



**IDENTIFYING THE FACTORS AFFECTING THE
PERFORMANCE OF BUILDING MAINTENANCE
CONTRACTORS: A CASE STUDY OF PERKESO
BUILDING IN KLANG VALLEY**

BY

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**A dissertation submitted in fulfilment of the requirement for
the degree of Master of Science in
Building Services Engineering**

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ABSTRACT

The aim of the research is to identify the performance measure factor of building maintenance contractor. The objective is to rank the factors affecting the performance of building maintenance contractors at PERKESO buildings. Building maintenance performance measures the characteristics of its performance factors. Three high-rise PERKESO office buildings in Klang Valley are selected, whereby the PERKESO technical teams involve in managing the buildings participated as the focus groups in the study. The effectiveness, efficiency, quality, timeliness, productivity and safety identified as the maintenance characteristics for the building maintenance contractor. Therefore, those elements are used as the key measured performance indicators in determining the factors affecting the performance of building maintenance contractor in the study. Qualitative and quantitative methods employed in gathering and analysing the data. The data collection includes review field documents such as contract agreements, monthly reports, and structured interviews. Interviews were conducted specifically to PERKESO property managers, engineers, and technical assistants who involve in the supervision of building maintenance contractors. Face-to-face interview technique was carried out by the researcher to the selected respondents. Sets of questionnaires with structured questions presented to the respective personal and answered to the same set of questions. Results of the interviews then analysed quantitatively. The study found that managers placed good security measures and precautions at work as first ranking. While engineers and technical assistants ranked that productivity of building maintenance contractor is the most important factor affecting maintenance contractor performance. es placed good security measures and precautions at work as first ranking. While engineers and technical assistants expressed that building maintenance contractor productivity is the most important factor affecting maintenance contractor performance.

خلاصة البحث

الهدف من هذا البحث هو تحديد معايير قياس الأداء. والهدف من ذلك هو ترتيب العوامل المؤثرة على أداء مقاولي صيانة المباني التابعة لمنظمة الضمان الاجتماعي. أداء صيانة المباني يقيس خصائص عوامل الأداء. تم اختيار ثلاثة مباني شاهقة تابعة لمكتب منظمة الضمان الاجتماعي في كلانج فالي، حيث الفرق الفنية التابعة لمنظمة الضمان الاجتماعي شاركت كمجموعات أساسية في الدراسة. تم تحديد الفعالية والكفاءة والنوعية والتوقيت والإنتاجية والسلامة وخصائص الصيانة، كمواصفات للصيانة لمقاول صيانة المباني. لذلك، يتم استخدام تلك العناصر مثل مؤشرات قياس الأداء الرئيسية في تحديد العوامل التي تؤثر على أداء مقاول صيانة المباني في الدراسة. الطرق النوعية والكمية المستخدمة في جمع وتحليل البيانات: يتضمن جمع البيانات مراجعة وثائق واقعية مثل اتفاقات العقود والتقارير الشهرية، والمقابلات المنظمة. وأجريت مقابلات خصيصا لمديري ملكيات منظمة الضمان الاجتماعي والمهندسين والمساعدين الفنيين المشتركين في الإشراف على مقاولي صيانة المباني. وقد أجريت المقابلات وجها لوجه من قبل الباحث للمستجيبين المحددين. وقدمت مجموعات من الاستبيانات بأسئلة منظمة لكل شخص فيما يخصه ليحجب على مجموعة من الأسئلة. ثم تم تحليل نتائج المقابلات كليا. وخلصت الدراسة إلى أن المديرين قاموا بوضع تدابير أمنية جيدة و احتياطات في العمل كمرتبة أولى. في حين أعرب المهندسين والمساعدين التقنيين أن إنتاجية مقاول صيانة المباني هي أهم العوامل التي تؤثر على أداء مقاول الصيانة.

APPROVAL PAGE

I certify that I have supervised and read this study and that in my opinion, it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Master of Science in Building Services Engineering.

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DECLARATION

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

Zainol bin Ahmed

Signature

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INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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Dedicate to my family especially my beloved mother, Che Puteh binti Nayan for her continuous care, support and inspiration. To all my lovely family brothers and sisters, for their understanding, care and support my study in many ways.

TABLE OF CONTENTS

Abstract	ii
Abstract in Arabic	iii
Approval Page.....	iv
Declaration	v
Copyright Page.....	vi
Acknowledgements	vii
List of Tables	xi
List of Figures	xii

CHAPTER ONE: BUILDING MAINTENANCE PRACTICE: AN OVERVIEW.....1

1.0 Introduction.....	1
1.1 Research Questions and Hypothesis	1
1.2 Aim and Objective	3
1.3 Background.....	4
1.4 Problem Statement.....	5
1.5 Research Methodology	6
1.6 Scope and Limitation of the Study	8
1.7 Research Significance.....	8
1.8 Outline Dissertation	8

CHAPTER TWO: LITERATURE REVIEW.....9

2.0 Maintenance Management of Office Buildings	9
2.1 Definition of Maintenance.....	10
2.2 Traditional Maintenance Management System	11
2.2.1 Custodial Maintenance.....	11
2.2.2 Corrective Maintenance	11
2.2.3 Preventive Maintenance	12
2.3 Maintenance Management.....	15
2.4 Position of the Maintenance Department within the Organisation	17
2.5 Scope of Building Maintenance Department.....	18
2.5.1 Type of Maintenance Department	18
2.5.1.1 Occupant Dominant Type.....	19
2.5.1.2 Owner/Client Dominant Type	19
2.5.1.3 Professional Dominant Type	19
2.5.1.4 Workforce Dominant Type.....	20
2.6 Office Maintenance Objective.....	20
2.7 Basic Model of Office Building Maintenance Management.....	21
2.8 Office Building Maintenance Management: A Case Study of Perkeso	22
2.8.1 Introduction	22
2.8.2 Scope of Works of PERKESO Property Division.....	23
2.8.3 Duties & Responsibilities of Managers	23
2.8.4 Type of Maintenance Works at PERKESO	26
2.8.4.1 Minor Maintenance.....	26

2.8.4.2 Planned Maintenance.....	26
2.8.4.3 Major Maintenance.....	26
2.8.4.4 Major Capital Works	27
2.8.5 Building Maintenance Contracts for PERKESO	28

CHAPTER THREE: MEASUREMENT CRITERIA AFFECTING THE PERFORMANCE OF BUILDING MAINTENANCE CONTRACTORS36

3.0 Introduction	36
3.1 Building Performance.....	36
3.2 Building Performance Measurement.....	37
3.3 Factor Affecting the Performance of Building Maintenance Contractors	38
3.3.1 Effectiveness.....	40
3.3.2 Efficiency	42
3.3.3 Quality.....	43
3.3.4 Timeliness	45
3.3.5 Productivity.....	46
3.3.6 Safety	46
3.4 Establishment of Checklist.....	47

CHAPTER FOUR: RESEARCH METHODOLOGY49

4.0 Introduction	49
4.1 Literature Review	50
4.1.1 Text-Based Materials.....	50
4.1.2 Preliminary Review	50
4.2 Research Setting	50
4.3 Checklist	51
4.3.1 PERKESO Property Manager, Engineer & Technical Assistant Checklist	52
4.4 Data Collection and Analysis	53
4.5 Problems and Limitation	56
4.6 Validation of Recommendation.....	56
4.7 Conclusion.....	56

CHAPTER FIVE: DATA COLLECTION, ANALYSIS AND FINDINGS57

5.0 Introduction	57
5.1 Data Collection.....	57
5.1.1 Demography of Respondents.....	58
5.1.2 Background of the Property Maintenance Team of PERKESO ...	60
5.1.2.1 Managers	60
5.1.2.2 Engineers	60
5.1.2.3 Technical Assistant.....	60
5.2 Data Analysis.....	61
5.2.1 Research Findings.....	67
5.2.2 Manager’s Responses.....	68
5.2.3 Engineer’s Responses	69
5.2.4 Technical Assistant’s Responses	69
5.3 Conclusion	70

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS	73
6.1 Recommendations for Research	74
6.2 Recommendations for Improving this Study.....	75
BIBLIOGRAPHY	76
APPENDIX A	FORM OF SEMI-STRUCTURED INTERVIEW
	QUESTIONNAIRES
	82
APPENDIX B	MANAGER QUESTIONNAIRES
	95
APPENDIX C	ENGINEER QUESTIONNAIRES
	98
APPENDIX D	TECHNICAL ASSISTANT QUESTIONNAIRES
	101
APPENDIX E	LIST OF PERKESO TECHNICAL STAFF
	PARTICIPATING IN THE INTERVIEWS
	104

LIST OF TABLES

<u>Table No.</u>		<u>Page No.</u>
2.1	Details of Three PERKESO Offices in Klang Valley	29
2.2	The list of PERKESO Offices and Appointed Maintenance Contractors	31
2.3	Detail of Building Maintenance Contractors Staff Engaged by PERKESO	32
4.1	The Fundamental Scale	54
5.1	Respondents' Demographics	58
5.2	Relative Weight and Rank for Managers	61
5.3	Ranking of the Performance Factors based on Managers' Responses in Relative Weight.	62
5.4	Relative Weight and Rank for Engineers.	63
5.5	Ranking of the Performance Factors based on Engineers' Responses in Relative Weight.	64
5.6	Relative Weight and Rank for Technical Assistants.	65
5.7	Ranking of the Performance Factors based on Technical Assistants' Responses in Relative Weight.	66
5.8	Ranking of the Performance Factors by all the Respondents	67

LIST OF FIGURES

<u>Figure No.</u>		<u>Page No.</u>
1.1	Flow Chart of Research Methodology	7
2.1	Types of Maintenance System	13
2.2	Types of Maintenance System with Explanations	14
2.3	The Organization Chart of the Property Division of PERKESO	25
2.4	General Scope of Works of Property Division for Building Maintenance of PERKESO	28
2.5	The Location of Three PERKESO Offices in Klang Valley	29
2.6	The Stand-Alone PERKESO Office Building at Jalan Ampang, Kuala Lumpur	30
2.7	The Stand-Alone PERKESO Office Building at Jalan Tun Razak, Kuala Lumpur	30
2.8	The Stand-Alone PERKESO Office Building at Jalan Selangor, Petaling Jaya, Selangor	31
3.1	Summary of Factors Affecting the Performance of Building Maintenance Contractors Discussed in Previous Literatures	40
4.1	The Research Process	49
5.1	Division of Gender Classification within the PERKESO Maintenance Management Team	59
5.2	Division of Employment Status within the PERKESO Maintenance Management Team Members.	59
5.3	Classification of age of the PERKESO Maintenance Management Team Personnel.	60

CHAPTER ONE

BUILDING MAINTENANCE PRACTICE: AN OVERVIEW

1.0 INTRODUCTION

Lack of routine and scheduled maintenance may depreciate the market value of a building and its aesthetical and functional qualities. Idrus, Khamidi, & Lateef (2009) state that consistent inspections and regular maintenance works carried out by the contractor may increase the life span of a building over deterioration, decay and failure delays. It is considered a strategic process that needs to be taken seriously if the building owners want to sustain the building's values. By carrying out the basic maintenance, expenses on the major repairs may be minimized and large repair bills can be reduced. In Malaysia, building maintenance is always treated as an 'ad-hoc' action and only to be performed whenever there is a report of a failure building elements or complaints (Lateef et al., 2011). It is a common scenario and in some cases, the building maintained is in poor condition as a result of less basic maintenance performed. This situation indicates that building maintenance is not a priority list in the procurement of a building. In a nutshell, overlooked dilapidation and inadequate maintenance practiced by maintenance managers may lead to a fast building deterioration, reduce building life span and subsequently threaten public safety.

1.1 RESEARCH QUESTIONS AND HYPOTHESIS

Based on the research background, a study of building maintenance is an important subject that requires extensive research particularly in the context of public buildings in Malaysia as it involves public funding and escalating costs estimation for

procurement. It believes that achieving appropriate management system of building maintenance may improve the yield better maintenance practice in the building industry and be able to ensure the buildings are in good conditions and safe to end-users.

The absence or lack of maintenance management may result in sick building syndrome (i.e. unhealthy indoor environment) affecting the staff and visitors who use the buildings. In this regard, the performance of building maintenance contractor is one of the key considerations to measure and assess.

The Prime Minister of Malaysia pointed out that it is very common to see that most government buildings are not regularly maintained because most faults cannot be distinguished at early stage (Utusan Malaysia, 2006). This assertion corroborates by the identification of fungi infested general hospitals in Kulim and Johor in 2006. Taking up from his remarks the Public Work Department (PWD) of Malaysia has to prepare building maintenance guidelines in order to identify at damage from the early stage.

The building maintenance management is crucial in managing the building function and its operation. It has many dimensions and aspects to be studied. Chan et al. (2001) discovered that maintenance activities are always overlooked or last in the agenda in particular development by the management. Therefore, to achieve the best maintenance practice, the factors contributing to the effectiveness and efficiency of building maintenance management are required to be identified and determined. In Malaysia is still lacking the standard guidelines and monitoring the exercise of appropriate maintenance approaches (Myeda, 2011). E-Haram and Horner (2002) found that a lower standard of quality, safety, time, cost, functionality and environmental friendliness in operational and maintenance activities seem to be the

ordinary insufficiency in building maintenance management. Shen (1997) observed that maintenance personnel focused on technical aspects and lack of understanding on strategic aspects.

The efficiency and effectiveness of buildings' function and service can be monitored using the assessing the performance of buildings' maintenance contractor, resulting in the improvement of comfort to the buildings' users. Therefore, the study on the performance of building maintenance contractor is vital to determine the effectiveness of their management.

In this study, all attributes derived will be evaluated to identify the factors affecting building contractor's maintenance performance. Then, rank them accordingly in sequence to help building managers or building owners to identify the important factors that need to take action in line to ensure the building maintenance is within an acceptable condition.

1.2 AIM AND OBJECTIVE

The aim of this study is to identify the performance measurement criteria of building maintenance contractors. The objective is to rank and prioritise the factors affecting the contractors' performance of building maintenance contractors at PERKESO office buildings. The objectives of this study are:

1. To identify the factors affecting building maintenance contractors' performance in Malaysian government office.
2. To rank and determine the sequence of priority factors affecting building maintenance contractor performance.

Research questions are then established: -

- a) To what extent the building owner monitors the performance of building

maintenance contractor?

- b) What are the key factors to ensure the building maintenance system properly manage?
- c) What is the most important factor affecting the building maintenance performance?

1.3 BACKGROUND

In Malaysia, the employees earning below RM3,000.00 per month of first month wage is mandated to contribute to Social Security Organization or SOCSO under the Employee Social Security Act 1969 and Employee Social Security General Rules 1971. “Through the Act and Regulations, SOCSO is able to provide free medical treatment, facility for physical or vocational rehabilitation, and financial assistance to employees if they have lost or have reduced their abilities to work or rendered them incapacitated due to accidents or diseases. If an employee has died, their dependents will be financially provided through pensions” (SOCSO, 2014). The SOCSO, commonly known as Pertubuhan Keselamatan Sosial (PERKESO) in Bahasa Malaysia, has fourteen (14) stand-alone office buildings and thirty-four (34) shop-lot offices throughout Malaysia. Proper building maintenance management is required in order to ensure that these buildings are in good condition and conforming to safety requirements while reducing the risk of any interference or disruption to the operations and their services to the public.

At present, the management of building maintenance and its operation on all buildings of PERKESO has been carried out by their appointed contractors referred as building maintenance contractors. This service is carried out by outsourcing the contractor through open tendering process. The major scope of the works is to perform

regular building maintenance while ensuring all the building elements are properly maintained. The performance of the appointed building contractors is monitored by the Property Division of PERKESO that managed by various technical experts namely the architects, engineers, and surveyors.

1.4 PROBLEM STATEMENT

Lack of preventive measure in most building upon completion is generally accepted as the cause of problem resulting to poor maintenance performance. In Malaysia, poor service quality is the issue of maintenance management (Ruslan, N, 2007). The issue arised due to the failures in planning of maintenance strategies caused by lack of knowledge of the maintenance strategies and inadequate performance standard. As a result, many buildings are found to be unfit in terms of building use and function (Au-Yong, 2004).

In February 2001, the Deputy Prime Minister of Malaysia Datuk Seri Abdullah Ahmad Badawi urged Malaysian to change their mind set or attitude to become more aware to provide good services and improve the upkeep of buildings. In previous study Au-Yong (2014) found that lack of preventive measure is the problem contributes to poor building maintenance performance and issue on the sustainability of buildings in Malaysia. At the moment, there is no single measure of a building standard in the Malaysian maintenance management practice (Myeda, Kamaruzzaman & Pitt, 2011). The evaluation of building maintenance performance is challenging due to limited mechanism to evaluate the performance of the building maintenance that maintained by the appointed building maintenance contractors.

However, Yahaya (2012) found that the present building stakeholders are more concerned about the building achievement and its performance as it reflects the

building image. In case of PERKESO, the management takes this issue seriously by taking a step to ensure their buildings are in good condition and safe to be occupied. Therefore, the present study to evaluate the performance of the building maintenance contractors is highly desirable to ensure the building is maintained well, in good condition and within an acceptable level. This study is to determine and identify the performance level of building maintenance contractors' through their efficiency and effectiveness in maintaining PERKESO buildings. Hence, this research focus on identifying the factors affecting the performance of building maintenance contractor, evaluating the performance criteria and ranking the factors. It is hoped that this research will be a useful reference to PERKESO property managers and contractors as well as other stakeholders in the field of facilities management.

1.5 RESEARCH METHODOLOGY

At the outset, the research problems, the significance, the objectives and the scope of the study are identified. Subsequently followed by the thematic literature review based on the related keywords. All information and data were gathered through three (3) sources. Firstly, the research started with the review of selected journals and books. Secondly, by reviewing field documents such as the contractors' services agreement, monthly services reports as well as auditor reports. Last but not least, interviewed with the PERKESO property division (technical team) to obtain information on the performance of the appointed contractors. The data was collected and compiled. The analysis was carried out using the Analytic Hierarchy Process Software (AHP). The findings were then derived and the recommendations were made based on the ranking and priority of the factors affecting the performance of building maintenance contractors (outsourced) at PERKESO. Figure 1 shows the flow chart for the research activity.

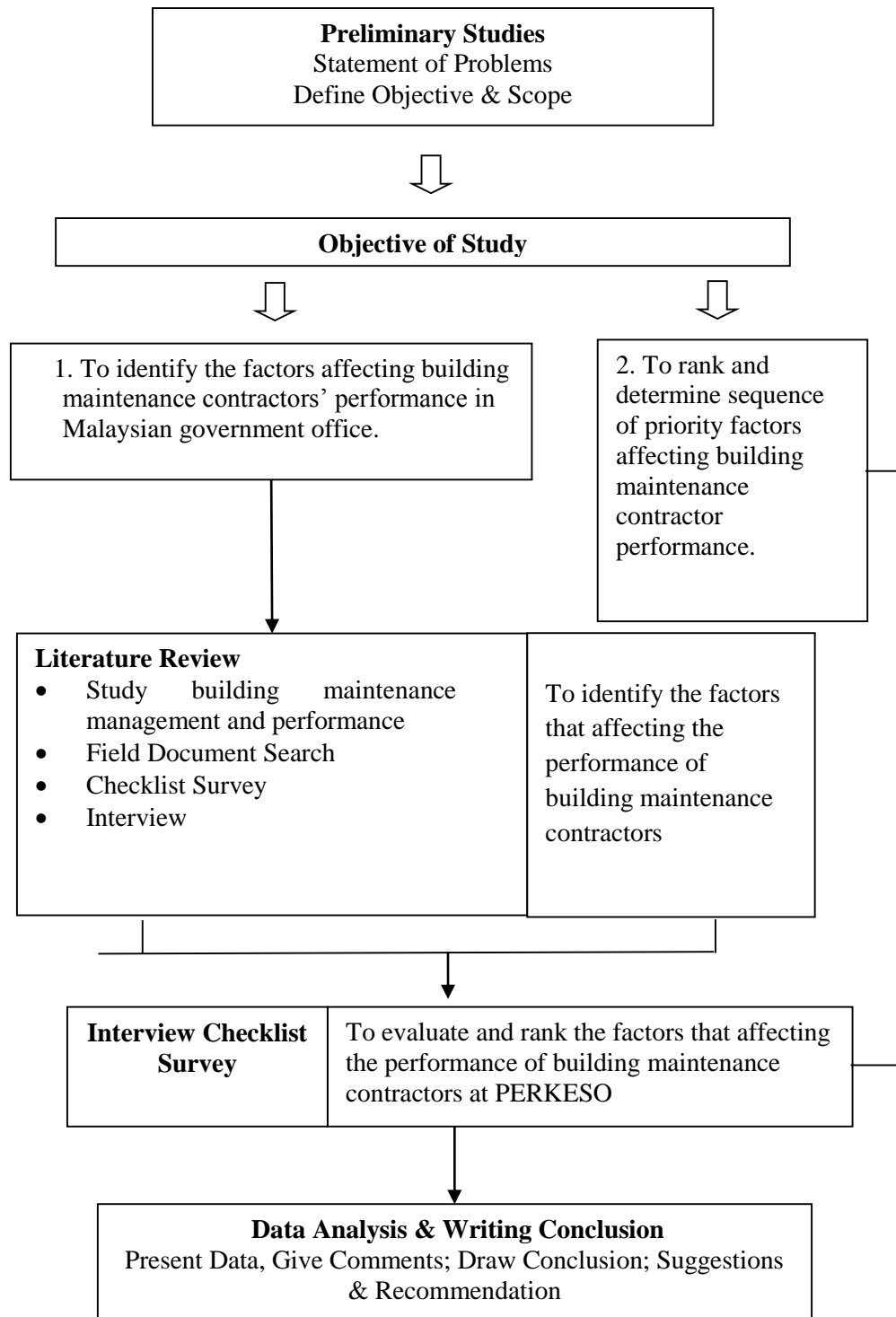


Figure 1.1 Flow Chart of Research Methodology

1.6 SCOPE AND LIMITATION OF THE STUDY

The case study is limited to PERKESO buildings located at Jalan Ampang, Jalan Tun Razak, Kuala Lumpur and Jalan Selangor, Petaling Jaya within Klang Valley, Kuala Lumpur, Malaysia. Three buildings were selected as case study of the research. Three (3) groups of positions within the building maintenance management namely Property Managers, Engineers and Technical Assistants were interviewed in field survey. Three (3) respondents are selected from each group of position who directly involved in the supervision and monitoring aspects of maintenance in their respective buildings.

1.7 RESEARCH SIGNIFICANCE

Upon completion of this research, the expected findings: -

- i. To be able to identify the performance measurement criteria that affecting the performance of the building maintenance contractors; and
- ii. To provide ranking of priority of the factors identified.

1.8 OUTLINE DISSERTATION

This research focuses on the performance measurement factors affecting the building maintenance contractors' performance at PERKESO buildings. In this study, the topic would be discussed in 6 (six) chapters. Chapter 1 is the overview of building maintenance practice, Chapter 2 explains the literature review, Chapter 3 is measurement criteria affecting the performance of building maintenance contractors, Chapter 4 is the research methodology, Chapter 5 is data collection and Chapter 6 is conclusion and recommendation.

CHAPTER TWO

LITERATURE REVIEW

2.0 MAINTENANCE MANAGEMENT OF OFFICE BUILDINGS

Every building is an asset that requires proper maintenance and attention to achieve their maximum life spans. No building is maintenance free and, in fact, 90 percent of the building's life cycle requires regular and active maintenance process (Lateef et al., 2011). If the building is having regular inspection and proper maintenance plan, the buildings can be projected last longer and would lead to sustainability as well as improve business economy (Sandberg 2013). Building conditions depreciate over time and as ended of various factors including weather such as direct sunlight, rain, wind, etc., besides wear and tear factors as a result of daily use by the occupants. Without proper maintenance, the buildings are likely to deteriorate quickly and diminished their services and life span.

The understanding of the concepts and techniques of managing office buildings are important for building managers and owners. Proper understanding and the right practice in building maintenance may prolong the building lifespan, provide continuous services to users and the buildings are always in acceptable condition. The quality of the operation and management maintenance would ensure the followings (Muhey, 2012):

1. Reduced frequency of unscheduled breakdowns and the downtime of critical equipment and systems, by using effective preventive maintenance programs;
2. Enhanced maintenance efforts;
3. Reduce the overall maintenance expenses;

4. Rehabilitation of facility systems, by analysing various strategies; and
5. Control of the budget, by comparing the maintenance expenses and the expected equipment performance.

It is an important reminder that all building owners and maintenance managers need to know their responsibilities regarding the maintenance as an essential safety measure in their buildings. A proper building maintenance procedure and practice work not only give assurance to health and safety, but lead to a good risk-management in making business decision as well. With good knowledge and skills, maintenance requirements will enable building owner or managers to plan strategically in terms of business operations, financial, customer satisfaction, and maintenance objectives. Building owners or managers may monitor and control the building maintenance contractors' performance to ensure the works or services meeting the requirement and expectation.

2.1 DEFINITION OF MAINTENANCE

British Standard, BS 3811: 1984 defines maintenance as a combination of various actions which the task is carried out accordingly to retain an element in, or reinstate it to the satisfactory situation.

Rakhra (1983) and Olanrewaju (2009) emphasized that maintenance is a necessity process for all buildings. The services are required to be carried out in order to preserve, repair and care for the building's structure and components after completion or after any renovation, repair, refurbishment, conversion or replacement to existing standard. The services would enable to serve its intended function throughout its entire lifespan without major changes of its basic features and use.

The International Electro-Technical Commission (2006) identified maintenance is the combination of all the technicals and administrative actions. The maintenance should include supervision, intended to retain an item or restore it to a state in which it can perform a required function. Meanwhile, Arazi (2009) discovered that maintenance means different thing to different people. Hence, it can be concluded that the building maintenance works as a continuous process to preserve, repair and care for its structure and components for the comfort of its occupants and users. It is a value-added initiative to the building's asset.

2.2 TRADITIONAL MAINTENANCE MANAGEMENT SYSTEM

Maintenance of the physical asset is divided into four (4) main categories. There is custodial, corrective, preventive and emergency maintenance (Brown, 1993, p. 428).

2.2.1 Custodial Maintenance

A research carried out by Rondeau, Brown & Lapides, (2006, p. 493) classifies custodial maintenance as planned maintenance that include all day-to-day routine maintenance activities. It is performed at least once a day as to upkeep the building and its operations. The activities include among others vacuuming and window cleaning, restroom cleaning and sanitization, floor waxing, lawn mowing and pest control.

2.2.2 Corrective Maintenance

Corrective Maintenance is also a planned maintenance to correct deficiencies and the restoration of the building elements once problems are identified before any major breakdowns or emergencies occur (Rondeau et al., 2006 p. 493).

2.2.3 Preventive Maintenance

It is a maintenance plan where scheduled inspections, services, and repair works are performed to maximize the lifespan of building elements. The maintenance is an essential safety measure and is to reduce the chances of buildings' element breaks down and unwanted service interruptions. British Standards Institution views preventive maintenance as works carried out at scheduled intervals or to other given criteria with the intention to reduce the possibility of an item not meeting an acceptable condition. Preventive maintenance would also act as a strategic move towards evading the probabilities of corrective and emergency repairs in the future (Rondeau et al., 2006 p. 501). This preventive maintenance belongs to the planned maintenance category.

2.2.4 Emergency Maintenance

A study carried out by Mohd Isa (2006) found that emergency maintenance categorised as unplanned maintenance. Where a corrective action must be performed immediately to eradicate threats to life, health, or property. The comprehensive emergency maintenance plan shall develop during site selection, acquisition of property development and property negotiation.

In general, old-style maintenance management is still required and part of industry practice nowadays. Zulkarnain et. al (2011) described the common practice maintenance management system in a flow chat as shown in Figure 2.