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A MATRIX ANALYSIS ON BUILDING MAINTENANCE BUDGET DETERMINATION IN MALAYSIA

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Abstract

The era of 'New Malaysia' has triggered the idea of high-class development in new public services delivery system. Budget and maintenance should be based on a need of the desired level by users or intended to optimize the technological level which can improve the quality of building functions. This manuscript present research analysis the current practice in public building maintenance, including budget allocation in Malaysia, by using Matrix Technique. The purpose of the research is to investigate towards strategies, current procedures and budget issues in public building maintenance in Malaysia. The in-depth investigation of the various policies and manuals in the practice of determining building maintenance budgets has been conducted in this study. From the main areas, the establishment of four key issues related to implementation while extracted and scrutinized, i.e. maintenance policy, procedure, strategy and budget determination. The results show Malaysia has a robust and comprehensive policy and procedure in terms of managing the public building maintenance, including budget estimating. However, they are not implemented in orderly practices, where scope of work unclear, and lot of contradictions appear during conducted the maintenance works. In conclusion, the research findings acknowledged that a new conceptual model for public building maintenance budget determination should be introduced immediately.

Keywords: Building maintenance, budget determination, public building, policy, procedure.

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1. Introduction

Year 2018 has recorded a big history in Malaysia which witnessed the exchange of the government power that sparked the 'New Malaysia' era. Policies and procedures for the maintenance of public buildings have also changed in line with the new Government's desire to drive a transparent management. Specially, to sustain the public service delivery in the Federal Government Administrative Centre in Putrajaya, that has been known for its sophistication and uniqueness. In addition, the 11th Malaysia Plan (MP11, 2016 -2020), Norehan, Md Yusof, Aida Affina, and Siti Norsazlina (2011) has emphasized the importance of enhancing the delivery of public services to the people and rationalizing public sector institutions to enhance productivity and performance, as the target vision. Indirectly, aspects of maintenance in public buildings being the main entity that affect this transformation, whereas need the urgency.

From the decade of independence (1957) to the present, the management and implementation system of the public building maintenance works only revolves around repair work based on damage complaint, and additional construction works on the existing building. Norehan et al., (2011) clearly showed that the building maintenance field in Malaysia are indeed left behind. Result from the preliminary investigation by Norehan and Md-Yusof (2011) also indicated that there is no information on any initiatives for the building maintenance works which have been implemented, for almost 15 years, beginning from 1976 till 1995. Based on a series of the Public Work Department Malaysia reports, from 2002 until 2017, the term of building maintenance was not popular in the decade of 1970 to 1980, and simply known as 'upgrading and expansion works.

1.1. Aim of the study

Evolution in building maintenance field (including policy, budget and implementation management) in Malaysia seriously transformed only in middle of 1990 (Norehan et al., 2011). In fact, Malaysia has its own uniqueness in developing their public amenities. As noted by Norehan et al. (2011) public facilities development is supported by a series of national development programs, and periodic plans, for example the National Physical Plan (NPP). The plan contains a 'series of economic development initiatives' known as the Malaysia Plan (MP). For this reason, the aim of this study is to synthesize current practices and budget issues in public building maintenance in Malaysia.

2. Problem Statement

Some researchers (Nik Elyna, Syahrul-Nizam, & Pitt, 2011; Mahli, Che-Ani, Tawil, Abd Razak, & Abdullah, 2012; Suffian, 2013; Talib, Ahmad, Zakaria, & Sulieman, 2014; Ganisen, Hakim, Jawahr, & Kanniyapan, 2015; Che-Ghani, Myeda, & Ali, 2016; Nawi, Baharum, Ibrahim, & Riazi, 2017) have explored the issues that has been a subject of discussion by both academics and professional bodies, for over decades in Malaysia. Results from their studies showed that: (i) the budget for maintenance works is limited; (ii) the scope of and standard work done are not comprehensive; and (iii) lack of awareness among the policy maker and parties involved in building maintenance. In fact, several unpleasant incidents have occurred due to weaknesses and negligence in doing maintenance works in public

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buildings. Other finding claimed the Government difficult to sustain the quality of public buildings due to the characteristics of design, insufficient of fund allocation, vandalism, lack of monitoring during construction, low quality of materials, and lack of knowledge among the staff involved (Au-Yong, Ali, & Ahmad, 2014). Apart from the discovery of these issues, a preliminary survey carried out by researcher found there are no best practice in the building maintenance management implementation. This statement is support by on statistical evidence issued by the Department of Housing and Community Development, DBKL (2015) (Ganisen et al., 2015).

2.1. Gap Analysis on the Public Building Maintenance Budget (BMB)

Considering the building maintenance field is still new in Malaysia, it's quite difficult to gain commitment and understanding level among the parties involved. This study focuses on four main areas are identified as research gaps. Table 1 describes the main sections of the research divided into four main areas of investigation.

Table 01. The Public Building Maintenance Budget: Issues and Scenario

Gaps Analysis	Exploration and Investigation area	Related and Focus area
Maintenance policy	Exploring the scenario and philosophy of the public BMB determination.	The best practice in budget management system
Maintenance procedure	Investigate the implementation system, and the best practices in the maintenance of public buildings.	Policy, scope and manual of building maintenance operation
Maintenance strategy		Procedure and implementation of public building maintenance works and their budget distribution.
Budget strategy	Assessing the applicability of the budget allocation strategy for public building in Malaysia setting.	The effectiveness of current strategy/method in forecasting and estimate the maintenance budget.

3. Research Questions

Some questions can be extracted into three research questions which need exploration of the various models and practice of determining the building maintenance budget to answer it. The questions are:

- What is the best practice adopted in the budget management system for building maintenance? The answer to this question is need an exploration the various models and practice of determining the building maintenance budget (Q1).
- How could budget determination strategy potentially offer in delivering public building maintenance in Malaysia? (Q2)
- Is it the existing practice in determining the building maintenance budget are accurate and appropriate? (Q3)

4. Purpose of the Study

Public buildings need holistic management, proper planning and budget to realize the government requirement and to create a workplace conducive to increased productivity. Many countries are forced to allocate a large amount of expenses for building maintenance and operations (M & O) (Al-Arjani, 2002;

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Straub, 2002). This is due to the implementation of maintenance system itself needs to be enriched with technical knowledge, site experience, and user satisfaction from time to time. An adequate budget allocation and efficient financial management is recognized as a major source of effective strategic management in addressing the needs of sustainable management, in the public sector. This manuscript focused on the gap and current practice in maintenance budget distribution which is implemented by the Federal Government on managing their buildings. This will include on how the policy maker/decision maker (DM) predict the estimating and determining the final budget allocation for their buildings, the measurement level and establishing of adequate budget. The purpose of the research is to explore various models and practice of determining the building maintenance budget.

5. Research Methods

In preliminary stage, an exploration by pilot study is carried out in order to investigate the phenomenon that is happened today. A total of 21 respondents were selected, whereas two head of department from decision-makers (DM) and appointed contractors (AC) took part in focus groups that designed to identify information needs in the public building maintenance area and the system of budget distribution. Next, this study adopted descriptive survey techniques, using the qualitative research approach as recommended by the focus group as the most appropriate. The main sources of data collection are the interviews, and supplemented by reviews of company documents, that are (i) the progress file of project at site; (ii) related document contract; and (iii) file of project interim payments. The method used to synthesize the data is the matrix analysis. The Federal Common User (FCU) buildings were chosen as case study because its function as the centre of Federal Government service delivery to the public. The number of FCU buildings which meet the specified requirements were sampled for the study was 14 and scattered in three zones. Whereas the total numbers of the FCU throughout Peninsular Malaysia are 162. Justification for the selection of the FCU buildings that coincides with the criteria required for this research was predetermined. There are three criteria that have been agreed in advance to comply with best practice model by Bossmann, Bahr, and Lennerts, (2011), and The State of Queensland (2011) as follows:

- Criterion 1: The selected FCU buildings that are under privatization contract. Hence, the FCU buildings which is complies with this research requirements are in three zones; the Northern zone (Perlis, Kedah, Perak and Penang), Southern zone (Malacca, Negeri Sembilan and Johor) and Eastern zone (Kelantan and Terengganu). The distribution of the sample covers only Peninsular Malaysia. Similarly, the Central zone is removed as it is completely under management of the Ministry of Work of Malaysia.
- Criterion 2: The building age selected, ranging from three to thirty years. The estimated age is according to research findings by Bossmann, Bahr, and Lennerts (2011)
- Criterion 3: The new design (not a standard plan), complete with sophisticated internal equipment, and multi-storey height.

The interviews population comprises two groups, i.e. (i) Decision-makers consists of head of department (HOD), technical staffs and financial executives of related government agencies; (ii) building contractors that are appointed to conduct the maintenance works, who are the project leaders (or project

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managers), management team inclusive of maintenance technical staffs, and site quantity surveyors who in-charge in project cost and site financial. A total of 32 semi-structured interviews were conducted with Head of Department (HOD) and technical staffs from the two departments of Federal agencies, as Regulator and Decision Maker; and 14 appointed contractor (AC) who are directly involved in their respective zones.

6. Findings

The research outcomes showed some weaknesses have started since in planning stage, and continuous to occur when carrying the maintenance works in the FCU buildings. The three main aspects of weaknesses are, (i) Failure to understand the policies and strategies of building maintenance systems, (ii) The absence of maintenance planning schedules in the short term or long term, and (iii) Method of estimating cost of building maintenance has never been practiced. Findings obtained from analysis of the documentation content and interview has been refined and interpreted in the summary of the matrix. However, it is important to assess the key points from different perspectives. Thus, by making a holistic comparison of research results with the best practice model as benchmarking, some of major cases obtained from the documentation screening are presented. Evidence in Table 2 shows three out of nine scopes of maintenance works, implemented in the FCU building are 'not in the category of Building Maintenance (BM) Works', i.e. (i) Cleaning and sweeping; (ii) Security; and (iii) Payment of utility bills.

Table 02. A Matrix for Generating Summary of Research Finding: Documentation Analysis: The Classification of Building Maintenance Works: Comparison between the FCU Building and the MMF Guideline (2017).

Findings		**Refinement Findings**
Scope of Woks Done by the FCU Maintenance Contractor		Resolutions Applied by the MMF Guideline (2017)
1) Cleaning and sweeping	(i) Office and Corridor (ii) Toilets (iii) Drainage (iv) External walls	Not classified as maintenance (The MMF lists it as an Operational task to enable occupancy and use (e.g. cleaning, security, waste management)
2) Structure and Civil works	(i) Wall and floor (ii) Ceiling, door, window and grill (iii) Roof, gutter, rainwater down pipe and drain (iv) Hard standing	**Maintenance**
3) Plant and Mechanical works	(i) Plant (ii) Fire Fighting System (iii) Lift	**Maintenance**
4) Electrical and wiring works		**Maintenance**
5) Security	(i) Patrols the entire area (ii) Control of entrance and exit (iii) Reporting	Not classified as maintenance
6) Landscape		**Maintenance**
7) Piping and sewerage system		**Maintenance**
8) Pest control		**Maintenance**
9) Payment of utility bills	(i) Electricity Bills (ii) Water Bill (iii) Sewerage Fee	Not classified as maintenance

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Table 03. A Matrix for Generating Summary of Documentation Analysis: The Contradiction in the Distribution of BM Budget Component: Comparison between the FCU Building and the Best Practice.

Item	BM Budget Component	Type of Expenditure	Resolutions Applied by the MMF Guideline (2011)
1	Fee Cost	Rental, fluctuation rate, taxes, assessment	Not maintenance
2	Facility Cost	Water supply, gas, electric, fuel, etc.	Not maintenance
3	Repair Costs	Maintenance, repair and replace	Maintenance cost
4	Services Cost	Guard, housekeeping, waste collection, wages	Not maintenance

In other side, pattern of budget determination for the FCU buildings revealed a contradiction in the distribution of the type of expenditures. The provision under maintenance costs have mingled with 'building operation' (or running cost), as displayed in Table 3. Only one category, namely Repair Cost are paid for the BM works. Other provisions such as Fee Cost, Facility Cost and Services Cost are 'not under the maintenance component'. The MMF Policy Guideline (The State of Queensland, 2017) asserted the importance of planning and predicting the accurate maintenance budget by the responsible team.

The budget team should have the expertise to differentiate between the expenditure of maintenance and capital (The State of Queensland, 2011; The State of Queensland, 2017) as there are significant differences in accounting, and tax liability approaches related with expenditures. The MMF (2011) stated that maintenance expenditure affects the cost of a department's outputs, whereas capital expenditure affects the value of the department's assets, which will be subjected to depreciation and return on equity (The State of Queensland, 2011; The State of Queensland, 2017). It is important that the determination of budget allocations should explicitly comply with the definition of 'maintenance expenditure' and 'capital expenditure'. Another best practice model (Bossmann, Bahr, & Lennerts, 2010; The State of Queensland (2017) claimed maintenance expenditure does not result in an improvement to the building asset (i.e., it simply preserves the asset's original serviceability).

Vice versa, capital expenditure includes upgrades, modifications and additions are input to building assets. So, the Fee Cost (consists of rental, fluctuation rate, taxes, assessment, etc.); the Facility Cost (consists of water supply bills, gas and electric bill, fuel, etc.); and Services Cost (consists cost of having security guard, housekeeping, waste collection, wages, etc.) falls into the category of capital expenditure, and are not part of building maintenance expenditure category. Again, result has disclosed there is no uniformity in estimating the basic rate for the building maintenance cost in the FCU building.

Table 04. A Matrix for Generating Summary of Documentation Analysis: Calculation and Comparison of the Basic Rate of Building Maintenance between Case Study

Basic price of BM cost	Northern Zone	Southern Zone	Eastern Zone
Cost (RM) per sq.	105.27	209.09	130.15
Average of building age	11.5	13	15.8

Table 4 shows the comparison of the maintenance rates between zones, on average building ages between 12 and 16 years. The Northern zone recorded RM105.27/m2; Southern zone registered the unit rate at RM209.09/m2; while the Eastern zone at RM130.15/m2. Based on the Practical Adaptive

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Budgeting of Maintenance model (PABI) (Bossmann et al., 2011; Bahr & Lennerts, 2010), the cost of maintenance increases with the age of the building. As developed by Bahr and Lennerts (2009), the PABI model proposes that under the age of 30, the maintenance cost is at a low percentage of replacement value, which is only 1.3% to 1.6%, compared to 5.6% after 30 years. This means that the type of maintenance measures should be based on regular inspections, which consider certain parameters, for example, building condition, technology level, gross floor area, frequency of use, facade design, and acoustic facilities services. Considering PABI's formula, findings indicated the basic rates of building maintenance per gross floor area in Malaysia are not uniform, even though all three zones have a building in almost same age, ranging from 12 years to 16 years. This revealed there are loopholes in the basic rate calculation for the FCU building maintenance cost. Therefore, these differences may have caused the contradiction in distribution of types of budget components, as have been discussed earlier (see Table 3). Then, results derived from the interview analysis are integrated into a matrix of summary as display in Table 5 - Current Practice in the Budget Allocation System for the FCU Building. Table 6 describe a Matrix summary of Type of Maintenance Works Undertaken by the Appointed Contractor, and Table 7 summarized the SOP of building maintenance

Table 05. A Matrix for Generating Summary of Research Finding: Interview Question, Current Practice in the Budget Allocation System for the FCU Building

Q	Sub theme	Findings		Refinement Findings
		DM	AC	
Q1	Finding 1	Supplied: On June, every year / 6 month before delivering / submit to AC	Received: Early and mid-year (approximately between Jan to June every year)	Budget preparation: six months before delivery. Budget received: in first six months, every year.
Q1	Finding 1	According to fixed annual fee as stated in Privatization Agreements	Annual allocation	Current BMB practice: Fixed annual fee according to Privatization Agreements
Q1	Finding 1	By 'fixed rate', monthly and annual fees - according to their contract agreements	In monthly fee with 2 sizes; Small - RM100 - 500 thousand and Large - more than 1.0 million.	Size of Budget: in small and large size, according their agreements
Q1	Finding 1	The maintenance fees/rate will be reviewed every 5 years.	From historical data, plus 20%	Formula of BMB determination: (1) Short term budget - additional cost of the historical data; (2) Medium-term budget - revised allocation is done every 5 years
	Finding 2	By monthly fee for routine schedule and upgrading works as the case requires.	Based on the maintenance planned schedule and material purchasing requirements.	BMB determination based on the PPM strategy

DM: Decision Maker; AC: Appointed Contractor

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Table 06. A Matrix for Generating Summary of Research Finding: Interview Question, Type of Maintenance Works Undertaken by the Appointed Contractor

Q	Sub theme	Findings		Refinement Findings
		DM	AC	
Q2	Finding 1	Implement a comprehensive maintenance as stipulated in the Privatization agreement.	Northern and Eastern zone - 4 scope of works; Repair work – (1) Mechanical and electrical; (2) Building structure and components; (3) Upgrading internal decoration and services; (4) Inspection and commissioning equipment's and plumbing system.	Scope of maintenance work must comply with the instructions in the privatization agreement
			Southern zone - 2 scope of works: Repair work - (1) Mechanical and electrical; (2) Inspection and commissioning equipment's and plumbing system.	The scope of work of each zone is not standardized
Q2	Finding 1	Using the 'blueprint' or based on the life of each component	Northern zone - 2 type of measurement;	Building performance measurement: according to regulation and monitoring task as stated in RDM tasks.

Q	Sub theme	Findings		Refinement Findings
		DM	AC	
	Finding 2	Monitoring is doing by site visits and feedback from every FCU building.	Southern zone: - When the components have been damaged, decayed, dilapidated, or does not work - then maintenance is carried out	Monitoring method is through visits and feedback from every FCU building
Q2	Finding 3		Eastern zone - 2 type of measurement: (1) Building condition analysis; and (2) Equipment data analysis	The building assessment is not uniform.

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Table 07. A Matrix for Generating Summary of Research Finding: Interview Question, The SOP of Building Maintenance

Q	Sub theme	Findings		Refinement Findings
		DM	CC	
Q3	Finding 1	Preventive Planning Maintenance (PPM)	Preventive Planning Maintenance (PPM)	Maintenance strategy current practice: PPM
Q3	Finding 1	Under the CC responsibilities	CC is responsible for providing an annual schedule for FCU building maintenance.	FCU maintenance work schedule prepared in accordance with the annual program.
Q3	Finding 1	CC is responsible to design and execute maintenance work on schedule.	Monthly schedule	The planned maintenance program, according to schedule monthly, periodically or based on CMIS and must comply with the guidelines and agreements to achieve the specified quality.

7. Conclusion

Results from the qualitative analysis depicted four elements that have led poor management system during implementing the maintenance works in the FCU buildings in Malaysia. The evidence from findings are discussed under four main themes, as follows; First, there are the misunderstanding and the inability to define the terms used under the scope of building maintenance. Findings clearly proved that the term “building maintenance” has been very vaguely defined. This has caused inconsistencies in the scope of work because works are categorized as ‘building facilities works,’ which means (a) cleaning and sweeping, (b) security, and (c) payment of utility bills, have been placed under the scope of building maintenance.

Second, there are ambiguities in the documentation assessment, specifically in the implementation of budget determination. This research has explored the extent of all manual are closely associates with the FCU building maintenance. There are several SOP manuals are submitted as part of the contractual agreement. From findings analysis found four of SOP documents, which were enforced to appointed contractor. Each manual has its own compliance agenda. Thus, all parties involved need to understand the content of SOP before embarking on their respective duties (in this manuscript, only the SOP related to the maintenance method / strategy are analysed). The preferred method of maintenance is Preventive Planning Maintenance (PPM) (See Table 7).

Unfortunately, confusion occurs not only in the budget-related SOP compliance process, but also in the way of maintenance works are conducted. Answers received from the AC are vary, some responding as 'planned by monthly basis', while others state on a yearly, or periodically or by complaints (CMIS). The differences in these maintenance programs can lead to low quality control. Meanwhile response from majority of Decision-makers stated that 'AC is responsible for designing and executing maintenance work on a schedule basis. The DM is only monitoring their work. '

This scenario depicts the decision-makers lack of strong knowledge and experience to exactly distinguish concept of building maintenance cost with expenditure cost. Thus, it is not surprising that the current practice in public building maintenance management in Malaysia is still far below, even though

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they are proudly claimed about having a complete and comprehensive policies such as the manual of Technical Requirement Performance Indicator (TRPI), Key Performance Indicator (KPI) and the Total Asset Management Manual (not discussed here) .

Third, comparison of unit rate per square meter for maintenance work between the three zones registered a very significant price difference. This situation is once again associated with internal factors such as expertise, experience and level of awareness among the staff involved. There is opinion from experts that claimed, this may be due to the improper method of forecasting, or poor maintenance budget management, and lack of understanding in the maintenance field. Furthermore, it may also be affected by local factors such as geographical and construction issues such as type of location, climate change, current prices of building materials, and political involved.

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