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The Prof. Dr. Satrio Segment Road Evaluation Using Road Safety Audit Method

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ABSTRACT

In recent decades, traffic accidents in Indonesia have become a growing public health problem, that requires attention. Drivers' low understanding of signs, and markings and less strict supervision related to road safety can increase the traffic accident problem. Therefore, it is necessary to reduce the risk of traffic accidents and to improve road safety using the Road safety audit (RSA) method on the Prof. Dr. Satrio road segment. Improve road safety, during the operation and maintenance phase, and prevent the reoccurrence of traffic accidents from research on these roads, then the precise recommendation and countermeasure are carried out on roads.

INTRODUCTION

Traffic accidents in Indonesia over the past few decades have become a public health concern for both developing and developed countries (Suwarto, F. et al, 2019). Traffic accidents are also the eighth leading cause of death in the 5-29 age group, with 73% of the world's traffic-related deaths among men. In Indonesia, the figure is even higher - 90% according to the Centers for Disease Control and Prevention (CDC), 2020. Therefore, it is better for the government and the community, especially in Indonesia, to pay more attention and be more responsible for preventing and handling traffic accidents (Kurniawan, 2016).

A region with a high number of accidents and fatalities requires special attention to reduce the number of accidents and fatalities of traffic accident victims (Idris, M., 2018) because basically a traffic accident is predictable and preventable (Setyarini & Lukito, 2020).

A large number of accidents is caused by several things, namely 61% due to human factors related to the capacity and character of the driver, 9% due to vehicle factors (related to the fulfillment of roadworthy technical requirements), and 30% due to infrastructure and environmental factors, according to Director General of Land Transportation Pudji Hartanto (2017).

The efforts to improve road safety that have been carried out in Indonesia include the Decade of Action (DOA) for Road Safety Program in 2011 – 2020, which will be continued in the period

2021 to 2030 as the Second Decade of Action for Road Safety which is in accordance with the National General Plan for Road Safety 2011 – 2035.

Aims to reduce fatalities of the accidents by 50% and directives from the President of the Republic of Indonesia No. 4 of 2013 on the Decade of Action for Road Safety, which reflects the idea of "safety systems" and is outlined in 5 pillars. The Road Safety Improvement Strategy, the provisions of which are shown in Fig.1 below.

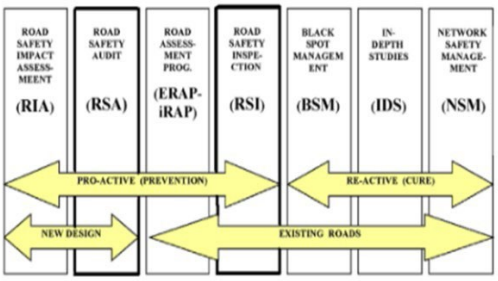

FIGURE 1. Integral Section of the Road Infrastructure Impact Assessment (Source: WYG International, 2009)

One solution to improve road safety is to use the Audit of Road Safety (RSA) approach. According to Nishimura (2017), RSA is a formal road safety inspection or traffic project, or other types of safety project affecting road users, which is carried out by an independent auditor or a team of qualified auditors who report on potential project accidents and safety performance for all type road users.

Therefore, it is considered necessary to conduct further research on the Prof. Dr. Satrio road section, Kuningan- Setiabudi, South Jakarta using the RSA method. The following is a picture of Prof. Dr. Satrio road section, as figure 2 below:

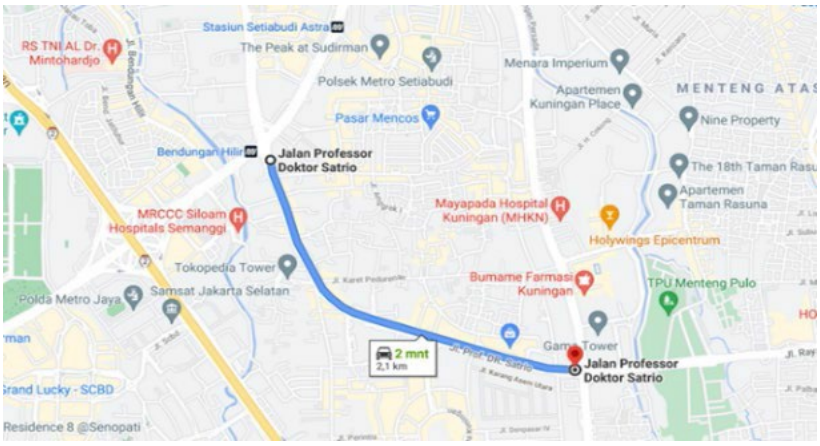

FIGURE 2. Dr. Satrio road segment, Kuningan, South Jakarta (Source: Google Maps)

Based on the background, this journal will identify the following problems:

1. Traffic accidents are based on the movement of people from one place to another, which

makes traffic safety indispensable in countries around the world.

2. Road safety is a major component of transport and is influenced by many factors including road users, vehicles and road infrastructure.
3. Economic activity has a strong relationship with an increase in traffic accidents.
4. The government has made efforts to improve road safety with pro-active approaches (accident prevention) such as RIA, RSI, IRAP, RSA and reactive approaches (reducing the number of accidents) such as BSM and NSM.
5. The RSA method is used starting from road planning to the operational period to achieve roads safety. Based on the formulation of the problem, the following are the objectives of the journal research:
6. Find out the actual star rating of Dr. Jalan Prof. Satrio in Jakarta using the IRAP method.
7. To learn how to use the RSA to reach the safe road of Jalan Prof. Dr. Satrio in Jakarta using the RSA method.

Road Safety Audit (RSA)

A Road Safety Audit (RSA) is a formal test of an existing road segment or a road/traffic project where a report on potential collisions in the project is provided by an independent and qualified team (Austroads, 2002). RSA is a road safety inspection, traffic program, or safety procurement that affects all road users and is carried out by qualified parties to report on the safety performance and potential accidents of all road users (Nishimura, 2017).

Road Operational Stage Audit

In this study, a road safety audit for operational roads is used which is referred to as Road Safety Inspection because it aims to ensure road safety by the functional classification of the road and to identify factors that can cause safety problems that develop over time. The road operation phase audit is used for the road start-up phase and the operational segment. The road safety audit at this stage aims to check such as:

8. Road geometry
9. Access road design
10. Complementary structures for roads, signs and road markings
11. Impact of implementation design on traffic
12. Land use on traffic conditions
13. Pedestrian and traffic characteristics
14. Effect of landscape, signs and road markings on traffic
15. Road surface conditions and street lighting

At this stage of the audit, many safety problems can be found that may have to be addressed by carrying out maintenance or simple handling at low costs.

RESEARCH METHODS

The following are the stages of the research method that consist of three parts, namely the preparation stage, data collection, and data analysis. The following is the flow of research methods carried out:

16. Determination of the location, at this stage the researcher determines the location of the road for research, and the specified road is Jalan Prof. Dr. Satrio, Jakarta
17. Starting, at this stage the researcher determines the research topic and then searches for and reads testimonial journals about road safety and the IRAP and RSA methods. After the research topic is determined, the researcher submits a title and if the title is accepted, the researcher will proceed to the next stage
18. Literature study, at this stage a literature review is carried out with topics related to accidents, road safety, road attributes, as well as RSA methods
19. Limitation and scope of research, at this stage the identification of problems, problem boundaries, problem formulation, and research objectives and benefits are carried out.
20. Data collection, primary data collection was carried out by observing using Google Earth and Google Street View. Secondary data retrieval regarding LHR, accidents, speed and RAB was obtained from the agency (Central Bureau of Statistics DKI Jakarta Province)
21. Methods of analysis, research on roads Prof. Dr. Satrio, Jakarta, this event was carried out using the RSA to get a safe road.
22. RSA method, the RSA method is carried out in several stages of implementation as follows:
    - The preparation stage, data preparation, and site inspection, at this stage data collection are performed on the road to be audited, followed by background cross-sections and issues on the road. A survey was then carried out by the RSA checklist.
    - Analysis and Evaluation, at this stage an analysis of the survey results and survey analysis is carried out to get suggestions for improvements to roads.
    - Results and follow-up, at this stage the analysis and evaluation results are presented, and if the road needs to be redesigned, follow up based on the findings.
23. Conclusions and recommendations, conduct research and present so that the conclusions can be further refined for the next study.

RESULTS AND DISCUSSION

The the stages of the research method, that consist of three parts, namely the preparation stage, data collection, and data analysis. The following research methods are carried out:

RSA method

Analyses with the RSA method were conducted to find problems on roads, that caused safety problems for Prof. Dr. Satrio roads. and provide advice and countermeasure to improve road safety for the road. Following the table of recommendations and follow-up results on the Prof. Dr. Satrio segment road as presented on table 1,2 and 3.

TABLE 1. Recommendations and Follow-Ups for Passenger Vehicles and Motorcycles

Segmen	Deficiency in road section	Risk	Recommendation	Reason
1	Alligator skin crack type pavement damage	Low	It is proposed that for crocodile skin cracks, local asphalt sprinkling and filling of potholes should be carried out according to the level of damage and repair of the road drainage system.	So that it can reduce the possibility and severity of accidents due to damage to the pavement
1	Hole type pavement damage	Low	It is proposed that the patch needs to be dismantled and then resurfaced with a suitable material, and repair the road drainage system.	
2	Longitudinal crack type pavement damage	Low	It is recommended to apply additional layers longitudinally, repair the drainage system, and fill the gaps in the cracks with a mixture of liquid asphalt and sand.	
2	Patch type pavement damage	Low	It is proposed that the patch needs to be dismantled and then resurfaced with a suitable material, and repair the road drainage system.	
13, 2' and	Excavation type pavement damage	Low	It is proposed that the patch needs to repair of the damaged utility excavation by re- closing the road and repairing the road drainage system.	
15	Transverse crack type pavement damage	Low	It is proposed to apply additional layers longitudinally, repair the drainage system, and fill the gaps in the cracks with a mixture of liquid asphalt and sand.	
4-8, 10-12, 22, 1',	There are no problems for passenger vehicles	Low	Road pavement, signs, and markings are in accordance with applicable regulations	

TABLE 1. Recommendations and Follow-Ups for Passenger Vehicles and Motorcycles (Continued)

Segment	Deficiency in road section	Ris	Recommendation	Reason

2, 9, 21, 2',	There are no intersection chanelisation	Medium	It is proposed to make intersection signs combined on the required road sections.	Drivers are more aware drivers in different lanes.
8, 13, 15, 17, and	There is no 3-foot crossing sign	Medium	It is proposed to create a 3-foot crossing warning sign on the required road section.	
19-21, 19' an	Has a short and low median	High	It is proposed to repair or build a fence.	This reduces the number of motorized vehicles changing lanes
13, 14, 15, 18	There is no sign for the right bend	High	It is proposed to create a right bend warning sign to reduce the risk of accidents on the part of the road that requires it.	So that it can reduce the possibility of accidents due to knowing the geometry of the road in that segment
13', 15', and 19'	There is no sign for the left bend	High	It is proposed to make a warning sign turning left to reduce the risk of accidents on the part of the road that requires it	

TABLE 2. Recommendations and Follow-Ups for Recommended Cyclists

Segmen	Deficiency in road section	Risk	Recommendation	Reason
Whole	There are no	High	It is proposed to create bicycle lanes on all roads	so that drivers are more aware of cyclists and can reduce the risk of cyclists being hit
Whole Segm	There are no bicycle	High	It is proposed to create bicycle lanes on all roads	

TABLE 3. Recommendations and Follow-Ups for Recommended Pedestrian

Segmen t	Deficiency in road	Risk	Recommendation	Reason
13, 14, 15, 18, 19, 13', 14', 15'	Parking on the sidewalk	Low	Pavement It is proposed that strict action be taken on vehicles parked on the sidewalk, signs and markings are in accorandce with applicable regulations.	This reduces the risk of a vehicle hitting a pedestrian while driving on the sidewalk
1-12. 16-17, 20-22, 1'-12', 16'-17' and	No problem for pedestrians	Low	This reduces the risk of a vehicle hitting a pedestrian while driving on the sidewalk	-

CONCLUSION

Based on research and analysis conducted on Prof. Dr. Satrio using the IRAP and RSA methods, it can be concluded that:

1. Road safety issues according to RSA's direct observation on Prof. Dr. Satrio segment road there is damage to road pavement, signs, medians, markings, and bicycle facilities (cyclists' lanes) along the road segment that conditions are not in accordance with applicable regulations.
2. RSA recommendations on Prof. Dr. Satrio to maximize safety produce low, medium, and high risk. It is best handled in high-risk situations by installing right or left turn signs, and fences along dividers, except at intersections, and setting up bike lanes.
3. The advantage of the RSA method it's can be used in 6 stages of road construction.
4. The disadvantage of RSA it's doesn't produce a benefit-to-cost ratio, prevent deaths and prevent serious injury to improve the feasibility of recommendations and reduce accidents and unpredictable fatalities.

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