Evaluating Traffic Incident Influence on Travel Time

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Abstract

Travel Time has turned out to be a standout amongst the most crucial markers of transport execution. In such manner, the effect of movement occurrences on Travel Time is urgent for both administrators and explorers. The reason for this examination was to build up a choice bolster approach to recognize the ideal areas of a limited arrangement of point locators on an interstate passageway to minimize the mistake in travel time estimation. Activity occurrences diminish the limit of street fragments and bother typical movement stream. Besides, this examination shows the basic strides to assess the effect of movement incident furthermore represents how investigation can be performed and at last that the exactness of results can be expanded. The research aim is to analyze impact of traffic incident and identify traffic condition that might lead to traffic accident by using PTV Vissim. The travel time is increased by 18.25% and in average 2.01% due to lane block condition and incident points respectively. This travel time will affect the efficiency of network of study area; so there is necessity to consider the impact and authorities should manage the situation adequately.

Keywords: Congestion, Incident, non-recurrent, Travel time

I. INTRODUCTION

The critical method of transportation is Road Transport. It is the most famous method for transport. Street Transport is further subdivided into two classifications, for example, Vehicular Transport specifically Cars, Trucks, Busses, Lorries, Auto Rickshaws and so forward and Non-vehicular Transport, for example, Animals like Cow, Dogs, Horse and so forward. On the planet India involves biggest street systems comprising of national highways (NHs), State highways (SHs), major district roads (MDRs), and RRs that incorporate other region streets and town streets.

Because of slower speeds, longer outing circumstances, and expanded vehicular lining activity blockage on street transport increments. Expanding populace and mechanization has prompt to traffic congestion in urban territories. Activity congestion is generally isolated into two sections, recurrent and non-recurrent. Recurrent congestion is sure and is transport about by expanding limit of street. Non-recurrent blockage is transport on by arbitrary incident where the street limit is incidentally reduced by traffic incidents, work zones, unfriendly climate [10]. In non-recurrent blockage, because of arbitrary incidents the peak hour requests are higher than typical requests. To minimize incident delay occurrence administration projects are composed.

Recognizing the impacts of incidents on congestion, incident administration projects are managed to minimize incident delay by rapidly restoring the limit of a street arrange on account of an incident. An efficient comprehension of incident attributes and examples is basic to resume a street system to its full limit. Hence, the collecting and investigation of traffic identified with activity incidents and their segments are critical

Travel time is an urgent part of street transportation, which is inspected as a compelling variable for measuring transportation arrangement execution [10]. Travel time mirrors the productivity of a street organizes. Congestion prompts to expanded travel times. Congestion not just builds travel times, travel times additionally turn out to be more factors and flighty as blockage increments Blockage administration frameworks ordinarily utilize travel time-based execution measures to assess and screen movement congestion. We have to characterize countermeasures of movement occurrence keeping in mind the end goal to maintain a strategic distance from the subsequent delay because of increment in travel time.

Numerous specialists have highlighted the impacts of congestion, especially non-recurrent congestion on travel time. In such manner, traffic incidents have been perceived as a noteworthy contributory variable. Because of its irregular conduct, many components add to the interrelations amongst travel time and delay. Travel time can be measured by various definitions: from everyday, over the course of the day, and vehicle-to-vehicle. In this way, the travel time measure is autonomous of blockage effects, which infers that there is no fluctuation in travel time on a congested street where comparable circumstances happen each day.

Various papers have been studied related to the topic and some of them presented: VanLint, Steven, Chien, Chandra Mouly Kuchipudi and Ruimin Li1 Geoffrey Rose and Majid Sarvi [1,2] have presented a reliable framework for online travel time prediction for freeways which used to generate traffic information on freeways. This empowers activity supervisors to screen continuously the unwavering quality of this framework without really measuring travel times. Ossenbruggen and Laflamme[3]
have concentrated basic role is to better comprehend the connection between interstate activity stream and speed identified with episodes of repetitive and non-intermittent blockage for this they summed up added substance binomial model to gauge the likelihood of clog and State-space models of speed and stream. Jun-Seok Oh, Cheol Oh, Myungsoon Chang, Praveen Edara and Brian Smith[4,5] have studied traffic safety that concentrated on dramatic information examinations for this they built up a model to recognize movement condition from continuous interstate activity information and to distinguish the connection between activity condition by traffic data and accident rates. Yue Liu, Woon Kim and Gang-Len Chang [6] proposed a reroute choice strategy for urban road non-recurrent congestion administration to give an administration arrangement of non-recurrent congestion for urban expressway and to decide the need of actualizing makeshift route operations amid non-recurrent congestion and the outcomes plainly demonstrate that a convenient and all around supported bypass operation can yield generous advantages to both the driving populace and the whole group. Ali Hajbabaie, Seyedbehzad Aghdashi, Deo Chimba, Boniphace Kutela and Gary Ogletree [7,8,9] have concentrated the travel time circulation over a long interstate path because of varieties in activity request levels, nasty climate conditions, and incidents that happen stochastically on an expressway office for this they proposed a basic leadership system in view of a travel time unwavering quality approach. Hongbing Zhang, Asad Khattak, Zhao Kang-jia, Chen Shu-yan and Lao Ye-chun[10,11] analyzed the different incident on expressway and traffic incidents which helps in better understanding activity stream qualities in anomalous conditions and furthermore gives a hypothetical premise to movement control techniques.

The primary point of this study is to create models to anticipate the effects of traffic incident on travel time on continuous roadway, for example, motorways. Objective has been distinguished to achieve this primary point are to identify traffic condition that might lead to traffic accident and to analyze the impacts of traffic incidents.

II. METHODOLOGY

To analysis a coherent structure investigation (Log frame) is utilized to examine the procedure for organizing and systematizing the information gathering, and demonstrating of this exploration. This approach is presented in light of a reasonable strategy to study complex tasks and to encourage better comprehension of the examination. This strategy highlights the center issues for examination and investigation in the exploration for this the study area is selected and recognizes the start-up steps.

A. Study Area

Nagpur is the winter capital and the third greatest city of the Indian state of Maharashtra and greatest city of central India. It has a standout amongst the most amazing instruction rates of 91.92% among all the urban agglomerations in India and one of the proposed Smart Cities from Maharashtra [12].

Nagpur is a critical crossing point for roadways as India's two essential national highways; Kanyakumari-Varanasi (National Highway 7) and Hajira-Kolkata (National Highway 6) experience the city. One more thoroughfare number 69 interfaces Nagpur to Obaidullaganj close Bhopal [12].

Fig. 1: Study Area (Source: GOOGLE Earth)
The study route selected has ring road connectivity to the major corridors of the city route and the maximum traffic flow is present over there. In study route as in fig. 1 consist of one major street and three minor streets and it consist of three intersections at which the traffic data and accident data are calculated. At the selected route to study area the travel time is calculated due to lane block which is divided in three cases like case-1 case-2 and case-3 represented as normal condition (no lane block), one lane block of Jayatala road and Subhas nagar road and one lane block of Trimurti nagar road and Subhas nagar road respectively at various locations such as A, B, C, D, E, F and G of the study route represent as T-point to Subhas nagar, Jaganan mandir to Subhas nagar, Subhas nagar road to Subhas nagar, Nagmandir road to Subhas nagar and IT park road to Subhas nagar respectively and travel time is calculated due to incident at different location such as T-point, Sitalamata mandir, NIT Garden and Sambhaji to Padole chowk.

B. Data Input
The main stage in the Log frame is "information sources" which affects the ensuing stages and results. In such manner, the data which are requiring to this study are accident data, traffic volume data and holiday data. The accident data is shown in figure 1 on X-axis which shows years from 2009 to 2016 and Y-axis shows the total number of accident and the traffic data is shown in figure 2 on X-axis it shows various locations at which require traffic volume data in PCU is collected such as A, B, C, D, E, F and G represented T-point, Jayatala, Subhas nagar, Gajanan mandir, Subhasnagar road, Nagmandir road, IT park road and Padole chowk respectively.

C. Data Processing
The second phase of the Log frame approach is the "procedure". In this stage, all information gathered from various sources is handled before the investigation organizes. The unformed occurrence information are normally fragmented, conflicting and contain errors. The initial step of this stage is "Information Screening". In this progression, the unformed occurrence information are assessed and arranged for the following strides. Amid this procedure, all factors are assessed and all irregularities are prohibited or balanced. In such manner, the fundamental criteria for checking and settling mistaken incidents information incorporate occurrence records without any directions, with negative occurrence span, with no begin time or end time and in addition the incident records from the street arrange. The second step is "Information Calculation", where determined factors are checked considering distinctive components from various information sources, for instance, estimation of the diverse lengths of precipitation for every incident.

D. Data Analysis
The third stage in Log frame is "analysis". As indicated by the aim of the study the investigation of the traffic incident affect assessed utilizing PTV Vissim software. Reproduction of movement framework utilizing tiny activity recreation software named as PTV Vissim as it ready to reenact multi-modular transport and different vehicle sort. It gives detailed introduction of the street system and vehicle development and it give reasonable outcome. It gives the outcome in light of operational level and considering singular vehicle attributes.

![Fig. 2: No. of accidents under selected study area](image-url)
III. RESULT AND DISCUSSION

The study is implemented with the acquired data of accident, traffic and public holiday data, through these data the incident points and block lanes are selected and the study routes are drawn in PTV Vissim software. The link-based and conditional based (incident points and lane block) travel time of vehicles in the network is calculated.

The result of lane block is represented in fig. 4 on X-axis various location and on Y-axis it shows the travel time and due public festival blockage of the single lane occurred and travel time is increased by 18.25% as of normal condition.
The result of incident is represent on fig. 5 on X-axis various locations where the incident occurs respectively and on Y-axis it show the travel time and at the above location the traffic flow is affected and the travel time is increases by 0.89%, 5.13%, 0.18% and 1.65% on above location respectively.

IV. CONCLUSION

Traffic incidents are the basic origin of non-recurrent congestion on road systems. Travel time is a champion among the most basic execution of transport execution for travellers and an operational point of view. Though numerous past reviews have done level best to appraise distinctive effects of traffic incident, understanding about the connection between traffic incident and travel time, and additionally the critical elements influence this relationship, is as yet restricted. To address and enhance the information around there, this review built up a logical framework to get the main objective of this study, which expected to model traffic incident issues to calculate the smash of traffic incidents on travel time.

REFERENCES