TRAFFIC ACCIDENT PROBLEM AREA RANTAU BERANGIN- UJUNG BATU ROKAN HULU DISTRICT, RIAU PROVINCE

Abdul Kudus Zaini [a], Ulfajri Fauzi [b],

Civil Engineering Program Islamic University of Riau, Pekanbaru, Indonesia
Jalan Kaharuddin Nasution Km.11 No. 113 Perhentian Marpoyan Pekanbaru
28284
Email : abdulkuduszaini@eng.uir.ac.id

ABSTRAK

A traffic accident is an event that occurs in a traffic flow due to an error in the traffic shaping system that involves humans as drivers, vehicles, roads, and the surrounding environment. In this study, the road that was studied was Rantau Berangin - Ujung Batu which was a class III collector road with a length of ± 66.5 km. This study aims to determine the level of traffic accidents in the area to obtain the *Accident Rate* value on the *Black Spot* and *Black site* . The method in this research is a qualitative method to get the value of the *Black Spot* and *Black Site* based on the a*ccident rate*. The data used are primary and secondary data obtained from the Kampar Police from 2014 - 2018, as well as those related to traffic accidents. The results of analysis of the received data show that the rate of traffic accidents on roads Rantau Berangin - Ujung Batu is relatively high with 24 scenes of the accident, which roads rantau Berangin - Silam be the point most vulnerable areas of traffic accidents with *Accident Rate* of the *Black Spot* by 9,767 and the *Accident Rate* of the *Black Site is* 1,205. Meanwhile, the factors that cause traffic accidents on the Rantau Berangin - Ujung Batu road section are dominated by human factors themselves, such as driving at high speed in crowds and using other drivers' lanes.

Keywords: *Black Site*, *Black Spot*, **Accident Causing Factors, Vehicles**

Abstrak

Kecelakaan lalu lintas merupakan peristiwa yang terjadi pada suatu arus lalu lintas akibat adanya kesalahan pada sistem pembentuk lalu lintas yang melibatkan manusia sebagai pengemudi, kendaraan, jalan, dan lingkungan sekitar. Pada penelitian ini ruas jalan yang diteliti yaitu Rantau Berangin – Ujung Batu yang merupakan jalan kolektor kelas III sepanjang ±66,5 km. Penelitian ini bertujuan untuk mengetahui tingkat kecelakaan lalu lintas di daerah tersebut untuk mendapatkan nilai Accident Rate pada *Black Spot* dan *Black Site*. Metode pada penelitian ini yaitu metode Kualitatif untuk mendapatkan nilai *Black Spot* dan *Black Site* berdasarkan *Accident Rate*. Data yang digunakan adalah data primer dan sekunder yang diperoleh dari Polres Kampar dari tahun 2014 - 2018, serta yang berhubungan dengan kecelakaan lalu lintas. Hasil analisa dari data yang didapatkan menunjukkan bahwa tingkat kecelakaan lalu lintas pada ruas jalan Rantau Berangin – Ujung Batu cukup tinggi dengan 24 kejadian kecelakaan, yang mana ruas jalan Rantau Berangin – Silam menjadi titik daerah paling rawan kecelakaan lalu lintas dengan *Accident Rate* terhadap *Black Spot* sebesar 9,767 dan *Accident Rate* terhadap *Black Site* sebesar 1,205. Sementara faktor penyebab kecelakaan lalu lintas pada ruas jalan Rantau Berangin – Ujung Batu didominasi oleh faktor manusia itu sendiri, seperti mengemudi dengan kecepatan tinggi di keramaian, menggunakan lajur pengendara lain.

Kata Kunci: *Black Site, Black Spot, Faktor Penyebab Kecelakaan, Kendaraan*

1. INTRODUCTION

A traffic accident is an event that occurs in a traffic flow due to an error in the traffic forming system that involves humans as drivers, vehicles, roads, and the surrounding environment. Traffic accidents are a problem that almost occurs in all countries in the world, which requires serious handling considering the large losses caused, such as in Kampar Regency. In Kampar Regency itself, there have been many cases of traffic accidents that caused material losses, minor injuries, serious injuries, and even death. The highest traffic accident cases in the last 5 years occurred in 2019 as many as 306 cases, of which there were 277 minor injuries, 85 seriously injured, and 102 deaths. In this study, the roads taken are the Rantau Berangin – Ujung Batu (Rokan Hulu) road The Rantau Berangin – Ujung Batu road section is located in Riau Province which connects Bangkinang City – Kampar Regency and Rokan Hulu Regency, and is also a causeway that connects Rokan Hulu Regency with the capital city of Riau Province, namely Pekanbaru as the center of the Riau Province government, which from year to year the volume of traffic flow is increasing and can trigger the level of accident rates such as: accidents, accident victims, accident-causing The Rantau Berangin – Ujung Batu road is a class III collector road which has a length of 66.5 km with a lane width of 6.5 meters, in terms of road conditions, there are holes in the road, there are cracks, sharp bends, no shoulder of the road, so that it can cause accidents that can be detrimental, both in terms of humanity and from the economy, due to the large number of casualties and a lot of material or money that has been spent due to an accident, therefore the author wishes to observe the accident rate on the Rantau Berangin – Ujung Batu road as the final project material selection.

2. RESEARCH PURPOSE

To calculate the level of traffic accidents on the Rantau Berangin – Ujung Batu section for a period of 5 years (2014 – 2018), 2. To calculate the Accident Rate for Black Spot and Black Site on the Rantau Berangin – Ujung Batu section, 3.To find out the areas prone to traffic accidents on the Rantau Berangin – Ujung Batu road section, 4. To find out the factors causing the accident, the time of the incident and how to deal with it.

3. LITERATURE REVIEW

Pignataro (1973) states that most traffic accidents are caused by the behavior of drivers or pedestrians, road conditions, bad weather conditions, and poor visibility. Carter and Homburger (1978) state that an accident is an event in which the movement of traffic is due to errors in traffic shaping, namely vehicles, roads, and environments. The definition of error can be seen as a condition that does not comply with applicable standards or regulations or human negligence, Priyanto (1997) states that the causes of traffic accidents can be examined from the system and as well as multicausal that consider three factors, human, vehicle, road/environment. Hobbs (1979) classifies the factors that cause accidents into three groups, namely: a. Road user factor (human), b. Vehicle factor, c. Road and environmental factors Article 1 number 24 number 22 year (2009) states that a traffic accident is an incident on the highway that is unexpected and accidental involving a vehicle with or without other road users which results in human casualties and/or property loss. Kadiyali (1983) and O'flaherty (1997), state that road traffic accidents are overturning or skid collisions that occur on open roads and involve public traffic that causes injury, death, or damage to vehicles (material loss). A traffic accident is an incident on the road that is unexpected and unintentional involving a vehicle with or without other road users resulting in human casualties and/or property loss. According to FD Hobbs (1995) quoted by Kartika (2009) revealed that traffic accidents are events that are difficult to predict when and where they occur. Accidents are not only trauma, injury, or disability but also death.

FACTORS CAUSING TRAFFIC ACCIDENTS

Pignataro (1973) states that most traffic accidents are caused by a combination of factors, namely: the behavior of drivers or pedestrians, bad weather conditions, and poor or unclear views of the road. Hulbert (1981) states that from the recording of traffic accidents that have occurred many cannot be separated from the problem of traffic accidents caused by sleepy drivers. More than 20 to 30 percent of traffic accidents are most likely caused by drowsiness. He also stated that drowsiness due to driving fatigue has a

large share of traffic accidents caused by drivers. Meanwhile, according to Austroads (2002), traffic accidents are influenced by human factors, vehicles, and the road environment

Accident Level

The high rate of traffic accidents can be caused by various factors such as oneself or supporting factors which are usually called human errors such as traffic violations committed by other drivers, pedestrians, road conditions, traffic conditions, weather, poor visibility, and vehicle fault.
Accident rate analysis is further demonstrated with a procedure that includes traffic accident report data for a certain time, road conditions, types of traffic accidents, weather conditions, driver actions, types of vehicles involved, as well as other information, traffic accident event patterns, data on average daily traffic volume, location properties, and traffic flow patterns

Accident Rate Per Km (Accident Rate Per Kilometers)

$$R_L = \frac{A_C}{L} \qquad \text{…………………………………………………..1}$$

Where :

RL = Total traffic accident rate per km for one year
AC = Total number of traffic accidents in a year
L = Length of road in km

Accident Rates Based on Vehicle-Km Trips

$$R = \frac{C \, x \, 100.000.000}{V} \text{…………………………………………….…2}$$

Where :
RL = Total traffic accident rate per km for one year
AC = Total number of traffic accidents in a year
L = Length of road in km

Accident Rates for Spots on the Highway
$$Rsp = \frac{A \, x \, 1.000.000}{365 \, x \, V} \text{…………………………………………………..3}$$

Where:
Rsp = Accident Amount for spot
A = Number of accidents during the analyzed period
L = Length of highway
365 = Observation time for a year

4.RESEARCH METHODE
Data collection and compilation is carried out according to the plan based on the identification of the problem and research objectives. The stages in this study begin with literature/library studies, followed by data collection. After the data is collected, an analysis of the data obtained is carried out, the results of the analysis are used as a reference in formulating alternative actions to reduce accidents.

Research Site

The location taken in this study is on the Rantau Berangin road section 74.6 km to Jalan Ujung Batu (Rokan Hulu) km 141 which is ±66.5 km long, which is a class III collector road connecting the provincial capital. to the district

Picture 4.1. Rantau Berangin - Ujung Batu

Analysis of Traffic Accident Characteristics

In general, accidents are classified based on the type of accident, the victim of the accident, the condition of the vehicle at the time of the accident, the vehicle involved in the accident, the time of the accident (days and hours), the weather at the time of the accident, the location of the accident, the type of collision, the type of vehicle and the cause of the accident. And in determining the characteristics of accidents in this study, the characteristics of accidents are based on the type and form of the accident, based on the time of the incident, based on the vehicles involved, and based on the victims involved.

Analysis of Traffic Accident Rates

In analyzing the number of traffic accidents, after the data is tabulated, the data is analyzed so that the most vulnerable areas will be obtained. The approach uses four methods, namely accidents per km of road length, accidents with a number ratio of , accidents per one million vehicle km, and accidents per 100 million vehicle km.

Analysis of Traffic Accident Prone Areas

Accident-prone areas are divided into black sites (accident-prone areas) and blackspots (accident-prone locations). Where the blacksite review has been determined from the results of the data on the road section, while for the black spot it is also seen from the results of the data analysis. On the Rantau Berangin Ujung Batu road section.

5.RESEARCH RESULT

The location of traffic accidents was observed by dividing the Rantau Berangin -Ujung Batu road section during the 5 year period (2014-2018) as many as 24 traffic accident incidents that occurred in 9 locations/villages see the table and shows the number of accidents at each location from the analysis data which shows a figure of 10 from the Rantau Berangin- silam.

Table 5.1. Number of Frequency of Traffic Accidents on Rantau Windy – Ujung Batu (2014 – 2018)

No	Desa	Km	Year					Total Accident
			2014	2015	2016	2017	2018	
1	Rantau Berangin - Silam	1–8,1	1	2	2	1	4	**10**
2	Silam – Batu Langkah Kecil	8,1–11,3	0	0	1	0	1	2
3	Batu Langkah Kecil – Kabun	11,3–29,3	1	1	0	0	0	2
4	Kabun - Aliantan	29,3–35,9	0	0	2	1	0	**3**
5	Aliantan – Bencah Kesuma	35,9–37,9	0	0	0	0	1	1
6	Bencah Kesuma – Tandun	37,9–47,8	0	1	1	0	0	2
7	Tandun – Tandun Barat	47,8–58,8	0	0	0	0	1	1
8	Tandun Barat – Ujung Batu Timur	58,8–60,7	0	0	0	0	0	0
9	Ujung Batu Timur – Ujung Batu	60,7–66,5	1	2	0	0	0	**3**
	Jumlah		3	6	6	2	7	**24**

Source: Data analysis 2019

To get the number of accidents on one part of the road, can be obtained based on accidents per one million km or 100 million miles traveled by the vehicle. In table 5.2, the results of the analysis of the highest travel performance are found on the Batu Step Kecil - Kabun road with a road length of 18 km with high traffic flow so that the LHR is multiplied by the length of the road, then the trip performance figure is 10,098 vehicles/day/km, followed by the Tandun – West Tandun road section.

Table.5.2 The results of the calculation of travel performance on the Rantau Berangin Road – Ujung Batu

No	Segment	LHR (Average)	Length (Km)	Total (Kend/hari)(Km) (1.000.000)
1	Rantau Berangin - Silam	561	8,1	4.544
2	Silam – Batu Langkah Kecil	561	3,2	1.795
3	Batu Langkah Kecil – Kabun	561	18	10.098
4	Kabun - Aliantan	561	6,6	3.703
5	Aliantan – Bencah Kesuma	561	2	1.122
6	Bencah Kesuma – Tandun	561	9,9	5.554
7	Tandun – Tandun Barat	561	11	6.171
8	Tandun Barat – Ujung Batu Timur	561	1,9	1.066
9	Ujung Batu Timur – Ujung Batu	561	5,8	3.254

Source: Data analysis 2020

Identify Black Spots Based on Accident Rate

The value on the Accident Rate is obtained by looking at the results of the highest accident events in the table and diagram above, then the Rantau Berangin – Silam road is a Black Spot location where there are 10 accidents, and the Kabun – Aliantan road and Ujung Batu Timur – Ujung Batu with 3 accidents, From the above calculation, the result of the Accident Rate is 9.767 in the Rantau Berangin – Silam area. Then the Rantau Berangin – Silam area with a value of 9.767 which is an indication of the number of accidents for the Spot (for accidents per one million vehicles entering the Spot).

Table 5.5 Accident Rate Calculation Results with Black Spots on the Rantau Berangin – Ujung Batu

No	Km	Segment	Accident Total		LHR	Accident Rate
			Total	Average		
1	1 – 8,1	Rantau Berangin – Silam	10	2	561	**9,767**
2	8,1 – 11,3	Silam – Batu Langkah Kecil	2	0,4	561	1,953
3	11,3 – 29,3	Batu Langkah Kecil – Kabun	2	0,4	561	1,953
4	29,3 – 35,9	Kabun – Aliantan	3	0,6	561	**2,930**
5	35,9 – 37,9	Aliantan – Bencah Kesuma	1	0,2	561	0,976
6	37,9 – 47,8	Bencah Kesuma – Tandun	2	0,4	561	1,953
7	47,8 – 58,8	Tandun – Tandun Barat	1	0,2	561	0,976
8	58,8 – 60,7	Tandun Barat – Ujung Batu Timur	0	0	561	0
9	60,7 – 66,5	Ujung Batu Timur – Ujung Batu	3	0,6	561	**2,930**

Source: Data analysis 2020

Identify Black Sites Based on Accident Rate

In table 5.6, it can be seen that the calculation of the Accident Rate for the Black Site with the highest Accident Rate value of 1.205 is found on the Rantau Berangin – Silam road section which shows the high Accident Rate for the accident rate on that road segment.

Table 5.6 Accident Rate Calculation Results with Black Sites on the Rantau Berangin – Ujung Batu Section

No	Segment	Accident Total		LHR (Kend/Hr)	Length (Km)	(Kend/Km)	Accident Rate
		Total	Average				
1	Rantau Berangin – Silam	10	2	561	8,1	4.544	**1,205**
2	Silam – Batu Langkah Kecil	2	0,4	561	3,2	1.795	0,610
3	Batu Langkah Kecil – Kabun	2	0,4	561	18	10.098	0,108
4	Kabun – Aliantan	3	0,6	561	6,6	3.703	0,443
5	Aliantan – Bencah Kesuma	1	0,2	561	2	1.122	0,488
6	Bencah Kesuma – Tandun	2	0,4	561	9,9	5.554	0,197
7	Tandun – Tandun Barat	1	0,2	561	11	6.171	0,088
8	Tandun Barat – Ujung Batu Timur	0	0	561	1,9	1.066	0
9	Ujung Batu Timur – Ujung Batu	3	0,6	561	5,8	3.254	0,505

Source: Data analysis 2020

Research on Traffic Accident Prone Locations

The location of this study is on the Rantau Berangin road section 74.6 km to Jalan Ujung Batu (Rokan Hulu) km 141 which has a length of ± 66.5 km, which is a class III collector road that connects the provincial capital to the district, in terms of road conditions, there are holes in the road, there are cracks, sharp bends, no road shoulders, so that it can cause accidents that can be detrimental, both from a humanitarian and economic perspective.

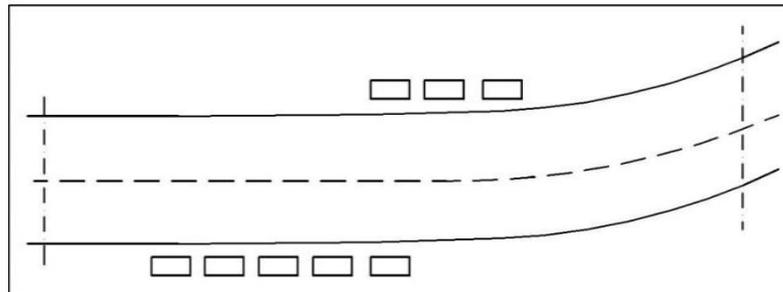**Pict 1: Location of Traffic Accident Prone Areas on the Rantau Berangin – Silam Road Section (km 1 – km 8.1)**
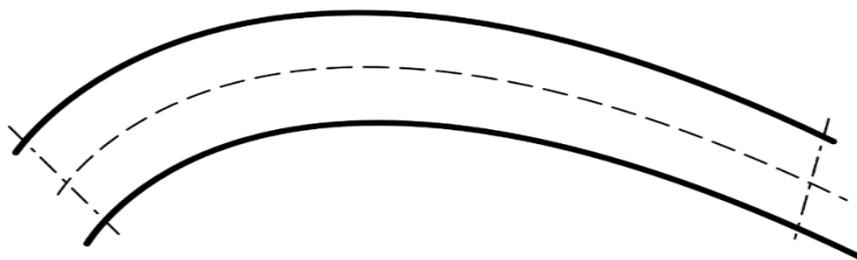
Location Description
a. The curvy road
b. Limited visibility of corners
c. There are no road markings or signs
d. Road width 6.4 meters
e. No no shoulder of the road

Pict 2: Location of Traffic Prone Areas onthe Kabun – Aliantan Road Section

location Description
a. No road markings
b. No shoulder of the road
c. Potholes/damage to the road
d. Road width 5.8 meters

Traffic Accident Management And Prevention Efforts
Traffic prevention and safety can be done through several aspects, including:
A. Engineering Aspect
Namely the provision and development of rest areas, maintenance of roads and their infrastructure, installation of rumble stripe, closing the distance between guide posts, installation of markings, installation of warning lights (flip flop lights), installation of signs, speed restrictions, providing pedestrian facilities, given straight roads. turns/narrowed to reduce speed, the road does not directly access the main road, all of which are essentially the right design for each road segment.
B. Educational Aspect
Because the main cause of accidents is humans (especially teenagers), the aspect of improving driver behavior is very important, which can be started from education at school/since childhood, through advice and training. Skill tests must be carried out in the field and understand the meaning of traffic signs. A driving license is only given to people who are really capable and skilled and polite in driving a vehicle, age in accordance with the provisions and excellent health.

C. Legal Aspect
It is necessary to socialize existing regulations and enforce them wisely, so that traffic violations do not occur. People obey the law not because there are police but their own awareness for safety

CONCLUSIONS AND SUGGESTIONS

Conclusions
1. The level of traffic accidents on the Rantau Berangin – Ujung Batu road is quite high because there are 24 traffic accidents on this road, with a total of 51 victims and 5 of them died.
2. The results of the analysis that have been carried out show that the Accident Rate value of the Black Spot in Rantau Berangin – Silam is 9.767, Silam – Batu Langkah Kecil is 1.953, Batu Langkah Kecil – Kabun is 1.953, Kabun – Aliantan is 2.930, Aliantan – Bencah Kesuma 0.976, Bencah Kesuma – Tandun 1.953, Tandun – West Tandun – 0.976, West Tandun – East Ujung Batu is 0, East Ujung Batu – Ujung Batu is 2.930. The Accident Rate for Black Site in Rantau Berangin – Silam is 1.205, Silam – Batu Langkah Kecil is 0.610, Batu Langkah Kecil – Kabun is 0.108, Kabun – Aliantan is 0.443, Aliantan – Bencah Kesuma is 0.488, Bencah Kesuma – Tandun is 0.197, Tandun – West Tandun is 0.088, West Tandun – East Ujung Batu is 0, East Ujung Batu – Ujung Batu is 0.505.
   Along the Rantau Berangin – Ujung Batu road, the area most prone to traffic accidents is Rantau Berangin – Silam.

4. The most dominant factor that causes traffic accidents on the Rantau Berangin – Ujung Batu road for 5 years is the human factor itself, such as driving at high speed in a crowd, using the lane of other drivers.

Suggestions

1. To create a safe, comfortable and orderly condition, it is necessary to increase the safety of road users. Because there are still many accidents that occur on the Rantau Berangin – Ujung Batu road, it is necessary to complete traffic facilities along the road, traffic signs, road markings, safety fences, and corner mirrors so that road users can feel safe.

2. To road users, especially motorcyclists, cars and others to further increase awareness to comply with road traffic regulations, and knowledge of traffic signs. And be more careful with areas that are prone to traffic accidents on the Rantau Berangin - Ujung Batu road section.

3. To take preventive measures to all traffic violators which can endanger the occurrence of traffic accidents both from vehicle equipment, road speed rules, and also permissible load restrictions.

Thank-you note Rohul Kampar police chief who has provided research data. Rector of the Islamic University of Riau

REFERENCES

1. Kampar Police, 2018. Data on Traffic Accident Development in Kampar Regency in 2014 – 2018
2. Austroad, 2002. Road Safety Audit. 2nd Edition. Standards Association of Australia

3. Chala G, Quezon E.T, Kumela T.; Effects of Human Behavior & Geometric Factors in Road Traffic Accidents: A Case Study along Sululta-Fiche Road, Ethiopia; GSJ:, November 2017; 5(11): 163-172. Online: ISSN 2320-9186.

4. Dewanti, 1996, Karakteristik Kecelakaan Lalu Lintas di Yogyakarta, *Media Teknik – UGM Yogyakarta.* No. 3 Tahun XVIII November 1996, Yogyakarta, Halaman 33-37.

5.

6. Fajar, Muhammad Syaeful, 2015. "Analysis of Highway Traffic Accidents in the City of Semarang". Final Project, Engineering, Electrical, UNNES, Semarang

7. Hijirin, Muhammad, 2013. "Analysis of Black Spots and Black Sites on the Pekanbaru - Duri Cross Road (Km 96 - Km 122) in terms of Road Safety Audits in Bengkalis Regency, Riau Province". Final Project, Engineering, Civil, Islamic University of Riau, Pekanbaru

8. Hobbs, F.D., 1995. "Traffic Planning and Engineering". Publisher Gadjah Mada Press.

9. Hullbert, 1981. Effect of driver fatigue (ed) "Human Factor in Highway Traffic Safety Research" Michigan State University East Lansing.

10. Government of the Republic of Indonesia, Law of the Republic of Indonesia Number 14 of 1992 concerning Road Traffic and Transportation, Jakarta

11. Pignataro, 1973. "Traffic Engineering Category Practice Entichal, in English clifs". New Jersey, USA.

12. Priyanto, S, (1997), "Training on Environmental Management of Urban Transportation", Gadjah Mada University, Jogjakarta

13. Sartono, Wardhani, 1993. Research on Traffic Accident Prone Areas on the Kupang – Atambua Road
14. in East Nusa Tenggara Province, in Media Engineering No. I year XV, UGM, Yogyakarta

15. Setiawati, Dwi. 2019. "Analysis of Traffic Accident Prone Points on Provincial Roads, Case study: Jl. Raya Legok and Jl. Raya Kelapa Dua, Tangerang Regency". Civil Engineering, Sultan Ageng Tirtayasa University.
16. Segni G. Causes of road traffic accidents and possible countermeasures on Addis Ababa Shashemene roads. [MA Thesis]; Addis Ababa University, 2007.

17. Soehartono, 1990. Traffic Accident. Jakarta.

18. International Journal of Civil Engineering and Technology (IJCIET) Volume 8, Issue 4, April 2017, pp. 588-596 Article ID: IJCIET_08_04_066 Available online at ISSN Print: 0976-6308 and ISSN Online: 0976-6316