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Evaluation of Impact on Traffic Conditions Due to Electronic Toll Collection System Design in Thailand

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Abstract : This research explored behaviors of toll way users that impact their decision to use the Electronic Toll Collection System (ETC). It also went on to explore and evaluated the efficiency of toll plaza in terms of number of ETC booths in toll plaza and its lane location. The two main parameters selected for the scenarios analyzed were (1) the varying ration of ETC enabled users (2) the varying locations of the dedicated ETC lane. There were a total of 42 scenarios analyzed. Researched data indicated that in A.D.2013, the percentage of ETC user from the total toll user is 22%. It was found that the delay at the payment booth was reduced by increasing the ETC booth by 1 more lane under the condition that the volume of ETC users passing through the plaza less than 1,200 vehicles/hour. Meanwhile, increasing the ETC lanes by 2 lanes can accommodate an increased traffic volume to around 1,200 to 1,800 vehicles/hour. Other than that, in terms of the location of ETC lane, it was found that if for one ETC lane-plazas, installing the ETC lane at the far right are the best alternative. For toll plazas with 2 ETC lanes, the best layout is to have 1 lane in the middle and 1 lane at the far right. This layout shows the least delay when compared to other layouts. Furthermore, the results from this research showed that micro-simulator traffic models have potential for further applications and use in designing toll plaza lanes. Other than that, the results can also be used to analyze the system of the nearby area with similar traffic volume and can be used for further design improvements.

Keywords : the electronic toll collection system, average queuing delay, toll plaza configuration, bioinformatics, biomedicine
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