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ANALYSIS OF TRAFFIC RISK SCORE ON BASIS OF HUMAN BEHAVIOUR

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Key Words: The risk score, risk factor, risk weightage, and the probability of occurrence.

Abstract:

The primary focus is on the nature of the outcomes, the degree of accidents, and the nature of the accident victims. Today's traffic has significantly grown. Also, there have been significant changes in how people behave and think about using the roads. In the context of these circumstances, a better strategy is needed to provide pavement that is both safe and dependable. So, we'll choose a few places in Pulivendula and Kadapa, and then we'll run a survey to determine the overall risk score there. By calculating the chance of an event occurring with the risk weight and using some common reference values, such as the risk factor and risk weight from IRC highway research volume III, we may determine the total risk score. Following the calculation of the total risk score, we will contrast the results with standards.

I. Introduction:

The purpose of the study is to determine risk scores for individual incidents that add up to a total risk score for a particular road. The total risk score can be compared to established standard values for the risk score. As a result, roads can be divided into groups according to the risks they present to traffic safety. This technique can be used to study qualitative data and determine whether a particular road needs to improve its traffic safety. India's vehicle sector has grown significantly during the past several years. As a result, traffic has exceeded its capacity, which has led to an increase in road crashes. A million or more people die on the roads each year, according to the global situation of road safety. Numerous studies have been conducted throughout the years to find ways to make roads safer for traffic as well as to provide safe roadways. Researchers in traffic safety are currently trying to identify the factors that primarily influence traffic safety in various road and traffic situations; therefore, the study continues into the future.

Road users who frequently use the particular road can accurately observe the traffic, which helps the traffic engineer designated to assess the safety of traffic on that road. We prepare the questionnaire to get responses from road users. As a result, in order to get more accurate responses from the questionnaire survey, road users are requested to respond to activities that pose a risk to traffic safety. This concept includes both drivers who collect traffic-related data and traffic engineers who can provide technical solutions to increase safety. The survey will be conducted on the stretch of road.

II. Literature Review:

Markus D. Jakobsen, Karina, Glices Vincents. Seeberg, And Alberte B. Andersen (2022):

The study included 64 moderate- and high-quality studies that examined risk factors linked to occupational road traffic crashes among professional drivers, indicating a total of 27 significant risk factors for road crashes. Driver intoxication, age, driving duration, and time of the day were found to have the most frequent and continuously significant connections with traffic crashes throughout the past 30 years of research on road safety. The use of a phone or navigation tools while driving is one of the more recent risk variables, but others include health conditions, driver experience, vehicle speed, and management assistance. Several of these risk factors were only examined within specific driver occupations.

EVALUATION OF RISK FACTORS FOR ROAD ACCIDENTS UNDER MIXED TRAFFIC BY SUJATA BASU AND PRITAM SAHA (2022) :

India's vehicle sector has grown significantly during the past several years. As a result, traffic has exceeded its capacity, which has led to an increase in road crashes. As a result, the current study made an effort to comprehend how various road factors affected traffic safety. To determine the causes of traffic accidents, 13 study locations were chosen. An analysis of a number of factors affecting location-specific accident rates for the past ten years demonstrates that they have such a significant impact on road safety. Evaluates crash risk factors for different types of highways under mixed traffic. Present a data-driven approach to assess the impact of risk factors on crash incidence. Estimates of the likelihood of crashes for various factors related to roadways and vehicles

An Assessment Of Risk Factors For Road Traffic Accidents By Chakradhara Panda, Aruna Kumar Dash, And Devi Prasad Dash:

India faces a serious challenge when it comes to road safety because it must fulfil the UN target of reducing traffic accidents by at least half by 2030. In the wake of this, the article addresses two pertinent questions: (a) What risk factors lead to traffic accidents on the road? (b) How might policy measures to prevent traffic accidents be developed utilising systematic and data-driven studies? The paper examines road accident data from numerous Indian states and union territories from 2014 to 2018 using both explorative and econometric analysis. According to the study, over speeding is the primary cause of traffic accidents, according to the panel approach. Overloading, wrong-side driving, businesses, and poor road design are determined to be the other important causes of traffic accidents. Drunk driving has been identified as a significant contributor to rural accidents in India, among other studies.

Road Traffic Safety Risk Estimation Method Based On The Vehicle Onboard Diagnostic Data:

Based on the vehicle's onboard diagnostic data, a method for estimating the risk to road traffic safety. At the moment, research on road traffic safety is primarily concentrated on traffic safety evaluations based on statistical accident indices. A case study on four continuously used roads total around 38 kilometres in length validates the suggested methodology. The findings demonstrate the consistency of trends in road traffic safety as measured by road safety entropy and traffic accidents.

III. Methodology:

3.1 Risk Factor:

Every quality, a trait, or exposure of an event that raises the possibility that it will result in an accident is said to be a risk factor. It is a state, behaviour, or anything else that raises the risk. Likert's

psychometric scale, which spans from strongly agree to strongly disagree, illustrates the risk connected to a particular occurrence.

Table: 1 Risk Factor For Different Responses

Response	**Risk Factor(F)**
Strongly Agree	2.0
Agree	1.5
Neutral	1.0
Disagree	0.5
Strongly Disagree	0

3.2 Probability Of Occurrence:

The possibility of an event occurring on a route is indicated by the probability of an event. The probability of each event can be estimated by dividing the number of affirmative responses by the total number of responses collected. Thus, it can be written mathematically as,

Probability of occurrence = $\frac{Number\ of\ responses\ in\ favour\ of\ an\ event}{Total\ number\ of\ responses\ collected}$

For instance, strongly concur with the statement "Driver does not heed traffic signs." In this model, a total of 15 replies are collected, and we'll assume that 9 of them support this event. In this instance, the chance of occurrence can be computed as follows:

Probability of occurrence = 9/15 = 0.6

Probability of occurrence for any event can be calculated in the same manner.

3.3 Risk Weightage:

While calculating the risk score, the risk factor and likelihood of occurrence are multiplied by a factor called risk weightage. As we all know, some of the primary reasons of an accident are human and driver traits, infrastructure features, and vehicular conditions. Human or driving traits are more likely to lead to danger or an accident out of these.

Table 2: Value Of Risk Weightage For Different Characteristics

Characteristics	**Impact**	**Risk Weightage**
Human/Driver	High	4.0
	Average	3.5
	Low	3.0
Infrastructure	High	3.0
	Average	2.5
	Low	2.0
Vehicular	High	2.0
	Average	1.5
	Low	1.0
Other		1.0-2.0

3.4 Risk Score:

The risk score for an event is computed by dividing the risk weight by the risk component and the likelihood that the event will occur. It can be expressed mathematically as follows:

Risk Score = W * $\sum_{j=Strongly\ Agree}^{j=Strongly\ Disagree}(Fj * Pj)$

Where
W = Risk Weightage of an Event
F = risk factor
P is the probability of the occurrence of an event.

Table 3: Standard Values Of The Total Risk Score And Its Risk Level

Total Risk Score	Risk Level	Significance
120 - 160	A	Very high-risk zone, an accident-prone zone. Too much traffic congestion or a complete breakdown of traffic flow Totally disturbed and flowless traffic Geometric design and traffic rule policies are required to be reassessed. Strict traffic rules should be made and enforced.
80 - 120	B	High-risk, with more chances of an accident. Relatively disturbed flow of traffic. Effective traffic management should be applied to improve safety.
40 - 80	C	Moderate risk means fewer chances of an accident. Relatively undisturbed flow of traffic. Traffic safety awareness measures can be taken to improve safety.
0 - 40	D	No risk; very low chances of an accident; smooth and undisturbed flow of traffic at design speed.

IV. Data Collection:

The study was conducted using the following methodology:
Road users were surveyed using a questionnaire to gather data. The questionnaire survey has been completed after choosing the ideal location for the study.
The survey consists of a number of common inquiries about driving safety. Here, questions are constructed around the potential occurrences that could lead to a dangerous driving situation. The following are the principal causes of accidents:

1. Human (driver or pedestrian)
2. Infrastructure (roads, signs, signals, etc.)
3. Vehicular (the condition of vehicles and their types, overloading or overcrowding, etc.)
4. Other (weather conditions, stray animals, roadside distaste, etc.)

With the aforementioned conditions in mind, a questionnaire with a set of typical inquiries that are thought of as model inquiries for analysis can be made.

Questionnaire Survey:

A questionnaire survey is used to compile factual data about the website. Roadside interviews with drivers or other road users must be documented using a questionnaire.

Each chosen location should have 15 responses collected for this model. Everyone has a different attitude and perspective about the traffic because of the diversity of human nature, which makes the analysis of traffic and safety very difficult. Many age groups and demographics have varied perspectives on traffic15 replies must be recorded for each age group in order to include all age groups and provide an accurate result. Following the completion of a questionnaire survey, the overall number of affirmative responses (ranging from strongly agree to strongly disagree) for each case for each individual question can be determined.

The Likert scale, a psychometric tool, must be used to record responses from drivers, ranging from strongly agree to strongly disagree. These terms describe how an issue or risky situation affects a road user, and their relevance is as follows:

1. **Strongly agree:** A driver or other road user runs into this issue frequently while driving or riding, or they see others running into it or running into it.
2. **Agree:** As a vehicle or other road user is travelling by, they frequently encounter or witness others encountering an issue of this nature.
3. **Neutral**: Due to internal conflicts between agreeing and disagreeing, the driver or other road user cannot make a judgement.
4. **Disagree:** The majority of the time, neither the driver nor the other road user has encountered nor seen others create or deal with such a situation.
5. **Strongly Disagree**: No motorist or other road user has ever encountered or seen someone else create or deal with such an issue.

Table 4: Questionnaire Form

SL No.	event causing an unsafe condition	Response (A/B/C/D/E)
1	Weather condition Good/Bad.	
2	Drivers using mobile devices while driving	
3	Road curvature is not proper.	
4	The driver seems to be very fast.	
5	Insufficient width of the carriage way.	
6	Water drainage problems	
7	The pavement is not properly maintained.	
8	Driver seemed to be drunk and drive.	
9	Drive 10 to 20 kmph over the speed limit.	
10	Drivers do not yield to pedestrians.	
11	The driver does not wear a helmet or seatbelt.	
12	Speed breakers were placed unnecessarily.	
13	Drivers are overtaking from the wrong side.	
14	The median strip is not properly maintained.	
15	Teenage people are driving more vehicles.	

16	Could you maintain a proper vehicle condition?	
17	encounters with stray animals.	
18	Take your eyes off the road to talk to passengers.	
19	Roadside distractions	
20	What was the death rate condition?	
21	Road safety accident prevention infrastructure is not proper.	
22	Heavy and long vehicles are creating unsafe conditions.	
23	Drive without wearing a seatbelt.	
24	making illegal turns.	
25	The sight distance is not sufficient.	

Table 5: Result

SL NO	**PLACES**	**RISK SCORE**	**RESULT**
1	KOTI REDDY CIRCLE	73.185	On the basis of analysis, it is classified as moderately risky and has fewer chances of accidents.
2	SANDHYA CIRCLE	87.706	Based on the analysis, it is classified as high-risk and has more chances of an accident.
3	OLD BUS STAND CIRCLE	63.2354	On the basis of analysis, it is classified as moderately risky and has fewer chances of an accident.
4	4 ROAD CIRCLE	64.3873	Based on the analysis, it is classified as moderately risky and has fewer chances of an accident.

Table 6: Comparison Of Result With Standard Risk Score And Risk Level

S.NO	Standard Risk Score	Standard Risk Level	Location	Risk Score	Risk Level
1	120-160	A	Koti Reddy Circle, Kadapa	73.185	C
	80-120	B			
	40-80	C			
	0-40	D			
2	120-160	A	Sandhya Circle, Kadapa	87.706	B
	80-120	B			
	40-80	C			
	0-40	D			
3	120-160	A		63.235	C

	80-120	B	Old Bus Stand Circle, Pulivendula		
	40-80	C			
	0-40	D			
4	120-160	A	4 Road Circle, Pulivendula	64.387	C
	80-120	B			
	40-80	C			
	0-40	D			

A Graphical Representation of Risk Level:

Below figure shows the graphical representation of risk levels for the Koti Reddy Circle, Sandhya Circle, Old Bus Stand Circle, and Four Road Circle.

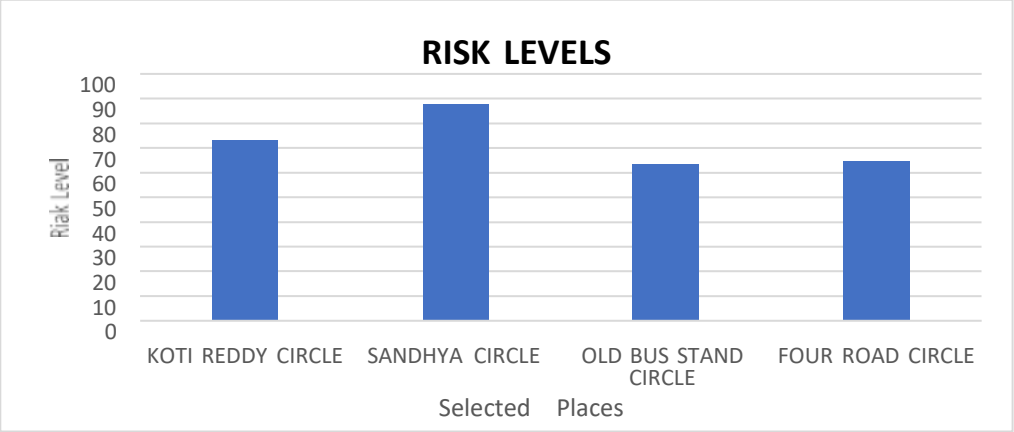

Fig.1 Risk Levels at Studied Locations

Risk Levels: The following below-listed Fig. shows the graphical representation of individual locations.

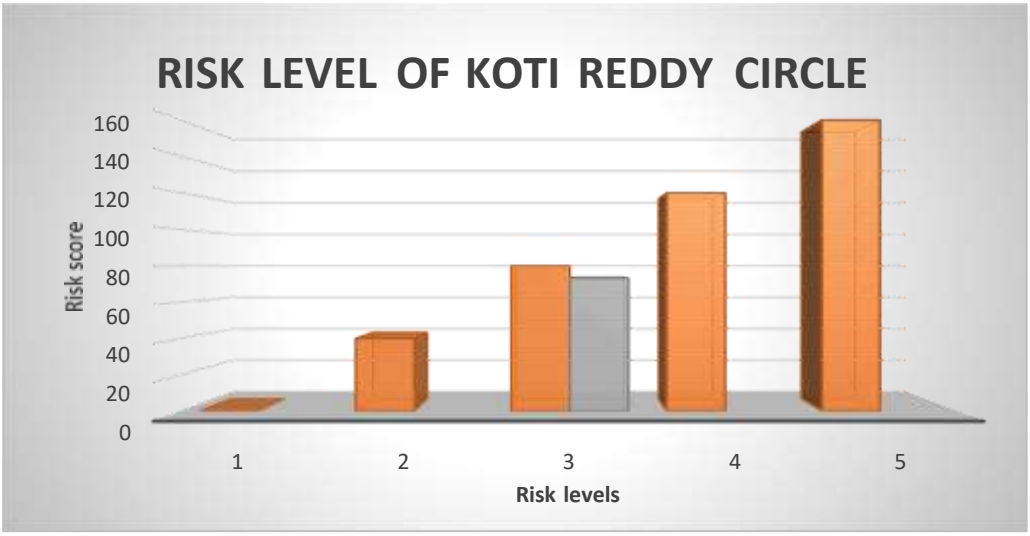

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Fig.2 Risk Level At Koti Reddy Circle

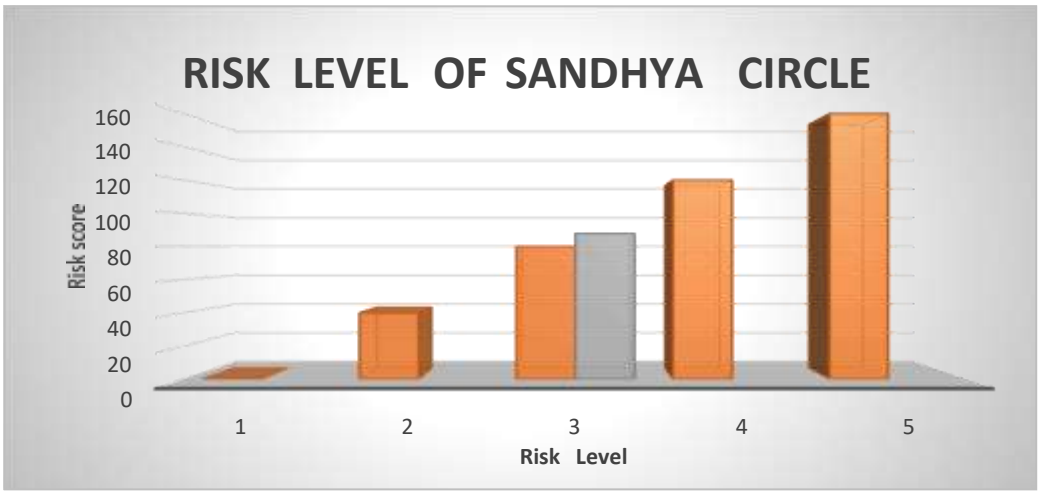

Fig.3 Risk Level At Sandhya Circle

Fig.4 Risk Level At Old Bus Stand Circle

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Fig.5 Risk Level At Four Road Circle

V. Conclusion:

We can conclude from the questionnaire survey and the results that, according to our survey, there are no suitable speed breakers, traffic signals, or road conditions at or around Sandhya Circle, and road users have also demanded signalised control there.

As a result, it is suggested that speed breakers and signals be installed around the Sandhya circle.

In the remaining locations, there were no such problems.

Finally, we turned in our project report to the executive engineer at the R & B office.

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