ISSN (e): 2250 – 3005 || Volume, 07 || Issue, 07|| July – 2017 ||
International Journal of Computational Engineering Research (IJCER)

Implementation Analysis of the Self-Management Contract System and Contract System Long Segment on Road Performance

Aspiani[1], Muh. Wihardi Tjaronge[2], Baharuddin Hamzah[3]
[1] *Master Degree of Transportation Planning, Faculty of Postgraduate, Hasanuddin University,*
[2]*Professor, In the Departemen of Civil Engineering, Hasanuddin University,*
[2]*Professor, Department of Architecture, Hasanuddin University, Makassar-Indonesia*
Makassar-Indonesia

ABSTRACT
This research aims to (1) analyze the technical implementation of self-management contract system and long segment contract for routine maintenance work, (2) evaluate factors affecting road performance of self-management contract work and long segment contract, and (3) formulate maintenance strategies of routine road maintenance. This research is a descriptive with qualitative descriptive approach and analysis Strengths, Weaknesses, Opportunities, and Threats (SWOT). The data collections are (1) primary data obtained by field observation, interview, questionnaire, documentation, and (2) secondary data obtained from reports or documents. Data were analyzed by qualitative descriptive analysis and SWOT analysis for routine maintenance management strategy, factors influencing road performance for self-management contract work and long segment contracts used external and internal factor analysis. The result of this research shows that (1) the routine maintenance of self-management contracts and long technical segment contract implementation is passably, (2) the factors affecting road performance in routine road maintenance are affected by the condition and limitations of routine maintenance equipment, for routine long-segment maintenance of road performance influenced by Alacrity of the provider in dealing with road damage, allocation of funds, level of understanding from providers and mobilization of personnel and equipment for routine maintenance, (3) special strategies namely the addition of routine equipment, the addition of technical/operator, the need for socialization involving the owner/Committing Officer, job executor elements and job inspection elements and the application of sanctions for delay in handling routine maintenance on long segment contract.
Keywords: Routine maintenance, self-management, long segment

Date of Submission: 12-07-2017 Date of acceptance: 21-07-2017

I. INTRODUCTION

The role of the road is very important to bring implications for the efforts and hard work of the government in realizing the implementation of quality road infrastructure. One such effort is through the provision of an annual road development budget for upgrading activities and the construction of new roads that are the responsibility of the government and/or local government [1].

Support from the Ministry of Public Works and People's Housing to realize the fulfillment of the role of roads, will be achieved through strategic objectives that will be achieved through program targets reduced travel time on the main corridor from 37 km/hour to 45 km/hour; Increased national road service from 101 billion vehicles km to 133 billion vehicles km; Increased facilitation of local roads to support the area from 0% to 100%, which will be achieved through a 47,017 km national road preservation strategy, 2,650 km of new road development (Border Area, Kalimantan, missing link completion in Aceh, Kalimantan, Papua, etc.), National road capacity improvement of 3,073 km, bridge construction, 29,859 m long, bridge replacement along 19,951 m, 1,000 km of toll road construction, regional road support for regional development [2].

Target and funding in the Medium Term Development Plan (MTDP) in the Strategic Plan of the Ministry of Public Works and People's Housing (2015-2019) for the road management program that is IDR.278,177 Trillions with the expectation of road stabilization rate reaching 98% in 2019. In order to achieve the level of road stability, the Ministry of Public Works and People's Housing through the Directorate General of Highways

is implementing a long segment contract in the implementation of national roads implemented in the National Road Implementation Area throughout Indonesia including the Great Hall of National Road Implementation or called BBPJN XIII Makassar.

In carrying out road maintenance, BBPJN XIII Makassar for 2016 gets a self-management contract and a long segment contract, whereby self-management contracts are conducted independently while long segment contracts are made through a public tender process. In 2016 the Great Hall of National Road Implementation of XIII Makassar, hereinafter referred to as BBPJN XIII Makassar, obtains a budget for road handling fees of IDR 1,482,132,425,000 for South Sulawesi and West Sulawesi Province, which is allocated for contract activities both physical and non-physical, self-management activities as well as general administration. The government through BBPJN XIII Makassar allocated 37.04% of the total ceiling with details of 32.43% for long segment contracts along 1,604.82 km and 4.61% for the self-management Contracts of 1,018.342 km [3].

The form of work contracts in the implementation of construction and road maintenance at this time is carried out periodically where the period of accountability of the implementation of the work is during physical execution and the period of guarantee a few months. So if there is construction damage faster than the age of the plan will be the responsibility of service users. The above mentioned occurs because the form of employment contracts between service users and service providers is a binding contract of work in the shortest timeframe [4].

High quality road infrastructure is needed to accelerate development. To improve the quality of road infrastructure needs to be reformed in the field of road management, ranging from planning, development, operation to maintenance. One form of reform is to implement performance based contracts [5].

To ensure the quality of road services, the Directorate General of Highways in the last 5-7 years has made a breakthrough to implement Performance Based Contract (PBC) to replace the conventional maintenance contracts that have been done. Unlike conventional maintenance that controls the inputs and maintenance processes that contractors must perform, the PBC emphasizes the achievement of road performance to be achieved through output or outcome parameters, which are first clearly defined and measurable [6]. However, due to a request for a review of the PBC contract from the Financial Auditor Agency (FAA) to the Ministry of Public Works and People's Housing because the use of state money must be clearly accounted for the measurement. Meanwhile, in the PBC contract, the government only ensures the achievement of the level of road service based on interpretation. In addition, the long term contract period is also shorter than the PBC contract, which is only about 3-5 years to be more effective.

Long segment contracts are an integration of some jobs handled in a road segment. The scope of work includes road widening, road reconstruction, road rehabilitation, road preventive maintenance, routine road maintenance, routine maintenance of bridges. The government hopes that the implementation of this long segment contract will be a solution for road handling, both from the government side in order to provide a continuous path in good condition, as well as from service providers who view this business as profitable and attractive to them. Routine maintenance previously carried out by self-management can be done by the service providers in a long segment contract. This routine maintenance work can reduce the administrative burden of self-management contracts, monitor quality and measure the volumes of routine maintenance work, focus on performance that road users expect, greater responsibility and motivate risk contractor initiatives and innovation, and create jobs, business, and new business actors in building the construction industries.

Road managers have desire an approach to performance-based contracts due to the following: reducing the cost of managing and maintaining road assets; provide more revenue for road managers; Have the ability to manage the road network with fewer human resources, the satisfaction of the road users about the service and the condition of the road; and stable financial conditions [7]. In addition, Performance Based Contract patterns can be a win-win solution for both service providers, service users, and the people who enjoy the results [8].

The objectives of this research are to analyze the technical implementation of the self-management contract system and the long segment contract for routine maintenance work, to analyze the factors affecting the road performance of the self-management contract work and the long-segment contract, and to formulate the strategy for handling routine road maintenance.

II. MATERIALS AND METHOD

Research Sites

This research was taken for the case study in the Work Unit of the National Road Implementation I West Sulawesi Province, namely the long segment contract of the Preservation Contract of Minor Road Rehabilitation of Mamuju Regency border - Tameroddo - Majene - Boundary of Polewali Regency as long as 100,50 km, and case study self-management contract is selected by Routine Maintenance Route of Kalukku road - Boundary of Mamuju City (007) along the 28.53 km.

The research area in Mamuju and Majene Regency where are: The self-management contract is on Kalukku road – Boundary of Mamuju city at km 401 + 350 up to km 438 + 500 with the type of flexible pavement and

long segment contract on the Boundary Road of Mamuju Regency - Tameroddo - Majene - Boundary of Polewali Regency that is at km 438 + 500 up to km 471 + 350.

Design and Research variables

This research uses a qualitative-descriptive approach and SWOT analysis method. The Qualitative-descriptive approach is to know the technical implementation of routine self-management and long segment maintenance as well as factors affecting road performance for routine self-management maintenance and long-segment. The descriptive approach uses a SWOT analysis to formulate routine road maintenance management strategies.

A Case Study and Population

The entire research population of the National Road Development Project is under the Environment of the Great Hall of National Road Implementation of XIII Makassar. The case studies used are 2 national road packages with the criteria of pavement structure using rigid asphalt the status of job implementation is self-management job and routine maintenance for long segment contract. The project location is located in West Sulawesi Province under the control of the National Road Working Unit of Region I of West Sulawesi Province.

Data collecting methods

The type of data was used in this research are primary and secondary data. Primary data is to know the performance of the road by distributing questionnaires and conducting interviews to the elements of the owner/Commitment Maker Officials (CMO), Executor of Works/Contractor and Supervisor/Consultant. Secondary data obtained from self-management contract documents and long segment contract documents.

The data obtained, i.e., 1) Respondent profile data, 2) Bid value in contract documents of self-management and long segment contract, 3) Variables that affect the technical implementation of routine maintenance work, and 4) Variables that affect routine road maintenance performance.

Data analysis

The research uses questionnaires to the parties involved in routine maintenance projects and contract documents. The data obtained is analyzed by using qualitative-descriptive analysis and the indicator is road maintenance service of self-management contract and long segment contract. The analysis results can be known whether the service provider has maintained the road performance (maintenance period) well or not. If there are unsuitable road performance indicators, then the service provider should improve in accordance with the specified response time.

To answer the problem formulation about road maintenance management strategies used SWOT analysis method, and then the results of SWOT analysis will be formulated its TOWS strategy, including:

a. S-O strategy (using power factor to seize opportunities);
a. S-T Strategy (using force factor to counter threats);
c. W-O strategy (reducing the weakness factor to exploit opportunities);
d. W-T strategy (reduce the weakness factor and counter the threat).

III. RESULTS

Technical implementation of routine maintenance work for self-management contracts and long segment contracts

From the results of interviews with CMO 01 and CMO 03 related to the technical implementation of routine maintenance refers to the Manual of Construction and Building No. 001-01/M/BM/2011 on Road Condition Survey for routine road maintenance [9] and No. 001-02/M/BM/2011 on Standard Improvement for routine road maintenance [10]. As for routine long segment maintenance refers to the Special Conditions of Contract (SCOC) contained in the long segment contract [11].

Routine maintenance work with self-management is self-sustaining and done by you, not through providers. Prior to the implementation of routine maintenance work, Budget Users/CMO conduct a road condition survey that refers to the Construction and Building Manual No. 001-01/M/ BM/2011 on Road Condition Survey for routine road maintenance. From the survey results, so it is known by the type of action to be taken on road damage to maintain good road conditions. If the percentage of damage restriction is <6%, the handling program is routine maintenance [12]. Before taking action on field conditions, CMO prepared an estimated unit price for each type of work to be performed. And the price as a reference held by procurement officials to make the procurement process. The procurement official conducts the procurement process in accordance with the Presidential Regulation of the Republic of Indonesia No.54 of 2010 along with its amendment on Government Procurement of Goods/Services. After the material procurement process that will be used for routine maintenance is done, and then routine maintenance work can be done.

The routine maintenance work with long segment of the procurement process is carried out by a public tender by the Working Group (WG) and this work is carried out by the service provider/contractor and supervised by the supervisor of the work/consultant.

To know the level of understanding and technical implementation of self-management contracts, questionnaires were given to the project owner, in this case the respondents from elements of CMO 01 and CMO 03 of Implementation of National Road Region 1 West Sulawesi with the total number of respondents 19 people. The educated Strata One (S1) is 10 people. Others are educated School of Mechanical Engineering or High School, Diploma 3, and Master (S2) with varying length of work. Meanwhile, to know the level of understanding of routine maintenance of long segment contract the number of respondents 32 people based on the project organization structure. Respondents come from 3 elements: project owner, job/contractor executor and supervisor of work/consultant. Respondents of project owner elements of the self-management contract packages and long segment contracts are the same people.

Table 1. Distribution of respondents by education level

No.	Level of Education	Project Owner (Self-Managemen and Long segment)	Contractor (Long segment)	Consultant (Long segment)
1.	Senior High School/School of Mechanical Engineering	7	3	2
2.	Diploma (D3)	1	0	0
3.	Strata One (S1)	10	6	2
4.	Master (S2)	1	0	0
	Total	19	9	4

Source: Results of the questionnaire, 2017

Factors that influence the performance of routine maintenance roads for self-management contracts and long segment contracts

From the results of the survey and interviews routine self-management of maintenance work, it is found that affecting routine maintenance is the limitations of routine maintenance equipment, old equipment condition, and limited skill of operator/equipment technicians.

For routine long segment maintenance, in this case Minerals Rehabilitation Presentation Contract Boundary Road Mamuju Regency - Tameroddo - Majene - Polewali Regency Boundary, there is no special inspection due to the absence of good management. Management is done in ad hoc or at any time.

Visually the condition of the flexible pavement structures in the routine self-management of maintenance contracts and no holes as well as the level of other road services, as per the performance indicators required in the maintenance period, includes road pavement, road shoulders, and drainage and road equipment in good condition. While the routine maintenance of long segment in moderate conditions and the existence of the hole caused is not the maintenance period of long segment.

Strategies used in routine maintenance of handling

The routine maintenance of handling strategy used SWOT (Strength, Weakness, Opportunity, and Threat) methods [13]. SWOT analysis aims to identify internal factors that include strengths and weaknesses and external factors that include opportunities and threats. From the observations result, questionnaire and other supporting data obtained strategy that need to be done on routine maintenance to achieve steady road performance, hence can be identified that become internal factor and external factor on routine maintenance as follows:

a. Internal Factors (IFAS), which consists of:

1) **Strength**

a) The existence of rules/Standard Operational Procedure (SOP) that regulate related routine maintenance

b) Understanding of the owner/elements of CMO related to routine maintenance

2) Weaknesses

a) Lack of routine maintenance equipment

b) The number of technical personnel/operator less

c) Low price allocated for routine maintenance

b. External Strategic Factors which consist of:

1) Opportunities

a) Produce steady road performance

2) Threats

a) The lack of knowledge of job executor and supervisor of work related to routine maintenance

b) No provider is ready to handle routine maintenance

c) Unpredictable weather conditions

IV. DISCUSSION

Technical Analysis of the implementation of routine maintenance work for self-management contracts and long segment contracts

From the results of the questionnaire shows that respondents who understand self-management contracts and long segment contracts for routine maintenance work 89.47% of the 19 respondents from the owner/CMO. From 89.47% or 17 respondents who know about routine maintenance of the road comes from following socialization as much as 58.83% and other respondents know from reading books, getting information from friends or searching information online, the results can be seen in Table 2.

Table 2. Source of respondent's understanding of the owner/CMO on routine maintenance

No.	Sources	Self-Management Contracts		Long segment Contracts	
		Total	%	Total	%
1.	Reading some books	1	5.88	1	5.88
2.	Information from friends	1	5.88	1	5.88
3.	Following the socialization	10	58.83	11	64.72
4.	Reading some books and Following the socialization	1	5.88	1	5.88
5.	Reading some books and Information from friends	1	5.88	1	5.88
6.	Reading some books, Information from friends and Following the socialization	2	11.77	2	11.77
7.	Reading some books and online	1	5.88	0	0.00
	Total	17	100.00	17	100.00

Source: Results of questionnaire, 2017

All respondents knew that there was Standard Operating Procedure (SOP) for routine self-management maintenances, but it did not know the exact name of the SOP of routine self-management maintenance. The number of respondents who do not know the name of SOP of routine self-management maintenance is 47.37% of 17 respondents, which can be seen in Table 3. As for routine maintenance on long segment packages are respondents from owner/owner, job/contractor, and supervisor /consultant. Of the three elements there are 55.17% of respondents who do not know the name of SOP for routine maintenance of long segment with the details can be seen in Table 4.

Table 3. Respondents who know the Standard Operating Procedures (SOP) routine self-management maintenance

No.	Descriptions	Respondent	
		Total	%
1	Manual Book 001-01/M/ BM/2011	2	10.53
2	Manual Book 001-01/M/ BM/2011 and Manual Book 001-02/M/ BM/2011	1	5.26
3	Technical Guidelines No.020/BM/2009	1	5.26
4	Manual Book 001-01/M/ BM/2011 and Technical Guidelines No.020/BM/2009	4	21.05
5	Manual Book 001-01/M/ BM/2011, Manual Book 001-02/M/ BM/2011 and Technical Guidelines No.020/BM/2009	2	10.53
6	Not knowing the routine maintenance SOP	9	47.37
	Total	17	100.00

Source: Results of questionnaire, 2017

In terms of implementation in the field, implementation of routine self-management of maintenance implementation has been done well. This case can be seen from the results of questionnaires given to respondents from 19 respondents who were given 100% of respondents said the implementation has been done well. While on the implementation of routine long segment maintenance, there is 87.50%, which states have been carried out well, but coordination with related parties in this case coordination between party owner, executor and supervisor of work only done 84.38% from s32 total respondents. And there are 71.88% of respondents who stated that the fulfillment time of routine maintenance on long segment contract.

Table 4. Respondents who know the SOP of long segment routine maintenance

No.	Descriptions	CMO 01 & CMO 03		Contractor		Consultant		Total	
		Total	%	Total	%	Total	%	Total	%
1.	Routine maintenance specification/SBD Long Segment	8	47.06	4	33.33	1	44.44	13	44.83
2.	Not knowing the SOP of long segment maintenance	9	52.94	5	66.67	2	55.56	16	55.17
	Total	17	100.00	9	100.00	3	100.00	29	100.00

Source: Questionnaire results, 2017

From the interview result, the implementation of routine maintenance of long segment contract has not been carried out well because the respondent has not understood the implementation of routine maintenance on long segment packages. So the need for understanding of the three sides so that the implementation of routine maintenance of the road either on the contract of self-management or contract long segment.

Table 5. Implementation of routine self-management and long segment maintenance

No.	Descriptions	Self-Management		Long segment	
		Total	%	Total	%
1.	Well Implemented	19	100	28	87.50
2.	Poorly Implemented	0	0	4	12.50

Source: Results of questionnaire, 2017

Analysis Factors that influence the performance of routine maintenance roads for self-management contracts and long segment contracts

According to the results of the questionnaire, although it has been implemented well the implementation of routine self-maintenance, but there are constraints in the implementation so that these factors affect the performance of the road, i.e. a) Limitations of routine maintenance equipment, b) Equipment, c) conditions for routine maintenance are old, d) Limited technician skill for equipment operation, and d) Limitations of technical personnel/operators.

While the constraints encountered in the implementation of routine maintenance so that affect the performance of roads for routine maintenance long segments, i.e. a) Not readily implementing the work/contractor in the routine handling of long segment contract packages.

The allocation of funds for minor routine maintenance contained in the contract is not proportional to the length of the segment handled. This can be seen in Table 6, b) Application of understanding of the implementation of routine long working method, c) Mobilization of equipment and personnel due to long distances, and c) Weather factor.

The scheme of comparison of routine maintenance cost of self-management contract with long segment contract.

Table 6. Comparison of Routine Maintenance Costs on Long Segment Contracts and Self-Management Contracts

No.	Descriptions	Fee Contracts of Long segment	Fee Contracts of Self-Management
1.	Routine Road Maintenance (Damage and repair pavement and road shoulders)	50,000,000.00	1,489,816,128.57
2.	Routine maintenance of road equipment	5,000,000.00	0.00
3.	Routine Maintenance of Water ditch, Excavation and Heaps	35,000,000.00	450,885,871.45
	Total	90,000,000,00	1,940,702,000,02

Source: Contract, 2016

Strategy for Handling Routine Maintenance

From the result of arrangement of internal and external factors above can produce the following scores:

a) Strengths : 1.60 b) Weaknesses : 2.20

c) Opportunities : 1.00 d) Threats : 3.00

From the set of scores, the matrix area and strategic priorities are given in Table 7.

Table 7. Matrix area and strategic priorities

Quadrant	Position Point	Matrix area	Rank	Strategic Choice
SO	(1.60 x 1.00)	1.60	IV	Aggressive
WO	(2.20 x 1.00)	2.20	III	Turn Around
WT	(2.20 x 3.00)	6.60	I	Defensive
ST	(1.60 x 3.00)	4.80	II	Diversification

Source: Result of analysis, 2017

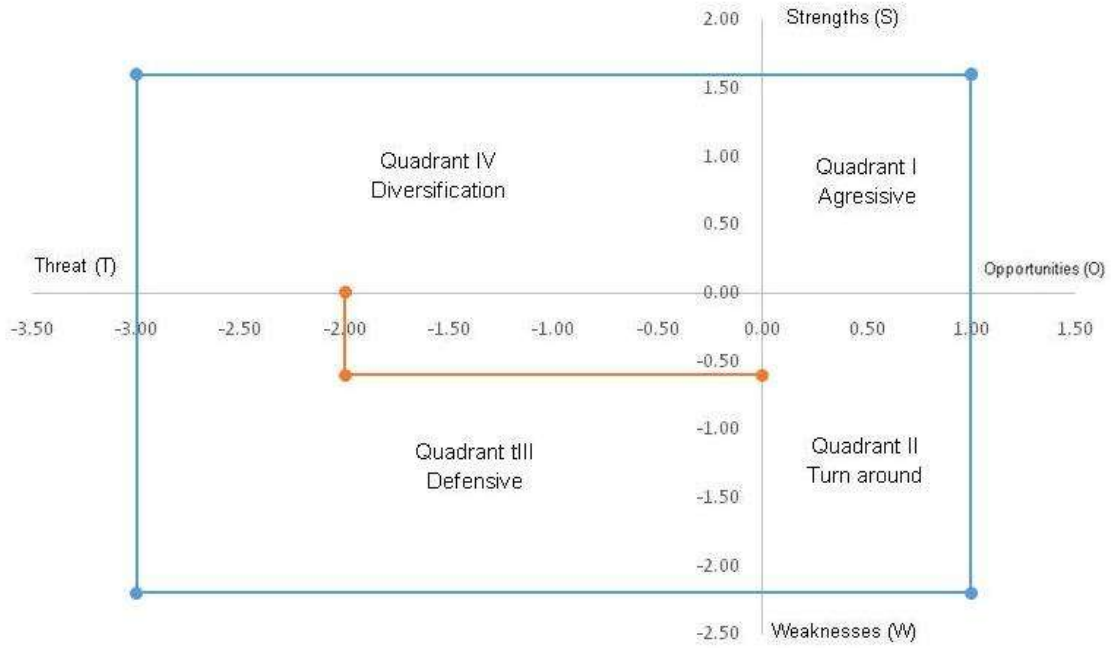

Figure 1. Diagram of SWOT Routine Road Maintenance Analysis

Based on the SWOT matrix table according to Rangkuti, then it obtained the results of SWOT analysis routine maintenance implementation strategy is as follows:

Table 8. SWOT Matrix Routine Maintenance

Internal External	**Strengths (S)** 1. Understanding of the owner/elements of CMO related to routine maintenance 2. The existence of rules/SOP that related routine maintenance	**Weaknesses (W)** 1. Lack of routine maintenance equipment 2. Numbers of technical personnel/operator less 3. Low price allocated for routine maintenance
Opportunities (O)	**Strategies (SO)**	**Strategies (WO)**
1. Produce a steady road performance	1. Improve understanding of maintenance can be realized in the field to be able to maintain the road conditions remain steady	1. The need for the addition of routine equipment 2. The need for additional technical personnel 3. Letters of warning related to provider's inconsistency
Threats (T)	**Strategies (ST)**	**Strategies (WT)**
1. Lack of knowledge of the executing jobs and supervisor of work related to routine maintenance 2. Uncertain weather conditions 3. Unscrupulous the provider in handling routine maintenance	1. Utilizing the owner's understanding to distribute knowledge related to routine maintenance to job executors and job inspectors 2. Implement Administrative sanctions related to provider's delay in carrying out routine maintenance	1. Apply for improvement of long segment contract, especially for routine maintenance work. 2. The needs for socialization for the three elements related to road maintenance are the elements of the owner/CMO, the implementing/contracting elements, and the element of the supervisor/consultant 3. The need for additional routine equipment 4. The need for training of operators for routine equipment 5. The need for additional technical personnel 4. The need for coordination with the executive with the road inspector to determine the condition of the road.

After SWOT analysis will be formulated by the plan of routine road maintenance of implementation based on Figures 1 and 8 above are based on SWOT calculation, formulated strategy on WT (Weakness, Threat) resources in quadrant III that is reducing the weakness factor and preventing the threat with strategy as following:

1. Apply for improvement of long segment contract, especially for routine maintenance,
2. The need for socialization for the three elements related to road maintenance, i.e. the owner/CMO elements, the implementing/contracting elements, and the supervisory/consultant elements.

3. The need for the addition of routine equipment for routine road maintenance
4. The need for training of operators for routine equipment
5. The need for additional manpower for routine self-management maintenance
6. The need for coordination from the implementer with road inspector is to know the condition of the road.

V. CONCLUSION

From the research conducted on the routine maintenance of self-management contracts and long segment contracts on the Kalukku - Mamuju City - Tameroddo - Majene road segment after the discussion. It can be concluded that: (1) there is still a need to reorganize personnel, cost and management so that for technical implementation (2) the need to increase the number of personnel/technical personnel and routine maintenance equipment both in the implementation of routine self-management maintenance and long segment contract, (3) the coordination of the owner/ CMO elements, the executing jobs/contractor and the job supervisor/consultant, (4) A contractual review of the contract document for routine maintenance work descriptions of the long segment contract is required due to the insignificant contract value the length of the segment handled to maintain the road performance in steady condition.

REFERENCES

[1]. Law of the Republic of Indonesia no. 38 of 2004, on the "Way"
[2] . The Strategic Plan of the Ministry of Public Works and People's Hosing, 2015-2019
[3]. Directorate General of Highways, 2016, e-Monitoring Budget Absorption Report, Available form; www.emonitoring.pu.go.id. [Last accessed on 2016 December 31]
[4] . Nurul Malahayati, Saiful Husin, and Asyifa Mursalin, 2009, Review of conventional contract system and Performance Based Contract (PBC) system on road maintenance project, Prosiding Regular Seminar Series I JTS UNSYIAH-ELTEES-MTS UNSYIAH ISBN
[5]. Hendra Hendrawan, 2015, Supporting Regulations To Implement Performance Based Contract On Roads Management (Journal), Widyariset, Vol. 18 No. 2, 2015: 237-248
[6]. Rizal Z. *Tamin, A*drianand*a* Z. Tamin, and Puti F. Marzuki, *2016,* Performance-Based Employment Contract And Implementation Evaluation On National Roads, HPJI Journal Vol. 2 No. July 2, 2016: 121-132.
[7]. Soelaeman, Wahyudi. (2009), Performance Based Contract Application (Performance Based Contract) to Improve the Effectiveness of Road Handling, Thesis, University of Indonesia, Jakarta.
[8]. Bulletin DwiWulan Construction Construction Agency Ministry of Public Works, 2014, Bulletin of Construction Construction Agency Edition VI / 2014 Page. 8
[9]. Directorate of Program Development Directorate General of Highways Ministry of Public Works, 2011, Manual of Construction and Building No. 001-01/M/BM/2011 on Survey of Road Conditions for Routine Maintenance, Jakarta.
[10]. Directorate of Program Development Directorate General of Highways Ministry of Public Works, 2011, Manual of Construction and Building No. 001-02/M/BM/2011 on Standard Improvement for Routine Maintenance, Jakarta
[11]. Contract Document Long segment Preservation Package Min Road Rehabilitation of Mamuju Regency border - Tameroddo - Majene – Polewali- Majene Regency border, 2016
[12]. Minister of Public Works Regulation no. 13/PRT/M/2011 on Procedures for Maintenance and Road Ownership, 2011, Jakarta
[13] . Tamin, O, Z. 2000. Transport Planning and Modeling. Institute Technology Bandung (ITB), Bandung.

Aspiani. "Implementation Analysis of the Self-Management Contract System and Contract System Long Segment on Road Performance ." International Journal of Computational Engineering Research (IJCER) 7.7 (2017): 01-08.