

Analysis Of Road Conditions Using The Method SDI (*Surface Distress Index*) On The Road Section Kesehatan Majalengka

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ARTICLE INFO	ABSTRACT
<p>Keywords:</p> <p><i>SDI (Surface Distress Index) Method and Inventory in GIS (Geographic Information System)</i></p>	<p><i>Roads are a transportation infrastructure for the daily needs of human life in the world, roads are also one of the most important parts that help human activities, roads are composed of several hard materials which are doused with asphalt (liquid) solution so that the roads we use feel comfortable when driving. Damage to the road that occurs causes huge losses for its users, so road damage is also the main trigger for traffic jams on the road, resulting in a decrease in the functional and structural quality of the road. The research location is located on Jalan Kesehatan, Majalengka, the main access to the entrance to the Majalengka Hospital, is damaged so that traffic jams often occur at the location, which is the main trigger for road damage in the field. This research was carried out by surveying directly to the field and using the SDI (Surface Distress Index) method to help collect data in the field, and inventory in GIS (Geographic Information System). The researcher also concluded that in the research location, there were roads that were damaged, and maintenance had to be carried out immediately regularly, bearing in mind that this road is the main access for people who want to go to the Majalengka Hospital, the researcher also suggested that the road be widened, to minimize congestion and expedite the speed of transportation in research sites.</i></p>

1. Introduction

The road is a transportation infrastructure for the daily needs of human life in the world, the road is also one of the most important parts that really helps human activities, the road is composed of several hard materials that are doused with asphalt (liquid) solution, so that the road we use feels comfortable when driving. while driving, there are many theories that explain the road, one of which is in the quote from the Law of the Republic of Indonesia No. 14 of 1992 "a road is a land transportation infrastructure in any form covering all parts of the road.

In Indonesia, more than 70% of roads are damaged, from minor damage to major damage that must be treated immediately. The interesting fact is that these roads include structures that have recently been given maintenance or recently built. traffic volume load, climate, unstable soil conditions, very thin pavement layer planning, and work processes that are not in accordance with specifications. (FARRAS & Muhammad, 2022)

Traffic volume and overload will affect the condition of the road pavement, so it is necessary to carry out maintenance so that the road remains in a stable condition, (NISUMANTI, Sartika, PRAWINATA, & Prawinata., 2020), the damage to the road that occurs causes huge losses for its users, so that road damage is also the main trigger for traffic jams on the road, resulting in a decrease in the functional and structural quality of the road. (Nurdin A. & Kumalasari, 2022)

Likewise in Majalengka, many new roads have been built to connect villages to cities, it is necessary to carry out periodic evaluations and maintenance so that roads can be used optimally, so that congestion around the place can be minimized, the need for road repairs to be carried out first, to maintain road service conditions, it is necessary to hold maintenance on the road so that the road remains in prime condition. (FRANSISCUS, SIHOMBING, & PRIMA, 2022)

In order to achieve road maintenance, a determination of road maintenance priorities is also held based on road condition criteria, traffic volume criteria, economic criteria, policy criteria, and accessibility criteria, and for maintenance based on a guidebook from the Ministry of PUPR "Procedures for preparing city road maintenance" (Hidayat, Ilham, Benny Hidayat, & Ophiyandri, 2020).

By using the SDI (Surface Distress Index) method through a pavement assessment process based on road performance obtained from visual observations in the field, thus road conditions can be monitored directly and methods of initial action for maintenance can be determined, there is good road maintenance periodically will greatly assist the community in supporting the smooth running of the economic wheels of an area, (Permadi, 2021)

2. Literature Review

2.1 Classification Road

Classification of roads which are infrastructure as the main need for transportation, has various classifications of shapes and constructions, road classifications are needed to be a guide in determining maintenance methods, Classification according to road class, road function and maximum vehicle dimensions (length and width) of vehicles allowed to pass through the road, (KAHARU, LALAMENTIK, & MANOPPO, 2020), in general can be seen from Table 1.1.

The following corresponds Undang-Undang RI No. 22 tahun 2009

Sumber : UU RI No. 22 Tahun 2009 Tentang Lalu Lintas dan Angkutan Jalan (Hal 16-17)

Road Class	Road Function	Maximum Vehicle Dimension		Heaviest Axle Load (ton)
I	Arteri	18	2,5	➤ 10
II		18	2,5	10
III A		18	2,5	8
III A	Kolektor	18	2,5	8
III B		12	2,5	8
III C	Lokal	9	2,1	8

Tabel 1. 1 Klasifikasi Jalan Secara Umum Menurut Kelas, Fungsi, Dimensi Kendaraan Maksimum dan Muatan Sumbu Terberat (MST)

Based on RI Law no. 22 of 2009 concerning road traffic and transportation, roads can be classified into 3 classifications into 3 road classifications, namely:

1. Classification based on road function.
2. Classification based on government administration.
3. Classification based on axle load.

Classification of roads according to Highways in the procedures for geometric planning of inter-city roads (TPGJAK) is divided into several points, classification according to benefits, according to role, according to function. (PUTRA & DWI, 2023), Several rule-based classification methods. There are four target class results obtained from these methods, namely rule-based, conceptual class definitions and properties, rules, and axioms. (Bayramoğlu, Zeynep, & Melis, 2023)

2.2 Surface Distress Index (SDI)

Surface Distress Index is one of the methods used by the Directorate of Highways which aims to plan direct assessments of road damage in the field (Adiman & Yusuf, 2023), Visual checking on the data on the total area of the cracks, the average width of the cracks, the number of holes and the depth of the vehicle's ruts, the value obtained by the examiner will then be calculated using the standard assessment by Bina Marga, (2011). (APTARILA, et al., 2020).

With the SDI (Surface Distress Index) method, damage assessment becomes simpler but has accurate data, because there is an assessment carried out visually directly in the field, SDI is also a road performance scale obtained from visual observations of road damage that occurs in field, The factors that determine the amount of SDI are the condition of the cracks on the road surface in terms of total area, average crack width, number of holes per 100m and depth of ruts/rutting. (YASTAWAN, I. Nyoman WEDAGAMA, Dewa Made Priyantha, ARIAWAN, & Agus., 2021)

In analyzing data using the SDI method, there are several types of assessment such as the Cracked Area Assessment, which assesses directly from a survey of cracked roads and is measured as a percentage of the road, then the Crack Width assessment, where the assessment is through measuring the space between two cracked areas, an assessment from the large number of holes and road measurements caused by the rut load. (IRHAMUDDIN, Irhamuddin, FIRZAN, RAHMAN, & Aulia, 2023)

2.3. Menggunakan Metode Inventarisasi GIS (Geographical Information System)

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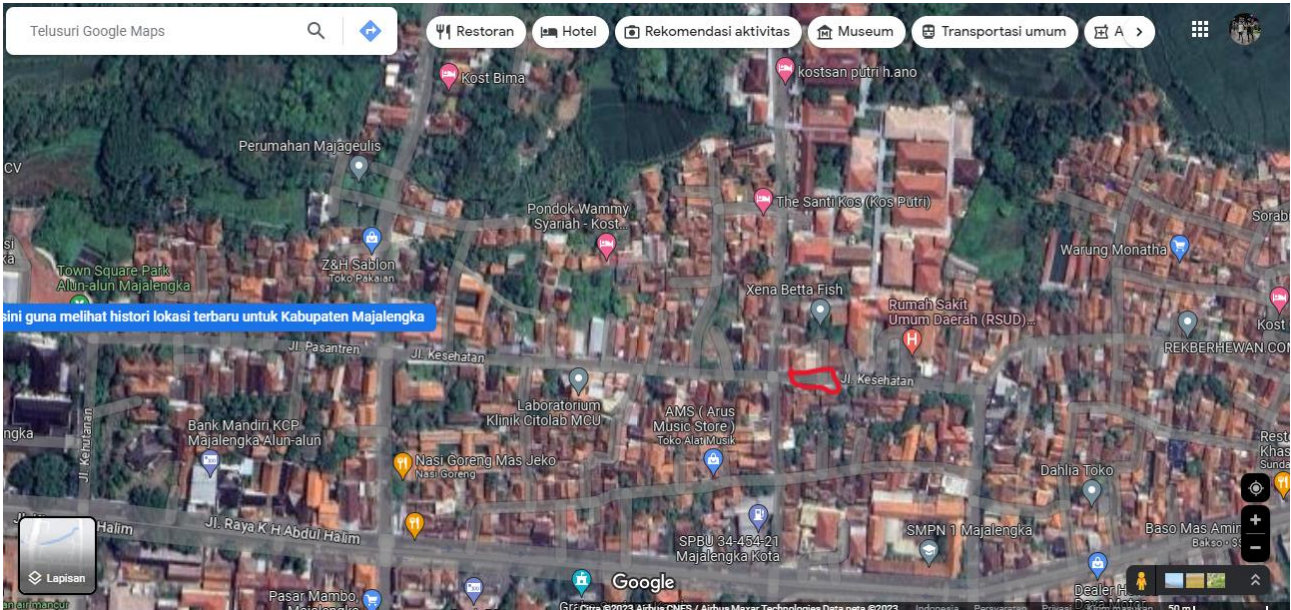
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The use of the GIS (Geographical Information System) method is also very helpful in strengthening data using the SDI (Surface Distress Index) method, by storing basic district road data and also road condition data, besides that GIS maps also have the benefit of showing the connectivity of roads that are desired by containing attributes and road condition data.

3. Method

This research was conducted by conducting preliminary studies, problem identification, literature review, research purposes, and data collection. The data collected are primary data and data secondary. Primary data is obtained through a road damage survey by looking for crack width, number of holes, and ruts. Secondary data was obtained from District PUPR/PPK Office Majalengka, District Road Map, and District Road Basic Data. After data collection is carried out, then data recapitulation is carried out, then data recapitulation carried out by the condition assessment criteria way using the SDI method. Then an analysis was carried out using the SDI method to obtain road conditions, types of handling, and inventory carried out in GIS maps.

The source of the data taken is the health road section, Majalengka, along with information for the research location and data collection:



Picture 1 1 Research location and data collection


3.1. Teknik Pengambilan Data


This data collection was carried out to complete the data to meet the research objectives. The data used are primary data and secondary data. Primary data is data collection that is carried out by survey directly to the field, namely health roads, Primary data includes data on road damage, type of road damage, amount of road damage and dimensions of the road. Secondary Data is a method of collecting data from health roads, documentation about these roads. The health road section is 850m long, only 250m of data is collected, primary data is carried out by survey directly to the field, while secondary data is taken from related data, after obtaining both data, data recap is then carried out via MS.e xcel using the SDI method, then enter the data into the GIS Inventory.

4. Result and Discussion

This research has been carried out and has obtained primary and secondary data, the health road section with a length of 850m with only 250m of data taken and inputted into the SDI (Surface Distress Index) method, there is some damage to the road and there must be handling so that the condition of the road can function again maximally, the following data obtained directly at the research location.

The following are the results of a direct survey in the field.

No.	Data	Information
1.		As seen in the picture, the road has some damage, and there is a lot of sand, which makes passing motorists uncomfortable, and sometimes there are accidents on the road.

2.		This photo of the road was taken a few meters after the picture above, very close to the Majalengka hospital gate, it can be seen that the road is damaged which needs to be repaired immediately.
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Tabel 4. 2 Data Reseach

No.	Stake (m)		Long (m)	Road Conditions			
	From	To		Road Conditions		Road Shoulder Surface	
				1-3	1-3	1-3	1-3
1.	00	250	250	2	2	2	2

Tabel 4. 2 Assessment of Road Conditions Based on Survey Results

No.	Stake (m)		Cek Status Entry	SDI Value Calculation				SDI Value
	From	To		Crack Area (m)	Wide Crack (m)	Number of Holes	Ruts	
1.	00	250	OK	30	5	102	102	102

Tabel 4. 3 Calculation of Road Conditions Using the SDI Method

Information :

- Value: 1. Severe Damage (Need Immediate Treatment)
 2. Minor Damage
 3. Good Way

Based on these data, it can be concluded that the road Jl. Kesehatan maintenance really needs to be carried out, because this access is the main access to the Majalengka Regional General Hospital, so it often causes transportation jams at that location.

No.	Stake (m)		Road Conditions (m)				Stability (m)		Handling Type
	From	To	Good	Currently	Light	Heavy	Good	Not Good	
1.	00	250	00	00	250	00	00	250	Periodic maintenance

Tabel 4. 4 Calculation of the Type of Maintenance After Conducting a Survey

The above data is obtained from the results of direct surveys to the field, and the calculations are obtained from analyzing the data that has been obtained from the field, from the application of the data contained in the previous table,

Judging from the table and the data above, we can conclude that the road on the health road must be maintained regularly, besides that, the suggestion from the researcher is to widen the road in the location, considering that this road is the only main access to the house. Majalengka Regional General

Hospital, thereby minimizing congestion and facilitating access for people who want to go to the Majalengka Regional General Hospital.

5. Conclusion

In this conclusion, the researcher can conclude that the health road sections in Majalengka are damaged, even though they are slightly damaged, but if left unchecked, they will experience severe damage, due to the frequent traffic jams at that location, so that it is required to carry out periodic maintenance so that it can function again as usual. , the authors also suggest that the roads on this health road can be widened, bearing in mind that this road is the only main access to the entrance to the Majalengka Hospital, in order to minimize congestion and expedite the transportation rate of residents and people who want to go to Majalengka Hospital.

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