people far way from each other much closer through improved telephone connections. However, much more important has been the creation and development of the Internet (www) facilities as a means of communication and dissemination of information, news and exchange of ideas of all kinds. This has created a really stiff competition for all sorts of knowledge based dissemination and exchange of all aspects related to development.

The Department of Science and Technology of Linköping University has been involved in these dynamic events since the end of the 1990s. The RetsNet\(^2\) project ‘Regional Traffic Safety Network’ was a distance education project, which included five Southeast African countries and aimed at improving the traffic safety. This web-based education for the ASEAN countries called ASNet\(^3\), ‘ASEAN Road Safety Network’, aims first of all to facilitate communication between all partners within each of the ten ASEAN countries who in some way or another work with topics related to road transport. Secondly, ASNet aims to facilitate the exchange of experiences and ideas between the 10 ASEAN countries. A web-based educational platform is the meeting point for weekly meetings of the members of the programme. Access to the particular site of this platform is only possible for members of this programme. Globesafe\(^4\), a worldwide database with traffic safety information, provides additional sources of information.

TRAFFIC SAFETY IN ASEAN COUNTRIES

The statistics available in this region are not always adequate. Concerning traffic safety, the definition of death related to traffic varies. In six of the ASEAN countries, Brunei, Cambodia, Indonesia, Malaysia, Myanmar and Singapore, the definition of death in a road accident is death within 30 days, while in three countries, the statistics available is death on the spot. Finally, in Vietnam the definition is death within 24 hours. This creates a lot of inaccuracy in the available statistics, which anyway indicates that around 70,000 persons are killed on the roads every year, while 4.6 million are injured. It is estimated that the deaths on the roads costs the ASEAN countries about 14 $ billion per year, or 2.1 % of the gross national product per year (ADB, 2004). The ministers of transport of the ASEAN countries have therefore decided to make all efforts possible to increase traffic safety in Southeast Asia. In 2003 the ministers of transport therefore demanded the Asian Development Bank (ADB) to assist and finance the creation of a programme with the aim to increase traffic safety in the ASEAN region. The Department of Science and Technology at Linköping University in Sweden was chosen as consultant to furnish the InterNetworking part of the programme.

Recent data from the United Nations show that population density varies widely from one ASEAN country to another, from a high of 6,700 people/km2 in Singapore to only 2 people/ km2 in Lao PDR. The growth rate of urban population increases rapidly across the ASEAN region and the degree of urbanisation also varies a lot. Singapore is fully urbanised while other countries like Cambodia and Laos have only 20% urbanisation of population.

\(^2\) This refers to the countries: Botswana, Malawi, Namibia, South Africa and Zimbabwe
\(^3\) http://www.asnet.org (last visited 2005-04-20)
\(^4\) http://www.globesafe.org/ (last visited 2005-04-20)
The quick growth in urbanisation, number of vehicles and GDP in the region are causing a very strong increase in demand for road transport. Therefore, the road networks also expand rapidly. However, in many ASEAN countries, the road infrastructure, legislation and education have often not followed this quick and sudden growth. The amount of money allocated to road safety countermeasures is inadequate in several ASEAN countries.

The ASEAN region with around 530 million inhabitants is one of the most fast-growing parts of the world. The transition from traditional to modern societies with transformation of rural and agricultural communities to increasingly urban and industrial societies results in very strong increases in all forms of transport and communication. These developments contribute to very severe transport problems all over this region. This strong economic growth has contributed to a very strong increase in the number of vehicles on the roads. At the same time, there has so far not been much attention to improving road safety. Beside, the road infrastructure, legislation and education in many ASEAN countries have not followed this quick growth in motorisation.

There is a clear relationship between traffic risk and motorisation in ASEAN countries as shown in figure 1. The increasing rate of motorization leads to decreased traffic risk. It is interesting to compare the present motorization in the ASEAN countries with the same vehicle density in the industrialized countries in earlier periods such as Sweden (1950 to 2000). Figure 1 shows that all values for Sweden lie on or below the estimated regression line, indicating that for a given vehicle ownership the level the fatality rate was less in Sweden during these years than in most ASEAN countries in 2003 where they lie over the line. In 2003 Laos had the same degree of motorization as Sweden had in 1950, but the fatality rate was clearly higher than that in Sweden in 1950. Similarly, Malaysia in year 2003 has the same motorization of Sweden 2000, but the traffic risk was clearly higher than that of Sweden. However this comparison should not be taken too seriously, since transport development is not of the same nature everywhere. Vehicles have become faster in the last 40 years, and accidents, therefore, much more fatal (on the other hand, road and vehicle safety has improved considerably). Singapore, Brunei and Malaysia have lower risk in traffic with high rate of motorisation level compared to other the ASEAN countries.

Figure 1: Traffic Risk and Motorisation for ASEAN countries 2003 (Al Haji, 2005)
Table 1. Accident rates over a period 1994-2003 in ASEAN countries (Al Haji, 2005)

<table>
<thead>
<tr>
<th>Country</th>
<th>Year of data</th>
<th>Deaths</th>
<th>Injuries</th>
<th>Vehicles</th>
<th>Population (000's)</th>
<th>Motorization (vehicles per 1,000 person)</th>
<th>Personal Risk (Deaths per 100,000 person)</th>
<th>Traffic Risk (Deaths per 10,000 vehicles)</th>
<th>Severity Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brunei</td>
<td>1994</td>
<td>56</td>
<td>977</td>
<td>160,000</td>
<td>289</td>
<td>553.63</td>
<td>19.38</td>
<td>3.50</td>
<td>5.42</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>28</td>
<td>1,273</td>
<td>244,727</td>
<td>358</td>
<td>683.59</td>
<td>7.82</td>
<td>1.14</td>
<td>2.15</td>
</tr>
<tr>
<td>Cambodia</td>
<td>1994</td>
<td>117</td>
<td>791</td>
<td>164,750</td>
<td>10,367</td>
<td>15.89</td>
<td>1.13</td>
<td>7.12</td>
<td>12.92</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>1,017</td>
<td>20,340</td>
<td>447,428</td>
<td>13,487</td>
<td>33.17</td>
<td>7.54</td>
<td>22.73</td>
<td>4.76</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1994</td>
<td>38,263</td>
<td>N.A</td>
<td>11,929,000</td>
<td>190,043</td>
<td>62.77</td>
<td>20.13</td>
<td>32.08</td>
<td>N.A</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>30,464</td>
<td>2,550,000</td>
<td>24,994,890</td>
<td>234,893</td>
<td>106.41</td>
<td>12.97</td>
<td>12.19</td>
<td>1.18</td>
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<tr>
<td></td>
<td>2003</td>
<td>581</td>
<td>18,690</td>
<td>278,384</td>
<td>5,912</td>
<td>47.02</td>
<td>9.81</td>
<td>20.87</td>
<td>3.01</td>
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<tr>
<td>Malaysia</td>
<td>1994</td>
<td>5,159</td>
<td>43,344</td>
<td>6,166,432</td>
<td>20,103</td>
<td>306.74</td>
<td>25.66</td>
<td>8.37</td>
<td>10.64</td>
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<tr>
<td></td>
<td>2003</td>
<td>6,282</td>
<td>46,420</td>
<td>12,868,930</td>
<td>24,500</td>
<td>525.26</td>
<td>25.64</td>
<td>4.88</td>
<td>11.92</td>
</tr>
<tr>
<td>Myanmar</td>
<td>1994</td>
<td>938</td>
<td>34,161</td>
<td>265,253</td>
<td>43,519</td>
<td>6.10</td>
<td>2.16</td>
<td>35.36</td>
<td>2.67</td>
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<tr>
<td></td>
<td>2003</td>
<td>1,308</td>
<td>45,780</td>
<td>467,350</td>
<td>48,895</td>
<td>9.56</td>
<td>2.68</td>
<td>27.99</td>
<td>2.78</td>
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<tr>
<td>Philippines</td>
<td>1994</td>
<td>2,723</td>
<td>211,732</td>
<td>2,580,000</td>
<td>66,814</td>
<td>37.42</td>
<td>4.07</td>
<td>10.89</td>
<td>1.27</td>
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<tr>
<td></td>
<td>2003</td>
<td>4,200</td>
<td>361,200</td>
<td>4,292,000</td>
<td>84,620</td>
<td>50.72</td>
<td>4.96</td>
<td>9.79</td>
<td>1.15</td>
</tr>
<tr>
<td>Singapore</td>
<td>1994</td>
<td>254</td>
<td>7,680</td>
<td>611,611</td>
<td>3,421</td>
<td>178.78</td>
<td>7.42</td>
<td>4.15</td>
<td>3.20</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>211</td>
<td>9,072</td>
<td>711,043</td>
<td>4,608</td>
<td>154.31</td>
<td>4.58</td>
<td>2.97</td>
<td>2.27</td>
</tr>
<tr>
<td>Thailand</td>
<td>1994</td>
<td>15,176</td>
<td>960,508</td>
<td>12,939,954</td>
<td>58,272</td>
<td>222.06</td>
<td>26.04</td>
<td>11.73</td>
<td>1.56</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>13,116</td>
<td>1,529,034</td>
<td>25,100,000</td>
<td>64,265</td>
<td>390.57</td>
<td>20.41</td>
<td>5.23</td>
<td>0.85</td>
</tr>
<tr>
<td>Vietnam</td>
<td>1994</td>
<td>5,043</td>
<td>19,558</td>
<td>3,360,555</td>
<td>7,1679</td>
<td>46.88</td>
<td>7.04</td>
<td>15.01</td>
<td>20.50</td>
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<tr>
<td></td>
<td>2003</td>
<td>13,186</td>
<td>30,999</td>
<td>12,054,000</td>
<td>81,624</td>
<td>147.68</td>
<td>16.15</td>
<td>10.94</td>
<td>29.84</td>
</tr>
</tbody>
</table>

Notes: Sources of data is ASNet “ASEAN Road Safety Regional Network and Database”
Correction factor for deaths and injuries (2003) were estimated by ADB experts and same were applied to year 1994
Number of vehicles taken as the sum of all registered cars, buses and coaches, lorries, motorcycles and motorised three-wheelers.

In most countries the number of motor vehicles in relation to population largely depends on the standard of living or GDP per capita income (the gross domestic product). Motorisation is highest in Brunei, Malaysia and Thailand (over 300 motor vehicles/1,000 inhabitants), and lowest in Myanmar, Cambodia and Laos (less than 50 motor vehicles/1,000 inhabitants). It can be seen that in all ASEAN countries (except Singapore) there was an increase in the number of vehicles per population over the studied period (1994-2003), see figure 2.

Figure 2. Motorization trend (vehicles per 1 000 persons) in ASEAN countries
MOTORCYCLISTS SAFETY IN ASEAN COUNTRIES

Motorcyclists account for the majority of road casualties and therefore require most attention in road safety programmes across the region. There is a high level of risk for motorcycle riders to get serious and fatal injury in road accidents, compared with other groups of road users groups.

The highest percentage of motorcycles are found in Vietnam with 95 % of all the motor vehicles, followed by 80 % in the Lao People’s Democratic Republic, 75 % in Cambodia and Indonesia, 71 % in Thailand and 48 % in Malaysia. The lowest shares of motorbikes are found in Brunei with 3 %, 19 % in Singapore and Myanmar with 37 % (see Figure 3).

Figure 3. Percentage of motorcycles in ASEAN countries (year 2003)

The risks of motorcyclists not using helmets are much higher than those wearing helmets. Motorcyclists who do not wear helmets are almost three times more likely to be killed compared to those who wear helmets. The risks are also related to: perception of the risks of travelling on roads and of using motorcycles, violation of traffic rules, poor driving attitude, aggressive driving behaviour as well as riding under influence of alcohol. Use of helmet has been shown to reduce the fatal and serious injuries in many ASEAN countries. Its use should therefore be encouraged through education, legislation, publicity campaigns and law enforcement.

In ASEAN countries, a high proportion of trips is made by non-motorised modes of transport (NMT). These road users are together with pedestrians and cyclists forced to share road space with motor vehicles because either there is no separated lanes to be used or the designed space is not enough or convenient.

Motorcycles do not offer much protection to the riders, thus helmets are required for people riding motorcycles. Still, this is not efficiently enforced in many ASEAN countries despite laws making wearing of helmets compulsory across the region. Only 3% of Vietnamese motorcycle riders use helmets. In Indonesia, motorcycle passengers rarely wear helmets in rural areas. In other countries like Malaysia and Singapore there is a high percentage of motorbike riders who wear helmets. The introduction of helmet use has led to a significant reduction in motorcycle deaths in both countries.
One of the issues discussed in the ADB-ASEAN-ASNet program is how to make the motorbikes helmets standardised, more convenient to wear, in good quality, lighter, less expensive, and suit the weather in this region (e.g. tropical weather). There has also been concern that riders should wear helmets properly.

The following measures are suggested to reduce the magnitude of road safety problem concerning motorbikes and increase the road safety for drivers of motorbikes:

First, promotion that people who at present travel with means of transport with high exposure and risk change to use such transport modes that have a low risk of accident, such as public transport.

Second, reducing the accident rate for a given unit of exposure (travel). It is possible to reduce this by improving driver skills, training and experience through road user education. Further, attention must be given to vehicle performance, road standards, legislation and enforcement.

Third, measures to reduce speed, like humps, speed limits, etc should be introduced. However it is more important that the riders of motorbikes should keep the speed limits.

Fourth, measures need to be taken to reduce the severity of accidents. This can be achieved by protecting riders better in vehicles from injury severity (better design) in protecting two wheelers by using appropriate and standard helmets.

Fifth, the use of helmets by motorcyclists must be enforced. In some ASEAN countries where enforcement is poor, levels of helmet use are low.

Finally, it is necessary for the ASEAN countries to share their best practises and good experience between each other with respect to motorcyclist's safety, for instance the successful campaign "Helmets for Kids" in Vietnam. Also, Malaysia has developed standards for helmets to be comfortable, light, cheap and to be manufactured locally. However, many motorcyclists in Vietnam still complain that helmets are uncomfortable to use in the heat and humidity of the Vietnamese climate.

**HUMAN PERCEPTION AND BEHAVIOUR RELATED TO TRAFFIC SAFETY**

Many studies show that motorcyclists are the highest risk group of being killed or injured in a road accident. In the ASEAN countries, this problem is serious because of the high exposure and the young age of riders.

There are many factors which cause road accidents, the most important ones being:
- Motorbike conditions
- Behaviour and human errors
- Road quality and design
- System (e.g. regulations, enforcement)
- Environment and weather conditions

The study of human behaviour is a behavioural science, not at all linked to engineering, transport or traffic safety. Still human behaviour certainly contributes to numerous deaths and injured on the roads, wherever in the world we study the topic.

A crucial point of departure to understand the reasons that contribute to road accidents is human society and development. 100 years ago there were hardly any
cars anywhere in the world. This had changed in most western societies already at the middle of the 20th century. The main reasons behind the rapidly increasing car ownership have been increases in economic development, resulting in higher standards of living and thus better living conditions, which allow that more and more, people may afford to buy cars.

In most of the countries of Southeast Asia, the economic development and standard of living was still in the 1970’s very low and did not permit many people to own cars. However, over the last few decades, this situation has changed very rapidly. Further, education related to the dangers of using roads and vehicles has not advanced enough. Further, awareness of the risks of using the roads changes very slowly.

The most efficient way to change human behaviour and attitudes related to the risks of using the roads is to have children as target groups. Children in cultures are very open-minded and receptive. They may therefore easily change their behaviour if they are made conscious of the risks of using roads. It is much more difficult to change the behaviour of adults.

CONCLUSIONS

The safety of motorcycles is a major concern in ASEAN countries due to the high proportion of this type of vehicles on the roads. The risks of accident are highest for riders of motorized two-wheelers. Much still remains to be done in this field in order to reduce the high numbers of motorcycle drivers and passengers killed or injured. This study has described the situation related to road safety as well as good practises in the ASEAN countries. Several recommendations are made to increase the safety of this target group.

REFERENCES

