ROAD SAFETY EVALUATION IN GALLE: TOWARDS STAR RATING FOR SRI LANKAN ROADS

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ABSTRACT - With the increase in transportation facilities, Sri Lanka has a high demand for the transportation sector. However, the existing road classification in Sri Lanka is challenging for people to judge their efficiency and safety. The standard of road classification needs to be self-explanatory with its infrastructure standard and road safety, in Sri Lanka that can be accomplished by performing a road safety evaluation. This study contributes to the improvements of the prevailing safety assessments regarding roads in Sri Lanka to the required standard. This can be performed through a road star rating system for Sri Lankan roads which may be based on the International Road Assessment Program (iRAP). The road star rating analysis would assist in locating high-risk areas on the Sri Lankan Road network and prioritizing safety measures to enhance the performance of the roads in terms of safety. The methodology entails gathering and evaluating data on the road network for the purpose of assessing the safety performance of roads using a star rating system. The data collection was done through the Google Earth Pro software, for 30 selected road segments in the Galle district. The analysis of the results will provide insight to identify the relationship that exists between the number of road accidents and the other roadside variables.

Keywords: Road Star Rating; Sri Lankan Roads; Road Safety

1. INTRODUCTION

Sri Lanka is a developing country that currently undergoes high economic pressure. Road transportation can be considered the most common mode of Sri Lankan transportation. Road safety has become one of the main worries because of the growth of the transportation industry and the increase in the number of vehicles on the road. The latest WHO statistics show that 4,200 persons died in road traffic accidents in Sri Lanka in 2020, which corresponds to 3.62% of all the fatalities. [1]. Due to the large number of fatalities and accidents on Sri Lankan roads each year, this issue of road safety is in a position where serious attention is needed [2]. Star Rating is one method of evaluating the state of road safety out of the numerous ways available [3]. The star rating of roads was initiated with the Road Assessing Program in 2006 under the guidance of the World Bank as a charity to lower the number of accidents on roads by evaluating the road conditions on a standardized method for the design and construction of safer roadways. The core program is named the International Road Assessment Program which is formerly known as iRAP. It was created globally to rate the star rating of a road's safety performance. Sri Lanka does not have a methodology for evaluating road safety that uses standardized levels to quantify each road's risk and pinpoint the high-risk roads that are responsible for a rise in accidents. Despite having well-developed road networks since the colonial period in the nineteenth century, Sri Lanka's level of road safety has not been evaluated and it was found that Sri Lanka's roadways need improvement [4]. Road safety improvements can significantly reduce traffic injuries and fatalities because roads are more likely to experience collisions and fatalities [5]. There is a necessity of maintaining excellent road conditions to prevent accidents [6].

2. MATERIALS AND METHODS

First, the study location was identified by defining the scope and boundaries of the research. A-Class, B-Class, and C-Class roads in the Galle district of Sri Lanka were selected for the study. Data

collection was conducted by considering 312 road sections around the Galle area. With the help of "Google Earth Pro", the data collection process was carried out. Collecting data was done individually for respective road sections in accordance with the prevailing roadside elements. Figure 1 shows an extracted image from Google Earth, and the red color lines represent the road segments where the data has been collected. Data collection was done by considering fourteen variables. The accident data was collected from Galle Police Station for the past five years.

Figure 1. Selected road segments in Galle District

Google Earth Pro has a tool called "ruler" and it was used to collect the length of the selected road segments, road widths, shoulder width, footpath length, roadside object length, and vehicle parking length. During the data collection using Google Earth Pro, in some locations, satellite images have low resolutions making it difficult to observe specific features or particulars on the ground. Despite these limitations and difficulties, Google Earth was a useful tool for gathering and visualizing data which helped with this study. The north and east coordinates of the start and ending locations of the route were used to find the starting and ending spots of each road. Data on variables such as the number of lanes, delineation, condition of the road, condition of the shoulder, number of intersections in the selected road segment, number of pedestrian crossings, and divided/undivided status were also collected. The SPSS software is used to conduct the overall analysis. Here accident number is inputted as the dependent variable, and the other fourteen parameters mentioned above are inputted as the independent variables. A Negative Binomial Regression model is developed to identify the relationship between accident numbers and the other roadside variables. The methodology is adopted to examine road parameters that show potential influences on the five-year trend in traffic accidents.

3. RESULTS AND DISCUSSION

Through the developed model, the factors which affect the safety of roads are identified. Out of the fourteen variables, it was identified that only five variables are significant to the accident number, and the other nine variables were identified as insignificant as shown in Table 1. Those variables include the weak condition of the road, shoulders with a moderate condition, number of intersections, length of the selected road segments, and width of the lane. Through the analysis, it will be able to provide insight to figure out the relationship between the rate of road accidents and other road-related variables. Based on these factors a star rating identification for Sri Lankan roads could be done. After a thorough literature review, it was identified that the Sri Lankan Road conditions are similar to the conditions of some other countries. The further study on the applicability of the star rating system of those countries for Sri Lanka will be investigated.

4. CONCLUSION

In conclusion, this study provides insight into the implementation of a road star rating for Sri Lankan roads. For that several roadside parameters were obtained and analyzed. It is needed to thoroughly evaluate each roadside parameter, as those will be helpful in identifying the areas that require improvements and ensuring the safety of all types of road users in Sri Lanka. Enhancing road safety is crucial as it will affect the country's economic and social development. Based on the results,

recommendations are developed regarding the implementation of a road star rating for Sri Lankan roads.

Table 1. Parameter Estimates

Parameter		Estimate (β-value)	Std. Error	Significant	Exp(β)
Intercept		-2.128	1.9324	0.271	.119
No Delineation		1.158	1.2501	0.354	3.185
Adequate Delineation		1.376	1.2422	0.268	3.957
Road condition	Poor*	-.558	0.2785	0.045	0.572
	Moderate	-.115	0.1580	0.468	0.892
	Best	0[a]	.	.	1.000
Shoulders	Weak	-.541	0.9583	0.572	0.582
	Intermate*	-.387	0.1763	0.028	0.679
	Continuously paved good	0[a]	.	.	1.000
Number of intersections*		0.082	-0.0040	0.041	1.085
Number of pedestrian crossings		0.010	-0.1160	0.874	1.010
Road divide	No*	-1.322	-2.5030	0.028	0.267
	Yes	0a	.	.	1.000
Number of bus bays*		0.053	0.0270	0.192	1.054
Roadside object length*		-.624	-1.3830	0.108	0.536
Vehicle parking length		.192	-0.5960	0.632	1.212
Footpath length		-.231	-0.6300	0.257	0.794
Shoulder width		-.044	-0.5060	0.852	0.957
Number of lanes		0.254	-0.2500	0.324	1.289
Width of lane*		1.122	0.7840	0.000	3.071
Road section length*		1.294	0.6640	0.000	3.647

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