

# Long-term Asian motorcycle safety strategies: Re-evaluating safety approaches

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About 1.3 million lose their life and 20 to 50 million people sustain injuries due to road traffic incidents every year in the world. If no effective measures are taken the road accident fatality is forecasted to double by 2030. Many developing countries are setting long term strategies to meet the part of global target, to half the projected fatality growth by half by 2010. However, there are emerging issues like increase in motorcycle ownership, higher rate of motorization and poorer infrastructural improvement in developing countries, which may lead to safety trend different from that of industrialized countries. This is important as it makes safety strategies different from the traditional approaches inevitable. Motorcycle, in particular, is dominating the developing Asia motorization trend in unprecedented way, with growing concerns of how this has affected the safety trend and the long term impact. This paper analyses the dynamics in traffic accident trend in Asian developing countries, in contrast to the industrialized countries. The paper looks at the need and the prospect of changing the current safety strategies, based on the trend.

**Key Words:** *motorcycle safety, safety strategy, road safety, transport system,*

## 1. INTRODUCTION

Developing countries, where 90% of the world road accident fatalities<sup>1)</sup> are recently trying to set up long term strategies to address their safety issues.

Southeast Asia alone contributes to over 20% of the reported world accident fatalities. Motorcycle remains a major safety challenge in this region, and it makes 60% more of the road accident fatalities in countries of the region such Thailand, Indonesia or Malaysia. The discussion on road safety in of the developing countries, including the Asian ones, mainly focus on lack of legislations, laxity in their reinforcement, poorness of the infrastructure or emergency service system. Currently, overwhelming majority of Asian developing countries has introduced prominent safety legislations: helmet, seatbelt, and drink driving laws are adopted by 95%, 87%, 88%, and of Asian developing countries respectively<sup>1)</sup>. The effectiveness of the measures is questionable, due to obvious socioeconomic

constraints in the short term.

Asian developing countries are facing unprecedented motorcycle growth, with the risk being dominant in the transport system. There is no clear vision of how to handle this new trend, or its subsequence on the road safety trend. Some local governments in China are restricting the motorcycle use, while others such as Malaysia see the motorcycle issue manageable and trying to accommodate in the transport system. Many more countries are facing the dilemma, and thinking of whether they should accommodate the motorcycle, by introducing motorcycle lanes systematically to improve motorcycle safety, beside other traditional measures. The question is, however, to what extent such accommodative intervention measures could improve the motorcycle safety in the long term, in contrast to other opportunities that could be utilized at this early stage of development to influence the transport system and the safety.

## 2. OBJECTIVE AND METHODOLOGY

The increase of motorcycle proportion in unprecedented way is among the emerging issues in developing Asia, with a major safety concern. Though some countries have taken innovative motorcycle oriented policies, the impact of the motorcycle increase on safety, in the long term in particular, remains unclear.

This paper analyses the dynamics in traffic accident trend in developing Asian countries, and verify of whether the trend varies from the conventional trend where motorcycle decreases with income growth.

The long term fatality trend of Malaysia, Thailand Vietnam, Taiwan, Japan are compared. While the first three are from developing Asia, Japan is from the developed Asia where motorcycle proportion decreased with income growth. Taiwan is selected for its unique nature, as motorcycle remained dominant despite the high income level.

To make the road accident fatalities in a comparable format, they are standardized to deaths within 30 days of the crash by using adjustment factor.

## 3. ROAD SAFETY TREND

Though total fatality is generally growing in developing Asia there are fluctuations in the trend fatality rate as shown in Fig. 1 The fluctuation may be best be explained by the economic changes over time, which affects the mobility. For example, there is fall in fatalities in mid 1990s, during the Asian financial crisis, and the fatality started once again to increase after the economic recovery. All three developing Asia but Thailand have passed this

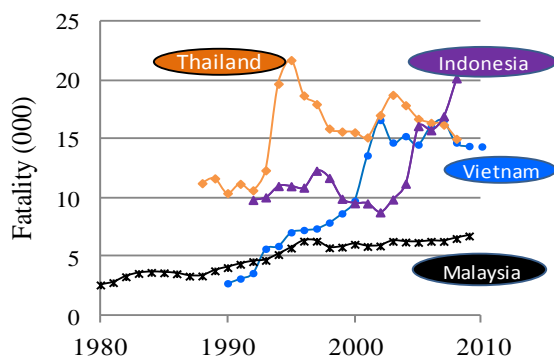


Fig. 1: Trend of fatality in selected developing Asian countries

temporary total fatality peak after economic recovery. Countries have taken several safety measures which may have also affected the trend to

some extent, though difficult to prove due to data constraints.

The fatality rate by year is basically similar to the fatality trend, except in Vietnam. To grasp if there is difference in the road safety trend of the developing Asia, the per-capita fatality rates are compared with that of Japan, at the same economic level. As Fig. 2 shows, it is clear that developing Asian countries show significantly higher fatality trend than Japan recorded when it was developing. Worse than that the developing countries have recorded fatality rate higher than that maximum Japan ever recorded.

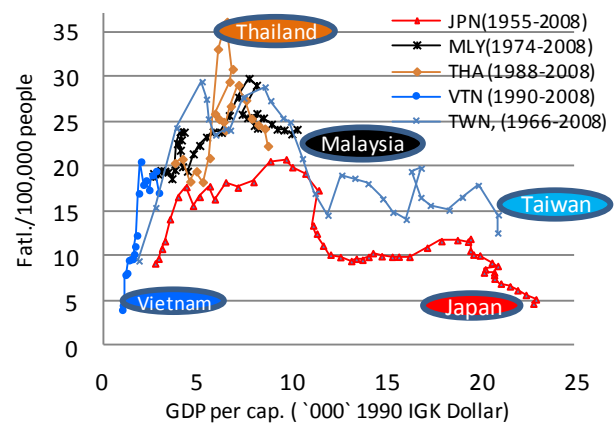


Fig. 2: Fatality rate by income of selected Asian countries

## 3. VARIATIONS IN THE TREND

The possible source of variation of the per capita fatality rate trend may be attributed to four factors: transport system, safety level, timing of the intervention, and safety management or organization system.

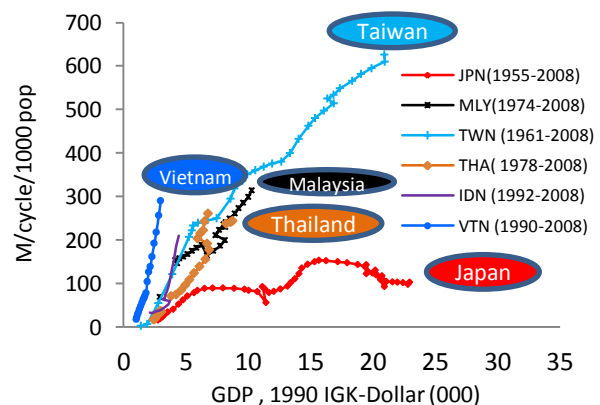


Fig. 3: Motorcycle ownership trend in selected Asian countries

Asian developing countries have introduced interventional measures, such as helmet or seatbelt wearing earlier than Japan, in terms of the economic level. However, they have poor management system

that they have not been as effective as Japan has been.

However, the major difference which is creating a safety concern is the trend of the transport system. As Fig. 3 shows Asian countries have a motorcycle ownership rate by far exceeds that of Japan. Motorcycle makes just 14% of motor vehicles in Japan, while it is as high as 70% in the developing Asian countries and Taiwan.

Motorcycle user fatalities make over half of the total road accident fatalities in developing Asia. Motorcycle fatalities make 60% or above of the total fatalities in Malaysia, Thailand and Indonesia (Fig. 4). As motorcycle is the most vulnerable motorized mode, dominating the developing Asia, it's critical to ensure its safety. However, as the motorcycle dominance at late stage of income is new trend, there is no clear vision of the how to ensure the motorcycle safety. The following section summarizes the dilemma.

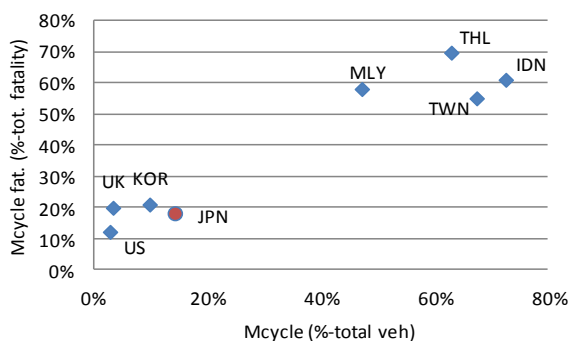


Fig. 4: Motorcycle fatality and proportion of selected countries Japan statistical bureau & NPO, IOHS and DoTof US, DfTof UK, Kor. Road Traf. Authority, MIROS of Malaysia, WHO statistics for Thailand and Indonesia

#### 4. STRATEGIC DILEMMAS IN MOTORCYCLE SAFETY

As mentioned in Section 3, developing Asia understand how critical the motorcycle safety is, to make significant progress in overall road safety. There is a large consensus among Asian developing countries on short and mid term safety measures, such as the introduction of helmet or strengthening the education to increase awareness, or in issuance of the riding licenses. The above strategies are basically based on the traditional trend that motorcycles proportion will fall as income increases. However, as motorcycle remained high, even after income growth, debates on the future role of the motorcycles in the transport system and the subsequent safety issues is inevitable.

Asians are divided in the future role of the

motorcycle, and on its safety management. While motorcycle lanes are not new to many Asian countries, Malaysia and Taiwan have systematically introduced to improve motorcycle safety. Unlike Taiwan and Malaysia, which have adopted accommodative strategies toward motorcycle, many Chinese local governments have taken a restrictive approach by banning motorcycle. Even though Japan has not taken harsh policies as the Chinese to restrict motorcycle use, it has succeeded to decrease the motorcycle to just 14%, which contributed in making it at the top of Asian countries in its road safety level.

While the traffic segregation certainly improves motorcycle safety, as research shows, the question remains of the level of improvement in contrast to the other modes, such as cars.

The issue is not only of whether developing Asia, should take an accommodative approach or not, toward motorcycles, but also whether that should be on voluntary or obligatory basis.

As the trend is just emerging without precedence, it's difficult issue. However, Taiwanese and Japanese experience may give some insight on viable long term motorcycle strategies. Taiwan has basically considered motorcycle safety manageable, and adopted various motorcycle centered safety policies. Japan, on its side, had a strategy that not favors motorcycle and its role in the transport system is marginalized. Many developing Asian countries are at cross road and it's the policies that they adopt today that decided the future role of the motorcycle and its safety. The following section looks at the outcome of the Taiwanese motorcycle approach, and the results achieved in contrast to Japan where motorcycle is marginalized.

#### 5. JAPAN AND TAIWAN MOTORCYCLE SAFETY STRATEGIES

The most significant difference in road safety of Japan and US is in the motorcycle fatality proportion. Motorcycle user fatalities make half of the road accident fatalities in Taiwan, while in Japan they make just 18% of the total fatalities. Motorcycle fatality proportion has increased by about 50% to make half of the fatalities since 1999 in Taiwan, while it was stable for over 20 years in Japan.

The road safety trend is basically due to change in travel behavior, but this is in return influenced by the policies adopted and the transport system

development and their timing. For the sake of the objective of the paper, we will focus on the main differences between Japan and Taiwan that may have contributed to the distinct safety trend.

**(1) Safety strategies**

Japan has gradually shaped the motorcycle role and subsequently its safety. It has avoided of any policy that may favor or encourage motorcycle use. Policies were introduced step by step, so that to bring the behavioral changes in line with the long term objectives. Helmet wearing, for example, was introduced in over 20 years period. Though helmet was made first compulsory in 1965, it was only in 1985 that it was made compulsory on all roads and for all motorcycles with penalty (Fig. 5).

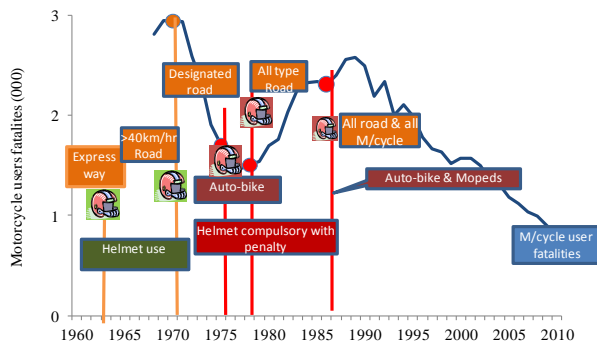


Fig. 5: Motorcycle safety measures and fatality trend of Japan

Educating the public to bring the necessary behavioral changes, and make them supportive of the government policies was another notable strategic approach of the Japanese. Even though the motorcycle helmet was made partially made compulsory with penalty in 1975, the compliance was as high as 70% even before this. Moreover, the fatality rate of which motorcycles were primary causes reduced by 60% by 1975, despite the motorcycle growth. This is believed to be the result of the behavioral changes resulted from the systematic education on motorcycle safety.

Japan, has in general, pursued policies discourage motorcycle use, as risky mode. There have been strict policies on illegal parking, despite the limited parking space provision. Motorcycle and bicycle parking management is given a priority and handled at cabinet level since 1970s. A comprehensive law issued in 1980s to control the illegal parking, and unlike many developing Asian countries road side parking is not common in Japan. The parking management is found to be the top factor in restricting the use and ownership of motorcycles (JAMA, 2012).

In contrast, even though Taiwan started national safety programs early 1980s, unlike Japan, it mainly

focused on traffic segregation by using motorcycle lanes, or traffic signals. In fact significant drop in overall fatality trend has been observed in the fatality until the end of the 1990s (Fig. 6). Taiwan was very late in introducing helmet, and it was only in 1997 that it was made compulsory.

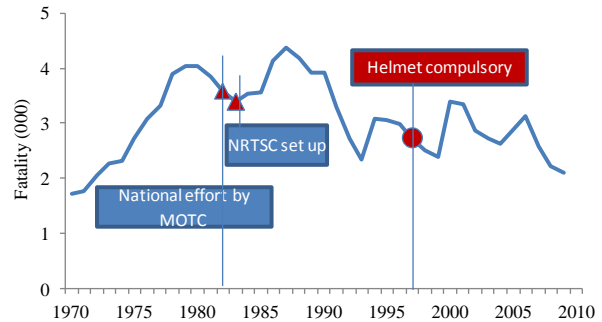


Fig. 6: Motorcycle safety measures and fatality trend of Taiwan

However, since 1993 though the total fatality has been fluctuating no significant no significant change is made and the fatality rates remained high. The per capita fatality rates of Taiwan are currently about three times of that of Japan. Similarly the fatality rates per vehicle kilometer travelled (VKT), of Taiwan is more than three times of that of Japan.

Table 1:Recent fatality rate per billion VKT

	Japan	Taiwan
2005	10.3	28.6
2006	9.5	29.5
2007	8.7	26.7
2008	8.1	25.1
2009	7.7	25.4

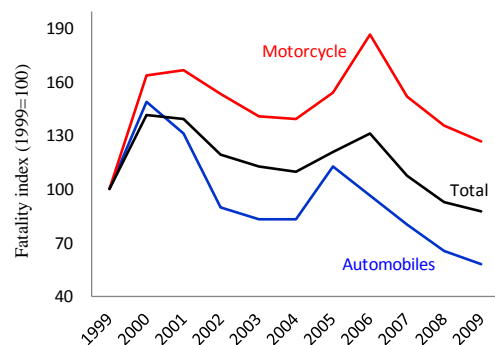


Fig. 7: The fatality trend by mode of Taiwan

The high fatality rate of Taiwan is linked with the motorcycle which dominates the transport system. As Fig. 7 shows motorcycle fatality has increased by about 30% while that of automobiles decreased by 42% since 1999.

Despite the introduction of all the major safety measures, motorcycle safety remained challenging in Taiwan, as discussed above. To overcome this,

Taiwan has shown strategic shift in its recent policies on motorcycle issues. Decreasing the motorcycle proportion has become the main target of Major Taiwanese cities to address the motorcycle issues. This strategic shift is briefly discussed below.

**(2) Taiwanese motorcycle policy shift**

Taipei is the first place which exhibited the shift in motorcycle safety. The main target is currently to control the motorcycle growth, by improving the public transport service and restricting the motorcycle use (Taipei City, 2011). Taipei has been improving its public transport service since 1997, and known to be leading in its service. Following this, Taipei started to restrict the motorcycle use. This was mainly through imposing motorcycle parking charges, and control on illegal parking that started in 2005. Even though Taipei still shows a motorcycle increase, it is much lower than the national average or that of city of Kaohsiung where similar measures just started in April, 2012 (Fig. 8).

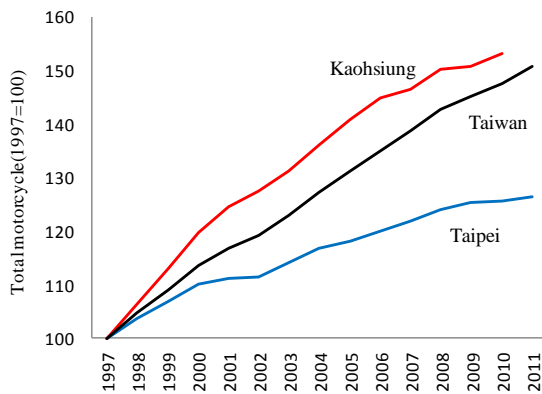


Fig. 8 Recent motorcycle growth trend in Taiwan

More importantly, Taipei could control the growth of accidents, resulting in deaths or injuries, which motorcycle is the primary cause. As Fig. 9 shows, the motorcycle accident in Taipei has increased by just 20% until 2008, after which it suddenly jumped to almost double of that of 2000. However, this is low compared to that of the national average which increased by six times.

Motorcycle makes 34% of Taipei trips. Though this is far lower than the 48% national average it is very high in contrast to Tokyo where motorcycle accounts for just 1% of the trips. This may be attributed to the Taipei's environment that still favors relatively, despite the recent attempt to restrict it. In Taipei, 94% are road side parking and only 6% of motorcycle parking is charged. Moreover, it is just one third of the road which has been covered by the parking management program.

Overall, Taiwan, though very late, is adopting policies similar to Japan. As mentioned in Section 5,

it was in 1980 that Japan introduced a comprehensive law to restrict parking and control illegal parking. Japan has already had public transport in place as an alternative. Moreover, Japan has had better road infrastructural development than Taiwan, favoring automobile use. Japan observed sharp decrease in the motorcycle proportion in 1960s, which may at least partly attributed to the intensive road improvement of that period.

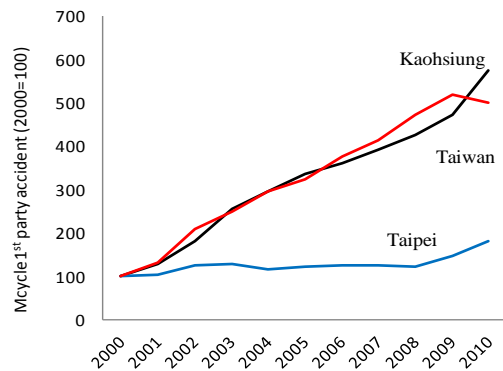


Fig. 9: Accidents where motorcycle is first party

**6. DEVELOPING ASIA MOTORCYCLE SAFETY PROSPECTS**

The main challenges for Asian developing countries are in adopting safety measures, without compromising in the long term safety objectives. Safety helmet, education or strict licensing system or law reinforcement are all critical, but the socioeconomic status puts some constraints from implementing these policies effectively. However, in the mid or long term, as the economy grows these challenges will be overcome and those policies would be implemented as effective as the developed countries.

The experience of Japan and Taiwan proves that it is the role of the motorcycle and its proportion that would decide the motorcycle safety in the long term. Therefore, safety strategies in developing Asia should be based on such long term vision and make sure that the short term policies implemented wouldn't compromise in the long term targets.

Policies that favor motorcycle such as easy and free parking, which is common among developing Asia, encourage motorcycle use despite the income growth. Systematic introduction of traffic segregation of traffic through physical means such as introduction of exclusive lanes may improve motorcycle safety, in the short term. However, this has the risk of making motorcycle as part of the main transport system affecting the road safety adversely in

the long term.

## 7. CONCLUSION

Motorcycle safety is the major safety concern as it accounts up to 60% of the total road accident fatalities. Traditionally, motorcycle is believed to be an intermediate mode that would be substituted by other modes as income growth. Taiwan emerged with new trend where motorcycle remains dominant, and many other developing Asians are showing similar trend.

Even though Taiwan has taken an accommodative approach toward motorcycles, and introduced motorcycle centered safety measures its safety still

remains a challenge. Taiwan has a safety rate that is about three times as high as that of Japan, which has taken restrictive approach toward motorcycles, and half of the fatalities are still motorcycle users.

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