

# Study of Road Safety Audit in Sagar at Sironja Road as Per IRC-88 - A Review

Anupam Shrivastava<sup>1</sup>, Dharmendra Prajapati<sup>2</sup>, Anudeep Nema<sup>3</sup>

P.G. Scholar<sup>1</sup>, Assistant Professor<sup>2</sup>, Professor and HOD<sup>3</sup>

Department of Civil Engineering, Eklavya University Damoh, Madhya Pradesh, India

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## ABSTRACT

Accidents are a drain on the national economy and may lead to disablement, death, damage to health and property, social suffering and general degradation of environment. To minimize the no of crashes by any kind and severity expected to occur on the entity during a specific period is known as road safety. Accidents and the fatalities on road are the result of inter-play of a number of factors. Road users in India are heterogeneous in nature, ranging from pedestrians, animal- driven carts, bi- cycles, rickshaws, hand carts and tractor trolleys, to various categories of two/three wheelers, motor cars, buses, trucks, and multi-axle commercial vehicles etc., The vehicle population has been steadily increasing because of change in the style of living of people. Increase in vehicle population with limited road space used by a large variety of vehicles has heightened the need and urgency for a well-thought-out policy on the issue of road safety. In India the rate of accident is directly proportional to growth of vehicle population.

In this paper past publications are reviewed and researches are reviewed.

**Keywords :** Road Safety, Blind Spots, Accident Prediction Model.

## I. INTRODUCTION

According to MORTH-2018 states 467 k total road accidents YOY 2011 to 2018 in India placing the country with highest number of accidents in the World. Accident Severity has been increasing year by year. A road accident is an unplanned and uncontrolled occasion, which happened on a road open to an open activity bringing about individual harm, harms to the property and death toll in which no less than one moving vehicle was included. Rapid

growth of population coupled with increased economic activities has favored in tremendous growth of motor vehicles. This is one of the primary factors responsible for road accidents. It is observed that few works have been carried out on statistical analysis of accidents particularly on Highways.

Road safety is one of the most important problems in our society. Every year 1.2 million of people are killed and between 20 and 50 million people are injured in road accidents. If current trends continue road traffic

accidents are predicted to be third leading contributor to the global burden of Disease and injury.

India had earned the dubious distinction of having more number of fatalities due to road accidents in the world. Road safety is emerging as a major social concern around the world especially in India.

Accidents are a drain on the national economy and may lead to disablement, death, damage to health and property, social suffering and general degradation of environment. To minimize the no of crashes by any kind and severity expected to occur on the entity during a specific period is known as road safety. Accidents and the fatalities on road are the result of inter-play of a number of factors. Road users in India are heterogeneous in nature, ranging from pedestrians, animal- driven carts, bi- cycles, rickshaws, hand carts and tractor trolleys, to various categories of two/three wheelers, motor cars, buses, trucks, and multi-axle commercial vehicles etc., The vehicle population has been steadily increasing because of change in the style of living of people. Increase in vehicle population with limited road space used by a large variety of vehicles has heightened the need and urgency for a well thought-out policy on the issue of road safety. In India the rate of accident is directly proportional to growth of vehicle population.

Road accidents are a human tragedy, which involve high human suffering. They impose a huge socio-economic cost in terms of untimely deaths, injuries and loss of potential income. The ramifications of road accidents can be colossal and its negative impact is felt not only on individuals, their health and welfare, but also on the economy. Consequently, road safety has become an issue of national concern. Road Safety is a multi-sectoral and multi-dimensional issue. It incorporates the development and management of road infrastructure, provision of safer vehicles, legislation and law enforcement, mobility planning, provision of health and hospital services, child safety, urban land use planning etc. In other words, its ambit spans engineering aspects of both, roads and vehicles

on one hand and the provision of health and hospital services for trauma cases in post-crash scenario.

## II. LITERATURE REVIEW

Kartik Venkata Mutya, Sandeep Rudra 2015 “Road Safety Mechanism to Prevent Overtaking Accidents” Author proposed a system using few gadgets which could enhance the safety by preventing when the driver of the vehicle going behind the large vehicle to be overtaken is warned about the vehicle coming in the opposite direction as hit a vehicle turning right as the overtaking vehicle was attempting to pass.

The system was proposed for large sized vehicles and has an automated sub-system that works with a microcontroller and a manual human controlled switch which needs to be operated by the driver upon requirement.

The working mechanism of system stated that the proximity sensors at the rear end of the vehicle are always activated, when a vehicle comes in the vicinity of the sensors they give an output signal to the control unit The control unit then performs two operations simultaneously, it gives an output signal to the video camera to start recording and forwards an activation signal to the tweeter. In this step, two actions take place simultaneously, the tweeters produce an alarm sound, as a result of the input received from the control unit, because of which the driver then looks at the monitor which by then would have received an input signal from the video camera at the back.

Conclusion stated that it is due to blind corners while overtaking that many of the trailer truck road accidents take place. This mechanism aims to provide an economical, docile way to prevent such accidents from happening and also facilitate ease of implementation so that it can used in middle and low income countries without incurring heavy costs.

Bhupendra Singh; Ankit Gupta 2015 “Recent trends in intelligent transportation systems: a review” The author presented four major parts of ITS (Intelligent

Transportation System) i.e., Advanced Traveler Information System (ATIS), Advanced Traffic Management System (ATMS), Advanced Public Transportation System (APTS), and Emergency Management System (EMS) with a primary objective to study various ITS architecture and model and review such models to get in-depth of their architecture.

It was clear that most of the ITS studies have been based in the developed countries. In developing countries still much work is needed in this field to solve the emerging traffic related problems. Most of the ITS systems have been developed on the GIS or WWW platforms. Both the platforms have their own advantages. While GIS platform provides very powerful spatial analysis techniques whereas WWW platform prove to be very useful in providing real time information. Some developed systems used integration of both GIS as well as WWW platforms which makes it possible to use the advantages of both the platforms. Most of the developed systems are based in the urban areas. There is a great scope of work to be done in rural areas. The GPS is very useful in all the ITS systems. GPS data is 50% more efficient in terms of manpower. It was found in the literature that with the use of ATMS technology the travel time was reduced around 1.9% - 29.0% and average stop speed reduced around 14.8% - 55.9%. With the use of EMS the responding speed applied to system is increased around 50% and the total time needed to handle the emergency event was decreased around 40% than the other traditional method.

In ITS real time information is a very important factor. GPS is one technology which can help in this direction so the work needed to be done towards making GPS more accurate and economical. In all the developing countries mixed traffic conditions prevails, so in the development of the ITS mixed traffic conditions should also be considered in order to make it applicable in developing countries also. In implementation of the ITS especially in developing

countries its installation and operating cost are very big factors. Hence, the work should be done in the direction to make the ITS more economical. New emerging technologies like Zigbee and RFID can be helpful in this direction. The reach of ITS till now is limited to few persons so the work should be done in order to make it more accessible and user friendly. The use of mobile phones can be really helpful in this direction as mobile phones are most commonly used electronic gadget all over the world.

Danish Zaffar Wani, Haiqa Riyaz and Ubaid Illahi 2016 "Solving Congestion by Designing of Traffic Signal at T-Intersection (Qamarwari Chowk) in Srinagar, J & K" Here the author carried out traffic studies and measurements were taken at the "Qamarwari Chowk" which was a T-Intersection in order to design traffic signal so as to highlight the problems which are in turn a cause of congestion at the intersection.

The major aim of this study was to solve congestion and make the traffic flow smooth at this T-intersection, which was done with the help of Traffic Signal Design. The design was carried out as per IRC guidelines is chosen which works out to be efficient. The method also explained about the pedestrian green time which was a very important concern regarding safety.

The study concluded the need to road widening at the intersections so as to cater the dense traffic efficiently besides forced on installation of traffic signals at the point of intersection so as to avoid any accidents. The Traffic handling capacity would be highest among the different types of intersections due to the reason that it is at-grade. This will provide a chance to the traffic of minor road to cross the continuous traffic flow of main road at reasonable intervals of time. At this intersection automatic traffic signal should be installed because they may work out to be more economical when compared to manual control.

Meng Lu, Kees Wevers, Evangelos Bekiaris 2006 "Traffic safety principles and physical road

infrastructure measures” The author presented the underlying concepts of safe road design with the aim of facilitating a comparative functional analysis of driving assistance systems and infrastructure measures for traffic safety underlying concepts of safe road design, and derives a general set of traffic safety principles.

Author defined an extended set of five traffic safety principles, and sixteen more operational sub-principles or traffic safety requirements. These principles and requirements better cover the whole spectrum of traffic safety measures than previous sets, which more specifically relate to infrastructure measures, and especially provide a good basis for a functional comparative analysis of measures based on infrastructure and driving assistances systems.

Proposed an alternate road categorization which is an essential element in safety focused road design, as well as for an optimal selection of safe routes through the network.

Even proposed future scope towards the possibility to develop an alternative objective method for assessing accident probability, which is not based on historical statistics, but on road function categorization and quantitative road parameters, such as, for instance, road geometry and layout (including variables like road surface, slope and banking), flow density, legal speed limit and behaviour.

Azadeh Emami, Majid Sarvi, Saeed Asadi Bagloee 2019 “Using Kalman filter algorithm for short-term traffic flow prediction in a connected vehicle environment” Author presented a Kalman filter technique to predict traffic flows approaching an intersection based on the data of connected vehicles. At the first stage of methodology the author adjusted the parameters of the Kalman equations through the use of Vissim microscopic traffic simulator and later evaluate the performance of the model for different penetration rates of connected vehicles under various traffic conditions.

The obtained results presented that the Kalman filter performs well when the penetration rate is more than 20%.

It was apparent from the results that the proposed method has an acceptable accuracy to predict the traffic flow even in the presence of abrupt changes in traffic condition. Moreover, there was a positive correlation between the model’s accuracy and the penetration rates, in the sense that, as the penetration rate increases, the model predicts traffic flow with more resolution.

Zhengyi Cai, Manchu Xiong, Dongfang Ma and Dianhai Wang “Traffic design and signal timing of staggered intersections based on a sorting strategy” The author identified problems generated due to staggered intersection as its geographical characteristics consists of two T-legged intersections that cause the lost time per cycle to become longer than at cross intersections under conventional signal control, thus leading to low intersection efficiency.

Further stated the way of to eliminate at the left–right type of staggered intersection by channelization and signal phasing, based on a sorting strategy and pre-signal, which reduce the amount of lost time during the signal cycle using the split distance as the sorting area.

Author used VISSIM which allows to stimulate traffic patterns whether comparing junction geometries, analyzing public transport priority schemes or considering the effects of certain signaling, for the purpose of modelling and analyzing the proposed method as well as the conventional method for comparison purposes This research has presented a signal control design for the LR type of staggered intersection, including intersection channelization and signal phasing based on a sorting area and pre-signal. This method reduces the lost time of the signal cycle using the split distance as a staggered area, which holds the transient queues of vehicles released into the sorting area. The sorting area is required to hold the relocated traffic queue of LVs from the

minor road without queuing back, which depends on the length of the sorting area and the number of vehicles released during the green signal from the minor street. Thus, short cycles may be needed if the length of the sorting area is short.

The sorting area allows cycles to be shortened by decreasing the lost time per cycle compared with the conventional method. When analyzed using a case study based on the VISSIM simulation, the proposed method shows promise in reducing the average delays and maximum queue lengths for each movement and the entire intersection, both in the off-peak hour and peak hours. The analysis in this article was conducted for a single length of sorting area.

Md. Tufajjal Hossain, Md. Kamrul Hasan 2019 "Assessment of Traffic Congestion by Traffic Flow Analysis in Pabna Town" Author conducted this research to measure the intensity of traffic congestion of Pabna town where the primary methodology was Traffic volume survey and spot speed study.

The research explored that auto-rickshaw, cycle rickshaw, bicycle, and motorcycle are the popular traffic mode and traffic flow becomes so intensive during the morning, noon and evening hours. It has also revealed that Ataikula road is the most congestion-prone route than A.H road and the level of services of all intersections is F except traffic which provided a comparatively better level of services to the travelers of the town.

Research paper suggested One-way traffic flow may be a possible solution of congestion for the town. Moreover, it has been observed that most of the commercial activities of the town take place within a very narrow space comparing to its total area. Therefore, growth centers should be developed at different important locations of the town to reduce trip generation towards the downtown of the town.

Enwuso Aleruchi Igwe, Daniel Azeruibe Nyebuchi 2017 "Thermal Effects on Elastic and Rigidity Modulus of Flexible Pavement Wearing Course" Researcher carried out Laboratory investigation of

flexible pavement using asphalt concrete samples to simulate the behaviour of actual field conditions of a flexible pavement. This was done to ascertain the changes that will result in the elastic and rigidity (shear) modulus of flexible pavement when subjected to increasing temperature conditions (thermal effect). The study became pertinent because mechanistic design of flexible pavement requires as input the determination of stiffness and strains of the pavement for accurate design.

Stiffness was limited to elastic and rigidity modulus. Samples were prepared for three categories of traffic and subjected to increasing temperature differentials of 20–60°C.

Results revealed that under increasing temperature viscosity of the binder (asphalt cement) is greatly reduced thereby reducing cohesion of the composite mix for all categories of traffic considered. In addition, the reduction in viscosity negatively affected the stiffness (bonding of asphalt cement with aggregates) behaviour of the pavement which directly influenced the reduction of both the elastic and rigidity modulus of the pavement for all categories of traffic under study.

Homayoun Harirforoush\*, Lynda Bellalite, Goze Bertin Bénié 2019 "Spatial and Temporal Analysis of Seasonal Traffic Accidents" Author's research paper presented an approach to analyze spatial and temporal (spatiotemporal) patterns of traffic accidents and to organize them according to their level of significance. Such approach was practically tested using three years (2011-2013) of traffic accident data for Sherbrooke.

The spatiotemporal patterns of traffic accidents were analyzed using kernel density estimation (KDE) for four different seasons. Two different crash measures were compared: simple crash counts and severity-weighted crash counts.

Results presented that severity-weighted crash counts reveal the effect of a single fatal/severe injury or light injury crash on the patterns. However, the lack of a significance test is the main drawback of the KDE.

Therefore, this paper integrates the KDE with local Moran's I to identify clusters of statistical significance for traffic accidents within each area. Thus, after the density is calculated by the KDE, it is then applied as the attribute (input value) for calculating local Moran's I.

Ranganathan. B.A 2016 "Road Safety and Accident Prevention in India" Authors research paper stated few stats and compared it with the traffic norms of India with European and US counties with an example that in US. The driving license needs to be renewed after every two years where they need to go thorough set of tests regarding and the people there are updated with new rules and amendments with such process.

This research paper identified few dark spots which leads to accidents on road and suggested few measures such as Identification of black spots/accidents prone spots, Round the clock accident relief team at all district headquarters, Educating public on traffic rules regulations and 4 E's Education (ii) Enforcement (iii) Engineering (roads as well as vehicles) and (iv) emergency, etc.

Singh Ajay Ranveer, Mukesh pandey, Sohit Agrawal 2017 "Smart Road System To Ensure Road Accidents & Traffic Flow: An Overview" Authors research paper worked on improvisation of road network system & design of road of a country which plays very crucial or vital roles in development & growth in various field like economic, social, cultural etc.

Research project suggested use of Power generation through speed breaker, 3D speed breakers, Road Marking and Indicator.

Derived conclusion stated introduction of innovative idea or concept and methods to minimize the road accident, traffic volume and road casualties with utilizing road for electricity generation and other factor and also improvisation and give attention to pervious method and concept.

Amirarsalan Mehrara Molan, Mahdi Rezapour, Khaled Ksaibati 2019 "Modeling traffic barriers crash

severity by considering the effect of traffic barrier dimensions" Research paper presented two new analytical models to investigate the effect of different variables on the severity of crashes involving traffic barriers, and end treatments.

Methodology included a field survey conducted on over 1.3 million linear feet of traffic barriers (approximately 4,176 miles road) in Wyoming to measure traffic barriers' geometric features like height, length, offset, and slope rate. The collected data included 55% of all non-interstate roads of Wyoming. Results stated that the crashes involving box beam barriers were less severe than the crashes involved with W-beam or concrete barriers. The traffic barriers with a height between 28 and 31 in. were found safer than the traffic barriers shorter than 28 in., while there was no significant difference between the traffic barriers taller than 31 in. to those shorter than 28 in. in terms of crash severity. The end treatments located nearer to the traffic lane had lower crash severity.

Raktim Pratim Tamuli "Road Safety Measures" Authors research paper stated that young people in the age group of 18-30 year are mostly involved in road traffic accidents, especially in two wheelers.

Recommended use of Protective gears like helmet, boots, and gloves are absolute necessity for riding a motorcycle. For four wheelers use of seat belts was highly recommended.

Author stated few measures to insure decrease in road accident due to traffic and road awareness as Parents should teach their children the common traffic rules and also should encourage their children regarding judicious use of motorbikes, Limit the speed of your vehicles and also stop drivers of public transports from crossing the speed limit, Proper implementation of ban on drink and drive, and use of mobile phones while driving, and Awareness to the public regarding importance of "golden hour" and rapid transportation of victims to specialized trauma centres, etc.

Rijurekha Sen, Bhaskaran Raman 2010 "Intelligent Transport Systems for Indian Cities" This research paper presented a comprehensive study of all available ITS systems, including both research prototypes and deployed systems posing a set of interesting open research problems in the context of Indian ITS.

There was scope for evaluating existing ideas in different and challenging traffic scenarios, innovate new solutions and empirically evaluate ideas in collaboration with public and private sectors.

Author put together the different ideas and people relevant in Indian ITS, so that it provide an overview of the problem and the available solutions.

N. Nishanthan, K. Thiruthanigesan, Dr. Panos Georgakis (2017) "Towards The Development Of Intelligent Transportation Systems In Sri Lanka" proposed an advance system to cope with the many issues like accidents rate, traffic congestion, traffic & carbon emissions air pollution, etc. the proposed system included real-time travel information display system solutions based on a fully transparent data distribution platform.

Research paper concluded the use of Intelligent Transportation System (ITS) to improve safety and making traffic flow, conjunction. This is may increase the number of the journey with Colombo Municipal Council (CMC) area. The Colombo Municipal Council (CMC) is economy will improve through the access. This is the influence of business and residential area which is negative impaction social and environmental. These are the factors consider in Colombo Municipal Council (CMC) for the travel information.

Vaiana Rosolino, Iuele Teresa, 2013 "Road safety performance assessment" a new road network Risk Index for info mobility. The research paper presented first applications of a methodology for developing a road safety performance index, Risk Index (RI), related to the risk deriving from infrastructure's features. In detail six different classes of events are identified: number of occurred accidents; density of

intersections/accesses on the road section; road surface anomalies; problems related to both horizontal and vertical road signs and deficiencies of roadside and safety barriers.

The research was focused on the possibility of giving real time information to road users about the risks associated to the specific travelled road segment, using a multiplatform mobile application and GPS system. The information was given to drivers considering driver's speeds (operating and average speeds) that are registered continuously by the application. In order to reach this aim, the road network was discretized with a squared grid: each node derived from the intersection of the grid with the infrastructure's network was considered as an informative node which contains the information related to an area, centered on the same node (RIj). This step represents just the initialization of the road network, which will be enriched with new points generated by users trips uploaded through an automatic server-side.

The proposed methodology was validated by means of a pilot study on a road test-site in province of Crotone (Calabria, south Italy); a sub-set of input parameters for the Risk Index calculation was selected. The values of the Risk Index estimated for some particular road segments were compared to the qualitative analysis obtained by a Road Safety Inspection of the same test site. Results showed that the methodology allows to reach a satisfactory matching between the two sets of data.

Aparna Verma, Ashutosh Gupta and Baikunth Nath 2017 "Road Safety Improvement in India" The research paper presented that the public and drivers are still not aware of road Safety program and for this improvement road safety management has highlighted the lack of road safety awareness.

Further the research stated that accidents on India's roads are a major concern for road safety management and to decrease the road accidents, some measures also have been suggested by Road Safety Management.

Road safety awareness program were organized for the public and they were trained. Frequently people are affected from minor and major accidents are reported and recorded for improving the great road safety improvement in India.

HameedAswad Mohammed 2013 “The Influence of Road Geometric Design Elements on Highway Safety” The research paper considered road geometric design elements and characteristics, further explanations were stated how to which extent they affect highway safety.

The relationship between safety and road geometric design were examined through results of studies made in different countries and it was compared with results of studies in different countries and summarizes current international knowledge of relationship between safety and the principle non-intersection geometric design parameters.

Author stated the safety of cross-section and alignment elements with various measures such as Lane and shoulder conditions directly affect run-off road (ROR) and opposite direction (OD) accidents. Other accident types, such as rear-end and angle accidents, are not directly affected by these conditions, Shoulder wider than 2.5m give little additional safety. As the median shoulder width increase, accidents increase, etc.

Akhand Pratap Singh, Dr. S.S.Goliya, Dr. Rakesh Mehar (2018) “Road Accident Analysis for Evaluation of Safety at Different Location in Vidisha City” Road Traffic Accidents (RTAs) are an important cause of morbidity and mortality worldwide, especially in low and middle income countries. Traffic police reports indicate that RTAs are amongst the commonest health challenges India faces.

The study was oriented in Vidisha city different location in which data was collected from police station and sp office vidisha.

Study evaluates the root causes of road accidents and its financial repercussions on the personal life of the victims and the family. fault of motor vehicle driver is

the main cause of road accident and followed by ‘other reasons’, fault of other motor vehicle drivers, drunken driving, fault of cyclist, pedestrian and passenger, technical defect of vehicles etc.

Some recommendation for country needs a lead agency on road safety, with the authority and responsibility to make decisions, control resources and coordinate efforts by all sectors of government – including those of health, transport, education and the police. This agency should have adequate finances to use for road safety, and should be publicly accountable for its actions.

### III. CONCLUSION

In this review we observed that authors in past performed study to eliminate the various causes of accident in roads, several authors identify the measures to rectify the flaws.

### IV. REFERENCES

- [1]. Arash Moradkhani Roshandeh , Mahmood Mahmoodi Nesheli, and Othman Che Puan , “ evaluation of traffic characteristics a case study “ International Journal of Recent Trends in Engineering, Vol. 1, No. 6, May 2009.
- [2]. B. K., et al. "Road accident and safety study in Sylhet Region of Bangladesh." Journal of Engineering Science and Technology 6.4(2011): 493-505.
- [3]. Ghee, C.; Silcock, D.; Astrop, A.; and Jacobs, G.D. (1997). Socio economic aspects of road accidents in developing countries. TRL Report 247, TRL, Crowthorne, UK.
- [4]. Karlaftis M, Tarko A. Heterogeneity considerations in accident modeling. *Accid Anal Prev.* 1998;30(4):425–33.



- [5]. Kristy, C.J.; and Lall, B.K. (2002). Transportation engineering. (3rd Ed.), Prentice-Hall of India private limited publishers.
- [6]. Kumar, Sachin, and Durga Toshniwal. "A data mining approach to characterize road accident locations." *Journal of Modern Transportation* 24.1 (2016): 62-72.
- [7]. Kumar, Sachin, and Durga Toshniwal. "Analysis of hourly road accident counts using hierarchical clustering and cophenetic correlation coefficient (CPCC)." *Journal of Big Data* 3.1 (2016): 13.
- [8]. Kumar, Sachin, Durga Toshniwal, and Manoranjan Parida. "A comparative analysis of heterogeneity in road accident data using data mining techniques." *Evolving Systems* 8.2 (2017): 147-155.
- [9]. Masuri, Mohamad Ghazali, Khairil Anuar Md Isa, and Mohd Pozi Mohd Tahir. "Children, youth and road environment: road traffic accident." *Asian Journal of Environment-Behaviour Studies* 2.4 (2017): 13-20.

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