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# SPEED ANALYSIS ON SAFE SCHOOL ZONES (ZOSS): CASE STUDY OF PANYINGKIRAN-MAJALENGKA ROAD

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***ABSTRACT***

Road safety is in the interest of every driver and the community around the road. Drivers often exceed speed limits and violate traffic signs. This issue has always been at the core of the world's roads. Zona Selamat Sekolah (ZoSS) didesain agar kendaraan yang melewati daerah ZoSS berada dalam kecepatan rendah (maksimal 30 km/jam). Speed seriously impacts the safety of drivers and other road users. In the province of West Java, many still ignore speed on certain roads, which is one of the causes of accidents. One often ignored is the Panyingkiran-Majalengka road, a major road with several schools. The type of research used is quantitative research with descriptive methods, which describe the speed facts at the research location. The data needed in this study are primary data, where primary data is data that is directly obtained in the field (km/h) at the research location. Several measurements can measure speed including Time Mean Speed, Running Speed, Journey Speed, and Spot Speed. The speed of vehicles on Monday-Wednesday is between 28 and 36 km/h, with an average speed of 32 km/h. Meanwhile, the speed of each vehicle ranged from 27-40 km/h with an average speed of 34 km/h. From the field survey results, the ZoSS markings and speed limit signs are not visible. The cause of the high speed in the Safe School Zone is the lack of supporting facilities such as road markings and signs.

## 1. Introduction

Road safety has been a major issue in contemporary societies, with road crashes incurring major human and material costs annually worldwide. Traffic and road safety practices have been implemented to save lives by halting the increase of road traffic fatalities against an ever-rising population (WHO, 2015) [1]. Road traffic injuries take the lives of nearly 1.3 million people every year and, at the same time, injure 20-50 million people. According to the World Health Organization (WHO), it is the leading cause of death for people aged 15- 29 years [2]. Road safety is in the interest of every driver and the community around the road. Drivers often exceed speed limits and violate traffic signs. This is an issue that has always been at the core of the world's roads. Sometimes, drivers fail to comply with the reduced speed limit in school zone areas, which creates a serious safety problem for children as well as other road users [3]. Factors of accidents in school safety zones are caused by traffic congestion in the school zone, irregular traffic signs, and lack of safety awareness.

In Indonesia itself, the use of School Safety Zones has been regulated. It is regulated by the Director General of Land Transportation Regulation Number SK.1304/AJ.403/DJPD/2014 concerning School Safety Zones. Its use is usually installed traffic signs that read (ZOsS). However, there are still many that do not have these signs installed in every school. Installing effective traffic signs is the most common and important means of preventing accidents and improving safety performance due to speeding in school zones. School Safety Zones (ZoSS) are designed so that vehicles passing through the ZoSS area are traveling at low speeds (maximum 30 km/h). [4].

Speed has a serious impact on the safety of drivers and other road users. In the province of West Java, there are still many who ignore speed limits on certain roads, which is one of the causes of accidents. That way, it will be very dangerous for school children when crossing the road in front of the school [5]. School safety zones are usually only located on major roads, so some minor roads still do not have school safety zones. While safety is of paramount importance, school safety zones should also be located in schools on small roads. The built environment, which contains roadway designs and development patterns, can affect traffic safety through traffic volume, speed, and conflicts [6].

Similarly, in the Majalengka Regency, school safety zones are only on large main roads. However, safety for drivers and road users such as school children must come first. Indeed, the speed of drivers on major roads is often not complied with because it is likely that most drivers are busy with their activities. Speed is an important factor for busy drivers who are racing against time to get to work on time. Most safety studies conclude that human error is the main cause of accidents [7]. Road traffic accidents are the dominant injury-related cause of death, especially in males, and globally ranked ninth in the year 1999 [8]

One that is often ignored is the Panyingkiran-Majalengka road, which is a major road with several schools. The road is also a large road where drivers often do not control their speed, ignoring that there are ZOSS signs on the road. Drivers should reduce their speed and be careful because there are many schoolchildren. Traffic accidents are the leading cause of death in children [9]. Based on this, researchers are interested in writing a journal titled Speed Analysis on Safe School Zone (ZOsS): Case Study of Panyingkiran-Majalengka Road.

## 2. Literature Review

### 2.1 Speed limit

Speed limits play a crucial role in ensuring the safety of roads and minimizing the risk of accidents. By setting a maximum speed that drivers should adhere to, speed limits help regulate the flow of traffic, reduce the severity of collisions, and provide a predictable environment for all road users. Exceeding the speed limit not only puts the driver at risk but also endangers the lives of pedestrians and other motorists on the road. It is widely accepted that speed limits and their enforcement are effective road safety measures. Nevertheless, raising speed limits is often a popular measure. Speed limits on some roads [10]. Drivers need to obey speed limits and adjust their driving speed accordingly, taking into account weather conditions, road conditions, and traffic volume. The study also reported an increase in driving speed on roads containing road markings compared to unmarked roads [11]. By doing so, they can contribute to creating safer and more efficient roadways for everyone. The driving speed of vehicles greatly influences the overall safety and efficiency of roadways.

Road traffic accidents are a result of many factors, although excessive speed is often thought to be a major cause. Speed limit signs were introduced as a safety measure, and the relationships between the speed characteristics of traffic, speed limits, and accidents have been debated each time limits have been

changed [12]. Maintaining an appropriate and safe driving speed is essential for preventing accidents, ensuring smooth traffic flow, and adhering to the regulations set by authorities. In certain situations, driving speed can also have an impact on fuel efficiency and environmental sustainability. By driving at a speed that is suitable for the conditions and within the legal limits, drivers can reduce the risk of collisions, save lives, conserve fuel, and minimize their environmental impact. Road traffic fatalities and injuries are a major public health problem worldwide, especially in developing countries (WHO, 2018) [13]. In summary, driving speed plays a vital role in road safety, traffic flow, and environmental sustainability. Drivers must understand the importance of adapting their driving speed to the conditions and obeying speed limits to promote safety, efficiency, and responsible driving practices on our roads. In summary, driving speed plays a vital role in road safety, traffic flow, and environmental sustainability. Drivers must understand the importance of adapting their driving speed to the conditions and obeying speed limits to promote safety, efficiency, and responsible driving practices on our roads.

Speed limits are put in place to protect everyone on the road, including drivers, passengers, and pedestrians. By adhering to speed limits, drivers can contribute to creating a safer and more harmonious driving environment for all. Speed management is, therefore, a very important aspect of transport planning [14]. In addition to following the posted speed limits, it's also important for drivers to be aware of their surroundings and adjust their speed accordingly, especially in areas where there may be pedestrians, cyclists, or other potential hazards. Being mindful of speed limits and driving conditions not only promotes safety but also demonstrates respect for other road users and the law. Therefore, by understanding and abiding by speed limits, drivers can actively participate in making our roads safer and more efficient for everyone.

## 2.2 School Safe Zone

The specificity of the "School zone" is reflected in their functional and spatial characteristics. The basic criteria that make these zones more design and management demanding are location, type of school, and the way children come to school [15]. The purpose of school zones is to ensure the safety of children while they travel to and from school. By establishing designated school zones, we aim to minimize distractions, reduce traffic, and enhance visibility, ultimately reducing the risk of accidents and injuries. School zone signs are essential components of any safe road environment. These signs help to alert drivers and pedestrians to the presence of a school in the area.

School Zone This sign indicates the beginning of the school zone and the speed limit reduction. School Bus This sign warns drivers to anticipate the presence of school buses and be prepared to stop. School Entrance: this sign alerts drivers to the presence of a school entrance and pedestrians entering and exiting the premises. Important areas of continued focus are schools and pedestrians, including the creation of 'school safety zones' based on a package of built environment interventions around schools [16].

Speed limits in school zones are significantly lower than regular roads. There are many types of physical barriers used for traffic calming. To manage traffic movement, generally, these barriers are often combined with road signs and/or road markings. The combination can be classified as zone restrictions, including home zones, 20 mph zones, and school zones [17]. These limits are in place to ensure the safety of children and minimize the risk of accidents. The speed limit reduction varies depending on the school zone but generally ranges from 15 to 25 miles per hour. Stop signs and traffic lights play a vital role in school zones. Drivers are required by law to stop at stop signs before

proceeding through a school zone and to obey traffic signals. Pedestrians should also exercise caution and obey all traffic signals when crossing the road. School crossing guards are well-trained individuals who assist children in safely crossing the streets near schools. They wear brightly-colored uniforms and have whistles to alert drivers to their presence. It is important to respect their instructions and follow their lead when crossing the road. Parking and drop-off areas should be designated and marked in school zones. It is crucial to avoid double-parking and obstructing the flow of traffic. Parents and guardians should drop off and pick up their children safely within the designated areas.

## 2.3 Vehicles Use

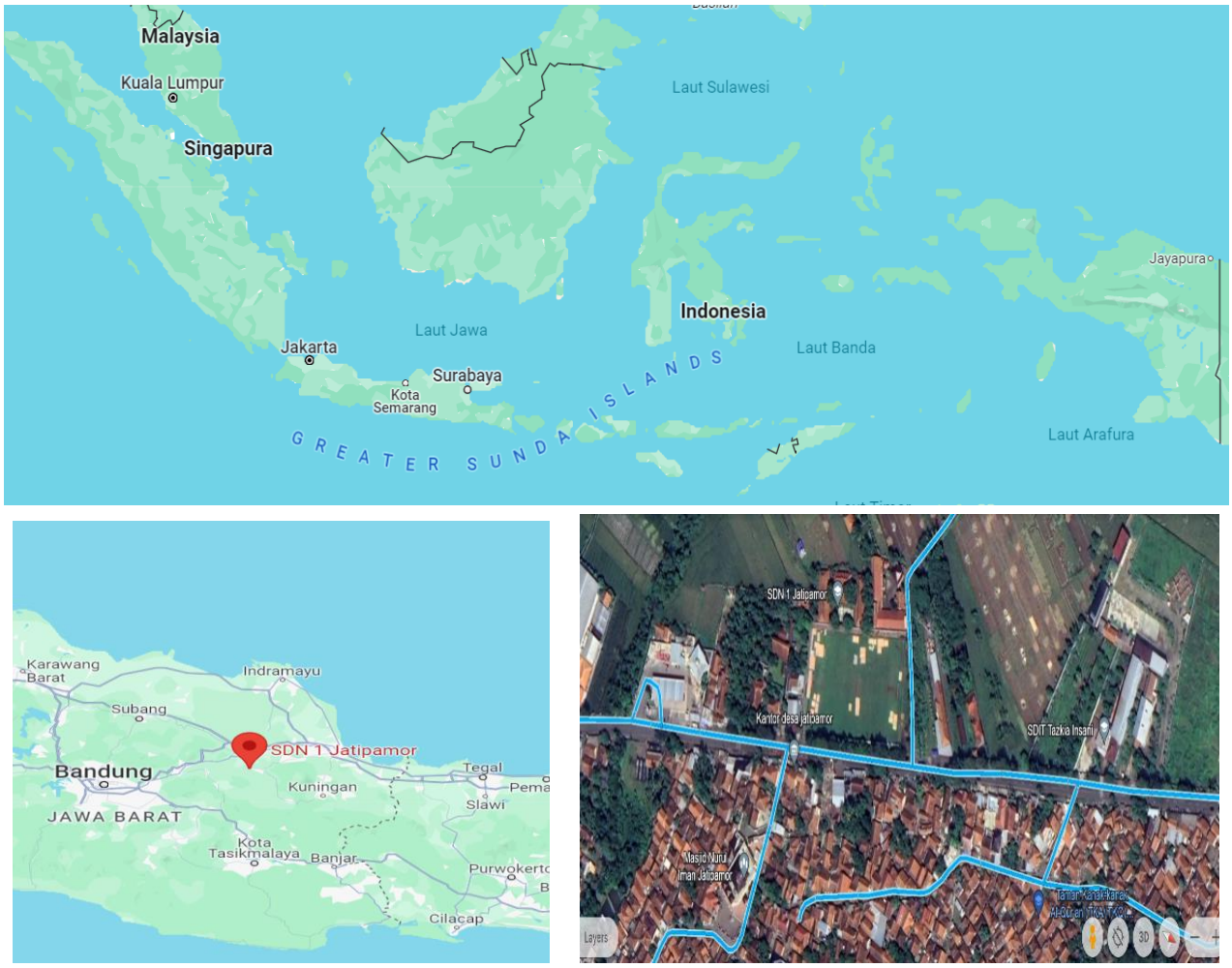
A vehicle is a mechanical device designed and used for the transportation of people or goods. Vehicles are typically powered by an engine or motor and are used on roads, rails, water, or in the air, depending on the type of vehicle. They serve as a means of conveying individuals or cargo from one place to another. The transport sector has extensive environmental, social, and economic impacts on human society [18]. Vehicles can take various forms, including cars, trucks, buses, motorcycles, bicycles, boats, ships, airplanes, and more. The design and functionality of a vehicle are determined by its intended purpose, mode of transportation, and the terrain it is meant to traverse.

Vehicles used in the study were equipped to measure the lateral and longitudinal parameters of the vehicle [19]. Vehicles are important for a variety of reasons, and their significance extends across social, economic, and personal dimensions. Here are several reasons why vehicles are considered crucial. Vehicles provide a convenient and efficient means of transportation, allowing people to travel easily from one place to another. Vehicles provide flexibility in terms of travel routes and schedules, offering convenience and efficiency compared to other modes of transportation. For individuals, vehicles represent a form of personal freedom, allowing them to explore and access various locations at their convenience. They enable people to commute to work, travel for leisure, and participate in various activities outside their immediate vicinity. Vehicles contribute to social connectivity by bringing people together, fostering. While vehicles offer numerous benefits, it is important to note that their use also raises environmental and safety concerns, including issues related to pollution, traffic congestion, and road accidents. Therefore, responsible and sustainable practices in the development and use of vehicles are essential to mitigate potential negative impacts.

The speed of vehicles on roads is a critical aspect of transportation and road safety. The higher the travel speed of a vehicle, the higher the impact speed will be, assuming other physical parameters are constant, such as deceleration, perception reaction time, and braking effectiveness. The impact speed during a crash [20]. Managing and regulating vehicle speed is essential to ensure the safety of road users and to maintain efficient traffic flow. Governments establish speed limits on different types of roads to regulate the maximum speed at which vehicles can travel. Speed limits are typically posted on signs and may vary depending on the type of road. Road design plays a significant role in influencing vehicle speed. Factors such as the layout of curves, intersections, road width, and the presence of traffic calming measures. Driver behavior is a critical factor in determining vehicle speed. Factors such as driver attentiveness, awareness of speed limits, and adherence to traffic rules contribute to safe and responsible speed management. Balancing the need for efficient transportation with the imperative for road safety is an ongoing challenge. Effective speed management involves a combination of regulatory measures, technological advancements, public awareness, and infrastructure improvements to create safer and more efficient roadways.

## 3. Method

The type of research used is quantitative research with descriptive methods which describe the speed facts at the research location. The data needed in this study are primary data, where primary data is data that is directly obtained in the field (km/h) at the research location, namely on Jalan Panyingkiran-Majalengka, which is precisely at SDN Jatipamor 1 and Tazkia Insani School. Meanwhile, the tools used during the research to get real data are stopwatches, counters, meters, and also stationery. The time of this research was carried out on Monday-Wednesday from 06.30-07.30, by taking several vehicle samples such as motorcycles, cars, and public transportation.




Picture 1 Location

*Source: Google Maps*

Speed can be measured by several measurements including Time Mean Speed, Running Speed, Journey Speed, and Spot Speed.

a. General velocity formula:

$$V = \frac{d}{t}$$

Description:

V = Speed (km/h)
d = Distance traveled (km)
t = Travel time (hour)

b. Time Mean Speed
The average speed of all vehicles at a point in time. $Vt = \frac{1}{n}\sum_{i=1}^{n} vi$
Description:
Vt = Time mean speed (km/h)
n = Number of speed data observed
vi = Speed of each vehicle observed

c. Running Speed
The average speed of the vehicle while moving
$$Running\ Speed = \frac{Jarak\ tempuh}{Running\ Time}$$

d. Journey Speed
The average speed of travel
$$Journey\ Speed = \frac{mileage}{Journey\ Time}$$

e. Spot Speed
Speed seen on the speedometer

## 4. Result and Discussion

From the method used, the results of research data on the average speed of drivers in the school safe zone at SDN Jatipamor and Tazkia Insani School where this road is one of the routes to the city center, many vehicles pass both motorcycles, cars, and public transportation. The survey time is adjusted to the school entrance schedule, which is from 06.30-07.30. The results of the field research survey data can be seen in Table 1 below.

Tabel 1 Hasil Penelitian Rata-Rata Kecepatan

| Day | Time | Motorcycles | Cars | public transportation | N | Σvi | Vt |
|---|---|---|---|---|---|---|---|
| Monday, 08 January 2024 | 06.30-07.30 | 178 | 43 | 34 | 255 | 7140 | 28 |
| Tuesday, 09 January 2024 | 06.30-07.30 | 143 | 21 | 25 | 189 | 6804 | 36 |
| Wednesday, 10 January 2024 | 06.30-07.30 | 159 | 28 | 27 | 214 | 7062 | 33 |
| N | | 480 | 92 | 86 | | | |
| Vt | | 40 | 35 | 27 | | | |
| Σvi | | 19200 | 3220 | 2322 | | | |

Keterangan:

N = Amount of speed data

Σvi = The sum of all vehicle speeds (km/h)

Vt = Average speed (km/jam)

As seen in Table 1, the speed of vehicles on Monday-Wednesday is between 28-36 km/h with an average speed of 32 km/h. Meanwhile, the speed of each vehicle ranged from 27-40 km/h with an average speed of 34 km/h. From the field survey results, the ZoSS markings and speed limit signs are not visible.

## 5. Conclusion

The results of the study showed that the average speed of drivers on Monday-Wednesday still exceeded the speed limit in the Safe School Zone (ZoSS) (30 km/h), namely 32 km/h. In addition, the average speed of each vehicle also still exceeds the limit of 34 km/h. The cause of the high speed in the Safe School Zone is the lack of supporting facilities such as road markings and signs.

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