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Black Sport on Highways and It's Eradication through Proper Investigation: A Literature Study

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A B S T R A C T

Roadway accidents cause numerous fatalities worldwide, with 150,785 deaths and 494,624 injuries in India alone in 2016. The government has implemented strategies to reduce accidents on National Highways, including identifying and correcting "black spots" and implementing short-term safety measures like rumble strips and cautionary signs, as well as long-term solutions like underpasses and flyovers. A study on National Highway 57 in Odisha, India, conducted a road safety audit and found hazards like poor road geometry and inadequate signage. Recommendations to improve safety include road design, traffic management, and enforcement. This audit serves as a valuable tool to improve safety on NH-57 and other highways in Odisha.

Keywords: Road Safety Audit, Black Spot, Retro-reflective test, Night visibility, Detailed analysis of road geometry, Roadside hazards

1. INTRODUCTION

Ensuring road safety is complex and involves various sectors and dimensions, such as highway network growth and management, secure automobiles, legislation and regulation implementation, urban land use planning, mobility planning, and safety measures for vulnerable road users. Responsibility is shared between the government and civil society stakeholders. The exponential growth in global economy and transportation has led to unsafe road conditions and a rising number of accidents. Developing countries with mixed traffic conditions are particularly affected, resulting in a significant economic burden. A comprehensive strategy is required to ensure road safety, including traffic regulation, road construction, provision of safer automobiles, law enforcement, and access to medical care. The Road Safety Audit is a tool used to identify possibly risky road features and recommend preventive measures. Adopting RSA can help reduce accident occurrences and improve road safety, especially in developing countries like India. It is imperative for all stakeholders to work together to prioritize road safety measures.

The study would examine the safety measures adopted in a certain section of the double lane National Highway-57, with a particular focus on identifying lacks in the highway network that have contributed to accidents and pose safety threats to road users. Investigation will look into different aspects of the road network such as design, signage, markings, and lighting, among others, to decide the degree of the problem. The thesis also aims to detect appropriate speed restrictions that match the vehicles speed on the current road profile of the road segment. This would involve analyzing different factors such as the geometry of the road, road surface condition, and traffic flow, among others, to determine the safe speed limits that are compatible with the vehicles operating on the highway. This study aims to develop a comprehensive framework for conducting Road Safety Audits on Highways that can help identify potential safety risks and recommend measures to mitigate them. By achieving these objectives, the study would contribute to improving road safety standards and decreasing the number of mishaps on Indian highways, leading to significant benefits for road users and the economy at large.

2. LITERATURE REVIEW

Geurts et al. (2003) provided a definition of black spots as a section of the road with a higher concentration of crashes than a specified value over a certain time frame. For instance, a black spot can be defined as a section of the road where at least 4 injury crashes occurred within the last 5 years. Locations where there is a high concentration of crashes over time are referred to as dangerous locations, hot spots, or black spots. Nevertheless, there is no universal definition of black spots for road accidents across the globe. The criteria for identifying black spots vary from country to country, and the traditional definitions are often based on the number or rate of mishaps.

Elvik (2007) has classified the descriptions of black spots into three categories based on the subsequent criteria: Quantitative explanations based on accident count, accident frequency, and both accident count and frequency; Statistical definitions based on the threshold worth of accident count, and the threshold value of accident frequency, and; Model-based definitions based on the Empirical Bayes approach and Dispersion value.

Geurts et al. (2005) suggested that black spots could also be detected by assessing the level of danger and the probability of an accident happening at each place. The risk level at a certain site may be greater than that in its neighboring locations. The black spot program in Australia from 1996 to 2002 extensively utilized this approach based on risk level and likelihood of crashes (Bureau of transport economics 2001). For the countries in Europe , black spots are typically recognized using the sliding window technique, which was found to be both statistically and empirically fruitless. In Germany, accident maps are utilized for identifying black spots, which are quite parallel to the sliding window approach.

An important study conducted by Elvik (2008) suggests that a uniform definition of black spots does not exist, and the criteria used to define them may influence the identification and treatment methods employed. The sliding window approach is commonly used in many countries to locate black spots on roads; however, the optimal length of the window is not standardized. Moreover, the duration of accident records considered for identification varies from nation to nation. Black spot identification is primarily based on either the number or rate of accidents in the past few years.

According to (MoRTH 2015), a roadway segment on the National Highway that spans approximately 500 meters and has seen either five motor vehicle collisions over the past three years or ten deaths over the same period is deemed a "road accident black spot." This classification encompasses both fatal and non-fatal accidents. Additionally, NH black spots are categorized according to their mean value severity index (ASI).

MoRTH provides a guideline for detecting black spots on National Highways (NHs) that depends on the fatality data obtained from traffic police of respective states or Union Territories (UTs) for each calendar year. To give each black spot a unique identification number, a state or UT code (XX) is combined with a numerical serial number of the black spot in that state or UT (YYY). This identification code is utilized for monitoring actions taken to rectify the black spots as well as for gathering feedback on accidents that occur after the rectification process. According to MoRTH (2017b), the government has acknowledged 700 black spots on NHs that need to be addressed.

MoRTH proposes the establishment of the National Road Safety Council (NRSC) as an advising body, which serves as the supreme authority under section 215 of Motor Vehicles Act, 1988 for taking policy decisions related to road safety. The National Road Safety and Traffic Management Board (NRSTMB) has also been created to supervise the strategies for implementing the road safety policy statements. Moreover, the “National Road Safety Policy” (NRSP) has been created in 2010 to improve road safety using a multi-faceted strategy and safe-system approach.

IRC:SP-88 by IRC provides a detailed framework for conducting road safety audits in India. According to this standard, a road safety audit is conducted at different phases of the road growth process, which are:

Stage 1: Planning The planning stage involves the identification of the need for the road, the determination of the alignment, and the selection of the appropriate design standards. The safety audit conducted during this stage focuses on identifying any potential safety issues related to the road's location, alignment, and design standards.

Stage 2: Detailed Design The detailed design stage involves the preparation of detailed design drawings, specifications, and construction details. The safety audit conducted during this stage focuses on identifying any potential safety issues connected to the detailed design of the road, including problems related to the layout of the road, sight distance, signage, and pavement markings.

Stage 3: Pre-Opening The pre-opening stage involves the construction of the road and its final inspection before it is opened to traffic. The safety audit conducted during this stage focuses on identifying any potential safety issues related to the construction quality of the road and ensuring that all safety features have been implemented as per the design.

Stage 4: Post-Opening The post-opening stage involves the monitoring of the road after it has been opened to traffic. The safety audit conducted during this stage focuses on identifying any potential safety issues related to the road's operation and maintenance, including issues related to traffic flow, signage, pavement condition, and the adequacy of safety features.

The guidelines in IRC SP 88 also provide detailed checklists for each stage of the road safety audit process. These checklists include specific items that the audit team should consider when conducting the audit. The checklists cover a wide range of issues including roadway alignment, geometric design, traffic control, pedestrian and bicycle facilities, and drainage.

In addition to the checklists, the guidelines in IRC SP 88 provide detailed guidance on how to conduct site visits and data collection. The guidelines emphasize the importance of collecting and analyzing crash data to identify potential safety issues. The guidelines also provide guidance on how to conduct road user surveys and public consultations to gather feedback on road safety issues.

The guidelines in IRC SP 88 also emphasize the importance of communication and collaboration between the audit team and other stakeholders such as the road agency, contractors, and the public. The guidelines recommend that the audit team provide regular updates to these stakeholders throughout the audit process and involve them in the decision-making process.

In conclusion, the guidelines provided in IRC SP 88 provide a comprehensive framework for conducting road safety audits in India. The guidelines cover all stages of the road development process and provide detailed checklists and guidance for each stage. By following these guidelines, road agencies can identify and mitigate potential safety hazards on roads and improve overall road safety in India.

3. CONCLUSION

The RSA revealed several important findings that underscore the need for improved safety measures on two-lane highways. The study identified inadequate visibility at turnings and junctions, which hinder the smooth flow of traffic and increase the risk of collisions. Additionally, special attention is necessary for vulnerable areas such as schools and healthcare centers, which require speed limits, signboards, pedestrian crossings, and traffic calming measures to protect pedestrians and other vulnerable road users.

Balancing design speed, Highway design, and user behavior is critical for ensuring highway safety. However, the study found that speed limits were rarely observed on the highways. To mitigate this, the report recommends specifying speed limits in built-up areas adjacent to educational institutes, hospitals, and markets. At curved and straight portions with inadequate visibility, speed limits should be enforced to reduce the likelihood of accidents.

Road user education and awareness are essential to promote safer driving practices and decrease the number of mishaps on the highways. The RSA suggests that school-based road safety training programs can implant safe attitudes in young persons and help produce better drivers. Additionally, raising awareness about transportation instructions and safe driving practices can help improve road user behavior and reduce the risk of accidents.

The RSA also identified a lack of clear sight distance and proper signboards as major causes of accidents on the main carriageway. To prevent future accidents, the report recommends clearing vegetation along the road, installing new visible signboards, and conducting regular maintenance and inspections to ensure safety measures are in place and functional.

The result of Retro reflective test showed that some of the signage and markings failed during testing, which poses a significant risk to road users. Failed signage and markings should be reinstalled and reapplied as soon as possible to avoid further risks and improve safety on the highways.

Recommendation

The report identifies several deficiencies in the road infrastructure that need to be addressed to improve road safety and facilitate the effective use of the highway. The following recommendations are made:

Road Markings and sign boards deficiencies: The report identifies chainage wise deficiencies of road markings and sign boards, and recommends prompt installation of these with photographs. The Authority's Engineer should review the installation.

Approaches of newly constructed Bridges and culverts: The report highlights that the approaches of newly constructed bridges and culverts are settled at different locations, which should be rectified with proper methodology.

Toll Plaza lighting: Interior and Exterior lighting at Toll Plaza area has to be installed.

Tree trimming: Trees and bushes obstructing the sign boards should be trimmed. Branches of roadside trees should be trimmed up to 5.5 mtr height.

Construction debris removal: Construction rubbles lying on the edge at many locations should be removed.

Retro reflective Tape: It is suggested that retro reflective tape should be applied to trees or electric poles within the width of the road or on the soft shoulder area adjacent to the road

Side drain covering: The report recommends covering the side drains as stated in the report.

Parking and encroachment removal: The report recommends removing illegal parking and encroachments where the road passes through built-up areas.

Emergency Telephone numbers: It is recommended to display the emergency telephone numbers such as the ambulance number, police helpline etc. along the alignment at intervals of 10 kilometers.

Black spot locations modification: The declared Black spot locations should be modified by providing proper sign boards, road marking and speed bump/rumblers to eliminate the future road crash.

Soft shoulders maintenance: Soft shoulders shall be cleared from growth of bushes and trees at regular interval. Also the undulation on soft shoulder must be removed.

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