

Prediction of Lowering Rate of Road Surface Damage with PKRMS Approach in Lumajang Regency

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Abstract:- Lumajang Regency is an area located in the southern part of Province. East Java. Lumajang Regency consists of. from 21 sub-districts and 198 villages and 7 sub-districts with an area of 1,790.90 km² with a district road length according to the 2017 Regent's Decree of 1109 km and 368 sections with a population of 1,104,759 people, road infrastructure in Lumajang Regency is important as inter-connectivity hub. The road in Lumajang Regency is divided into 368 roads with a length of 1,109 km spread over 21 sub-districts (Regent Decree Number: 188.45 / 89 / 427.12 / 2017 concerning the Stipulation of Roads according to Road Function and Status as District Roads). But seen from the district road stability figures from 2017 to 2020 it tends to decline and is not in accordance with the RPJMD (Medium-Term Development Plan) target while road sector funds increase every year in 2019 Lumajang district receives grant assistance for a long segment maintenance activity package for 15 special sections. for roads that are in good condition above 90% named Provincial / District Road Management System (PKRMS) (Provincial / Regency Road Management System). Therefore, we conducted a study to compare the rate of reduction in road stability against sections that are routine road maintenance and those that are not regularly maintained.

Keywords:- Reduction of Road Damage, PKRMS.

I. INTRODUCTION

Viewer Definition Road construction is the activity of road handling, in the form of prevention, maintenance and repairs needed to maintain road conditions so that it can continue to function optimally to serve traffic so that the defined plan age can be achieved. There are 368 roads in Lumajang Regency with a length of 1,109 km spread across 21 sub-districts (Regent Decree Number: 188.45 / 89 / 427.12 / 2017 concerning Stipulation of Road Sections according to Road Function and Status as District Roads with Lumajang condition, a steady road, from 2017 it continues to decline until 2019 while the budget in the Highways sector, the Public Works and Spatial Planning Office increases every year. For the Regional Medium-Term Development Plan (RPJMD) target every year it always does not meet the target, in 2019 the Public Works and Administration Agency The Lumajang Regency Room received a grant from the Ministry of Public Works and Housing for the maintenance of 15 long segment roads with road stability conditions above 85% equipped with a road condition survey method, then trying to do research to

reduce road conditions according to other research by Suherman (2008) Study of correlation equation between road surface unevenness and road conditions, Novia Ayu Nugraheni (2018) Analysis of Functional Conditions of Road with the PSI and RCI Methods and Prediction of Remaining Life of Pavement with Conclusion predicting the remaining life of pavement using the PCI and RCI methods needs to be completed with traffic data volume.

II. LITERATURE REVIEW

➤ Road Maintenance Activities

The definition of road maintenance is road handling activities, in the form of prevention, repair, and maintenance required to maintain road conditions in order to keep functioning properly in order to optimally serve traffic so that the defined plan age can be achieved (Permen PU No.13 / PRT / M / 2011). Road administration is obliged to prepare a road maintenance plan. The road maintenance general plan includes: information system; asset management system; and road maintenance management plans. The information system includes the activities of collecting, processing, and maintaining data (road inventory data and road condition data) to produce information and recommendations for road maintenance handling. Road maintenance includes routine maintenance, periodic maintenance, road rehabilitation and reconstruction activities.

➤ Provincial / District Road Management System (PKRMS)

The Provincial / District Road Management System (PKRMS) is a system that can be used as a tool to support planning, programming and budgeting (PPP) for local roads (provincial roads and district roads). PKRMS A computer-based instrument developed to support PPP's work on road asset management. Built based on the MS-Access application. Supported by QGIS as a geospatial data presentation application. The basic implementation steps of PKRMS are data input then validated, an analysis is carried out which is directly related to the budget plan entering the program so that reports and maps appear related to current road conditions. Survey preparation is carried out before carrying out any data collection survey activities. Survey preparation includes defining the network, planning the survey, and calibrating the necessary survey tools.

The data collection survey for PKRMS was carried out for the first time by surveying reference points, road inventories, road conditions and traffic. The reference point data collection survey was conducted for the first time before undertaking another survey. This is because the

reference point data will be used later as a reference for defining the location of the road inventory survey results and road conditions. Reference point data, road inventory and traffic in general can be valid for a long period of time, so it is sufficient to do this every 5 (five) years unless there is a significant change in the road. In contrast to the road condition data which tends to change in the short term, a road condition survey is conducted once a year. Survey tools used in the implementation of the Provincial/ Regency Road Management System (PKRMS) survey method

III. METODE

1. Preliminary studies

The activities carried out in this preliminary study are basically to compare the road condition survey method with the Road Condition Index (RCI) which is carried out on sections without routine maintenance and the Provincial / Regency Road Management System (PKRMS) survey method with roads under maintenance. routine,. The results of this preliminary study are as follows:

- 6 sections of roads that were initially rehabilitated without routine road maintenance in the following year;
- 15 roads that are included in the Provincial / Regency Road Management System (PKRMS) program for which routine maintenance is carried out;
- Literature or reference literature as a reference for the theoretical basis is obtained from several textbooks related to the survey method for RCI road conditions;
- Hardware for RCI surveys and Provincial / Regency Road Management System (PKRMS) surveys
- Software as a tool used in analyzing the Provincial / District Road Management System (PKRMS) and Microsoft Excel programs.

2. Research variable

The variables used in this study consisted of road conditions with RCI according to the Regulation of the Minister of Public Works and Public Housing, Determination of RCI Value in Review Based on Surface Types and Visual Conditions.

Table 1. Determination of RCI Value

No	Surface Types	Visual Conditions	RCI Value
1	Dirt roads with poor drainage and all types of surfaces that go unnoticed	It can't be passed Heavy damage,	0 - 2
2	Any surface type that has not been noticed in a long time (4-5 years or more)	lots of holes and entire pavement areas	2-3
3	Old P.M, Old Latasbum , pebble stone	Damaged bumpy, lots of holes In order to be damaged	3 - 4
4	P.M after 2 years of use	Sometimes there are holes, the surface is uneven	4 - 5
5	New macadam, new latasbum, Latusbag after 2 years of use	Enough, no or very little stretch	5 -6
6	Old thin layer of hotmix, new latasbum lasbutag, new Hotmix after 2 years,	the road surface is uneven good Very good,	6 - 7
7	Hotmix is thinner on P.M	Generally average	7-8
8	New Hotmiz (Lataston, Laston) (upgrade and use	Very flat and egg	8 - 10

Conducted on 6 roads without routine road maintenance:

- Improvement of Jatiroto Street - Sumbersari
- Improvement of Senduro Road - Jemplangan
- Improvement of Pandanwangi - Jatigono Road
- Krasak - Merakan Road Improvement
- Improvement of Sumber Petung Street - Papringan
- Improvement of the Pasirian - Tempursari Road
- Improvement of Gesang Street - Jokarto

Survey for Provincial/Regency Road Management System (PKRMS) for road sections where routine road maintenance activities have been carried out for 2 years

- Semeru Street
- Banjarwaru Street - Karanganom
- Karanganom Street - Tumpang
- Karanganom Street - Senduro
- Senduro Street - Kandangan
- Kandangan Street - Wonokerto
- Wonokerto Street - Gucialit
- Kedawung Street - Gucialit

- Dawuhan Lor Street - Bodang
- Bodang Street - Wonokerto
- Tempeh Lor Street - Kedungmoro
- Boreng Street - Dawuhan Wetan
- Rowokancu Street - Kedawung
- Sarikemuning Street - Pagowan
- Street Pagowan - Jambearum

IV. RESULT AND DISCUSSION

The survey, which was carried out using the RCI method, was carried out in sections without routine road maintenance for 3 years:

- The level of damage reduction using a survey method for RCI road conditions which has decreased is not too extreme

a. Jalan Jatiroto - Sumbersari

For three years without maintenance activities and it is predicted that in 2021 the difference is 6.3 in good conditions with the regression analysis method the equation

= 2.375x + 4890.4 means that every additional year entered the letter x will get a good condition value

b. The Gesang - Jokarto road section

For three years without maintenance activities and predicted in the year 2021 difference of 8.3 in good conditions with the regression analysis method the equation = -3.125x + 6404.2 means that every additional year is entered in the letter x will get a good condition value.

c. Jalan Purwosono - West

For three years without maintenance activities and it is predicted that in 2020 the difference is 6.22 in good conditions with the regression analysis method the equation = -2.3469x + 4783.5 means that every additional year entered the letter x will get a good condition value.

2. The level of damage reduction was carried out using a survey method for RCI road conditions which experienced an extreme decline.

a. The Wonokerto - Wonogriyo road section

For three years without maintenance activities and it is predicted that in 2021 the difference is 86.84 in good conditions with the regression analysis method the equation = -29.038x + 58628 means that every additional year entered the letter x will get a good condition value.

b. The Pasirian - Tempursari road section

For three years without maintenance activities and it is predicted that in 2021 the difference is 75 in good condition with the regression analysis method the equation = y = -25x + 50475 means that every additional year entered in the letter x will get the value of good condition.

c. The Krasak - Merakan road section

For three years without maintenance activities and it is predicted that in 2021 the difference is 44.5 in good conditions with the regression analysis method the equation = y = -13.75x + 27758 means that every additional year put into the letter x will get a good condition value.

The survey conducted for roads with routine maintenance for 2 years for 15 roads resulted from the 15 sections surveyed using PKRMS software with only 5 roads that experienced a decline which did not exceed 6%

V. CONCLUSION

After conducting a survey of road conditions on roads where routine maintenance is not carried out and comparisons with roads that are not carried out maintenance. If no routine maintenance is carried out it will cause a decrease in road surface conditions. And according to regression analysis with data on road surface conditions without routine maintenance, it is predicted to experience an average decline of 12% each year. For roads with routine maintenance, it is predicted that they will decline by an average of 1.23% each year.

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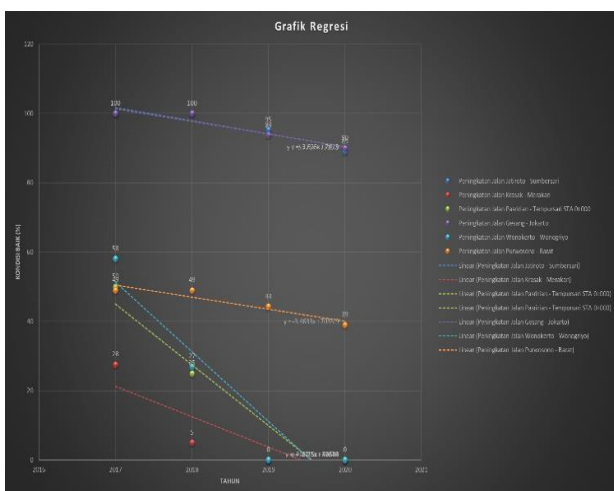


Fig 1:- Regresion Analysis