

The Global Fight for Road Safety: Asian Contribution

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Road accidents kill more than 1.3 million people per year worldwide, with 90 % of the deaths occurring in low to middle income countries. Asia has more than its fair share of the death tolls. For example, nine Asian countries: Cambodia, China, India, Indonesia, Japan, Malaysia, Singapore, Thailand, and Vietnam, account for about 0.5 million road deaths annually.

This issue of the journal comprises eight papers presented at the 2009 EASTS Conference in Surabaya. All of the papers deal with road safety related issues, five directly, and three indirectly. The topics cover methodological development, analysis of factors affecting traffic accidents, and policy/program evaluation, and relevant case studies were conducted in the context of Australia, Japan, Singapore, Taiwan, and Thailand. These studies have provided rich insights into traffic safety measures and at the same time various future research issues have also been identified. A brief description of each paper is given below.

Ishak *et al.* present a holistic approach to assess safety risks in a level crossing by using the Stochastic Petri nets (SPN) approach with the help of Π -tools, which are suitable for the creation of complex models and for analyzing deterministic and stochastic behavior. SPN is designed following a hierarchical system with three levels, where the first hierarchy represents the occurrence of traffic accidents, the second hierarchy deals with the basic level crossing operations, and the third hierarchy includes the details of train, traffic and signal control parameters included in the system. The proposed approach was tested at ten critical level crossing locations in South Australia. The result shows that the potential accident occurrence was very close to the actual accident at selected locations.

Hagita *et al.* evaluate the comprehensive safety programs in Japan which were launched around 1990 by involving different stakeholders (e.g., police agencies, road authorities, and automobile manufacturers). The targeted program contents include driver education, enforcement measures, and engineering measures. The programs were found to be effective in reducing traffic fatalities from 11,415 in 1992 to 5,744 in 2007. Severe penalties for drunk-driving, vehicle speed, rate of seatbelt use, road infrastructure improvements were among the effective countermeasures of the programs.

Dissanayake looks at the willingness-to-pay (WTP) for road casualty risk reduction in Thailand based on a stated preference (SP) contingent valuation experiment. Factors influencing the WTP were examined with respect to four severity classes of both cars and motorcycles (i.e., slight casualty, serious casualty but no permanent disability, serious casualty with permanent disability, and fatal casualty) based on multinomial logit models. The results show that the WTP is strongly influenced by level of education, vehicle ownership, and past casualty experiences.

Focusing on the role of pedestrian signals in improving drivers' safe driving at intersections, Hamaoka *et al.* conducts a laboratory experiment to observe how drivers confirm the flashing green and non-flashing red of pedestrian signals. The study examines the behavior of vehicles proceeding through intersections, and evaluates the contributions of pedestrian signals to intersection safety by analyzing drivers' decision times. They show that anticipation of a signal change to yellow by using a pedestrian signal enables drivers to avoid

the dilemma zone and consequently results in the improvement of safety at intersections.

Haque *et al.* examine how motorcyclists' behavioral factors influence their crash risks and attempt to identify the most vulnerable group by classifying drivers' behaviors into impulsive sensation seeking, aggression, and risk-taking behaviors within the log-linear modeling framework. Analysis results revealed that aggression and risk-taking behaviors are significant contributors to the crash involvement of motorcyclists while impulsive sensation seeking behavior was found to be insignificant. It is further confirmed that the probability of involvement in a crash after a crash-free period of six months is higher for "Extrovert" and "Follower" personality type motorcyclists. It is concluded that personality traits of motorcyclists are the dominant factors leading to high crash risks.

Alhajyaseen and Nakamura develop a methodology to estimate the minimum required crosswalk width at signalized intersections for different pedestrian demand volumes considering bi-directional flow and pedestrian age groups. The optimized crosswalk configuration including width is an important concern to improve the overall performance of signalized intersections. The study divides the total pedestrian platoon crossing time into discharge and crossing times, where the former is modeled by using shockwave theory and the latter by applying aerodynamic drag theory. As a result, various required crosswalk widths as well as directional split ratios are proposed, and it is also revealed that wider crosswalks are required for pupil and elderly pedestrians to achieve the required design speed.

Ai *et al.* describes the development of an automatic incident detection model based on a genetic fuzzy logic controller (GFLC). GFLC can self-learn the optimal combination of fuzzy rules and shapes of membership functions; however, as the number of state variables increases, it is difficult for GFLC to search a comprising rule combination and representative shapes of membership functions. To overcome this shortcoming, two approaches are proposed: the first one is to only select a part of state variables, and the second one is to employ the principal components technique to classify the original state variables into several groups. For comparison, incident detection models based on artificial neural network (ANN) approach were also developed to incorporate all the state variables. The results show that the model based on principal components technique outperforms the other models.

Finally, recognizing the serious influence of traffic incidents on congestion delay and aiming to support the effective implementation of traffic incident management program (TIMP), Luathep *et al.* develop a traffic incident management location model under degradable stochastic network to identify the critical links for appropriate resource allocation for long-term TIMP. They assume the user equilibrium to represent the unregulated network without TIMP implementation and the system optimum to characterize the controlled network under TIMP execution. The inefficiency of degradable network performances is evaluated by defining a new index (i.e. traffic incident management ratio) based on the concept of price of anarchy. Analysis results based on a hypothetical network show that attention should focus not only on restoring traffic capacity on the critical links, but also on handling unexpected congestion incurred because of re-routing traffics on related paths or links.