Effectiveness of Longsegment Contract Method on The Road Rehabilitation and Maintenance System

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Abstract. Longsegment is a road maintenance system on a contract basis to service providers throughout the fiscal year. In implementing longsegment contracts, service providers are required to have good quality materials so that road maintenance is maintained in quality, this causes the costs incurred to be efficient. This research will discuss how effective the longsegment road maintenance system is so that it can achieve a more efficient implementation cost for road maintenance. This research method is to measure the performance of roads handled by conventional contracts and longsegment contracts in terms of the final results of road conditions as assessed by the International Roughness Index (IRI) and Surface Distress Index (SDI) methods, then analyze the effectiveness of the contract system on the costs incurred by the user. The results showed that road performance carried out in 2016 by conventional contracting resulted in road stability of 88.79% at a cost of Rp. 87,912,696,000.00 while road performance using the longsegment contract system implemented since 2017 resulted in road stability 95.29% with a fee of Rp. 75,312,723,000.00; road stability is 95.97% at a cost of Rp.70,026,300,000.00; road stability is 90.42% at a cost of Rp. 24,014,464,000.00. From the results of road conditions and costs incurred for road preservation, it can be concluded that longsegment road maintenance is more effective than conventional contracts.

1. Introduction

Road maintenance is an important thing that must be done to achieve steady road conditions. The road maintenance system in Indonesia that is commonly used is the conventional contract system (design-bid-build) with a unit price payment system. Performance-based contracts were first implemented in Indonesia in 2011. Basically, performance-based contracts are risk sharing from the government to third parties who are considered capable of bearing risks [1]. One of the most fundamental differences between a traditional contract and a PBC is the output required in the contract. In PBC, payments to contractors are made based on meeting the performance indicators required in the contract.

According to Rahadian [2], implementing PBC requires a shift in work culture, be it road operators as road users, service providers, or the community as road users. Since the PBC contract system is not perfectly implemented in Indonesia, the Directorate General of Highways of the Ministry of Public Works and Public Housing has combined the conventional contract system with the performance-based contract system known as the longsegment contract system. Currently, the national road maintenance system throughout Indonesia uses a longsegment contract system.
The longsegment contract system is a breakthrough in the new method currently being applied to national road maintenance throughout Indonesia.

Long Segment is the handling of road preservation within the limits of one continuous segment length (can be more than one segment) which is carried out with the aim of obtaining uniform road conditions, namely a steady and standard road along the segment. The scope of road maintenance work is the most dominant treatment based on road length, so the types of work in maintenance activities are also the main work [3]. With the existence of longsegment contracts, service providers are required to fulfill road and bridge service levels by fulfilling performance indicators along the contracted roads. Not only does maintaining the effective site, but the service provider must maintain the functional location throughout the year during the contract period.

With the implementation of the longsegment contract system, service providers are required to have good material quality so that the quality of road maintenance is maintained. With the quality of materials that are maintained, and implementation in accordance with procedures will lead to good quality work. The quality of work is very influential in the longsegment contract system, because it can reduce the costs of contract implementation expenses.

According to Budilukito, A [4], the quality achievements of road preservation will be influenced by the components of labor, materials, equipment, work methods and quality standards from the contractor.

The purpose of this study is to assess how effective the road maintenance system is using the longsegment contract method by (1) comparing the performance of service providers with the implementation of conventional contracts and longsegment contracts; (2) comparing the actual costs incurred in contract execution against the results of year-end road conditions after contract execution.

2. Experimental

If the research location which is used as the object of this research is the national road section of the Surakarta and Sragen regions with a total length of 72.25 KM with contract data for the 2016-2019 TA. This research method is to measure the performance of roads handled by conventional contracts and longsegment contracts in terms of the final road conditions. Service provider performance results are measured based on the condition of stability (International Roughness Index (IRI) and Surface Distress Index (SDI)).

The International Roughness Index (IRI) is a method used to measure road conditions with the parameter used is the unevenness of the road surface. According to Pataras [5], the M 2019 Roughness parameter is presented on a scale that describes the unevenness of the pavement surface felt by motorists. The unevenness of the pavement surface is a function of the longitudinal and transverse sections of the road surface.

Surface Distress Index (SDI) is a method used to measure road conditions by visually observing road damage conditions in the field. According to Manurung and Ardita [6] the factors that determine the amount of the SDI index are crack conditions on the road surface (total area and average crack width), other damage (number of holes per 100 m of road length) and wheels / rutting (depth).

From the results of national road conditions, a preservation management plan can be proposed for the next fiscal year. However, due to limited costs, the Directorate of Highways (DGH) as the operator of the national road takes a policy on priority handling that will be carried out. After obtaining data on the condition of national roads and the cost of implementing the work carried out by contract, this study will analyze the contract implementation system used in the handling of national road preservation. Longsegment contracts have been carried out from 2017 to the present, previously using conventional contracts.

3. Results and Discussion

In National road condition data is taken every 100 m distance for each section. This research data uses secondary data from the national road operator for the road area, namely the Central Java DIY
National Road Implementation Center. Table 1 shows the results of the recapitulation of national road condition data for the Surakarta and Sragen regions from 2016 to 2019.

| Road Condition | Excellent (%) | Poor (%) |
|----------------|---------------|----------|
| 2019           | 90.42         | 9.58     |
| 2018           | 95.97         | 4.03     |
| 2017           | 95.29         | 4.71     |
| 2016           | 88.79         | 11.21    |

In addition to data on national road conditions, this study also uses annual job funding costs, namely: in 2016 amounting to Rp. 87,912,696,000; in 2017 amounting to Rp. 75,312,723,000; in 2018 amounting to Rp. 70,026,300,000; in 2018 amounting to Rp. 24,014,464,000; in 2019 amounting to Rp. 24,014,464,000.

From the existing data it can be drawn the relationship from 2016 to 2019 since using the longsegment contract system (2017 to 2019) the costs incurred every year have decreased to produce a relatively similar road stability value. Whereas in 2016 using the conventional contract method, the costs were more disbursed to produce a smaller road stability value.
Handling of road preservation with the longsegment contract system can be seen from the graph above, at the beginning of the implementation of the contract for handling functional segments the condition was restored in the first 3 (three) months, namely January to March, after which the performance indicators were fulfilled from April to December. Meanwhile, the functional sections will be handled from January to October, and from November to December performance indicators have been fulfilled as stated in the contract.

With the limitation on implementation time and performance indicators, service providers are required to have a good management system, starting from material selection management, human resource management, and financial management.

4. Conclusion
Based on the results of the analysis and discussion that has been done, the authors draw the following conclusions:
1. The road condition results in the longsegment contract system are better with less allocation of costs compared to the conventional contract implementation system.
2. In 2017 to 2018, the road conditions were improving but the costs incurred were getting smaller, indicating that the longsegment contract implementation system was more effective from year to year with costs decreasing gradually.
3. But in 2019 the contract implementation cost dropped drastically to Rp. 24,014,464,000, - this has an effect on road conditions that have also drastically decreased to 90.42%.
4. The implementation of the contract system method for road preservation greatly affects the results of road stability.

References
[1] Tjendani, Hanie T., & Widhiarto, Herry 2017 Kontrak Berbasis Kinerja Di Indonesia. Universitas 17 Agustus 1945 Surabaya. ojs.ejournalunigoro.com.
[2] Rahadian, H. 2009 Langkah Awal Menuju Performance Based Contract Melalui Extended Warranty Period. Diambil kembali dari www.hpji.or.id/majalah/mjt_0401.pdf
[3] ____, 2015, SE Direktur Jenderal Bina Marga Nomor 9/SE/Db Tahun 2015 Kementerian Pekerjaan Umum Dan Perumahan Rakyat.
[4] Andri Budilukito. 2016 Evaluasi Kesiapan Kontraktor Terhadap Kebijakan Long Segment Preservasi Jalan Nasional (Studi kasus : Preservasi Jalan Nasional di Sumatera Selatan). Universitas Gadjah Mada. Jurnal HPJI, 2(2).
[5] Pataras, M. Kadarsa, E. Susanti, B. Adhitya, BB, dan Juliastini, D. 2019 Road Asset Management System Dalam Penanganan Longsegment Jalan Nasional (Studi Kasus : Batas Kota Sekayu – Mangun Jaya). Seminar Nasional AVoER XI 2019. Falkutas Teknik Universitas Sriwijaya.
[6] Manurung, Ardita E dkk. 2015 Analisis Perhitungan Surface Distress Index (Sdi) Menggunakan Data Hawkeye. fstpt.unila.ac.id