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Study of Performance-based Contract Application in Building Maintenance

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Abstract

Some buildings have no clear and structured maintenance. Currently building maintenance is mostly done when there has been damage or system instability attached to the building. Besides that, there are still not many buildings that have data about the age of use of each particular facility, for example plumbing, lights, faucets, telephones, and past data related to the changes that have been made. On one hand, a good maintenance system has been implemented in road projects because it uses Performance Based Contracts (PBCs). Therefore, the purpose of this study is to examine the application of Performance Based Contracts in buildings. The research method is in quantitative and qualitative ways to analyze the opportunities for the implementation of Performance Based Contracts in building maintenance by way of case studies. The object of research is government and private building. The results of this study are the compilation of the initial concept of building maintenance based on the Performance Based Contract (PBC). The implication of this research is the potential for making performance-based contract standard documents for more structured buildings so that they can effectively manage building maintenance.

Keywords: Performance based, contract application, building maintenance

1. Introduction

Building construction in Indonesia is increasing rapidly every year, both commercial buildings and buildings for public services. But the rapid construction of buildings is often not accompanied by increased maintenance activities. Maintenance is a very important activity in preventing damage (Usman & Winandi, 2009). In addition, building maintenance will also reduce the risk of greater repair costs in the future (Rawis, 2016).

In general, building construction uses a traditional contract system both with a system of unit price payments and lump sum (Wirabakti, Abdullah, and Maddeppungeng 2014). Currently there has been an innovative form of contract that is being used, namely performance-based contracts (PBCs). Performance-based contracts are multi-year contracts, the responsibility for design, construction and maintenance is fully left to the contractor (Guajardo et al. 2011). One of the fundamental differences between traditional contracts and performance-based contracts is: at the maintenance stage, in the traditional contract the contractor is not responsible for maintenance after the project is completed, while in performance-based contracts, the contractor is the party responsible (Chan Edwin H. W. and Tse 2003).

The implementation of performance-based contracts is currently only used in the construction of road infrastructure that requires service providers to participate in supervising the road so that the factors that cause road damage can be minimized (Catur et al. 2016). Even though risk and waste occur in all stages of the project life cycle of all types of projects (Wibowo et al. 2017). So that it becomes an interesting discussion if maintenance such as the Performance Based Contract can be applied to other types of projects.

Poor building maintenance activities are currently caused by ineffective maintenance strategies (Zawawi et al. 2010). Therefore, to improve the efficiency of building maintenance systems, the authors want to conduct research on the implementation of a performance-based contract system in building infrastructure. Implementation of performance-based contracts is expected to provide effective results in building maintenance activities so that there is guaranteed quality planning and construction as well as operational guarantees so that they can meet the age of the building.

The purpose of this study is to examine the application of performance-based contracts in buildings. This is due to the lack of serious maintenance in the building. Therefore, it is necessary to examine what factors can be the drivers and constraints in the implementation of performance-based contracts in buildings. In addition, it will be examined whether performance-based contracts can be applied as alternative contracts for building maintenance.

2. Research Methods

This research was conducted on government and private buildings. The main location of this research was conducted in one of the Building Buildings located in Kudus Regency - Central Java. Based on its nature, this study includes qualitative research. Qualitative research is systematic scientific research on parts and phenomena and their relationships (Gunawan 2016).

The first step is to do a literature study. Literature studies are grouped in several sections according to the research objectives. In reviewing the reasons for implementing the PBC on the maintenance of related literature study buildings in the form of: the application of PBC in other countries, the application of PBC in Indonesia, and the reasons for the PBC being applied. To identify constraints and assess the magnitude of the constraints, study the related literature in the form of: constraints to the application of PBC, laws and policies that form the basis for managing building maintenance. There are several stages of research carried out, namely:

2.1. Data Collection

The data collection techniques used in this study include:

2.1.1. Questionnaire

Data collection is done by distributing questionnaires to respondents by being given directly and re-collecting questionnaires that have been distributed and filled out by respondents.

2.2. Processing Data

- The interview data is assessed using the assessment measures that have been developed.
- The results of the questionnaire data are used as input to calculate the importance of the existing constraints.

2.3. Discussion

- From the results of the assessment of the constraints that exist in implementing the PBC in the maintenance of buildings, it will be known the magnitude of the constraints at each level of assessment.
- This value will then be analyzed to determine the strengths and weaknesses of the assessment.

3. Results and Analysis

PT. XXX as a case study is one of the national cigarette companies located in Kudus City. The area in one of the factory locations of the company PT. XXX this is 82 Ha, which is divided into open and closed areas. To support the company's business processes, the role of building facilities needs to be maintained and maintenance of factory buildings, warehouses, public facilities, parks and road and channel infrastructure. Targets achieved in the process of maintaining and maintaining these building facilities so that the building is safe, health, comfort and convenience.

To achieve this goal, PT. XXX in conducting maintenance and maintenance of building facilities divides 2 (two) Maintenance and Maintenance Division of Building Facilities which consists of (1) Division of Maintenance and Maintenance of Security Systems and Security Systems, (2) Division of Maintenance and Maintenance of Building, Roads and Parks. The maintenance and maintenance division of the utility and security system is called Utility Engineering (EU), while the maintenance and maintenance division of buildings, roads and parks is called the General Service Building Operation and Maintenance (GS). Every time you take care of building maintenance and maintenance, the GS team must make an estimate of its cost budget every year. The estimated budget is carried out by referring to the calculation of the maintenance budget that has been carried out in previous years, based on the cost of previous development, as well as routine maintenance costs carried out in line with the operation of the building. The distribution of costs to total maintenance costs consists of vehicle maintenance, maintenance of safety and health equipment, landscape maintenance, maintenance of furniture and office equipment, AC maintenance, photocopy usage and maintenance, cleaning tools & materials, external cleaning with each cost value (in billion) seen in Figure 1.

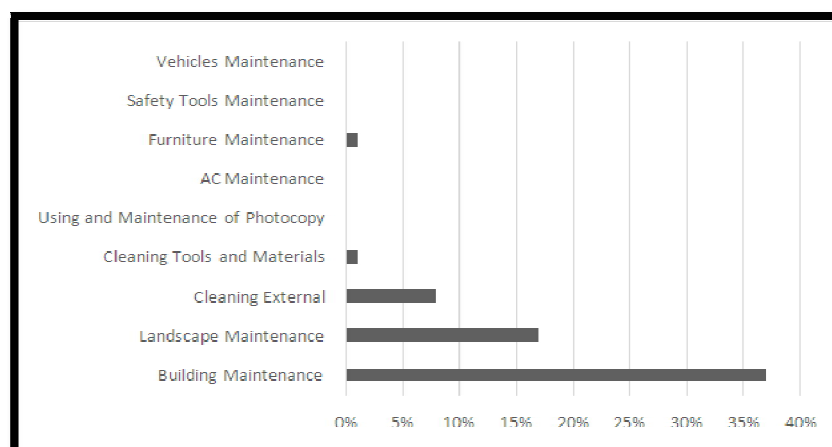


Figure 1: Percentage of Maintenance Costs

Based on Figure 1, the criteria included in building maintenance and the environment can be seen from the maintenance group from the top to the bottom, namely the cost percentage is building maintenance (37%), landscape maintenance (17%), external cleaning (8%) and cleaning tools & materials (1%) of the total maintenance group costs. The building maintenance group is again grouped into two categories of building maintenance, namely the maintenance of buildings that can be predicted and maintenance of buildings that cannot be predicted. The characteristics / types of work related to building maintenance that are predictable and unpredictable can be seen in Table 1 below.

Type of Maintenance	Predicted	Unpredictable
Periodic maintenance	√	-
Maintenance for prevention	√	-
Repair due to operational damage	-	√
Repair due to natural disasters and human errors	-	√

Table 1: Characteristics of Building Maintenance Works

The predicted process of estimating costs for building maintenance uses a reference from the cost of building maintenance in previous years. How to calculate the estimated maintenance budget for this building is still using the traditional method. In the process of calculating predictable maintenance costs more use.

As a comparison of studies, patterns and procedures for maintenance and maintenance of buildings in Kudus Regency Government, only through submission / request every year (by order). They cited the maintenance of the building walls in the form of painting the outer and inner walls of the building, if the paint color was really dull and dirty, then repainting would be submitted with the system of calculating the work volume multiplied by the work unit price set by the Government. Another example is if there is a ceiling that is damaged or collapsed, then repairs are immediately carried out at the expense of local governance.

4. Discussion

4.1. Character Building Maintenance Related to Procurement of Implementing Parties

The process of handling building construction should be separated from the contract system and the type to be used, related to the procurement of implementing parties. The following is a summary of building maintenance related to alternative handling, funding sources, and types of contracts.

Handling Category	Nature of Financing	Contract System	Handling Characteristics	Handling Description	Budget Percentage		
Construction	Investation	DBB	New construction	Steel construction	0.26%		
				Building construction	6.55%		
				Pond making in the east of OASIS	15.70%		
				Garden making	0.24%		
Total Construction					22.76%		
Enhancement	Investation	DB	Improved building functions	Building improvement	1.06%		
		DBB	Improved building functions	Building improvement	3.17%		
			Garden function improvement	Garden improvement	0.23%		
Total Construction					4.46%		
Rehabilitation	Preservation	DB	Periodic maintenance	Utility maintenance	0.09%		
				Repair of buildings	0.18%		
				Furniture repairs	0.23%		
				DBB	Periodic maintenance	Washing biomass walls	0.04%
						Painting new walls/ceilings	0.40%
						New floor painting	0.04%
						Painting of iron/ steel	0.35%
						Repainting walls/ ceilings	7.06%
						Painting the floor again	27.37%
						Repainting markings	0.80%

Handling Category	Nature of Financing	Contract System	Handling Characteristics	Handling Description	Budget Percentage
				Repair of buildings	5.08%
				Garden improvement	0.04%
Total rehabilitation					41.66%
Maintenance	Preservation	DBB	Periodic maintenance	Garden improvement	0.99%
			Routine maintenance	Repair of buildings	2.94%
		PBC	Periodic maintenance	Building maintenance	0.44%
			Routine maintenance	Building maintenance	9.46%
				Garden improvement	17.29%
Total Maintenance					31.12%
Grand Total					100.00%

Table 2: Alternative Handling, Funding Sources and Types of Contracts

Note: DBB: Design-Bid-Build; DB: Design-Build; PPP: Public Private Partnership; UP: Unit Price; LS: Lumpsum; BOT: Build, Operate, Transfer; APBN: State Expenditure Budget; PBC: Performance Based Contract; BOM: Build-Operate-Maintenance.

Based on Table 2 above it can be seen, the character of building maintenance is the category of handling rehabilitation and maintenance with a preservation financing system, DBB, DB and PBC contract systems with values that tend to be relatively small. In the maintenance of performance-based contract, there are two types of maintenance, namely periodic maintenance and routine maintenance. Periodic maintenance with a budget percentage of 0.44% while routine maintenance is 9.46%.

Routine maintenance is carried out by self-management, while for periodic maintenance is done by contracting. Constraints that arise in routine maintenance with self-management, namely sometimes the owner does not carry out maintenance activities even tend to extend maintenance intervals to reduce maintenance costs. Periodic maintenance by scheduling maintenance from the start of the building, for example, periodically in daily, monthly, and yearly.

4.2. Building Maintenance Performance Parameters

The basis for determining building maintenance and maintenance parameters, which are maintenance indicators can be seen in the table below. The table will be compared with how the hygiene standards that have been done at PT XXX as a case study.

Maintenance Object	Cleanliness Standards	Comparison with the Cleanliness Standards of PT XXX
Diffuser/Grill	: Clean, immaculate, no cobwebs, not dusty	Perform routine cleaning on the diffuser/grille
Plafond	: Free from dirty, no stains, not dusty, no spiderwebs	The ceiling is cleaned regularly
Glass	: Clean, clear, clear, no stains, no dirt, no dust, clean glass frames	The glass is cleaned every dirty
Horizontal Blind	: Clean, not dirty, not dusty, neat	Horizontal blinds are cleaned regularly
Switch and Socket	: Not dusty, stained	The switch and socket are cleaned periodically and checked for function
Furniture	: Clean, not dusty, immaculate, if rubbed does not imprint, no rubbish, no spiderwebs	Furniture is cleaned regularly
Floor	: Clean, not dusty, immaculate, not blurry, not wet, no smell, clean floor grout	The floor is cleaned every day
Carpet	: Clean, not dusty, immaculate, not smelly, not wet, neatly combed	The carpet is cleaned regularly
Toilet		
Room	: No smell: piss, fishy, rancid	Cleaned twice a day
Mirror	: Clear, bright, not dull, not stained, not wet	Mirror glass is cleaned using a glass cleaner
Toilet	: Smooth flowing, no stains, no water spots around it, no smell	The toilet water flows smoothly and is cleaned twice a day

Maintenance Object		Cleanliness Standards	Comparison with the Cleanliness Standards Of PT XXX
Faucet	:		The faucet is cleaned and replaced if it has rust and is dull
Floor	:	Clean, dry, no stains, no trash	The toilet floor is cleaned regularly and marked before it is dry
Door handle	:	Clean, no stains, shiny (as original)	Door handles are cleaned regularly
Urinoir	:	Clean, no stains, no smell, no rust	Urinal is cleaned twice a day and always check the water can flow
Mat	:	Not dusty, not wet, no garbage, no smell	Doormat cleaned and replaced regularly
Faucet	:	Not rusty, not wet, not dull	The faucet is cleaned and checked for function
Stairs			
Railing	:	Odorless, immaculate, if rubbed does not imprint	Railing stairs are cleaned regularly
Bordes	:	Not dusty, no garbage, not wet, no smell	Bordes stairs are cleaned regularly
Iron	:	Odorless, immaculate, no spots	Iron stairs are cleaned regularly
Garden	:	Fertile, clean, neat, beautiful	The park is kept clean and tidied up to look beautiful
Asphalt floor	:	Clean no garbage, no flooding, no dirt	Asphalt floors are cleaned of dust and garbage from company activities

Table 3: Adoption Standards for Adoption of Minister of Public Works Regulation No. 24/PRT/M/2008

In general, the cleaning standards at PT XXX in this case study have been done well. When compared with the standards in the regulation, almost all meet the hygiene standards. The building maintenance parameters are quite complex by considering many aspects. Maintenance of building refers to the scope of handling components of the General Service (GS) team building which includes structural, architectural, mechanical, outdoor, and housekeeping components.

4.3. Opportunities for the Implementation of Performance-Based Contracts in Building Maintenance

Based on the characteristics of building maintenance and the problems that often occur in buildings, a performance standard based on references can be made that has been set by the government related to the procedure for calculating buildings. The first is the adoption of a contract system. The contract system commonly used in building construction is a traditional contract that separates the person in charge at each stage of the project cycle. Design stage by planning consultants, implementation by contractors, and maintenance by building owners. The adoption of Performance Based Contracts (PBCs) that integrate the design, implementation and maintenance phases is an opportunity to be used in building projects. The first step is to map or design the activities carried out by the responsible person (stakeholder) at each stage of the project cycle.

The second is a maintenance component that is an opportunity to be applied to buildings based on analysis, which is building maintenance, landscape maintenance, external cleaning, and cleaning tools & materials.

4.4. Effectiveness of Building at PBC

The effectiveness of Performance Based Contracts (PBCs) in buildings is very potential to be applied but will face several differences when compared to the implementation of road projects. In road projects, the type of maintenance is not as much as in buildings. In the road project most of the maintenance is to ensure the road is not hollow, cracked, and deflated for a number of years in accordance with the contract document. But in buildings, which must be maintained by the contractor very much includes the main structure, complementary buildings, and contents in the building.

Therefore it is necessary to arrange in a detailed contract document to implement a Performance Based Contract (PBC) in a building. Which is the responsibility of the building owner (owner), which is the authority of the contractor. So far, building maintenance is still the responsibility of building owners. In the case study of this study at PT XXX Kudus Regency, a good and structured maintenance was carried out. This is because the owner is a private party whose policies and budgets can be managed independently. In contrast to government projects that have more rules.

5. Conclusion

The conclusion that can be obtained from this study is the maintenance of a Performance Based Contract showing that there are two types of maintenance, namely periodic maintenance and routine maintenance. In the case study it was found that periodic maintenance with a budget percentage of 0.44% while routine maintenance amounted to 9.46%.

Parameters of building maintenance performance by considering many aspects. Maintenance of building refers to the scope of handling components of the General Service (GS) team building which includes structural, architectural, mechanical, outdoor, and housekeeping components.

The opportunity to implement PBCs in buildings is the adoption of PBC contracts and maintenance components, namely maintenance of buildings, maintenance of landscape, external cleaning, and cleaning tools & materials due to the highest percentage of maintenance costs among other components.

The pattern of building maintenance after the Final Hand Over (FHO) on building maintenance will need to be mentioned in the contract document. The age of the building is based on the duration of the minimum service standard of the building.

The effectiveness of Performance Based Contracts (PBCs) on building maintenance is very potential to be applied but will face some differences when compared to the implementation of road projects. Maintenance of building includes structural, architectural, mechanical, outer space and housekeeping aspects while road projects include structures and supporting facilities.

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