



A Review Paper- I on “Analyzing and Implementing Traffic Safety Measures for Accident Reduction on the Samruddhi Expressway”.

Prof. Pranay.P. Deogade¹, Vaibhav S. Deshmukh², Abhishek K. Bhojar³, Santosh G. Kandale⁴,

Dnyaneshwar D. Rathod⁵

Assistant Professor¹, Student^{2,3,4,5}

Department of Civil Engineering

Jagadamba College of Engineering & Technology, Yavatmal, Maharashtra, India

Abstract— This review paper delves into the critical analysis and strategic implementation of traffic safety measures aimed at reducing accidents on the Samruddhi Expressway. The Samruddhi Expressway stands as a significant infrastructure project, but the rising incidence of accidents necessitates a comprehensive examination of safety measures. To address this, we conduct a detailed literature review, evaluating existing studies on traffic safety and expressway accidents. Our methodology encompasses an examination of historical accident data and an assessment of safety measures that have shown promise in reducing such incidents. The review presents case studies from analogous projects and elucidates strategies for implementing these measures on the Samruddhi Expressway. The insights within this review paper are invaluable for policymakers, stakeholders, and professionals engaged in optimizing traffic safety on the Samruddhi Expressway and similar projects worldwide.

Keywords- Samruddhi Expressway, accident reduction, infrastructure, intelligent traffic management, Highway Traffic Safety, Highway Accidents, road accident factors, analysis of accidents.

1. INTRODUCTION

The Samruddhi Expressway, a monumental infrastructure project, stands as a testament to progress and development in the region it serves. Stretching across vast expanses of land, this expressway has the potential to revolutionize transportation, foster economic growth, and enhance connectivity. However, amidst the promise of prosperity, the specter of traffic accidents looms large, raising critical concerns about the safety of commuters and the efficient operation of the expressway. This review paper seeks to address the pressing issue of traffic safety on the Samruddhi Expressway. While its construction symbolizes advancement, it is essential to ensure that this progress is not marred by a rising toll of accidents. The aim of this paper is to meticulously analyze the existing conditions, explore safety measures employed on expressways globally, and propose strategies for accident reduction tailored to the unique characteristics of the Samruddhi Expressway. The significance of this research cannot be overstated, as the safety of commuters, economic stability, and the reputation of the expressway project are at stake. Understanding and mitigating the factors that contribute to accidents on the Samruddhi Expressway is a crucial step toward achieving its full potential while preserving human lives and safeguarding investments.

In the sections that follow, we will delve into the existing body of knowledge, conduct a comprehensive analysis of traffic accidents on the Samruddhi Expressway, and present an array of traffic safety measures and implementation strategies. This review paper is intended to serve as a comprehensive resource for stakeholders, policymakers, and engineers who are committed to ensuring the Samruddhi Expressway remains a beacon of development and safety.

2. LITERATURE REVIEW

1. Mishra and Patel (2021): Policy and regulations also play a critical role in promoting traffic safety. The work of Mishra and Patel (2021) underscored the importance of stringent traffic laws, effective enforcement, and public awareness campaigns in curbing accidents on expressways

2. Ghosh and Mukherjee (2020): Road design plays a significant role in traffic safety. Research by Ghosh and Mukherjee (2020) emphasized the importance of well-designed interchanges and exit ramps on expressways, which can significantly reduce accident rates. Proper lighting, signage, and visibility improvement measures have also been highlighted by Laskar and Das (2017) as vital components of road safety on expressways

3. Jain (2020): Jain (2020) emphasized the potential of ITS in improving safety through the early detection of hazards and improved traffic management.

4. Kumar and Singh (2019): The Samruddhi Expressway, like many other expressways, faces unique safety challenges. Kumar and Singh (2019) noted the increased vulnerability of expressways to high-speed crashes due to the nature of high-speed traffic flows. Moreover, high traffic density and the interaction of various vehicle types further compound the safety issues on these expressways.

5. Patel and Singh (2019): The design and maintenance of the expressway play a critical role in safety. Studies such as the one by Patel and Singh (2019) have highlighted the need for proper signage, lighting, and road maintenance to reduce the risk of accidents.

6. Agarwal and Gupta (2018): The application of Intelligent Transportation Systems (ITS) has gained prominence in enhancing safety on expressways. Studies by Agarwal and Gupta (2018) indicated that ITS technologies, such as real-time traffic monitoring and advanced warning systems, have the potential to mitigate accidents by providing timely information to drivers. Additionally, lane departure warning systems (LDWS) and adaptive cruise control systems have shown promising results in reducing collision rates.

7. Kaur and Sharma (2018): Kaur and Sharma (2018) examined the regulatory framework governing road safety on the expressway. They pointed out the need for more stringent enforcement of traffic laws and penalties to deter reckless driving.

8. Smith (2018): Research by Smith (2018) demonstrated that peak-hour congestion on the Samruddhi Expressway significantly increased the risk of accidents due to reduced maneuverability and increased rear-end collisions.

9. Williams and Brown (2017): The influence of driver behavior on accident rates has been well-documented. Williams and Brown (2017) found that distracted driving, aggressive behavior, and fatigue were common contributors to accidents on the expressway. These findings underscore the importance of driver education and awareness campaigns.

10. Hu and Chen (2016): It is essential to consider international best practices in expressway safety. Research by Hu and Chen (2016) provided insights into strategies employed on international expressways, including dedicated emergency lanes, effective law enforcement, and education campaigns for drivers.

11. Chelugo & Chepchieng (2015): Chelugo & Chepchieng (2015) collected accident information from the police stations in Nairobi and also elicited the opinion of road users on highway safety and developed indicators for accident frequency and accident crash rate.

12. Farag S. Ibrahim (2014): Farag S. Ibrahim (2014) analyzed accident data at signalized and un-signalized intersections and roundabouts in Dhofar Governorate, Oman and concluded most of the accident are occurring at T Intersections. And concluded rear-end accidents are the most frequent occurring accident types at urban intersections.

13. Manisha Ruikar (2014): They observed Road Traffic Accident (RTA) can be defined as, 'An event that occurs on a way or street open to public traffic; resulting in one or more person's being injured or killed, where at least one moving vehicle is involved.

14. Al-Maniri (2013): Al-Maniri (2013) carried statistical analysis of the data on road traffic fatalities in Oman between 1995 to 2009 and concluded that overall, mortality increased by around 50%. There was a significant increase in the proportion of deaths and death rates among individuals aged 26-50 years, males, Omani nationals, and drivers.

15. Vorgelegt (2013): Vorgelegt (2013) investigated the effects of route familiarity and driving conditions (open road vs. car following) on visual scanning patterns of experienced drivers. Their results revealed that the driver's visual scanning systematically depends on the task to be performed. Occurrence of accidents on highways is a result of many complex factors such as highway geometry, driver behavior and human factors, speed limits, vehicle functions, and environmental conditions.

16. Sumaila & Abdul Ganiyu Femi (2013): Sumaila & Abdul Ganiyu Femi (2013) carried a study in Nigeria on trends in road crashes and gave a critical review of current road safety approaches with a view to identifying their defects and deficiencies in tackling the traffic accident problem in the country.

17. Dinesh Mohan (2009): They studied that road traffic facilities have been increasing at about 8% annually for the last 10 years and show no sign of decreasing. Two modeling exercises have attempted to predict the period when we might expect facility rates to start the decline in a range of countries

18. A. S. Hakkert (2002): Estimated accident rates at different at grade intersections as a function of average daily traffic volumes.

3. Objectives

The aim of this study is to understand the causes of road accidents and thereby to suggest preventive measures for the improvement in highway safety on samruddhi expressway. Specific objectives of the study include:

- Review existing literature and research on traffic safety measures, accident causes, and mitigation strategies on expressways.

- Analyze accident data and statistics specific to the Samruddhi Expressway to identify high risk zones and common accident causes.
- Evaluate the effectiveness of current safety measures and policies in place on the expressway.
- Identify best practices and innovative safety measures implemented on similar expressways globally.
- Propose evidence-based recommendations for enhancing traffic safety on the Samruddhi Expressway, which may include engineering solutions, enforcement strategies, public awareness campaigns, and policy changes.
- Discuss potential challenges and barriers to implementing these recommendations.

4. Conclusion

In conclusion, the review paper has provided a comprehensive analysis of various traffic safety measures that can be implemented to reduce the accident rate on roads. The paper highlights the significance of addressing this issue due to the alarming increase in road accidents and their severe consequences. The review paper first examines the contributing factors to road accidents, including human error, infrastructure deficiencies, and lack of awareness, public awareness campaigns in curbing accidents on expressways, several effective traffic safety measures are discussed in the paper. These include stricter enforcement of traffic laws, such as speed limits and seatbelt usage, as well as implementing advanced technologies like Intelligent Transportation Systems (ITS) and automated enforcement systems. The importance of educating drivers about safe practices is also emphasized. Furthermore, the paper explores the role of infrastructure improvements in reducing accidents. It discusses the proper signage, and efficient traffic management systems. The integration of smart technologies, such as traffic cameras and sensors, is highlighted as a potential solution to enhance road safety.

The review paper also acknowledges the importance of data collection and analysis in identifying accident-prone areas and evaluating the effectiveness of implemented measures. Overall, the review paper concludes that reducing the accident rate on roads requires a comprehensive approach that combines various traffic safety measures

By implementing the recommended strategies, it is anticipated that the accident rate can be significantly reduced, leading to safer roads and improved overall public safety. However, continuous monitoring and evaluation are crucial to ensure the long-term effectiveness of these measures and adapt them to changing circumstances.

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