

Comprehensive Study of Road Safety Issues in Sangli City with Improvement Measures

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Abstract: A Road Safety Audit (RSA) is a comprehensive, independent team's official examination of the safety performance of an existing or planned road or intersection. It qualitatively assesses and reports on potential road safety issues and finds solutions that improve overall road users' safety better. This study aims to understand the different factors which show severity of accidents. A review of the actual scene conditions reveals that incorrect signage and a misleading road layout also played an important role. The goal of this research is to highlight significant safety problems that were detected when conducting an RSA on a road. Finally, according to the findings collected, countermeasures were recommended.

1. INTRODUCTION

It has been noted that more than 13 persons worldwide pass away in traffic accidents every hour. The World Health Organization (WHO) notes that road traffic injuries are the major cause of death for young people aged 15-29 in its worldwide report on road safety from (2013). Increasing population, rising car registration, expanding road system, and quick urbanization are all contributing factors to the daily rise in accidents in the Sangli city [1–3]. The number of accidents caused by inappropriate lane switching, illegal and risky passing and merging, abrupt and unpredictable speeds, disobeying traffic signals and signs, driving too fast, and/or erratic driving, racing, poor road conditions, etc. Driving-related blame for accidents is still common. Even though, it may enable road officials to avoid accepting responsibility for their part. Rather than this, poor road design was also a significant contributor in accidents. The government authority undervalues this risk of accident [4, 5].

2. Objectives-

This study's primary goal is to reduce both the risk of crashes occurring on the road under consideration of the severity of any crashes that do or are likely to happen. By taking several factors into account, including accident location, kind of accident, road features, road condition, and intersection type. Project objectives lay out the project's purpose and define the success criteria. Project objectives motivate the team to remain focused since they are measurable and achievable. Several goals are set for a project, and these goals are accomplished at various times during the project's lifetime. The following are the actual objectives that are proposed:

1. To study the road Network and inspect the trends in road accidents.
2. To identify the road safety issue and highlight their concerns.
3. To analyze the road alignment and travel pattern for road safety.
4. To prepare preventive action plan to avoid road accidents..

3. Literature Survey

RSA is a method that is often used to evaluate the safety of places that are prone to accidents. To make sure that the needs of all road users are taken into account during each stage of project development, RSAs can be carried out at five different stages: i) the planning phase, (ii) the preliminary design phase, (iii) the detailed design phase, (iv) construction phase, and (v) operation and maintenance phase of an existing road. In this research, Road on an existing road, a safety assessment was performed to assure user safety [6, 7]. Road accidents can be caused whether by manmade (such as speeding, rushing to get there, spilled oil on the road, or wrecks) or natural circumstances (such as fog, heavy rain, and pollution)

After choosing a location using spot speed studies, a road inventory is developed. According to IRC 65-1976, calculations are done using the data obtained and comparisons are made for the designed and actual sections of rotary junctions, such as weaving length, width at entry and exit, PCUS, and superelevation, which results in identifying the causes of accidents and gives solutions for it

4. Methodology

The RSA was conducted in the current situation on an active road. After conducting the RSA, the key findings should be highlighted, and any necessary recommendations or countermeasures should be made in order to decrease the probability that crashes would occur in the junction under consideration. The following approach was used for this study Figure 1

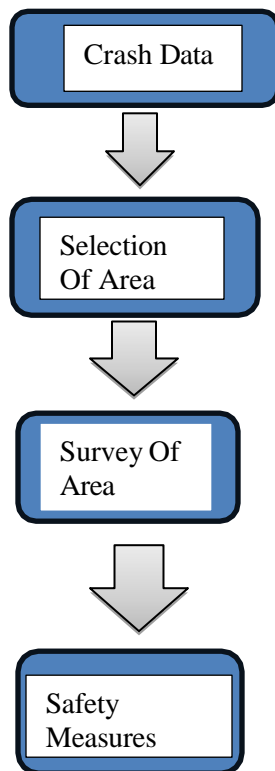


Figure 1. Proposed Methodology.

Define Problem Statement

In road accidents, it is not always the driver's fault. Accidents may occur as a result of inadequate road signage, bad road conditions, deficiencies in intersection design, or infrastructural issues. Road safety is an essential aspect of transportation. While planning new or existing roads or highways, planners and engineers must consider all elements of road safety.

A road safety engineer is a professional who strives to improve road safety such as through infrastructure engineering and safe traffic management for all road users. Road safety engineering is a career that includes traffic engineering, road design, human factor understanding, extensive analysis, proactive and reactive procedures. Engineers can offer standard cross sections, major and minor intersections, and access, edge delineators and crash barriers, bus stopping facilities, pedestrian walkways, road signs and markings, street lighting, traffic signals, speed breakers, and speed rumbles to avoid accidents.

We can avoid accidents by effective road planning, design, and analysis of road audits. and it aids in the growth of the nation's economy, with the main goal of saving human lives from death and injury.

Data Collection and Analysis

We got the accident data from the police department, Sangli from the year 2019-2021. The data we got is much more complex in nature first of all we categorize and filter the data as per our need afterward we observed the data and by analyzing we found the trends in accidents moreover by using this data we prepared no. of Figure 2. specific gravity and density for shredded plastic is much lower than NCA which offers a light weight concrete. A lower crushing value indicates the complexity with which a shredded plastic concrete could be crushed under compressive stresses.

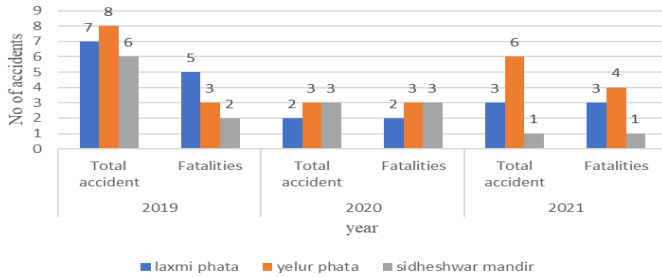


Figure 2.

Accidents According to the Classification of Road considering no of fatal accidents

From the graph we got an idea that maximum number of accidents are occurred on other district roads rather than on highways, also we got to know that although there are restrictions of covid in year 2020 proportion of accident occurring is same. After the covid in year 2021 restrictions of covid are eliminated by the government resulting that there is increase in no of accidents again. The above graph shows the no fatalities caused on different types of roads in year 2019,2020 and 2021.

Selection of Study Area

We had chosen the spots by referring to the accident data that we had collected from the respective authority. After analysis of data, we prioritize the spots based on the number of fatal accidents. Among which three locations were selected as following:

- Laxmi Phata - situated on a sangli - islampur state highway.
- Yelur Phata - situated on a pune - Bengaluru national highway.
- Sidheshwar Mandir Chowk - within the tasgaon city.

Survey of Study Area

We created a standard checklist to conduct RSA (Road Safety Audit) at the intersection by researching various IRCs. As most of the IRCs are designed for metropolitan centers, we found that all of their points do not apply to our location. We eliminated them and created a checklist for our convenience. This made it easier for us to thoroughly inspect the intersection, spot issues, and pinpoint the

reasons why accidents happened there. Using a distometer and measuring tape, we measured the lane width, sign board height, a cross-section of the road, and different characteristics of the road at that location. then we compared the results to the IRC's standard requirements Figure 3.

Afterward, using video, we conducted a traffic count at that point and also estimated the velocity of the vehicle by implementing the spot speed velocity method. In this method, we measure the time required for the vehicle to travel a certain known distance(100m) by using the formula– $V = \text{Distance} / \text{time}$ we calculated velocity. There are some problems identified at the selected three spots they are as follows:

- Sign boards are provided but they are covered with the vegetation as a result they are not visible properly.



Figure 3. Road signs are not visible due to vegetation.



Figure 4. All the markings are faded away.

- i. Although Road markings are provided they are faded away and not visible a proper maintenance is required Figure 4.
- ii. Placing many sign boards at short interval of distance can confuse the driver Figure 5.
- iii. The bus and IPT vehicles stops exactly at the intersection which causes issue of sight distance and the intersection can be crowded by the passengers Figure 6.
- iv. Due to the lack of pedestrian facilities people are gathered almost on the carriageway which possess a higher risk Figure 7.



Figure 5. Many signboards at short interval of distance.



Figure 6. Bus stops exactly at the intersection.



Figure 7. Lack of pedestrian facility.

Safety Measures

The following road safety parameters need to be implemented:

- According to IRC 35.2015 guidelines, suitable road markings are required to be offered.- Arrow markings, Lane markings, Bus-bay marking, Stop line, etc.
- Road signs must be placed at the right distance and be clearly visible. Additionally, a controlling system must be implemented wherever it is required.
- It is necessary to offer lighting equipment that has adequate reflection to provide optimal visibility during night time - delineators, Traffic studs, lighting etc.
- Additionally, pedestrian facilities on sites must be built because they are a crucial aspect:- Footpath, Crosswalk, Side Ramp, Kerb Ramp, Guardrails as per IRC 103.
- According to IRC 80.2022 guidelines, a bus stop must be provided between 50 and 100 metres from the junction, with the bus bay properly marked and signboards and IPT stop must be at 100-150m away from junction (as mentioned in IRC)
- spreading awareness of traffic regulations and safe driving.

CONCLUSIONS

The primary objective of the RSA in the current study was to identify the significant safety defects at the risky places throughout the considered road stretch and to offer recommendations that are appropriate. The audit's risk factors were determined, and it was evident that one of the main issues to be addressed in order to reduce the probability of accidents occurring is the interaction between pedestrians and vehicle users. Vulnerable road users had been exposed to high-speed vehicles in several locations due to a lack of proper infrastructure. However, although some locations had the necessary infrastructure, it was sometimes mistreated or neglected (for instance, signboards that were either improperly positioned or hidden in vegetation). The police and local authorities should also make sure that the traffic laws are enforced.

It was also noted that some road users did not understand the importance of driving safely. Road users' current attitudes and behaviors can be influenced and changed by education and awareness campaigns. In our case we are going to provide a typical intersection plan to the municipal corporation or any other respective authority of that points. The plan represents the ideal intersection

obeying all the guidelines of IRC's so that in future the government can refer this for the development at that point.

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