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ANALYSIS OF TRAFFIC ACCIDENTS ON HIGHWAY SECTIONS USING THE AEK METHOD: CASE STUDY IN BALURAN NATIONAL PARK

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Abstract

Traffic accidents are a significant problem in various areas, including highways that cross National Park areas. This research aims to analyze the level of traffic accidents on roads in Baluran National Park using the Equivalent Accident Number (EAN) method as an evaluation tool. This case study involves collecting data on traffic accidents, traffic characteristics, and related environmental factors. The first step involves collecting traffic accident data from relevant agencies, including accident locations, types of accidents, and victims involved. Risk factors such as speed, traffic volume and road conditions are also identified to support the analysis. The AEK method is then applied to calculate the expected equivalent number of accidents based on traffic characteristics and road parameters. The analysis results show the actual accident rate compared to the calculated AEK. If the AEK is higher, this indicates that the location has a significant risk of accidents. Recommendations for improvement were then put forward, including improving infrastructure, implementing more effective traffic signs, and efforts to increase driver awareness. This research makes an important contribution to understanding and overcoming the challenges of traffic accidents in Baluran National Park. With the AEK approach, policies can be designed to effectively improve traffic safety, while maintaining the environmental sustainability of the National Park.

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Keywords: ***AEK, EAN, Traffic, Highway***

INTRODUCTION

Traffic accidents are a detrimental problem in various areas (Yan & Shen, 2022), including highways that cross National Park areas. Baluran National Park, as an important conservation area, is not only a natural habitat for various rare flora and fauna, but also a vital transportation route that connects the surrounding area (Wijaya et al., 2020). Even though it has extraordinary natural beauty, Baluran National Park also poses serious challenges regarding traffic safety. Traffic accidents can have serious impacts on road user safety, public health and ecosystem integrity (Hu et al., 2023). Therefore, it is necessary to carry out an in-depth analysis to understand the factors that contribute to traffic accidents on highways within this national park (Zou et al., 2021). One method that can be used for this analysis is the Accident Equivalent Number (AEK) Method (Treeranurat & Suanmali, 2021).

Data analysis process to obtain results from research in the form of traffic accident characteristics, accident-prone locations, and efforts to prevent traffic accidents (Gu & Dai, 2022). In this case, the data analysis used is analysis of calculations from the data that has been obtained. (Haris Dhaifullah et al., 2023) stated that the data analysis used in this research is firstly the characteristics of traffic accidents, secondly the Accident Equivalent Number (AEK) method for calculating the number of accidents (Kulsum & Sholichin, 2022) and thirdly alternative prevention and handling of their occurrence. traffic accident. The results and discussion are to present an overview of the found data, so that it does not just re-present the data, but rather provides analysis and understanding of the research (Othman & Ali, 2020). The final stage of the research is the conclusions and recommendations that have been made from each research result and providing advice to readers about traffic accidents.

LITERATURE REVIEW

The AEK method is relevant because it can provide a more accurate picture of the level of accident risk at a location by taking into account traffic characteristics and road parameters (Aziza Kurnia Jurusan et al., 2022). In the context of Baluran National Park, where conservation and traffic safety interests intersect, AEK analysis can provide a scientific basis for planning and implementing effective preventive measures (Doneddu et al., 2022).

Table 1. Accident Equivalent Number (AEK) Weighting Values

Equivalent Accident Number				
Method	Died (MD)	Serious Injuries (LB)	Minor Injuries (LR)	Material Losses (K)
Pd T-09-2004-B	12	3	3	1

By weighting a list of accident rankings will be obtained, this method uses Equation 1 (Feryati, 2019)

AEK = 12MD + 3LB + 3LR + 1K……..... ..... (1)

Information:

MD = Died
LB = Serious Injury
L.R = Minor Injuries
K = Accident with material loss

Analysis of traffic accidents in Baluran National Park will involve several important measures of road conditions, such as type, width, surface condition and road signs. Environmental factors such as weather, lighting, and surrounding natural conditions. Types of vehicles involved, average speed, traffic volume, and information about drivers (Muto'in & Utami, 2022). By understanding the factors that influence accidents and measuring the level of risk (Triawan & Susilo, 2023), it is hoped that this research can contribute to the development of mitigation strategies that are appropriate to the specific context of this conservation area. It is hoped that the research results can be used as a basis for improving infrastructure and better traffic policies, so as to create a safe and balanced environment for road users and the Baluran National Park ecosystem. The following is accident data from the Banyuputih Police, Situbondo Regency.

Table 2. Baluran Park Highway Accident Data

Year	Number of events	Number of Victims		
		MD	LB	L.R
2018	45	21	37	36
2019	24	16	13	24
2020	45	7	21	40
2021	27	6	19	39
2022	23	12	19	23

METHOD

This research uses a case analysis approach to understand the level of traffic accidents on the Baluran National Park highway. The data collection method is carried out as follows (Priambudi et al., 2021):

Primary data

Primary data is data obtained directly at the research location (Cai et al., 2020). In this research, the primary data used includes data on the condition of the Baluran National Park Highway, including road length, lane width, shoulder width and completeness of road infrastructure and road conditions in 2022.

Secondary Data

Secondary data collection was carried out first in this writing based on the objectives and scope of the research (Muto'in & Utami, 2022). Secondary data is information taken from written sources in the form of reports, recapitulations, or official sources. Secondary data obtained from Banyuputih Police Traffic Accident Data 2018-2022, namely traffic accident reports, including accident location, data on the number of victims, time, type of vehicle, victim class, gender and age of victims for five years (2018-2022) which registered with the agency. The research method refers to (Jaya et al., 2023) which is carried out with detailed activities such as determining the research location in the form of road segments every 5 km, recapping accident victims for each road segment or every 5 km, calculating the weight of the equivalent number of accidents every 5 km (Equation 1). If the weight of the accident equivalent number exceeds the upper control limit value, then the segment is a black spot location (Sutriasti et al., 2023). The editing stage, namely checking the completeness of the data that will be processed using the AEK method, the coding stage, namely classifying and identifying the data obtained into the variables to be studied (Prasetyo, 2023). Data tabulation stage, namely tabulating data that has been classified, problem formulation testing stage, namely the testing stage of the assumptions made (Darmawan & Arifin, 2020). Problem formulation testing is a form of inferential statistics for decision making (Oktopianto & Pangesty, 2021).

RESULTS AND DISCUSSION

Division of Research Locations Per Segment

The road that will be analyzed and discussed is the Baluran National Park Highway, 17 kilometers long from the starting point of the Batangan Banyuputih intersection at km 11 and the final point is at the Bakal intersection at kilometer 28. The analytical calculations in this study are divided into 5 segments, each segment has Different distances according to land use division. The following is the division of research locations per segment:

Segment 1

Segment 1 is located at the Batangan Banyuputih intersection, precisely at km 11. The location of segment 1 has a segment length of 2 km starting from km 11-km 13 with a lane width of 7 m with a lane width of 3.5 m, segment 1 has a road shoulder with pavement with a road shoulder width of 1.5 m. On direct observation at the location, the condition of road segment 1 was seen to be straight and there were 4 bends and the road conditions had potholes, damage, and a lack of traffic signs.

Segment 2

Segment 2 is located on the Baluran National Park Highway, precisely at km.13. At location segment 2, it has a length of 2 km starting from km.13-km.15 with a lane width of 7 m with a lane width of 3.5 m, has a road shoulder without pavement. Segment 2 is in a quiet zone, a landfill location so there are lots of heavy vehicles going in and out of the Bajulmati reservoir location. Apart from that, segment 2 is on a road that is still forested. In observations, segment 2 locations tend to have damaged road conditions, there are points where the road is bumpy and there are bends where vehicles in the opposite direction cannot be seen (blind spots) and there are no traffic signs.

Segment 3

Segment 3 is located on the Baluran National Park Highway, precisely at km.15. Location segment 3 has a length of 3 km starting from km 15-km 18 with a lane width of 7 m and a lane width of 3.5 m. Segment 3 has a road shoulder with 0.5 m wide pavement. Segment 3 is in a fixed zone in the middle of the forest. On direct observation at the segment 3 location, it can be seen that the road conditions in segment 3 tend to be straight and there are damaged roads due to excessive vehicle loads.

Segment 4

Segment 4 is located on the Baluran National Park Highway, precisely at km.18. Location segment 4 has a segment length of 4 km starting from km.18-km.22 with a lane width of 7 m and a lane width of 3.5 m. This segment has a road shoulder without pavement. Based on observations at the location, the condition of road segment 4 tends to be straight and has 2 bends, as well as the condition of the road is damaged, bumpy and there are no traffic signs.

Segment 5

Segment 5 is located on the Baluran National Park Highway, precisely at km.22. It has a length of 6 km starting from km.22-km.28 with a lane width of 7 m with a lane width of 3.5 m, in segment 5 there is a road shoulder without pavement. Segment 5 is at a location via the Maredan bridge which is 1,474 m long with a bridge width of 12.7 m and is in a forest location. When observing the location, the road conditions tend to be straight, bumpy and there are many damaged roads and there are no traffic signs.

1. Characteristics of Traffic Accidents

   Characteristics of traffic accident-prone locations on roads along the Baluran National Park Highway, where many accidents occur involving people using vehicles. It was recorded that in 2018 and 2020 there were the most traffic accidents compared to 2019, 2021 and 2022. In 2018 there were 45 accident cases, in 2019 there were 24 accident cases, in 2020 there were 45 accident cases, in 2021 there were 27 accident cases and in In 2022 there will be 23 accident cases

2. Location of Traffic AccidentsPer Segment

   Traffic accidents along the Baluran National Park Highway are divided into 5 segments consisting of segment 1, segment 2, segment 3, segment 4 and segment 5. From the results of the division per segment according to the traffic accident data obtained, it is clear that each segment occurs uneven. The following number of traffic accidents by location per segment can be seen in Figure 1.

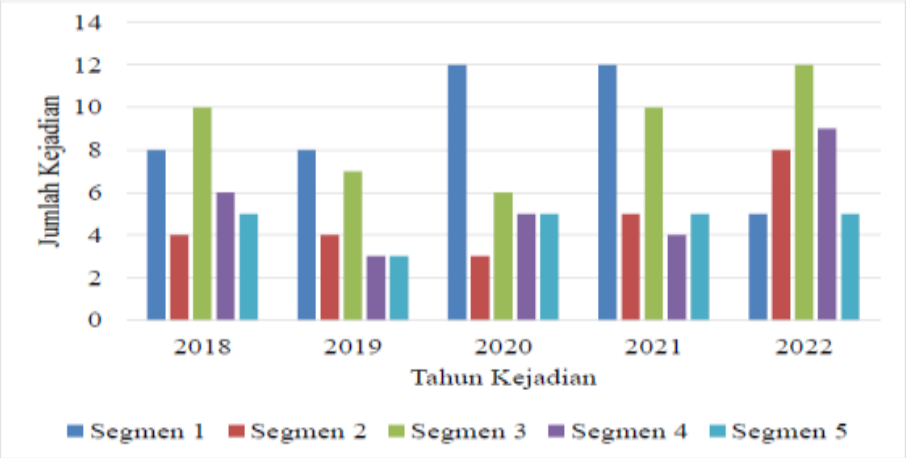

Figure 1. Data graph of the number of traffic accidents per segment

Figure 1 explains that the highest traffic accidents occurred in segments 3 and 4 with a total of 12 incidents occurring in 2018, in 2019 traffic accidents occurred in segment 5 with a total of 8 incidents, then in 2020 they occurred in segment 5 with a total of The 12 highest incidences of traffic accidents occurred, in 2021 the highest incidence of traffic accidents occurred in segment 5 with a total of 9 incidents, and in 2022 the highest number of accidents occurred in segments 1, 3, 4 and 5 with a total of 5 incidents. From the data obtained, divided by segment, the most dominant every year for five years occurred in segment 5 with a total of 39 incidents. Road users who pass through segments prone to traffic accidents are advised to be more alert and careful.

3. Traffic Accidents Based on Time (Hours)

Traffic accidents can be seen from the time a traffic accident occurs, the division of traffic accidents based on the time they occur is divided into four time periods with six hour intervals for 24 hours, namely starting from 00.01-06.00 WIT, 06.01-12.00 WIT, 12.01 WIT -18.00 WIB, and 18.01-24.00 WIB. The following is the number of events based on time (hours) in Figure 2.

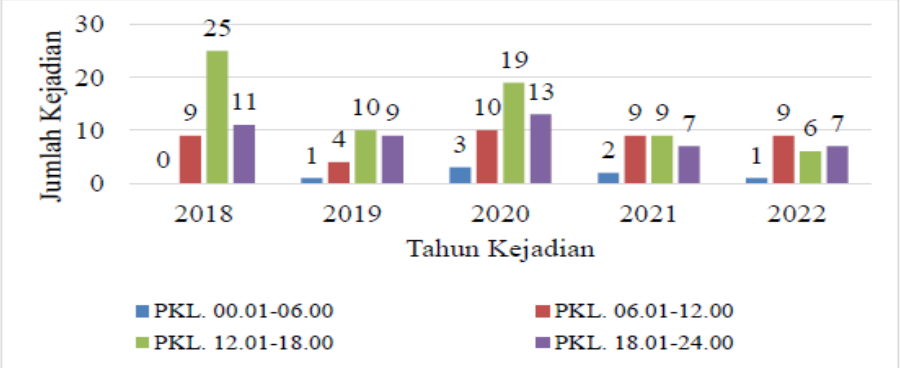

Figure 2. Data graph of time (hours) of traffic accidents

In Figure 2, the results of the distribution of traffic accidents based on the time of occurrence of traffic accidents, the highest occurred at 12.01-18.00 WIB in 2018 with a total of 25 incidents, the next highest occurred at 12.01-18.00 WIB in 2019 with a total of 10 incidents. , in the following year the highest occurred at 12.01-18.00 WIB in 2020 with a total of 19 incidents, in 2021 the highest occurred at 06.01-12.00 WIB and at 12.01-18.00 WIB with a total of 9 incidents, and in 2022 that The highest occurred at 06.01-12.00 WIB with a total of 9 incidents. The highest total number of traffic accidents based on time (hours) for five years (2018-2022) occurred at 12.01-18.00 WIB with a total of 69 incidents because that time was rush hour, where everyone was carrying out activities outside the home. Meanwhile, the lowest total of traffic accidents during 2018-2022 occurred at 00.01-06.00 WIB with a total of 7 incidents because most people were at home resting.

4. Traffic Accidents Based on the Day of Occurrence

Traffic accidents on the Baluran National Park Highway can be seen from the day the traffic accident occurred, from data obtained over the last 5 years of traffic accidents can be seen in Figure 3.

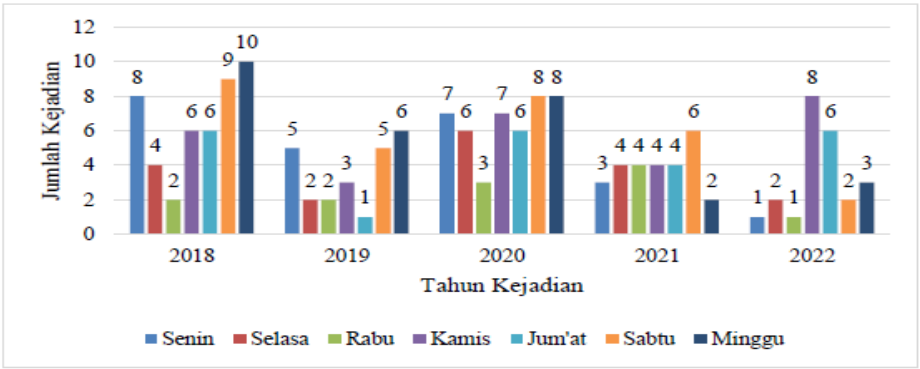

Figure 3. Accident data graph based on incident day

In Figure 3 it can be seen that in 2018 the number of traffic accidents which dominated the occurrence of traffic accidents occurred on Sundays with a total of 10 incidents, in 2019 the dominant number of traffic accidents occurred on Sundays with a total of 6 incidents, next in 2020 The dominant traffic accidents occurred on Saturdays and Sundays with a total of 8 incidents, in 2021 the dominant traffic accidents occurred on Saturdays with a total of 6 incidents, while in 2022 the highest occurred on Thursdays with a total of 8 incidents. So, the highest total number of traffic accidents by day for five years

(2018-2022) occurred on Saturday with a total of 30 incidents. Meanwhile, the lowest total number of traffic accidents over five years (2018-2022) occurred on Wednesday with a total of 12 incidents.

5. Traffic Accidents Based on Victim Class

Traffic accidents on the Baluran National Park Highway can be seen based on victim class, namely death (MD), minor injuries (LR) and serious injuries (LB) for five years (2018-2022). From the data obtained, it can be seen that minor injuries (LR) dominate every year for the last five years. We can see the number of accident data based on victim class in Figure 4.

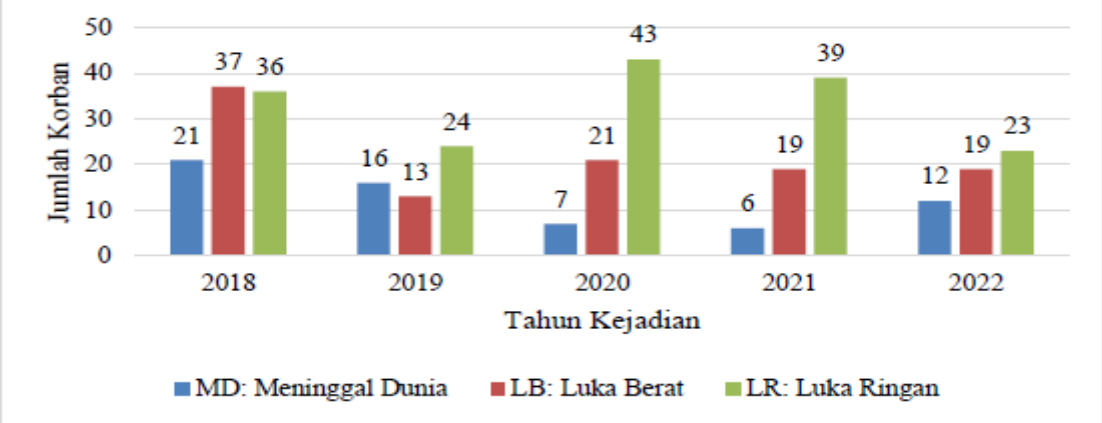

Figure 4. Accident Data Graph Based on Victim Class

In Figure 4, it can be seen that from the data obtained in 2018, serious injuries (LB) dominated with 37 victims, in 2019 minor injuries (LR) dominated with 24 victims, in 2020 minor injuries dominated. (LR) with a total of 43 victims, in 2021 the dominant will be minor injuries (LR) with a total of 39 victims, and in 2022 the dominant will be minor injuries (LR) with a total of 23 victims. So, the highest total number of traffic accidents over the five years (2018-2022) were minor injuries (LR) with a total of 165 victims. Meanwhile, the lowest for five years (2018-2022) was death (MD) with a total of 62 victims.

6. Traffic Accidents Based on Gender

Traffic accidents on the Baluran National Park Highway can be seen from gender. From the data obtained on the number of traffic accidents, it is clear that the male gender dominates as the party most involved in traffic accidents. The number of victims by gender can be seen in Figure 5.

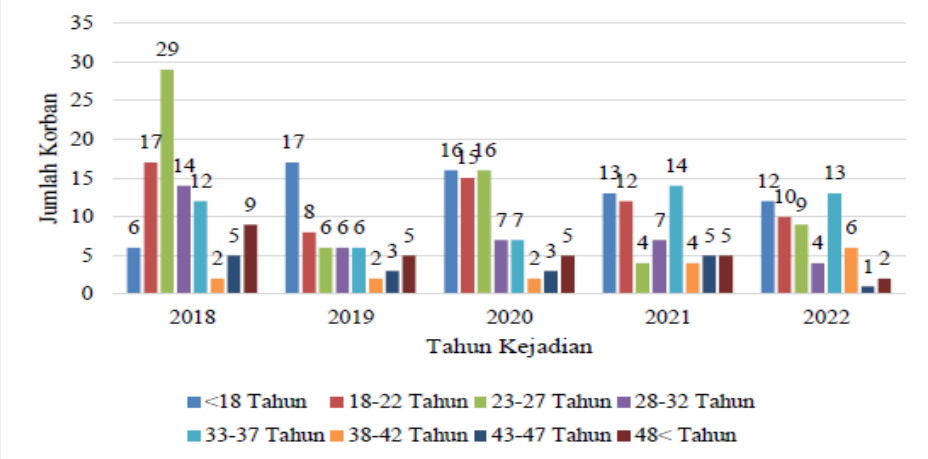

Figure 5. Data graph of the number of accidents based on gender

In Figure 5 it can be seen that the highest number of traffic accident victims based on gender in 2018 was 65 male, in 2019 the highest was 38 male, next in 2020 the highest

was 53 male. male, in 2021 the highest with 38 male gender and in 2022 the highest with 44 male gender. So, the highest total number of accidents based on gender during the five years (2018-2022) was male with a total of 238 victims because vehicle drivers on the highway are dominated by men. Meanwhile, the lowest for five years (2018-2022) was female with a total of 98 victims.

7. Based Traffic AccidentsAge

Traffic accidents on the Baluran National Park Highway can be seen from the age of road users starting from less than 18 years to more than 48 years with five year age intervals. From the data obtained, the number of traffic accidents can be seen in Figure 6.

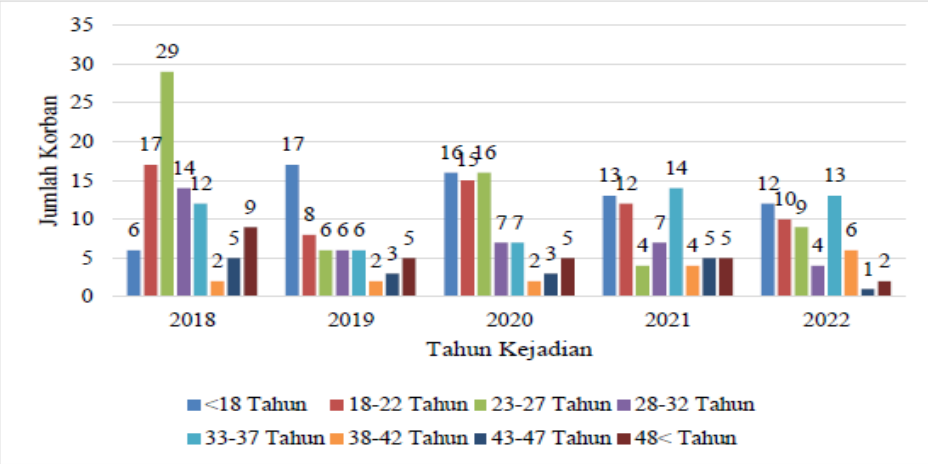

Figure 6. Data graph of the number of accidents based on age

In Figure 6 it can be seen that the highest number of traffic accident victims based on age in 2018 was 29 victims aged 23-27 years, in 2019 the highest number was 17 victims aged less than 18 years (<18), then in in 2020 the highest occurred at ages less than 18 years (<18) and 23-27 with 16 victims, in 2021 the highest occurred at ages 33-37 years with 14 victims, and in 2022 the highest occurred at ages 33-37 year with a total of 13 victims. So, the highest total number of traffic accidents based on age for the five years (2018-2022) were those aged less than 18 years (<18) and 23-27 years with a total of 64 victims. Meanwhile, the lowest for five years (2018-2022) was aged 38-42 years with a total of 16 victims.

8. Traffic Accidents Based on Vehicle Type

Traffic accidents on the Baluran National Park Highway section based on the type of vehicle involved. It is clear that motorbikes dominate as the type of vehicle that is most often involved in traffic accidents. The data obtained can be seen in Figure 7.

Figure 7. Accident Data Graph Based on Vehicle Type

In Figure 7, it can be seen that traffic accidents based on the type of vehicle in 2018 dominated the occurrence of traffic accidents, namely motorbikes with a total of 67,

in 2019, the ones that dominated the occurrence of traffic accidents were motorbikes with the number 32, in 2020, the occurrence of accidents dominated. traffic accidents are motorbikes with a total of 56, in 2021 the ones that dominate the occurrence of traffic accidents are motorbikes with a total of 38, in 2022 the ones that dominate the occurrence of traffic accidents are motorbikes with a total of 27. So, the total number of traffic accidents is based on type The highest number of vehicles for the five years (2018-2022) was motorbikes with a total of 220 vehicles because the main means of transportation that is widely used by the people of West Perawang is motorbikes for daily mobilization needs to go to school or work. Meanwhile, the lowest for five years (2018-2022) was rowing bicycles with a total of 1 vehicle

Accident Analysis

The traffic accident data results come from Banyuputih Police traffic data. The data obtained is traffic accident data from 2018-2022, the location which occurred on Jalan Raya Baluran National Park km 11- km 28. The data obtained is in the form of total accident victims for five years, time of incident, type of vehicle involved, class of victims , gender and age. The data obtained from the Banyuputih Police is then divided into 5 segments each year according to the division of land use. The total number of traffic accidents each year has been different over the last five years. The following is data on the number of traffic accident victims for 5 years divided by segments, which we can see in Figure 8.

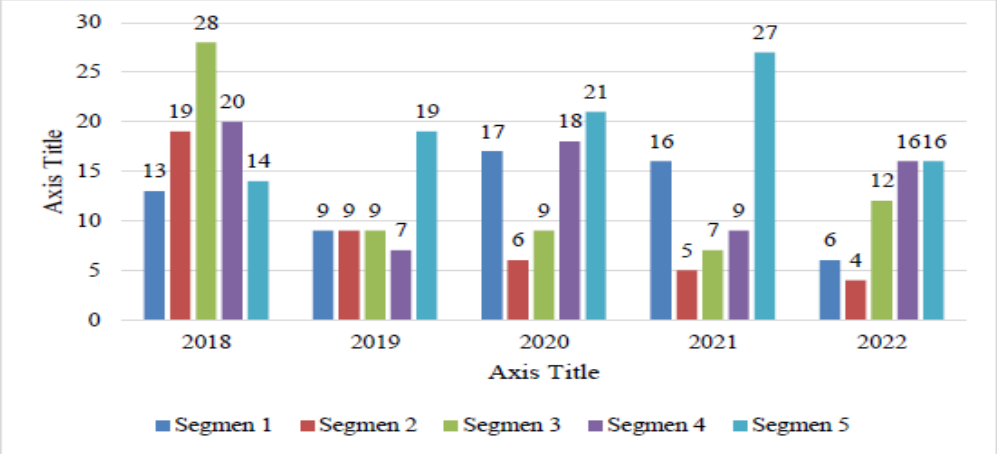

Figure 8. Data on the number of traffic accident victims

It can be seen in Figure 8 that over 5 years the data on the number of accidents has increased and decreased. In the last five years the highest number of victims occurred in segment 3 in 2018, which was 28 victims, in 2019 the highest was in segment 5, which was 19 victims, in 2020 the highest was in segment 5, which was 21 victims, in 2021 the highest was in segment 5, which was 27 victims, and in 2022 the highest will be in segments 4 and 5 with a total of 16 victims. So, the total number of accident victims is the highest in the segment for five years (2018-2022) with a total of 96 victims in segment 5. Meanwhile, the total number of accident victims is the lowest in the segment for five years (2018-2022) with a total of 43 victims in segment 2.

Accident Equivalent Figure (AEK)

Based on data on the number of accident victims obtained from the Banyuputih Police, the number of accidents on the Baluran National Park Highway section can be calculated using the AEK (Accident Equivalent Number) method. The AEK method (Accident Equivalent Number) is calculated by adding up the accident events at each kilometer or segment and then multiplying by the weight value according to the victim class. The standard weight values used are Death (MD) = 12, Serious injury (LB) = 3, Light injury (LR) = 3, Vehicle damage (K) = 1 (Pd T-09-2004-B). As an example of calculations in calculating accident numbers using the AEK Method (Accident

Equivalent Number) in this research is the Baluran National Park Highway section, Situbondo Regency km 11-km 28 during the 2018-2022 period, from the Baluran National Park Highway section it was obtained data on the number of victims in 2018 in segment 1, 3 people died, 8 people were seriously injured, 2 people had minor injuries. This analysis was carried out to weight the level of traffic accidents. Where accident-prone locations are determined based on the weighting of victims resulting from traffic accidents. The formula notation uses Equation (3.1), a method for calculating the AEK formula based on the Handling of Accident Prone Locations (Pd T-09-2004-B).

AEK = 12 (3) + 3 (8) + 3 (2)

= 36 + 24 + 6 = 66 (segment 1)

So, the value of the AEK accident rate (Accident Equivalent Number) on the Baluran National Park Highway section in segment 1 in 2018 is 66

Table 3 Values of Accident Equivalent Figures (AEK) in 2018

Roads	Number of events	Number of Victims			AEK value			AEK value
		MD	LB	L.R	MD*12	LB*3	LR*3	
Segment 1	8	3	8	2	36	24	6	66
Segment 2	8	4	5	10	48	15	30	93
Segment 3	12	7	9	12	84	27	36	147
Segment 4	12	5	11	4	60	33	12	105
Segment 5	5	2	4	8	24	12	24	60
Total	45	21	37	36	252	111	108	471

In table 3 it can be seen that the results of data analysis in 2018 which had the highest Accident Equivalent Number (AEK) value was in segment 3 with a total Accident Equivalent Number (AEK) value of 147 because segment 3 had a high number of incidents and was also supported by The number of fatalities is very high in segment 3, so it will increase the AEK value significantly in segment 3 locations. Meanwhile, the lowest Accident Equivalent Figure (AEK) value is in segment 5 with an Accident Equivalent Figure (AEK) value of 60 because the number of fatalities is the lowest. . The total value of the Accident Equivalent Figure (AEK) in all segments in 2018 with a total value of 471.

The formula notation uses Equation (1), the method for calculating the AEK formula based on the Handling of Accident Prone Locations (Pd T-09-2004-B).

AEK = 12(2) + 3(2) + 3(5)

= 24 + 6 + 15 = 45 (segment 1).

Table 4 Value of the Accident Equivalent Figure (AEK) in 2019

Roads	Number of events	Number of Victims			AEK value			AEK value
		MD	LB	L.R	MD*12	LB*3	LR*3	
Segment 1	4	2	2	5	24	6	15	45
Segment 2	4	3	3	3	36	9	9	54
Segment 3	3	3	0	6	36	0	18	54
Segment 4	5	2	2	3	24	6	9	39
Segment 5	8	6	6	7	72	18	21	111
Total	24	16	13	24	192	39	72	303

In table 4, it can be seen from the data analysis that the highest Accident Equivalent Rate (AEK) is in segment 5 with an Accident Equivalent Rate (AEK) of 111 because segment 5 has a high number of incidents and is also supported by a very high number of fatalities. in segment 5 so that it will significantly increase the Accident Equivalent Figure (AEK) value at segment 5 locations.

Meanwhile, the lowest Accident Equivalent Number (AEK) value was in segment 4 with an AEK value of 39. The total Accident Equivalent Number (AEK) value in all segments in 2019 was a total value of 303. The formula notation uses Equation (3.1), the method for calculating the AEK formula based on the Handling of Accident Prone Locations (Pd T-09-2004-B).

AEK = 12 (1) + 3 (7) + 3 (9)
= 24 + 6 + 15 = 60 (segment 1)

The results of the AEK (Accident Equivalent Number) analysis in 2020 for each segment on the Baluran National Park Highway can be seen in Table 5.

Table 5. Accident Equivalent Figures (AEK) in 2020

Roads	Number of events	Number of Victims			AEK value			AEK value
		MD	LB	L.R	MD*12	LB*3	LR*3	
Segment 1	10	1	7	9	12	21	27	60
Segment 2	8	0	2	4	0	6	12	18
Segment 3	6	1	4	4	12	12	12	36
Segment 4	9	2	3	13	24	9	39	72
Segment 5	12	3	5	13	36	15	39	90
Total	45	7	21	40	84	63	129	276

In table 5, it can be seen from the data analysis that the highest Accident Equivalent Rate (AEK) is in segment 5 with an Accident Equivalent Rate (AEK) of 90 because segment 5 has a high number of incidents and is also supported by a very high number of fatalities. in segment 5 so that it will increase the Accident Equivalent Figure (AEK) value significantly at the location of segment 5. Meanwhile, the lowest Accident Equivalent Figure (AEK) value is in segment 2 with an AEK value of 18 because in segment 2 there were no fatalities. The total AEK value in all segments in 2020 was 276. The formula notation uses Equation (3.1), the method for calculating the AEK formula based on the Handling of Accident Prone Locations (Pd T-09-2004-B).

AEK = 12(2) + 3(3) + 3(11)
= 24 + 9 + 33 = 66 (segment 1)

The results of the analysis of the Accident Equivalent Number (AEK) in 2021 for each segment on the Baluran National Park Highway can be seen in Table 6.

Table 6. Accident Equivalent Figures (AEK) in 2021

Roads	Number of events	Number of Victims			AEK value			AEK value
		MD	LB	L.R	MD*12	LB*3	LR*3	
Segment 1	6	2	3	11	24	9	33	66
Segment 2	3	0	2	3	0	6	9	15
Segment 3	5	2	5	2	0	15	6	21
Segment 4	4	2	4	3	24	12	9	45
Segment 5	9	2	5	20	24	15	60	99
Total	27	6	19	39	72	57	117	246

In table 6, it can be seen from the data analysis that the highest Accident Equivalent Rate (AEK) is in segment 5 with a total Accident Equivalent Rate (AEK) value of 99 because segment 5 has a high number of incidents and is also supported by a very high number of light injury victims in segment 5 so that it will increase the Accident Equivalent Number (AEK) value significantly at the location of segment 5. Meanwhile, the lowest Accident Equivalent Number (AEK) value is in segment 2 with an Accident Equivalent Number (AEK) value of 15 because the number of incidents in segment 2 is very low and not there were fatalities in segment 2. The total value of Accident Equivalent Figures (AEK) in all segments in 2021 is 246.

The formula notation uses Equation (3.1), the method for calculating the AEK formula based on the Handling of Accident Prone Locations (Pd T-09-2004-B).

AEK = 12 (4) + 3 (1) + 3 (1)

= 48 + 3 + 3 = 54 (segment 1)

The results of the analysis of the Accident Equivalent Number (AEK) in 2022 for each segment on the Baluran National Park Highway can be seen in Table 4.5

Table 7. Accident Equivalent Figures (AEK) in 2022

Roads	Number of events	Number of Victims			AEK value			AEK value
		MD	LB	L.R	MD*12	LB*3	LR*3	
Segment 1	5	4	1	1	48	3	3	54
Segment 2	3	1	1	2	12	3	6	21
Segment 3	5	0	5	7	0	15	21	36
Segment 4	5	0	9	7	0	27	21	48
Segment 5	5	7	3	6	84	9	18	111
Total	23	12	19	23	144	57	69	270

In table 7, it can be seen from the data analysis that the highest Accident Equivalent Rate (AEK) is in segment 5 with an Accident Equivalent Rate (AEK) of 111 because segment 5 has a high number of incidents and is also supported by high death tolls in segment 5 so that it will increase the Accident Equivalent Number (AEK) value significantly at the location of segment 5. Meanwhile, the lowest Accident Equivalent Number (AEK) value is in segment 2 with an AEK value of 21 because the number of incidents in segment 2 is very low and the number of victims is small. The total AEK value in all segments in 2022 will be 270.

In the recap table, the AEK (Accident Equivalent Figure) values for the last five years are obtained which are divided into segments each year. The following is the AEK (Accident Equivalent Number) value in graphic form in Figure 9 for five years.

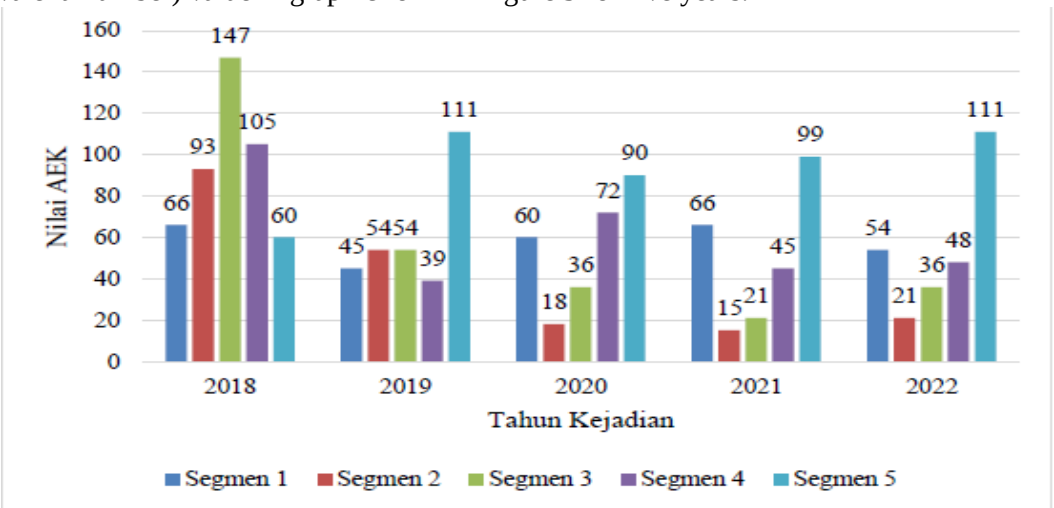

Figure 9. Graph of AEK Value (Accident Equivalent Number) for 5 Years Per Segment.

In Figure 9 it can be seen that those with the highest AEK (Accident Equivalent Figure) values were in segment 3 in 2018 with an AEK of 147, in 2019 with the highest AEK value of 111 in segment 5, in 2020 with the highest AEK value of 90 in segment 5, then in 2021 with the highest AEK value of 99 in segment 5, and in 2022 with the highest AEK value of 111 in segment 5. The analysis results from Figure 4.9 are the highest total AEK (Accident Equivalent Number) values for five years is in segment 5 with a total AEK (Accident Equivalent Number) value of 471 and the lowest AEK (Accident Equivalent Number) value occurs in segment 2 with a total AEK (Accident Equivalent Number) value of 201.

Determining Locations Prone to Traffic Accidents

From the results of AEK calculations, locations prone to traffic accidents can be identified. After obtaining the AEK (Accident Equivalent Number) value, then identification of locations at risk of accidents is carried out based on the accident number for each road segment that has an AEK (Accident Equivalent Number) accident value. So from this value it can be seen which road segments are in locations prone to accidents. The AEK value shows that the line value occurred in segment 3 in 2018 with a value of AEK = 147 so it is at risk of being prone to accidents, in 2019 the location prone to accidents occurred in segment 5 with a value of AEK = 111, in 2020 the location prone to accidents occurred in segment 4 with a value AEK = 72, UCL = 71 and in segment 5 with an AEK value of 90, accident-prone locations in 2021 will occur in segment 1 with an AEK value = 70, segment 5 with an AEK value = 99, in 2022 accident-prone locations will occur in segment 5 with AEK value = 111. The AEK value in segment 3 in 2018 with AEK value = 147 means it is at risk of accidents. The AEK value in segment 5 in 2019 with an AEK value = 111 means there is a risk of accidents. The AEK value in 2020 in segment 4 is AEK = 72, segment 5 is AEK = 90, so this location is prone to accidents. The AEK value in 2021 in segment 1 with AEK value = 66, segment 5 with AEK value = 99 means this location is prone to accidents. The AEK value in 2022 in segment 5 with AEK value = 111 means this location is prone to accidents.

CLOSING

Conclusion

Based on the results of survey data, analysis and calculations, several conclusions can be drawn based on the discussion that has been explained, that the characteristics of traffic accidents on the Baluran National Park Highway for the five years (2018-2022) based on location per segment, the highest occurred in segment 5 with the highest number 39 incidents, the highest accident based on time (hour) occurred at 12.01-18.00 WIB with a total of 69 incidents, the highest accident based on day occurred on Saturday with a total of 30 incidents, the highest accident based on victim class was light injuries (LR) with a total of 165 victims, the highest accident based on gender was male with a total of 238 victims, the highest accident based on age occurred at ages less than 18 years (<18) and 23-27 years with a total of 64 victims, and accidents based on type The highest number of vehicles are motorbikes with a total of 220.

The results of accident analysis based on the Accident Equivalent Number (AEK) method occurred in segment 3 in 2018 with an AEK value = 147, segment 5 in 2019 with an AEK value = 111, segment 4 with an AEK value = 72 and segment 5 with an AEK value = 90 in 2020 , segment 1 with AEK value = 66 and segment 5 with AEK value = 99 in 2021, and segment 5 with AEK value = 111 in 2022. The prevention and treatment alternatives provided include installing traffic warning signs at locations prone to accidents, repairing roads according to the geometric structure of roads that are prone to accidents, and adding road markings. This alternative is carried out to reduce the occurrence of traffic accidents and casualties.

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