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# INVESTIGATION OF OPTIMUM SPEED ON HIGHWAY

**Rajeshwari B[1], Smitha gowda M S[2], Kavya S N[3]**

[1]*Assistan Professor, Department of Civil Engineering, East West Institute of Technology, Bengaluru*
[2]*Assistant Professor, Department of Civil Engineering, East West Institute of Technology, Bengaluru*
[3]*Assistant Professor, Department of Civil Engineering, East West Institute of Technology, Bengaluru*

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**Abstract -** *People usually consider that higher speed of the vehicle reduces the travel time. For this reason, high speed is very common in India. Many people drive at high speed and cross the signal just before it turning red, causing risks of accident, and discomfort to the traffic from another direction. This paper presents the results of a preliminary investigations conducted on express highway (NH-53) section between Durg and Raipur in Chhattisgarh. It is observed that average speed of vehicle is constant irrespective of the driving at high speed. Overall travel time remains constant, being nearly same in the section irrespective of the driving speed.*

***KeyWords*: Trip, Travel Time, Optimal speed, High Speed, average speed**

## 1. INTRODUCTION

India's population is second largest in the world and in last decade many express highway were constructed in India to support urban and rural transport. People usually consider that higher speed of the vehicle reduces the travel time. For this reason, rash driving is a common sight in India. Due to driver's ride impulse, many people try to cross the signal just before it turning red, causing risks of accident and discomfort of the traffic from another direction. However, due to many factors higher speed may not always result in less travel time. This paper investigates if speedy driving results in lesser travel time or if it does not have much impact. This paper presents the preliminary findings of an investigation conducted on express highway (NH-53) section between Durg and Raipur in Chhattisgarh. It may be noted here that the findings are very preliminary and detailed study is in progress.

## 1.1 Optimum speed on highway in India

Optimal speed is the most favorable speed which causes least accidents, wear and tear of vehicles.
Due to lack of knowledge on optimum speed upto 60 percent of the accidents occur on highways in India .
The most deaths due to speeding were in Rajasthan (9,618 deaths), followed by Tamil nadu (9,224 deaths) and Karnataka (8,714 deaths) in 2015. The current speed limit in the country is 80 km per hour on a 4-lane highway. However, the WHO has recommended that if we reduce the speed limit to about 55-57 km per hour, we could save around 30%-37% lives by considering the fact that travel time will not vary much in spite of high speed specifically for highway.

## 2. DATA COLLECTION

This paper presents a preliminary case study conducted on express highway (NH-6), which is part of Kolkata Mumbai expressway, on a section between Durg and Raipur in Chhattisgarh. Total distance between Durg and Raipur is 32 KM and the study was conducted on the expressway section of 27 km distance. In 27 km distance of the expressway, there are seven traffic signals. The measurements were taken for vehicle average. In addition, measurements were taken for the private transport mode. The results and analysis are presented in next section.

## 2. RESULTS AND ANALYSIS

Table 1 represents times taken by private transport mode for six set of observations – named T1 to T6 during evening hours. Within each set, times are noted for three trips with the same maximum speed to calculate the average speed for each set of observations.

**Table -1:** Total time by private transport mode

| TRIP | MAXIMUM SPEED | TIME (Minute) | AVERAGE SPEED KM/H |
|---|---|---|---|
| T1 | 100 | 44 | 36.54 |
| | 100 | 43 | |
| | 100 | 46 | |
| T2 | 90 | 46 | 35.73 |
| | 90 | 44 | |
| | 90 | 46 | |
| T3 | 80 | 44 | 35.73 |
| | 80 | 47 | |
| | 80 | 45 | |
| T4 | 70 | 45 | 36.26 |
| | 70 | 46 | |
| | 70 | 43 | |
| T5 | 60 | 46 | 34.96 |
| | 60 | 47 | |
| | 60 | 46 | |
| T6 | 50 | 47 | 34.46 |
| | 50 | 46 | |
| | 50 | 48 | |

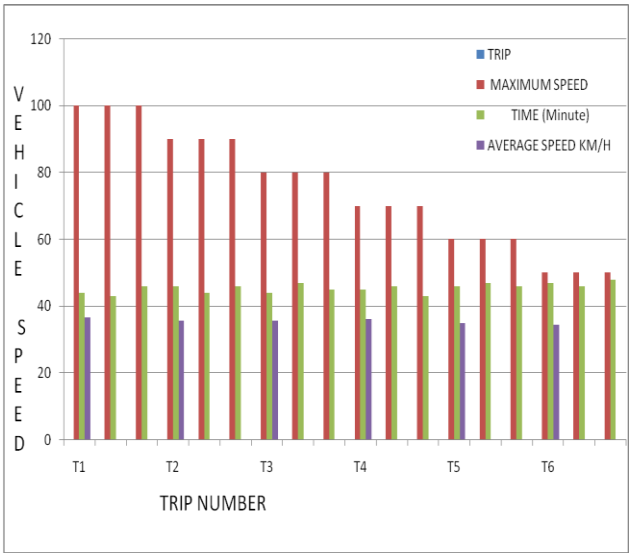


**Chart -1:** Total time by private transport mode

The total travel time measures for trip 1 to trip 6 was approximately same for different maximum speeds, there by resulting in approximately same total travel time. This indicates that the driving speed may not be a major factor in determining the total travel time. The uneven traffic density is the main reason which restricts the possibility of maintaining the maximum speed. Different levels of service [2,3] conditions prevail across different sections based on the driver's position in the traffic (i.e. whether the driver is in the front position during the red light), timing difference between signals (e.g. the driver may find the first signal green but the next two are red), or different traffic densities in different sections. Due to these differences, a driver may speed-up at one section but may need to wait on another. Therefore, in the long-run traffic lights and other conditions push the traffic conditions towards an equilibrium where total travel time is nearly same for everyone irrespective of their maximum driving speed. Therefore, rather than just focusing on speed, recent works make use of complexity theory in traffic analysis by noting small changes in multiple variables.

**Fig -1**: NH-53 speed monitoring.

## 3. CONCLUSIONS

The primary conclusion of this research is that the driving speed has very little effect on the total travel time due to multiple other situational factors that result in the equilibrium of travel time. These factors may be the driver's position in the traffic, timing difference between signals, or different traffic densities in different sections. Therefore, traffic models should include variable that have an impact on the level of service.

A main limitation of this paper is that the data is very limited and the observations were manually recorded. However, it may be noted that this is a preliminary investigation and it is planned to include data for over a month and then running computer simulations based on the collected data in the future research.

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