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Traffic Incident Management Performance Measures: Ranking Agencies on Roadway Clearance Time

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Abstract

Traffic incidents like crashes, highway debris, spilled roadway reduce roadway capacity significantly, thus impacting the overall mobility of a network. Moreover, it increases the risk of secondary crashes in a roadway. According to NCHRP report of "Guidance for Implementation of Traffic Incident Management Performance Measurement," there are three main performance measures of traffic incident management: incident clearance time, roadway clearance time and number of secondary crashes. This study develops a procedure to rank law enforcement agencies based on their incident response depending on their roadway clearance time for crash related incidents. This analysis is not intended to grade agencies but to assist the DOTs to identify those agencies who would require more training or resources in terms of incident management. Selecting a specific threshold for performance measures like- 90 minutes clearance time for all fatal crashes, will not differentiate the variety of other variables that are associated with the crash. Previous NCHRP reports discussed how to use different factors like: incident severity, roadway characteristics, number of lanes involved and time of incident separately for estimating the performance measures. But it does not tell us how to incorporate all the factors at the same time. In this regard, our study aims to take into account all the factors combinedly and rank the agencies accordingly. This study used 149,174 crashes from the state of Iowa that occurred from 2018 to 2021. Tobit regression model is used to find the effect of different variables on roadway clearance time. Variables which cannot be controlled directly by agencies (such as: crash severity, roadway type, weather conditions, lighting conditions etc.), were included in the analysis as it helps to reduce bias in the ranking procedure. Then clearance time of each crash is normalized into a base condition by adding the variable effects, estimated from the Tobit model. The normalization makes the process more efficient for ranking as the effect of uncontrollable factors have already been mitigated in this process. Then the agencies were ranked by their average normalized roadway clearance time. An interactive dashboard was also created to help the agencies to find the crashes with higher roadway clearance time. This allows agencies to track their performance of previous crashes and associates the stakeholders to decide which agency needs more training to enhance their performance. This study has transferable outcomes and can be used to rank agencies in other states. Also, this method can be used for estimating the rank of agencies/teams for other purposes which have a single quantitative outcome.