International Journal of GEOMATE, March, 2019 Vol.16, Issue 55, pp. 160 -167
ISSN: 2186-2982 (P), 2186-2990 (O), Japan, DOI: https://doi.org/10.21660/2019.55.62181
Special Issue on Science, Engineering & Environment

# EFFECT OF BUREAUCRACY ON-ROAD PERFORMANCE (CASE STUDY ON INDONESIAN REGENCY ROADS)

* Henri Siswanto[1*], Harnen Sulistio[2], Ludfi Djakfar[3], Achmad Wicaksono[4]

[1]The Faculty of Engineering, Universitas Negeri Malang, Indonesia
[2, 3, 4]The Faculty of Engineering, The University of Brawijaya, Indonesia

*Corresponding Author, Received: 15 July 2018, Revised: 07 Aug. 2018, Accepted: 03 Oct. 2018

**ABSTRACT:** Regency roads are currently the worst performing of all road networks in Indonesia despite being the majority within the Indonesian road network system distribution. To be able to properly handle road treatments, it is necessary to be aware of factors that influence regency road performance. Research on bureaucracy as a variable to improve the performance of regency roads in Indonesia has never been done before. The purpose of this study is to evaluate the effects of bureaucracy on the performance of regency roads in Indonesia. Data collection was carried out by distributing questionnaires to as many as 54 respondents, consisting of officials at the Regency public works office in East Java Indonesia. The analysis method used in this research is the structural equation model - partial least square (SEM-PLS). Bureaucratic factors were analyzed along with four other factors that are postulated to be affecting regency road performance, namely; existing conditions, human resources, maintenance and rehabilitation funds, and the road treatment technique used. Research results showed that bureaucratic factors are the most critical in determining regency road conditions. Bureaucracy has the biggest effect on road performance. Bureaucracy has indirect effects of 0.268 to the road performance, it is higher than that of an existing condition. Meanwhile, the existing condition has an indirect effect of 0.147. Bureaucracy also has a direct influence on the placement of human resources and maintenance and rehabilitation funds. While maintenance and rehabilitation funds, human resources and existing road conditions affect road treatment processes. Lastly, road treatment directly affects road performance.

*Keywords: Bureaucracy, Road performance, Indonesian regency road*

## 1. INTRODUCTION

Performance and types of road pavements affect the cost of road use [1-3]. Damaged road conditions are detrimental to road users resulting in higher vehicle operating costs, longer travel time, and costly accidents [4]. The Condition of Indonesian regency roads is the worst in its network [5]. Because of this, proportionate efforts are required to improve regency road conditions for better performance. Proper maintenance of regency roads requires knowledge of the factors affecting their conditions.

Several studies have shown that influential factors in road performance improvements are among others: bureaucracy, road treatment technique being used, human resources, existing road conditions and road maintenance funds [4, 6-9]. The preferred type of road treatment method is selected based on road conditions data, i.e. types of damage and road damage levels. Pavement treatment, especially preventive maintenance, have a significant influence on determining road performance [6]. Bureaucracy has a role in road maintenance prioritization and road maintenance budget proposals [7]. Reliable managers are required in road maintenance activities so that implementation of road maintenance can run effectively. Human resource factors are keys to success in road infrastructure implementation [8]. Existing conditions of roads are main factors of consideration in determining maintenance priorities and types of road maintenance methods to use. Preparations for road maintenance programs are based on existing road conditions data besides traffic data. An obstacle often faced by road maintenance programs is limited maintenance funds [4]. Funds required for road maintenance also depend on the frequency and type of maintenance performed.

Ibraheem [9] built a road maintenance model that consists of three elements namely; compilation of road database, assessment of pavement condition and applicable maintenance type selection. Pavement condition is analyzed by type, rate, and extent of road damage.

Maintenance of Indonesia's regency roads is very specific, as there are differences in maintenance management systems as well as budgeting systems between provincial and national roads. The aspects of maintenance, human resources and bureaucracy also differ between provincial and national roads [7].

Hence, separate studies are required, starting from factors that affect their conditions. Research on bureaucracy as a variable to improve the performance of regency roads in Indonesia has never been done before. This study aims to evaluate the effect of bureaucracy on Indonesia's regency road performance and to produce recommendations for improving Indonesian regency road's performance.

## 2. METHOD

This research was conducted in 7 regencies in the East Java Province; Lumajang, Pasuruan, Malang, Blitar, Tulungagung, Jombang and Pacitan regencies. Data were collected through a questionnaire survey of social worker officials at the study sites. The number of respondents in each regency adjusts to the local organizational structure. Since the Indonesian bureaucracy received a reform through the implementation of regional autonomy, organizational structures may be different between regencies.

The method used for data processing is a structural equation model - partial least square (SEM-PLS). Software used for data processing is SmartPLS version 3.2.6. SEM-PLS was chosen because it corresponds to research data characteristics. It accommodates a combination of formative and reflective models from the relationship between indicators and latent variables. The advantages of analysis using SEM-PLS are among others; small sample size, applicable with limited supportive theories, requiring accurate predictions and not requiring model specifications [10,11]. SEM-PLS is suitable for multiple regression analysis [12]. There are 6 (six) variables in this study, namely: bureaucratic factors, existing condition, human resources, M & R road funding, road treatment, and road performance. The relationship between variables and indicators in this study contain formative and reflective variations. The relationship between variables and indicators is established based on literature studies. According to literature studies, bureaucratic variables assumed to be related to indicators are reflective, while other variables have formative relationships.

Hypothesis testing was performed in two stages, namely; outer and inner model testing [11]. Outer model testing, which tests the relationship between indicators and latent variables, aims to determine the value of loading factors, variance inflation factors (VIF) and the validity and reliability of construct and R Square ($R^2$). $R^2$ describes the magnitude of the influence of independent variables on the dependent variable. Inner model testing, which tests the correlation between latent variables, aims to find the values of coefficient paths, inner model T-statistics, total effect values which shows the various levels of independent variable changes toward dependent variables, and model suitability. SEM-PLS calculations order can be seen in Fig. 1.

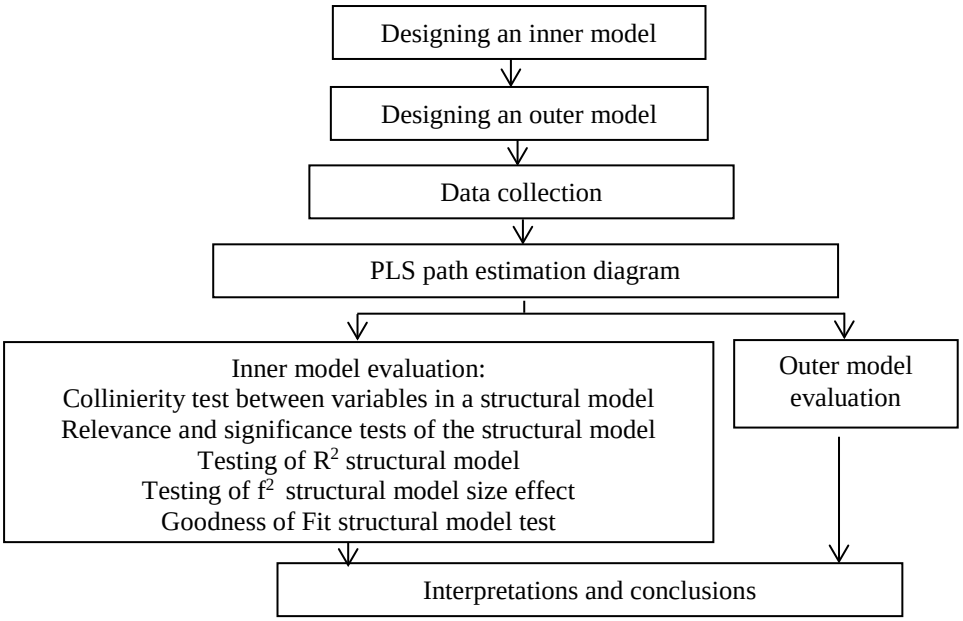


Fig.1 SEM-PLS testing flowchart

## 3. RESULTS AND DISCUSSION

### 3.1 Linearity Test between Variables

The relationships between variables are assumed to be linear, therefore linearity tests are required [11]. Linearity test results of variable relationships are shown in Table 1. The table shows that all the relationships between variables are linear. The linearity tests indicate that the p-value of all paths yields p<5% which means the relationship between paths in the inner model is linear. Linearity tests and deviations from linearity tests conclude that the linearity requirements are fulfilled in all paths within a hypothetical model. This shows that there are relationships between variables as references to previous studies [4, 6-9].

Table 1 Examination of linearity assumptions

| Path | Linearity | | Deviation from Linearity | | Status |
|---|---|---|---|---|---|
| | F | p | F | p | |
| Bureaucracy - Human Resources | 60.600 | 0.000 | 0.032 | 0.044 | Linear |
| Bureaucracy - Maintenance and Rehabilitation Funds | 161.423 | 0.000 | 0.559 | 0.884 | Linear |
| Existing Condition - Maintenance and Rehabilitation F. | 134.641 | 0.000 | 0.578 | 0.871 | Linear |
| Bureaucracy - Road Treatment | 74.592 | 0.000 | 1.490 | 0.166 | Linear |
| Human Resources- Road Treatment | 47.964 | 0.000 | 0.783 | 0.542 | Linear |
| Existing Condition - Road Treatment | 350.809 | 0.000 | 3.049 | 0.027 | Linear |
| Maintenance and Rehabilitation F. - Road Treatment | 289.046 | 0.000 | 7.110 | 0.000 | Linear |
| Existing Condition- Road Performance | 67.515 | 0.000 | 0.717 | 0.585 | Linear |
| Road Treatment - Road Performance | 60.600 | 0.000 | 0.032 | 0.044 | Linear |

### 3.2 Outer Model Testing

Testing of loading factors and VIF of initial and final outer models after an evaluation is shown in Table 2, while Fig. 2 shows the path coefficients and the initial model of the loading factors before evaluation. Reflective outer models have good convergence validity when outer loading values are> 0.7, communality> 0.5, and the average variance extracted are (AVE)> 0.5. Meanwhile, outer models with formative characteristics are seen from the VIF value. If VIF< 5, then no high multi-collinearity occurs among indicators of a single construct [11].

In Fig. 2, the results of reflective outer model tests show that not all items have outer loading higher than 0.50 such as X2.2 and X2.7, resulting in these items being excluded from the analysis. The validity of each formative items are checked using the outcomes from variance inflation factor (VIF) calculations and the results show that all VIF values are less than 5 which means they meet the requirements. These results show that the majority of indicators are tested according to previous studies [4,7]. There are 2 of the 29 indicators that are invalid, while the remaining 27 indicators are valid.

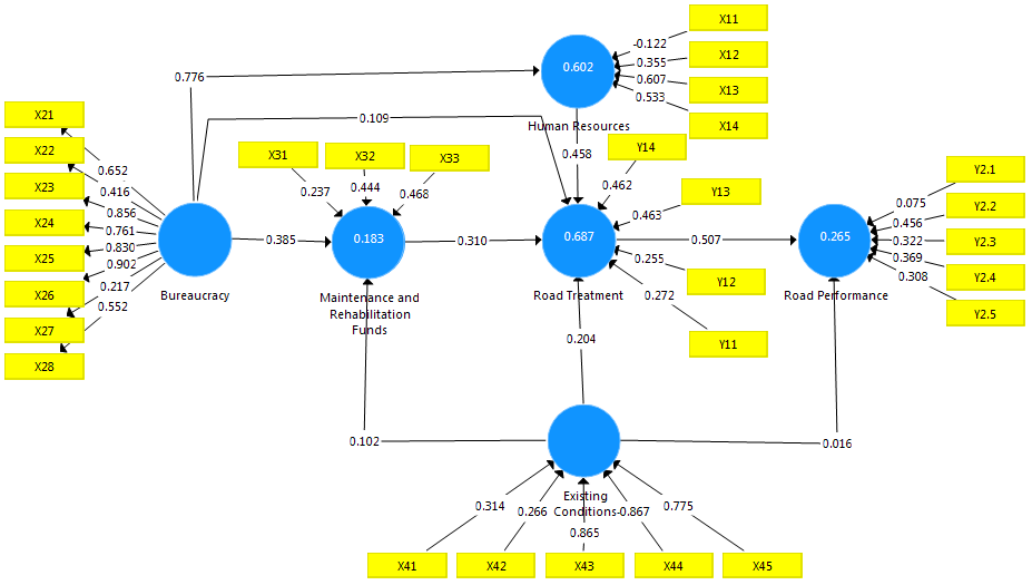


Fig. 2 Outer model test results

Table 2 Loading factors and initial and final VIF of outer model

| Variable | Indicator | Loading Factor | | VIF | |
|---|---|---|---|---|---|
| | | initial | evaluated | initial | evaluated |
| Human Resources (F) | X1.1 | -0.122 | -0.150 | 1.378 | 1.378 |
| | X1.2 | 0.355 | 0.315 | 2.191 | 2.191 |
| | X1.3 | 0.607 | 0.654 | 1.962 | 1.962 |
| | X1.4 | 0.533 | 0.526 | 1.168 | 1.168 |
| Bureaucracy (R) | X2.1 | 0.652 | 0.621 | - | - |
| | X2.2 | 0.416 | - | - | - |
| | X2.3 | 0.856 | 0.856 | - | - |
| | X2.4 | 0.761 | 0.803 | - | - |
| | X2.5 | 0.830 | 0.829 | - | - |
| | X2.6 | 0.902 | 0.899 | - | - |
| | X2.7 | 0,217 | - | - | - |
| | X2.8 | 0.552 | 0.601 | - | - |
| Maintenance and Rehabilitation Funds (F) | X3.1 | 0.237 | 0.198 | 1.574 | 1.574 |
| | X3.2 | 0.444 | 0.452 | 2.371 | 2.371 |
| | X3.3 | 0.468 | 0.491 | 2.025 | 2.025 |
| Existing Condition (F) | X4.1 | 0.314 | 0.313 | 1.168 | 1.168 |
| | X4.2 | 0.266 | 0.241 | 1.088 | 1.088 |
| | X4.3 | 0.865 | 0.858 | 2.323 | 2.323 |
| | X4.4 | -0.867 | -0.852 | 3.295 | 3.295 |
| | X4.5 | 0.775 | 0.783 | 2.017 | 2.017 |
| Road Treatment (F) | Y1.1 | 0.272 | 0.293 | 1.636 | 1.636 |
| | Y1.2 | 0.255 | 0.254 | 1.118 | 1.118 |
| | Y1.3 | 0.463 | 0.461 | 1.280 | 1.280 |
| | Y1.4 | 0.462 | 0.450 | 1.828 | 1.828 |
| Road Performance (F) | Y2.1 | 0.075 | 0.071 | 1.134 | 1.134 |
| | Y2.2 | 0.456 | 0.452 | 1.067 | 1.067 |
| | Y2.3 | 0.322 | 0.340 | 1.632 | 1.632 |
| | Y2.4 | 0.369 | 0.352 | 3.447 | 3.447 |
| | Y2.5 | 0.308 | 0.313 | 2.606 | 2.606 |

### 3.3 Inner Model Testing

The results of structural model tests (inner model) can be seen on the path coefficient values, p values and $R^2$ of each path relationships between latent variables. Table 3 shows the path coefficients between latent variables and their significance. While $R^2$ is shown in Table 4.

In the hypothetical model tests, there are 5 path coefficients that are not significant i.e. the path coefficient of existing conditions – maintenance and rehabilitation funds, bureaucracy – road treatment, existing conditions – road treatment, maintenance and rehabilitation funds – road treatment, and existing conditions – road performance. After evaluation by eliminating several paths gradually, an evaluated model was eventually found by performing a three-track elimination, i.e. a route through existing conditions – maintenance and rehabilitation funds, bureaucracy - road treatment, and the existing conditions - road performance.

Model compatibility can be assessed from several calculations such as model determination coefficient (Rm2) and the goodness of fit index (GoF). The coefficients of determination model (Rm2) and goodness of fit index (GoF) are presented in Table 4. Hair et.al [11] stated that generally, the coefficient of determination is classified as low if the value is at 0.20, while in the results of this model, the four coefficients are valued in the range of 0.182 to 0.680 or having an average of 0.430 or more than 0.20. Hence, based on these results, the models' suitability is classified as favorable.

The calculation results show the value of the Rm2 inner model of 0.922 which means the model of this study has high levels of compatibility. The model accuracy of 92.2% explains that the models' contribution to explaining the structural relationship of the six variables studied is 92.2% and the rest is explained through other variables that are not related to the model.

Table 3 Results of line coefficient testing on inner model

| Path | Proposed Model | | Evaluated Model | | Indirect Effects | Total Effects |
|---|---|---|---|---|---|---|
| | Path Coefficient | p | Path Coefficient | p | | |
| Bureaucracy - Human Resources | 0.776 | 0.000 | 0.769 | 0.000 | - | 0.769 |
| Bureaucracy - Maintenance and Rehabilitation Funds | 0.385 | 0.021 | 0.410 | 0.003 | - | 0.410 |
| Bureaucracy - Road Performance | - | - | - | - | 0.268 | 0.268 |
| Bureaucracy - Road Treatment | - | - | - | - | 0.507 | 0.507 |
| Bureaucracy - Road Treatment | 0.109 | 0.290 | - | - | - | - |
| Human Resources - Road Treatment | 0.458 | 0.073 | 0.464 | 0.047 | - | 0.464 |
| Human Resources - Road Performance | - | - | - | - | 0.246 | 0.246 |
| Existing Condition - Road Treatment | 0.204 | 0.163 | 0.278 | 0.032 | - | 0.278 |
| Maintenance and Rehabilitation Fund - Road Treatment | 0.310 | 0.096 | 0.365 | 0.036 | - | 0.365 |
| Maintenance and Rehabilitation Fund - Road Performance | - | - | - | - | 0.193 | 0.193 |
| Existing Condition - Road Performance | 0.016 | 0.485 | - | - | 0.147 | 0.147 |
| Road Treatment - Road Performance | 0.507 | 0.083 | 0.530 | 0.000 | - | 0.530 |

Model compatibility can also be calculated using the goodness of fit index. The goodness of fit index (GoF) is defined as a geometric average or the roots of communality average and the average of R2 for all endogenous constructs [13]. The GoF values have intervals between 0 and 1. GoF values that approach 1 indicate a good path model estimation [14]. The GoF index for this research model is 0.511. Thus, the structural model that explains the relationship of the six variables has a good prediction power (fit).

Table 4 Goodness of Fit (GoF) Index and coefficients determination model ($Rm^2$)

| Variable | Proposed Model | | Evaluated Model | |
|---|---|---|---|---|
| | Commonality | $R^2$ | Commonality | $R^2$ |
| Human Resources | - | 0.595 | - | 0.592 |
| Bureaucracy | 0.603 | - | 0.605 | - |
| Maintenance and Rehabilitation Funds | - | 0.182 | - | 0.168 |
| Existing Condition | - | - | - | - |
| Road Treatment | - | 0.680 | - | 0.684 |
| Road Performance | - | 0.261 | - | 0.280 |
| Total | 0.603 | 1.781 | 0.605 | 1.724 |
| Average | 0.603 | 0.430 | 0.605 | 0.431 |
| The goodness of Fit (GoF) Index | 0.509 | - | 0.511 | - |
| The coefficient of determination model ($Rm^2$) | - | 0.922 | - | 0.923 |

### 3.4 Evaluated Model

The last model is an evaluated model and fully qualifies for matching test qualifications. The last model can be seen in Fig. 2. Bureaucracy has a positive path coefficient toward human resources of 0.769 ($p < 0.05$), providing the conclusion that bureaucracy has a significant effect on human resources. Bureaucracy towards road funds has a path coefficient towards positive values. The results show that the path coefficient is 0.410 ($p < 0.05$), this means bureaucracy has significant effects on road funds. Bureaucracy has the most extensive influence on-road performance through human resources and road funds as well as being the most crucial factor in the efforts to improve the performance of regency roads.

According to Eckhart and Ege [15], there is a general consensus that international bureaucracy influence policies. Bureaucracy has a significant influence during the early stages of policy development. While Baekgaard et al. [16] found that politics and bureaucracy affect public funding policies; the significance of its influence depends on the public policy type. Bureaucracy has the privileged position of an information provider, instrumental in formulating key policies [17].

Bureaucracy as an institution runs the task of preparing funds and setting up political institutions that set the funds. Dynamic relationships occur between politics and bureaucracy during preparation phases, implementation, and

Some works of literature see bureaucracy as something sluggish, convoluted and a process that takes a long time. Discontentment is often directed towards immigration officers, university administrators in Italy, police corps in the Philippines and other examples of bureaucratic representatives deemed slow and lacking transparency. In addition, newspapers continuously broadcast news of corruption, nepotism, bribery, and oligarchy in various parts of the world. In these cases, bureaucracy is considered a problem [18]. Bureaucracy does have shortcomings but nevertheless have a large role in societal structures.

In 1970, Bennis stated in his academic paper *The End of Bureaucracy* that each era will form a bureaucratic model corresponding to existing problems of the time. Bennis predicted that future organizations will have unique characteristics, tendency to be temporal, adaptive and changes rapidly. Problem-solving will be done by diverse professional groups. These groups will be organized in a non-mechanical, organic basis; it supervision of public policies. The role of bureaucracy is of particular relevance in the preparation of funds, including funding of regency roads, determination of human resources, and implementation of road maintenance.

will continue to evolve based on problems that developed rather than structured programs. People will be evaluated not by a vertical hierarchy, but on the more flexible basis of competence.

Despite the negative views on bureaucracy, a previous work of literature also views bureaucracy in a hopeful manner, not as a problem but a solution to social problems and goals. A well-executed bureaucracy can be felt in public services in Swedish cities and state administrative services [18]. The existence of bureaucracy is absolute, and expectations can be addressed towards well-functioning bureaucratic systems. Continuous improvements, Innovations and technological advancements are needed to achieve the desired bureaucratic system. Technical iinnovation includes intellectual, technical and social components and has cognitive and emotional consequences. Innovation is very closely linked to cross-functional communications and collaborations, departments, and expert groups. Innovations occur dynamically and synchronize thoroughly [19].

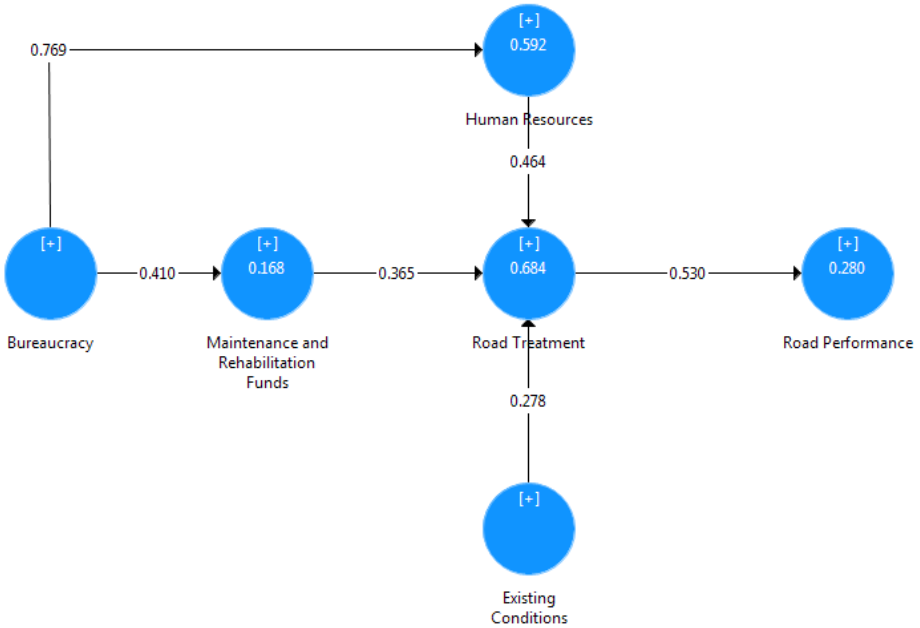


Fig. 2 Evaluated Model

Efficient bureaucracy, sufficient road maintenance and rehabilitation funds, quality human resources, and good existing road conditions will improve road conditions. Bureaucracy has a role in planning and providing adequate maintenance and rehabilitation funds, and choosing including preparing for appropriate, qualified human resources. Appropriate and qualified human resources will be able to carry out job responsibilities properly. Bureaucracy improves by combining bureaucracy with professionalism, managerialism and even with entrepreneurship [20].

After bureaucracy variables, variables of road maintenance and rehabilitation funds serves as a second variable affecting road conditions. The adequacy of maintenance and rehabilitation road funds is often a problem faced in regards to achieving the goal of improving the condition of regency roads. The role of bureaucracy is, again, required to solve this problem. Roads are a part of an infrastructure system that has a strategic role in the process of national economic growth. Given the importance of road maintenance, it is only appropriate for maintenance funds allocations duty to occupy a high position in the process of priority organization for construction financing programs. Budget allocations must be performed accurately.

Subsequent variables that play a role in improving the conditions of regency roads are the variables of human resources. Human resources can be a decisive factor in the process of road maintenance management from planning, and supervision to the maintenance of regency roads. Comprehension of sustainable road development processes should be possessed by the human resources of road managers. This way, human resources will support the results of the implementation of quality road works in accordance to target quality, target time and target costs, so that time allotment of road planning can be expected to be hit according to plans.

Understanding of pavement management system (PMS) is absolutely mandatory for human resources in this field. PMS, widely developed worldwide, includes maintenance, repairs, and rehabilitation (M, R & R) selection, prioritization and optimization of improvements and predictions of road conditions [21-22]. PMS includes the following steps: pavement deterioration survey, evaluation of pavement conditions, life cycle cost analysis, and maintenance strategies [23-24].

Human resources include managers and staff. Pavement managers have a very important role in road maintenance. Pavement managers are responsible for collecting, managing, analyzing and communicating information related to his line of work [25]. Pavement management needs a big investment [26] and to control this need a reliable pavement managers.

The existing condition of roads has a role that cannot be underestimated in improving the conditions of regency roads. The existing condition of roads is closely related to the quality of road implementation and the selection of handling priorities. The lifespan of roads and premature deterioration is a problem that is also often faced by regency roads. The average lifespan of roads that are shorter than the timespan of the planning stage or the occurrence of premature deterioration amplifies bad road conditions. The combination of premature deterioration and the lack of maintenance funds can cause a backlog.

Maintainance of damaged roads become a variable that is influenced by funds, existing conditions, and human resources. The output from road treatment is road condition or road performance. Road maintenance can come in the forms of routine maintenance, periodic maintenance, and rehabilitation. Each type of existing conditions requires a specific type of maintenance. Problems become complex when the number of maintenance funds is insufficient to maintain due diligence for existing damages. Determining maintenance priorities correctly is a necessary step.

Other findings in this study are: bureaucracy has no direct influence on road treatments and conditions nor does it have any direct effects on maintenance and rehabilitation funds and road performance. Road performances are only directly affected by road treatment. Bureaucracy has the highest amount of influence routes, directly affecting human resources and road maintenance funds.

From the results of this study, taking strategic steps beginning from the bureaucracy is recommended to achieve high road performance. Bureaucracy system improvements and rectifications are the most strategic steps needed to improve the performance of regency roads. Simultaneously, the bureaucracy will affect the selection or determination of human resources and the allocation of regency road maintenance budget. Human resources play a role in the management of road maintenance.

## 4. CONCLUSION

Based on the results of this research, it can be concluded that bureaucratic factors have the most crucial influence on improving regency road conditions. Bureaucracy directly influence the placement of manpower and the allocation of road maintenance and rehabilitation funds. Road treatment is directly affected by human resources, maintenance and rehabilitation funds, and road conditions. Existing road conditions determine the type of maintenance suitable for implementation. Accordingly, in the effort of improving the road performance, it is recommended to immediately readjust the bureaucratic system. Bureaucracy readjustments are expected to be the most strategic step in improving regency road condition

.

## 5. REFERENCES


[1] Newbery D. M., "Road Damage Externalities and Road User Charges," *Econometrica*, vol. 56, no. 2, 1988, pp. 295–316.

[2] Thompson R. J. and Visser A. T., my haul road maintenance management systems, South African Inst. Min. Metall., vol. June 2003, pp. 303–312.

[3] Levik K., How to sell the message *Road* maintenance is necessary to decision makers. 2002, pp. 1-10.

[4] Burningham S. and Stankevich N., Why Road Maintenance is Important and How To Get It Done, Transport Note, no. TRN-4, Washington, DC, 2005, pp. 1–10.

[5] Ministry of Public Works and Housing, Information of Infrastructure Statistics. 2015, pp. 1-226.

[6] Giustozzi F., Crispino M., and Flintsch G., Multi-attribute life cycle assessment of preventive maintenance treatments on road pavements for achieving environmental sustainability, International Journal of Life Cycle Assess, vol. 17, 2012, pp. 409–419.

[7] Nefiadi E. N. and Latief M. H., The Challenges of Local Level Road Planning and Budgeting, Journal of the Indonesia Infrastructure Initiative Prakarsa, no. 14, 2013, pp. 14–15.

[8] Kerali H. G., Overview of HDM-4. Paris and Washington DC: PIARC and World Bank, 2000, pp. 1-43.

[9] Ibraheem A. T., Modelling The Methods of Flexible Pavements Maintenance, Journal of Transportation Engineering, vol. 140, no. 3, 2014, pp. 1-10.

[10] Wong K. K., Partial Least Squares Structural Equation Modeling ( PLS-SEM ) Techniques Using SmartPLS, Marketing Bulletin, vol. 2013, no. 24, 2013, pp. 1–32.

[11] Hair Jr J. F., Sarstedt M., Hopkins L., and Kuppelwieser V. G., Partial least squares structural equation modeling ( PLS-SEM ) An emerging tool in business research, vol. 26, no. 2, 2014, pp. 106–121..

[12] Hair J. F., Ringle C. M., and Sarstedt M., PLS-SEM : Indeed a Silver Bullet PLS-SEM : Indeed a Silver Bullet, J. Mark. Theory Pract., vol. 19, no. 2, 2011, pp. 139–152.

[13] Tenenhaus M. and Esposito V., PLS path modeling, vol. 48, 2005, pp. 159–205.

[14] Akter S. and Ray P., Trustworthiness in health information services : an assessment of a hierarchical model with mediating and moderating effects using partial least squares ( PLS ), vol. 62, 2011, pp. 100–116.

[15] Eckhard S. and Ege J., International bureaucracies and their influence on policy-making : a review of the empirical evidence, vol. 1763, no. April 2016, pp. 1-19.

[16] Baekgaard M., Blom-hansen J., and Serritzlew S., When Politics Matters : The Impact of Politicians ' and Bureaucrats ' Preferences on Salient and Nonsalient Policy Areas, vol. 28, no. 4, 2015, pp. 459–474.

[17] Blom-hansen J., Baekgaard M., Christensen J., and Serritzlew S., Politicians and Bureaucrats : Reassessing the Power Potential of the Bureaucracy," 2017, pp. 1-46.

[18] Styhre A., The Innovative Bureaucracy, vol. 3. New York: Routledge, 2007, pp. 1-233.

[19] Adler P. S. and Borys B., Two Types of Bureaucracy: Enabling and Coercive, Adm. Sci. Q., vol. 41, no. 1, 1996, pp. 1-89.

[20] Newton J., Bending bureaucracy: leadership and multi-level governance, in The Values of Bureaucracy, P. du Gay, Ed. Oxford and New York: Oxford University Press, 2005, pp. 191–209.

[21] Han D. and Kobayashi K., Criteria for the development and improvement of PMS models, KSCE Journal of Civil Engineering, vol. 17, no. 6, 2013, pp. 1302–1316.

[22] Tavakoli A., Lapin M. S., and Figueroa J. L., PMSC: Pavement Management System for Small Communities, Journal of Transportation Engineering, vol. 118, no. 2, 1992, pp. 270–280.

[23] Moretti L., Mandrone V., D'Andrea A., and Caro S., Comparative 'from cradle to gate' life cycle assessments of Hot Mix Asphalt (HMA) materials, Sustain., vol. 9, no. 3, 2017, pp. 1–16..

[24] Siswanto, H., Supriyanto, B., Pranoto, Putra, Y. A. M. & Huda, A. S. AIP Conference proceedings 1977, in Proc. 4th Int. Conf. on ICETIA, 2018, pp. 1-6.

[25] Broten M., Local Agency Pavement Management Application Guide, no. December. Washington, DC.1996, pp. 1-346.

[26] Alkawaas N. G. A., A Genetic Algorithm-Based Approach to Predict Pavement Maintenance Strategies:Iraqi Expressway No.1 Case Study. International Journal of Geomate, Vol. 11, Issue 27, 2016, pp. 2790-2795.