

**FACTORS AFFECTING MAINTENANCE OF BUILDINGS AND ANCILLARY
SERVICES IN THE UNIVERSITY OF MALAWI:
A CASE STUDY OF THE POLYTECHNIC**

**MASTER OF SCIENCE IN INFRASTRUCTURE DEVELOPMENT AND
MANAGEMENT THESIS**

BLESSINGS NDAWABERANJI CHAPHADZIKA HUDGE

UNIVERSITY OF MALAWI

THE POLYTECHNIC

December 2017

**FACTORS AFFECTING MAINTENANCE OF BUILDINGS AND ANCILLARY
SERVICES IN THE UNIVERSITY OF MALAWI:
A CASE STUDY OF THE POLYTECHNIC**

Master of Science in Infrastructure Development and Management Thesis

By

BLESSINGS NDAWABERANJI CHAPHADZIKA HUDGE

BSc in Architecture – University of Malawi

Submitted to the Department of Civil Engineering, Faculty of Engineering, in
partial fulfilment of the requirements for the degree of Masters in Infrastructure
Development and Management

University of Malawi

The Polytechnic

December 2017

DECLARATION

I, **Blessings Ndawaberanji Chaphadzika Hudge (Mrs)**, hereby declare that this thesis is my original work and has not been presented at any university for any other purpose even examinations.

SIGNED: 

Blessings Ndawaberanji Chaphadzika Hudge (Mrs)

CERTIFICATE OF APPROVAL

We, the undersigned, certify that we have read and hereby recommend for acceptance by the University of Malawi a thesis entitled '*Factors Affecting Maintenance of Buildings and Ancillary Services in the University of Malawi – a Case Study of the Polytechnic*'.

Dean-Postgraduate : **Dr. Peter Mhagama**
Signature : _____
Date : _____

Main Supervisor : **Mr. Kenneth J. Gondwe**
Signature : _____
Date : _____

Co-Supervisor : **Dr. Burnet O. Mkandawire**
Signature : _____
Date : _____

Head of Department : **Dr. Burnet O. Mkandawire**
Signature : _____
Date : _____

DEDICATION

I dedicate this thesis to my late mother,
Mrs Virginia Msiyadungu,
my model who believed education is the key to everything in life.
May your soul rest in Peace.

ACKNOWLEDGEMENTS

Over the years, I have learnt that good things are not easy to find. Without the presence of The Almighty God in my life, His Grace and favour, I would not have made it. I hereby offer my Praise and Thanksgiving to My Creator “for his love endures forever” Psalm 100:5.

I would also like to extend my gratitude to my husband, Macdonald Terry Hudge, for all his love, encouragement, understanding, company during the late nights and the hope in me, has seen me come this far. Mac, I say, “thank you and God bless you”. To you my daughters, Tertia, Precious, Antonia and Talisha - I say, "thank you for your encouragement, understanding and patience. My special appreciation goes to you Tertia for all the patience in teaching mummy the computer techniques, shortcuts and also believing and pushing me to finish. Today, I say, here you are.

To my supervisor, Mr Kenneth J. Gondwe, I extend my heartfelt gratitude for your patience, guidance, advice and faith in me. I could not have made it if it was not for your constant encouragements, academic and professional critics throughout the journey of this thesis. I sincerely say, “God Bless you”. I would also like to extend my appreciation to Dr Burnet Mkandawire for his constructive ideas during the development of this thesis. Your ideas and guidance encouraged me to continue with the research topic and “I therefore say thank you”

Lastly, I would like to thank management at the Polytechnic for accepting that I conduct this case study within the corridors of the College. I do not take it for granted. I believe this thesis will bring about some new ideas in the management of college property.

ABSTRACT

University buildings require maintenance in order to create conducive environment that supports and stimulates learning, teaching, innovation, and research. The prime objective of maintenance is to ensure, as far as practicable, the continued peak performance of the building throughout its design life.

This thesis seeks to report the factors that affect maintenance of buildings in the University of Malawi with the Polytechnic, a constituent college of the University, as the case study. Primary data was gathered through the analysis of a case study. The objectives of the case study are to identify, describe and assess the maintenance management process used at the Polytechnic with a view to assessing its effect on the user and on university infrastructure.

The major conclusion drawn from the case study is that the Polytechnic lacks a definitive maintenance policy, and a comprehensive maintenance management framework to guide the maintenance processes. The case study also reveals anomalies in the university's maintenance management system.

KEYWORDS

Maintenance Framework; University buildings; Maintenance management; Malawi Polytechnic

Table of Contents	Pages
DECLARATION.....	ii
DEDICATION.....	iv
ACKNOWLEDGEMENTS.....	v
ABSTRACT	vi
KEYWORDS.....	vi
CHAPTER ONE.....	1
BACKGROUND OF THE STUDY AND PROBLEM CONTEXT.....	1
1.1 Introduction	1
1.2 Problem Statement.....	3
1.3 Research Questions.....	3
1.3.1 Main Research Question.....	3
1.3.2 Research Sub questions	4
1.4 Objectives of the Study.....	4
1.4.1 Main Objective	4
1.4.2 Specific Objectives	4
1.5 Significance of the Study.....	4
1.6 Scope of the Study.....	5
1.7 Limitations of the Study	6
1.8 Outline of the remaining chapters	7
CHAPTER 2	8
LITERATURE REVIEW	8
2.1 Introduction	8
2.2 Building Maintenance.....	8
2.3 Evolution of Building Maintenance	8
2.3.1 Servicing or Preventing	10
2.3.2 Rectifying or Repairing	10
2.3.3 Rehabilitation or Replacement	10
2.3.4 Renovation.....	10
2.3.5 Extension	10
2.4 Significance of Maintenance of Buildings	10
2.5 Types of Maintenance	12
2.5.1 Planned Maintenance.....	12
2.5.2 Unplanned Maintenance	13
2.6 The Maintenance Management Process	14
2.6.1 Organizing	14
2.6.1.1 Maintenance Policies.....	14
2.6.1.2 Maintenance Standards.....	15

2.6.1.3	Maintenance Strategies	15
2.6.2	Planning	15
2.6.2.1	Maintenance Plan	15
2.6.3.	Implementing.....	17
2.6.3.1	Assessment of Maintenance work	17
2.6.3.2	Budgeting for maintenance.....	17
2.6.3.3	Procurement.....	18
2.6.3.3.1	The Malawi Public Procurement Act	19
2.6.3.4	Developing Work Plans.....	20
2.6.4.	Monitoring and Reporting	21
2.7	Structuring Maintenance Management.....	21
2.8	Maintenance Management Structure at the Polytechnic	22
2.9	Factors affecting Maintenance of buildings in Universities of Africa	23
2.10	Chapter Summary	24
CHAPTER 3	26
RESEARCH METHODOLOGY	26
3.1	Introduction	26
3.2	Research Design	26
3.3	Methodology.....	26
3.4	Sampling.....	27
3.5	Data Collection	28
3.5.1	Primary Data.....	29
3.5.2	Secondary Data.....	29
3.6	Data Analysis.....	29
3.7	Limitations.....	30
3.8	Research Ethics.....	30
3.9	Chapter Summary	30
CHAPTER 4	31
RESULTS AND DISCUSSIONS	31
4.0	Introduction	31
4.1	Administration of questionnaires.....	31
4.2	Estates Personnel Staffing Levels.....	32
4.3	Project Implementation Team	33
4.4	Maintenance Policy, Strategy and Standards	34
4.5	Maintenance Budgeting and Funding.....	36
4.6	Expenditure Over the years	38
4.7	Handling of Maintenance Requests.....	39
4.9	Procurement of Materials	44

4.10	Perception of users on Maintenance of Buildings	46
4.11	Conclusion	47
CHAPTER 5		49
CONCLUSION AND RECOMMENDATIONS		49
5.1	Introduction	49
5.2	Maintenance policies and practices	49
5.3	Physical Condition of Infrastructure.....	50
5.4	Stakeholders evaluation.....	50
5.5	Application of Policies in response to stakeholders	51
5.6	Other findings	51
5.7	Recommendations from the study	51
5.8	Recommendations for further research.....	52
REFERENCES		53

List of Figures

Figure 1 - Map of The Polytechnic Main Campus. Source: Google map.	5
Figure 2 – Map of The Polytechnic Chichiri Campus. Source: Google map.	6
Figure 3 – Evolution of Maintenance since World War II (Schokry, 2010/2011).....	9
Figure 4- Purpose of Maintaining Buildings (Schokry, 2010/2011).....	11
Figure 5- Types of Maintenance.....	12
Figure 6 - Proportion of types of maintenances. (Attack Placements, 2014).....	13
Figure 7 - The Maintenance Management Process (DHPW, 2012).....	14
Figure 8- Six Planning Steps (Campbell, 2006).....	16
Figure 9 - Maintenance Budget Model (Strawn, 2011).....	18
Figure 10-Material Verification Process (Attack Placements, 2014).....	19
Figure 11- An Estates Management Unit Structure at Kenyatta University (Choka, 2012)	22
Figure 12- An organogram of the maintenance section before abolishment.....	23
Figure 13-Relationship Diagram of Allocation and Expenditure from 2010 to 2014.....	39
Figure 14-Relationship Diagram of Expenditure and maintenance calls from 2010 to 2014. .	42

List of Tables

Table 1 - Categories of selected participants.....	28
Table 2 - Questionnaire Response Rate.....	31
Table 3- Personnel in the Estates Section at the Polytechnic	32
Table 4 -Illustrates variances in maintenance personnel	33
Table 5 - Composition of Project Implementation Team (PIT) at the Polytechnic.....	34
Table 6 - Response rates to the questionnaires.....	34
Table 7 - Proposed Maintenance funding sources for the period 2010 – 2014.....	36
Table 8 - Actual Estates funding for the period 2010 – 2014.....	37
Table 9 - Actual Estates funding for the period 2010 – 2014.....	38
Table 10 - Expenditure over the period 2010 - 2014.....	38
Table 11- Maintenance requests by trade over the period 2010 - 2014	40
Table 12–Comparison of maintenance requests with expenditure from 2010 to 2014.....	41
Table 13 - Sample of maintenance request categorization in the Maintenance Section	43
Table 14 – Illustration of work distribution.....	44
Table 15–Sample programme for procurement of maintenance materials.....	45
Table 16- Summarised average perceptions of users of buildings at The Polytechnic.	46

List of Acronyms / Abbreviations

CBD	-	Central Business District
CMMS	-	Computerized Maintenance Management System
EDO	-	Estates Development Officer
EMU	-	Estates Management Unit
FMU	-	Facilities Management Unit
LPO	-	Local Purchasing Order
MIM	-	Malawi Institute of Institute
MMF	-	Maintenance Management Framework
MMP	-	Maintenance Management Process
MMS	-	Maintenance Management System
PIT	-	Project Implementation Team
UCO	-	University Central Office
UEDO	-	University Estates Development Officer
UNIMA	-	University of Malawi

APPENDICES	58
Appendix 1 - College Buildings	58
Appendix 2 - Research approval request	60
Appendix 3 - Structured questionnaire for College Management	61
Appendix 4 - Structured questionnaire for Estates Officers	63
Appendix 5 - Interview schedule for maintenance supervisors/ foremen	66
Appendix 6 - Tenant satisfaction questionnaire	68

CHAPTER ONE

BACKGROUND OF THE STUDY AND PROBLEM CONTEXT

1.1 Introduction

The highest proportion in the world's investments is physical infrastructure. They need to be of good quality and standards so that they can achieve the aim of satisfying the aesthetical and architectural functions that they were constructed for (Adenuga, Odusami, & Faremi, 2007). It is unfortunate that the world judges their ability to deliver good, safe and reliable services through their appearance, hence it is important to have strong and structurally sound infrastructure. Buildings, which are among these physical infrastructure have a long life span and are prone to different environmental conditions. As a result, all elements of the buildings deteriorate at a greater or lesser rate depending on the materials, methods of constructions and use of the building (Her Majesty's Stationery Office (HMSO), 1972). It is therefore of utmost importance to ensure that buildings are kept, as close as practicable, in their original state by maintaining their defects.

One of the weaknesses being faced in building infrastructure in Malawi is lack of a maintenance culture (University of Malawi Strategic Committee, 2012). Malawi does not have any official maintenance policy to influence developers to maintain their properties (Msukwa, 2015), a situation that has resulted in owners maintaining the buildings at their own discretion. This has seen buildings in the public institutions being left to care for themselves without any sustainable maintenance plan for preservation of the quality (Cobbinah, 2010). This has seen Malawi having dilapidated buildings both in the public and private sector.

Majority of the buildings available in the public universities in Malawi were put up through donor funded grants or concessionary loans because putting up new building calls for large capital outlay. Although the buildings play a crucial role in the provision of these essential services, most of them are in a bad state. University buildings are meant to create a suitable, conducive and adequate environment that supports stimulates and encourages learning, teaching and innovations (Olanrewaju, Khamidi, & Idrus, 2010). Failure to provide this environment to the university community and the stakeholders, results in the loss in value to the institution. To ensure such buildings provide the required services for a long time, universities must then, adequately maintain their existing buildings to acceptable performance standards that are capable of facilitating the transfer of knowledge and carrying out other

academic activities effectively and efficiently (Lateef, 2008). Teaching and learning are the core business of the University of Malawi – The Polytechnic and this happens within closed walls called buildings (University of Malawi Strategic Committee, 2012).

Maintenance is described as the continuous protective care of the fabric, its contents and settings of a place to bring a building to an accepted standard (Cobbinah, 2010). Maintenance is described as “the combination of all technical and associated administrative actions intended to retain an item in, or restore it to, a state in which it can perform its required function” (British Standard Institution [BSI 3811], 1974). It cannot be disputed that an effective and good maintenance system is also a good disaster mitigation system. The effects of using a well-operated maintenance system for buildings and other facilities brings about very effective disaster mitigation measure in terms of cost and facility usage. It also ensures the most economical way of keeping the buildings and other facilities in the best of form for normal use, the highest safety standards met, and improved full utilization of the infrastructure (British Standard Institution [BSI 3811], 1994). Poor maintenance systems and neglect of maintenance has given rise to safety hazards, which could result in injuries, damages and loss of value.

Maintainability of buildings is identified as one of the key areas in which the construction industry must achieve significant improvement (Adenuga, Odusami, & Faremi, 2007). There is need for designers to produce good designs that minimize maintenance since no building can be maintenance free. The industry must also produce enough and competent skilled workers to handle maintenance works with proper expertise using the recommended methods of installation and requisition of materials. When buildings are neglected, which is the case with most University of Malawi (UNIMA) buildings, defects can occur which may result in extensive and avoidable damage to the building.

There are different maintenance approaches that could be applied to buildings. Maintenance is broadly categorized as planned, where work is specifically done to prevent failure but under proper procedures; or unplanned (like roof leaking, broken water pipe and blackouts) with work that must be initiated immediately for health, safety, security reasons or that may result in the rapid deterioration of the structure if not undertaken. This is discussed in more detail in the subsequent chapters.

1.2 Problem Statement

Many public buildings in developing countries are often inadequately maintained whereby windows, doors, other building elements frequently show evidence of lack of maintenance¹ and repair (Switzer Daily, 2012). Studies in developing countries have shown that residential and office buildings owned by public institutions rarely receive any significant maintenance after construction. This has resulted in such buildings being dilapidated with some being abandoned. The lack of maintenance by the authorities and occupants of these facilities often leads to reduced lifespan of these buildings which invariably defeat the purpose for which they are constructed (Melvin, 1992).

There are not many studies done on issues relating to maintenance of UNIMA buildings. Buildings within The Polytechnic can pose as a threat to the users as well as the environment in terms of infrastructure maintenance and sanitation (Shane, 2011). According to Shane's report of 2011, the existing buildings at the college are dilapidated, inadequate and inappropriate for use under higher education learning environment. He further discusses poor management in handling all maintenance activities as another contributing factor to the sorry state. In addition, the issue of occupants regarding these buildings as state property and handling them without due care, has also largely contributed to the current poor state of the buildings and hence have passive attachment in relation to the efficient use and maintenance of the building.

It is in view of this, that the study sought to assess the building maintenance practices at the Polytechnic and identify factors that have contributed to the current poor state of buildings and their ancillary services (variety of welfare support services such as Firefighting equipment, car parking etc.) within the College.

1.3 Research Questions

The types of research question that must be answered determine the choice of research approach for a study (Saunders, Lewis, & Thornhill, 2000). Thus, this section lays out the research question and sub questions.

1.3.1 Main Research Question

What are the reasons or factors that have contributed to the current state of buildings at The

¹Maintenance is work that prevents deterioration or fixes current deterioration whilst repair is partial and restores something to its original state.

Polytechnic?

In order to adequately answer the main research question, research sub questions were formulated as shown below;

1.3.2 Research Sub questions

- i. Does the Polytechnic or UNIMA have any maintenance policies and practices in place that are being followed? Are people aware of these policies? What interventions have been placed to achieve the strategic policies?
- ii. What is the perception of management and users on maintenance of buildings and their ancillary services? What impact does the perception have on the life span of the buildings?
- iii. How does The Polytechnic carry out its maintenance activities?

1.4 Objectives of the Study

1.4.1 Main Objective

The main objective of the study was to evaluate the building maintenance processes that are being used by The Polytechnic and establish their effects on the users and infrastructure itself.

1.4.2 Specific Objectives

In order to accomplish the main objective, the following specific objectives were used to guide the study:

- i. To analyze the existing policies and practices governing maintenance of buildings and services at the Polytechnic.
- ii. To assess the operational condition (physical function state) of buildings and services at the Polytechnic.
- iii. To assess how stakeholders' (users of the infrastructures) rank the efficiency and effectiveness of maintenance operations at the Polytechnic
- iv. To establish the reaction of stakeholders to the available maintenance practices.

1.5 Significance of the Study

The conduction of this study will contribute to knowledge, theory and also to the development of good maintenance practices within the Polytechnic, which would possibly be replicated in the other constituent colleges of the UNIMA. These will be achieved by finding out the factors that have contributed to the present state of buildings at the Polytechnic and

recommending appropriate necessary actions to be taken. In addition, the study will highlight the current state of buildings infrastructure and their effects on safety and health of occupants (students and staff members).

Suggested recommendations will assist the college in the prevention of deterioration of buildings, which ultimately leads to increased restoration costs. It is therefore anticipated that the study will bring out the hidden importance of having well and up to standard buildings in achieving teaching and learning goals in higher learning institutions. This will be achieved through the provision of critical and analytical perspective for appreciating the factors affecting the decision making in carrying out building maintenance to the Academicians and Management. It is also in the interest of the study to bring to the fore the major inhibiting factors in the maintenance of buildings in the UNIMA.

1.6 Scope of the Study

This study concentrated on the buildings within The Polytechnic, a constituent College of UNIMA for a period of 5 years (2010 – 2015). The buildings are located in various sites within Blantyre CBD.

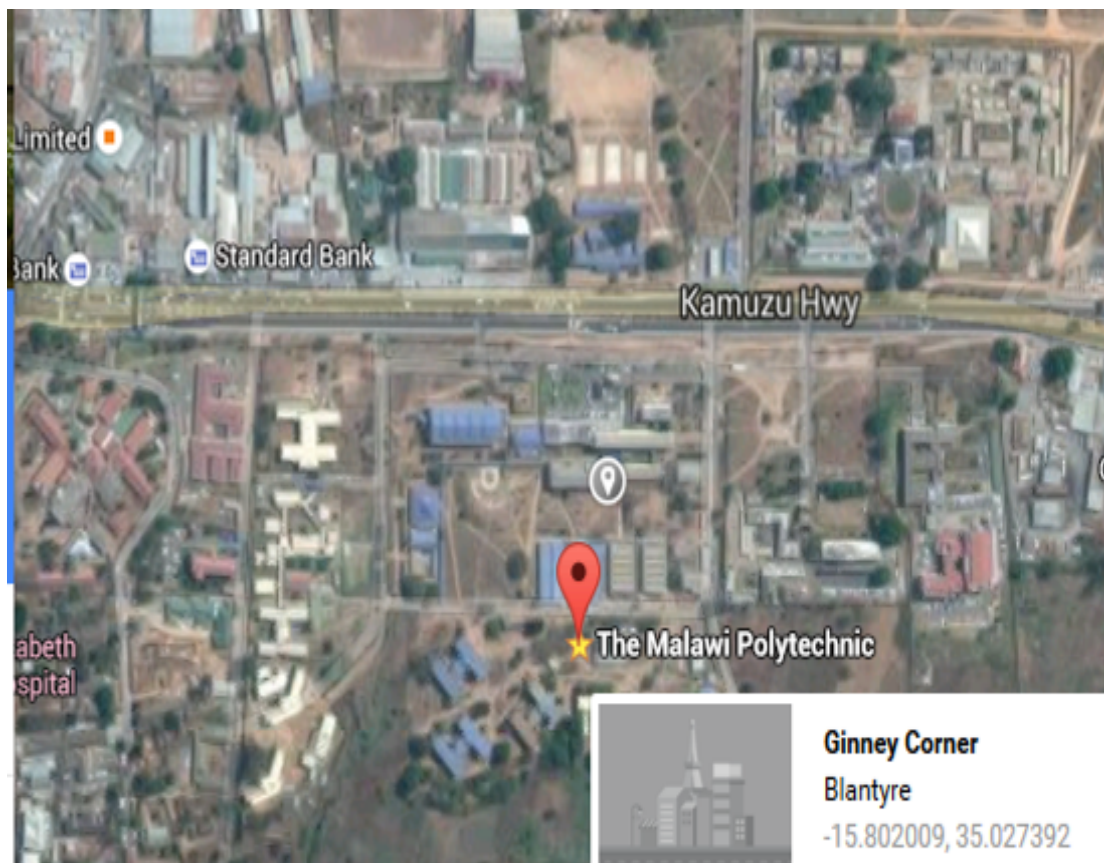


Figure 1 - Map of The Polytechnic Main Campus. Source: Google map.



Figure 2 – Map of The Polytechnic Chichiri Campus. Source: Google map.

All types of buildings at the College, which include residential, office and learning areas, were examined to determine their state and come up with conclusive results. The buildings were divided into three categories, thus residential which included hostels (including cafeteria) and staff housing; staff offices and learning areas, which included classrooms, library, laboratories, workshops and lecture theatres.

1.7 Limitations of the Study

The researcher had difficulties in having access to the required data since record keeping was not up to date and in most situations, information was obtained from people who had worked long within the College, thus they had vital institutional memory.

The Researcher is a member of staff in the Estates Section at the College; this creates potential for bias, as she is a key stakeholder in maintenance activities. Engaging research assistants in data collection to ensure that they would get independent views from respondents mitigated this challenge.

Regardless of the limitations, the results of the study were not affected and are credible,

reliable and useful for any purposes of evaluation and feedback.

1.8 Outline of the remaining chapters

The study has been outlined in five chapters and these include; Chapter One covers the background and objectives of this study, the problem statement, research questions and outlines the importance and extent of the study to The Polytechnic. Chapter Two reviews relevant literature on maintenance management processes used by other researchers /authors/organizations. Chapter Three describes the methodology adopted in undertaking the research. The data collected data has been systematically presented in Chapter Four, using the maintenance management processes. Chapter five provides conclusions drawn from the findings and finally recommendations have been made in chapter six.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter covers the secondary information on the issues regarding maintenance of institutional buildings. It seeks to review literature on the concepts of buildings maintenance, the evolution of building maintenance, principles and practices of maintenance management of buildings in some higher learning institutions and also common factors affecting maintenance of buildings and their ancillary services in these institutions.

2.2 Building Maintenance

It is an agreeable fact that over time, any building would surrender to the normal wear and tear due such factors as usage, harsh weather conditions and state of air quality. Therefore, deliberate activities or interventions have to be undertaken to conserve it, as nearly as possible, to its original condition. Thus, building maintenance is said to be "work or a combination of actions associated with initiation, organization and implementation carried out to retain an item in or restore it to an acceptable standard (BSI 3811, 1974). It is also defined as "work undertaken in order to keep, restore or improve every part of a building, its services and surroundings, to a current acceptable standard, and to sustain the utility and value of a building (Seeley, 1976). These views have been consolidated as a combination of all technical and administrative actions, which also include the supervision action, made in trying to retain or restore an asset to its original state of functionality (Wood, 2009). Another dimension of what maintenance of buildings entails has been said to be a continuum activity that range from predicting or preventing failures to capital improvements and renovations with repairs and support maintenance involving operational activities in the middle (Becker, 2011).

It could be drawn from the aforementioned definitions that building maintenance is necessary work required to correct defects that develop in a building, for the purpose of ensuring that the functionality and aesthetic condition of the building are not compromised. Thus, serves to prolong the life of a building.

2.3 Evolution of Building Maintenance

The idea of maintaining buildings started with the early man when it used to be described as a necessary evil. The perception then was that failure in a structure was unavoidable and

therefore “it costs what it costs” (Zacharias, 2015). Repairs and replacements were handled when needed and no questions were raised. As time went by, people started developing different theories and strategies since they started conceiving it as a technical matter or a support function to ensure good quality buildings (Pintelon & Parodi-Herz, 2008). Because of these developments, the world began to consider building maintenance as an activity that could be “controlled and planned” (Cobbinah, 2010)

It has been illustrated that the development of maintenance over the years starting from as early as before World war two, in a diagrammatic expression as Figure 3 (Schokry, 2010/2011):

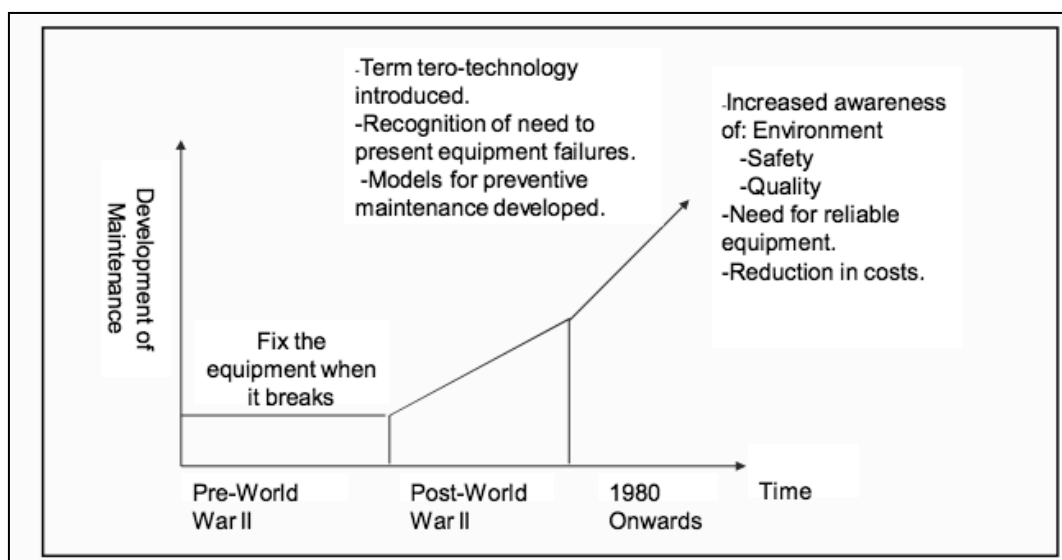


Figure 3 – Evolution of Maintenance since World War II (Schokry, 2010/2011)

As can be seen from Figure 3, maintenance started as early as 1910 when maintenance was done on equipment only and people believed in maintaining equipment after breaking down. As time went by, they started recognizing the need for maintenance before breaking down to ensure continued use. Later in years, more improvements were made after realizing that preventive maintenance is the means of having reliable and safe equipment at all times. Notwithstanding the application to equipment, the model (Figure 3) is also applicable to buildings.

In today’s world, building maintenance is considered as “an integral part of the building process that is perceived as creating additional value” (Liyanage & Kumar, 2003). There still remains a misconception as to the span of maintenance despite the general paradigm shifts towards maintenance (Lateef, 2008). There are people who still hold a narrow definition of

maintenance as the repairing of broken services or components. On the contrary, maintenance revolves around five levels; servicing, rectifying, replacing, renovating and extending (Siyabola, Ogunmakinde, & Akinola, 2013) as described below;

2.3.1 Servicing or Preventing

This is a cleaning activity taken at various intervals in order to reduce likeliness of failure. It can be done on daily basis or at scheduled times for instance, floor cleaning/ scrapping using a planned guideline

2.3.2 Rectifying or Repairing

This is the work done in the early stages of the life span of a building due to either design problem or material failure. This level is mainly meant for rectifying a default not caused by deterioration.

2.3.3 Rehabilitation or Replacement

This is an activity done due to material deterioration or decay. Sometimes, parts could be replaced in the early life of a building because of the low quality of materials or out-dated materials used in construction. This maintenance activity can be avoided by use of good quality and durable materials.

2.3.4 Renovation

This is work done to improve the service provision of a building. Some renovations are meant to enhance the outlook and service of the structure but others are made to restore the original glory of a building or modernization.

2.3.5 Extension

This involves the addition of space in some areas of an existing building to enhance the usage. Extensions are not meant to change the original use of the building and are supposed to be done in accordance to building regulations.

It is a good practice to think of maintenance right from design stage. A good design will ensure that maintenance is minimized and easier to handle over the life of the building.

2.4 Significance of Maintenance of Buildings

Buildings are constructed to house several activities such as dwelling office use, storing, learning and many more, meant for the comfortable habitation of the specific user. In order to ensure maximization in the use of the building, it is important for the user of the building to

ensure that the functionality of the structure is not compromised during the time it is in use. With time, every building experiences changes in its physical appearance and economic contribution. These changes can be in form of cracks, loss of paints, leaking, and breakage of services, out-dated designs or fittings and many more.

Different factors attribute to these changes and these may include; exposure to varying outside weather conditions, varying loads, vandalism, advent of new technology, unsuitable materials used for construction, chemical reactions and also incompatibility of materials used. These changes, affect the functionality of each and every part of the building. It is therefore, necessary to carry out maintenance in order for those functions to continue to be carried out, preferably in a way and manner and to the standard that was originally envisaged, designed and built and mostly satisfactorily (Wood, 2009). There are five main reasons of maintaining buildings (Schokry, 2010/2011). These are shown in Figure 4:

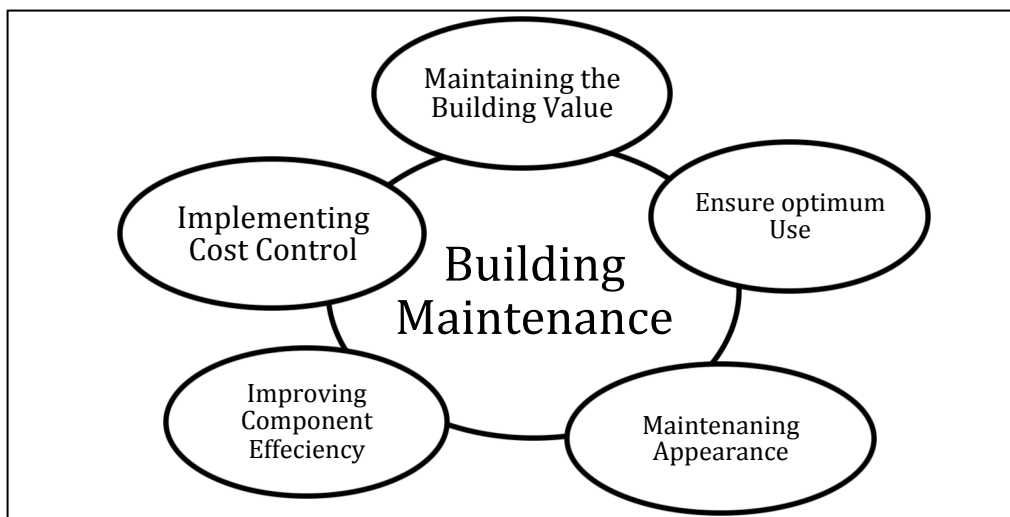


Figure 4- Purpose of Maintaining Buildings (Schokry, 2010/2011)

A building is regarded as an economic asset, which needs to be maintained so that it appreciates in value and results in giving a good return to the owner either socially or economically. Thus, maintaining a building ensures that the investment, which was made in it, brings about the biggest returns as much as possible during its lifetime and also fulfils the ultimate responsibility of providing the needed human satisfaction and comfort (Cobbinah, 2010).

2.5 Types of Maintenance

Maintenance is broadly divided into two major types and these are; planned and unplanned maintenance (BSI 3811, 1974). These types are further broken into four other parts to continue describing them on how they can be operated. Figure 5 shows the interrelationship amongst these types;

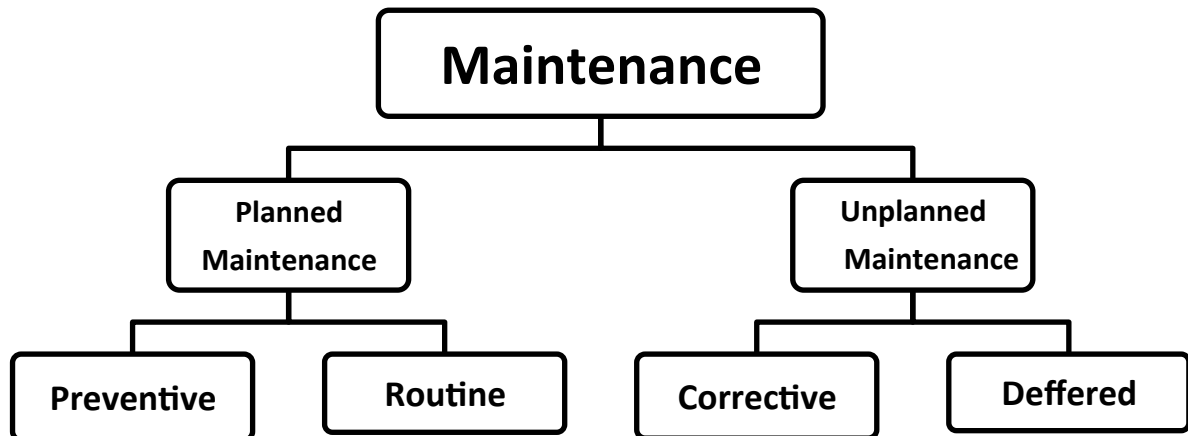


Figure 5- Types of Maintenance

2.5.1 Planned Maintenance

Work is carefully planned, organized and implemented by following a specific framework. A schedule of work is developed, planned (a time frame is attached), priced, implemented and then evaluated. Planned maintenance can either be; preventive - when its aim is to preserve the physical appearance, functionality and value of a building through or routine – when it is meant for periodical checking. In routine maintenance, there are periodical checks and inspections of the facilities before any planning is done. There is empirical evidence that all planned maintenances, combined with an appropriate parts replacement policy, are less expensive and proactive in nature and in tandem with the English adage of “a stitch in time saves nine”. It is increasingly being accepted that it is in the best interest of building owners to conduct maintenance not only in a reactive manner but also as a planned and managed activity in an efficient manner as any other corporate activity.

2.5.2 Unplanned Maintenance

Unplanned maintenance refers to activities that are done in reaction or response to a breakdown of services. The work is carried out in response to an emergency and as such, there is no prior arrangement to have the item fixed at that particular time. They can be either corrective whereby it addresses a problem that has just happened; or deferred which addresses a problem that has just happened, but it was anticipated to happen and was ignored due to other reasons. These works are also known as responsive maintenances, because they always respond to a query or problem (Wood, 2009).

Though such types of maintenance cannot be avoided, they are considered as “the controlled self-destruction of your property” (Stonegate Property Inspections LLC, 2011). Literature has also shown that these types of maintenances are not only expensive, but also inconvenient to both the property owner and user. Besides, they pose a risk to the life span of a building as it could easily be neglected if the building owner has challenges with their cash flow.

There is empirical evidence that organization that use planned maintenance experience less operational disruptions than those that do not. However, it is almost impossible for a building to completely avoid unplanned maintenance, although good scheduled planned maintenance can minimize the need for unplanned maintenance. A good maintenance system will ensure that more than 60 percent of the budget is used for planned maintenance works while the remaining 40 percent is used for all unplanned maintenances – thus 20 percent for deferred and the remaining 20 percent for corrective maintenance (Strawn, 2011).

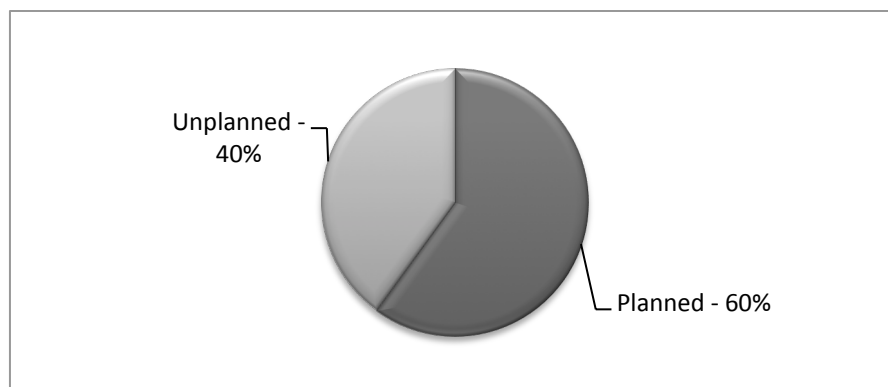


Figure 6 - Proportion of types of maintenances. (Attack Placements, 2014)

2.6 The Maintenance Management Process

Maintenance management process is a generic process that assists an organization to establish appropriate practices for the maintenance of its buildings (Queensland Department of Housing and Public Works [DHPW], 2012). Its objective is to facilitate consistency in the planning and execution of maintenance. It is a well-defined procedure describing the stage to stage of activities that should be carried out and is supposed to form the major part of the overall asset management process of an institution. Figure 7 describes the stages of the process.

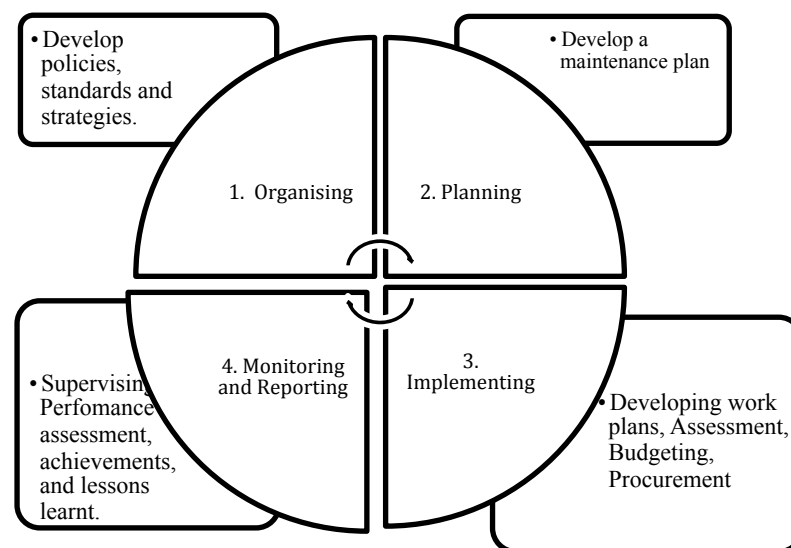


Figure 7 - The Maintenance Management Process (DHPW, 2012)

The above process is a continuous activity in any maintenance job and has to be done with due care. Part one and two of the processes are meant to be done as the base line of the maintenance department. Steps three and four are continuous and recur in every maintenance job.

2.6.1 Organizing

Organization of maintenance starts with the development of relevant policies, standards and strategies to govern the daily operations. It is also important to establish a unit that will be responsible for overseeing and coordinating maintenance activity.

2.6.1.1 Maintenance Policies

These are a formal set of rules and guidelines established for the purpose of achieving good maintenance practices (Choka, 2012). It would be difficult for maintenance activities to

achieve the desired outcomes in the absence of a well-defined maintenance policy (Hackman & Scott, 2008). A properly developed maintenance policy will clearly define the frameworks on which maintenance activities and operations are to be based. It will also define expected outcomes from maintenance operations within budgetary constraints.

2.6.1.2 Maintenance Standards

These are operational levels or benchmarks that are set to provide analytical overview of the work process. To implement a successful maintenance system, an organization should know how to set the right maintenance standards and be able to use them as the base for innovation cost efficiency and social responsibility (Hackman & Scott, 2008).

2.6.1.3 Maintenance Strategies

Maintenance strategies are rules that define the sequences of doing the maintenance works. A detailed maintenance strategy seeks to address various maintenance-related aspects including technical, risk management, financial as well as procurement (DHPW, 2014).

2.6.2 Planning

It is the organization of work in the manner it is going to be executed in the most efficient manner by involving the right people at the right place with the right tools and right information to perform a task. These plans can be long² or short³ range depending on the nature of the activity that is going to be carried out. The process requires a thorough understanding of the institution's capital acquisition plans, service delivery strategy, and the contribution of the maintenance activity to the building's anticipated services. Thus, need to develop a maintenance plan (Melvin, 1992).

2.6.2.1 Maintenance Plan

A maintenance plan creates a workflow of the tasks that are supposed to be carried out, to ensure that the database is optimized; and is always backed up and at the most, free of inconsistencies (Microsoft Developer Network [MSDN], 2015). In developing a maintenance plan, it is good to realize that maintenance activities are generally labour-intensive, as they require human involvement for them to be completed. Such being the case, personnel costs form the largest proportion of maintenance costs whilst costs on equipment, building materials, consumable items and overheads complete the equation for maintenance costs (Ali, 2009). The plan ensures that the sequence of carrying out activities culminates in the desired

²Long-range maintenance plans are long-term plans for a period of not less than one year.

³Short-range maintenance plans are maintenance plans that have been developed for activities that will happen within a period of less than six months.

end and to achieve an effective plan (Campbell, 2006). The following steps; illustrated in Figure 8 are necessary.

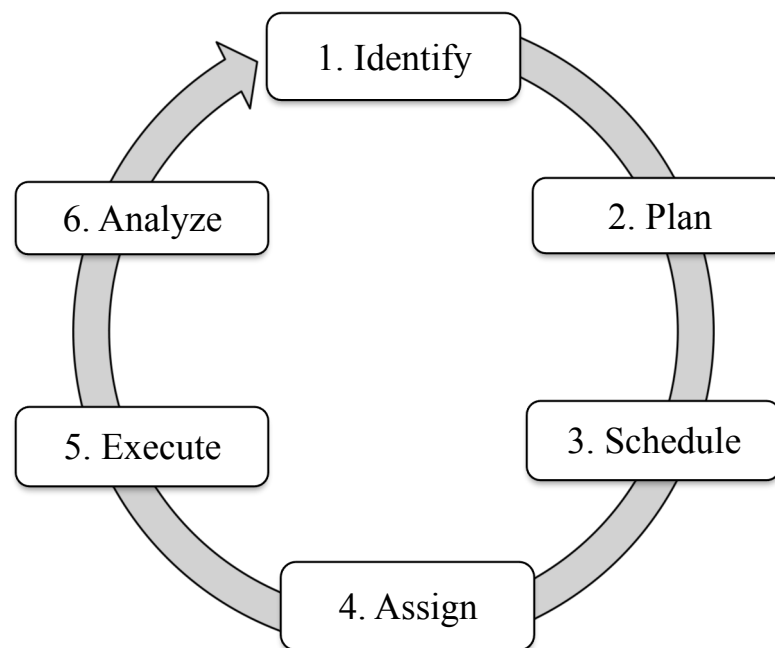


Figure 8- Six Planning Steps (Campbell, 2006)

Thus, there is need to identify the required activity before planning for the execution. The schedule of activities to be carried out is also important to be done in order to allocate the appropriate assignment to the correct person. During execution, it is necessary for regular supervision and later; analysis of the whole programme is also essential in any maintenance activity. This is a repetitive exercise as it is supposed to be happening on each and every project.

The sequence indicated in Figure 8 is critical to the achievement of the desired result as each stage entails activities that must be accomplished before commencement of the next stage. Tools available to assist in the implementation of a well-developed maintenance place are (Campbell, 2006);

- The Gantt chart⁴ (Investopedia , 2016)
- The Critical Path Analysis⁵ (2020 Business Insight., 2015)
- The Pareto diagram⁶ (Rouse, 2011)

⁴A Gantt chart is a visual representation of a project schedule. It shows the start and finish dates of different requirements of a project.

⁵A Critical path is the longest sequence of activities in a project plan which must be completed on time for the project to complete on due date.

2.6.3. Implementing

Implementation of maintenance activities requires a well planned sequence if one is to complete the desired work on time and at budgeted cost. Sporadic implementation, however, can be costly by either producing work at high or under cost but poorly done. These stages are listed below;

2.6.3.1 Assessment of Maintenance work

Assessing maintenance works or investigation stage entails gathering information on the proposed activity, analysing the findings and then presenting the collected data with recommendations. The aim of assessing work before it is done is to obtain an understanding of how the building systems operate and relate to each other. It is important that assessment of works should be as comprehensive as possible to ensure that all required information is captured at an earliest stage by using a checklist.

A checklist is an informational job-aid that is used to reduce failure by compensating for potential limits of human memory and attention (Gawande, 2009). It identifies items required to do the job, what is to be done and what should be considered when doing the work. Checklists may differ from one organization to the other depending on the work ethics and operation styles of each organization. It is necessary for each organization to develop a standard checklist, which can be used to assess any maintenance works within its span. These checklists are supposed to be administered by skilled personnel within the maintenance section.

2.6.3.2 Budgeting for maintenance

A maintenance budget identifies the level of funding required by the organization or department to comprehensively attend to the important maintenance needs of a building for the purpose of assuring and ensuring continuity in supporting organizational services. Budgeting should be demand-driven – that is to say, should be done according to maintenance demands. There are three forms of a maintenance budget (New South Wales Heritage Office, 2004);

- a) **Committed Budget Expenditure;** which caters for tasks that happen every year under planned maintenance like contracts.

⁶A Pareto Diagram is a vertical bar graph in which values are plotted in decreasing order of relative frequency from left to right.

- b) **Variable Budget Expenditure;** which caters for tasks that happen regularly, under planned maintenance, but not yearly; and,
- c) **Managed Budget Expenditure;** which, caters for all unplanned tasks at the discretion of the Manager.

Every budget has a component of the above category, however, all plans under managed budget should not exceed 40 percent of the total budget for maintenance works (Strawn, 2011). In addition, any maintenance budget formulation should include expenditure lines of: labour, materials, tools and resources and contracted services. Figure 9 depicts a general indicative framework of a maintenance budget.

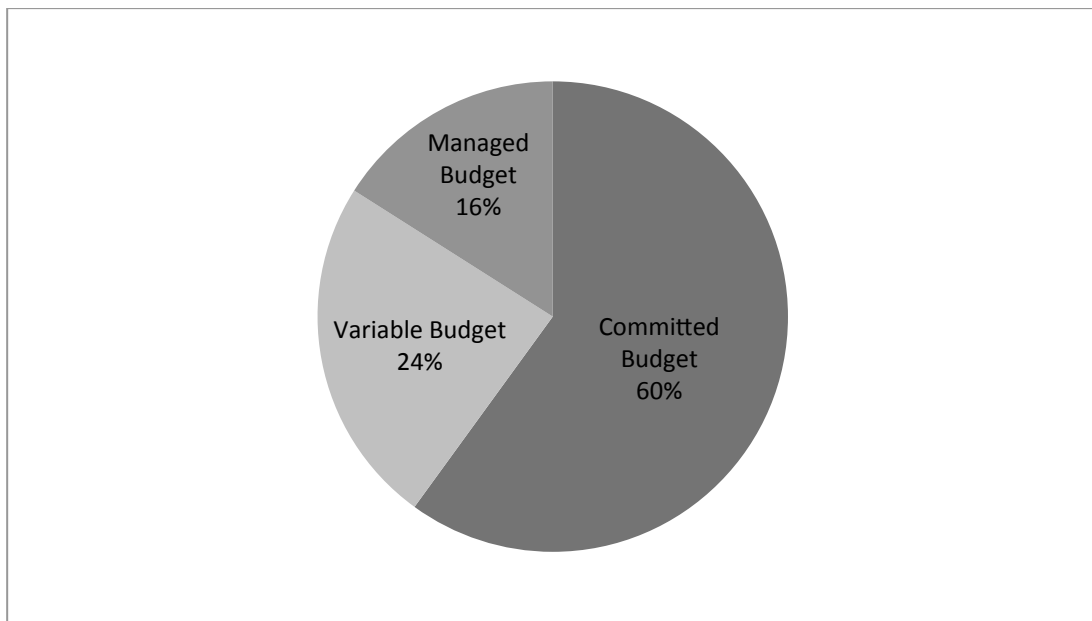


Figure 9 - Maintenance Budget Model (Strawn, 2011)

The exclusion of maintenance budget in an entity’s annual budget turns any maintenance requirement into an emergency activity, hence recipe for disturbance to the budget.

2.6.3.3 Procurement

Procurement is defined as the process on how maintenance works are realized (Wordsworth, 2001). Maintenance activities can be procured either using works or materials, where labour is available.

- a. **Procurement of Works:** There are six ways that can be used, namely: direct labour or in-house service, outsourcing, out-tasking, public private partnership, total facilities management and traditional partnering (Attack Placements, 2014). An entity may determine

the best method for procuring maintenance works, by looking at its requirements, which can be determined by examining Client requirement, Client/decision-maker characteristics, Project characteristics and External environment/factor (Institute of Maintenance Management Education, 2013).

b. Procurement of Materials: where labour is available, this method of procurement is considered to be a better option. To achieve the maximization of this method, a model was developed from requisition to receipt by Attack Placement (2014), whereby verifying whether the requested materials are of good quality as per order is a necessity. The module follows the SAP⁷Material Management (MM) module, with its varied customizable features, to cater for all domains of the industry irrespective of size and operation. Figure 10 illustrates the process;



Figure 10-Material Verification Process (Attack Placements, 2014)

2.6.3.3.1 The Malawi Public Procurement Act

It was formulated and came into use in 2003 under the act of Parliament. A body was established to oversee all public procurements in Malawi and is called Office of the Director of Public Procurement. This office is responsible for regulating and monitoring all public procurements under the general supervision of the President of Malawi (Office of the Director of Public Procurement [ODPP], 2003).

The Act says that all procurements in the Government Ministries, departments and parastatal organisations shall comply with the laid down procedures under the act. One of the rule under this act is that all concerned bodies should form Internal Procurement Committees (IPC) whose responsibilities are to “ascertain availability of funds, open bids, examine,

⁷SAP stands for Systems, Applications and Products.

evaluate and compare the bids and later select the successful bidder” (ODPP, 2003). In addition, the act speculates that once an order is given, materials are supposed to be delivered after a lean period of fourteen days (14) or works are supposed to be done within the agreed time frame. All materials or works are supposed to be checked or verified to ascertain their quality before a receipt and payment is issued.

However, it states that both procurement of works and materials should be as open as possible, thus using Open Tendering⁸ to enhance transparency and give equal opportunities to all parties involved (Business Dictionary). This system allows that the service providers or suppliers be given a minimum of 14 days submit their quotations and compete on the basis of fair pricing. In some situations where procurement is limited to factors like delivery time and specifications of the items to be procured, the act accepts the use of Restrictive Tendering⁹ (either use of Request for Quotations (RFQ) or selective tendering) (Lynch, 2017). A minimum of seven (7) days is allowed suppliers or service providers to submit their quotation for consideration. However, in some very rare situations, single – sourcing is allowed but with strict conditions.

In all these procedures, the significant thing is that emergency purchase is not among the conditions of the act and regulations hence encouraging offices to use planned methods in their procurement of either materials or works. This arrangement concurs with Attack Placement, 2014 method where all procurements have to follow an agreeable procedure before payment is issued.

2.6.3.4 Developing Work Plans

A work plan is a written resource whereby labour resources and support equipment are allocated to specific jobs at a fixed time (Nyman & Levitt, 2006). It is advisable to develop a standardized work plan that can be followed at any time and by all maintenance personnel. A work plan is developed for the purpose of improving workforce productivity and work quality thereby minimizing completion delays. Through good work plans, it is easier to achieve good coordination of labour, materials, and equipment within a specified period of time and at the correct place. In developing these work plans, the engagement of the right personnel is important and they can be categorized by size – the amount of work; or type – the definition

⁸Open Tendering is a bidding process that is open to all qualified bidders and where sealed bids are opened in public for scrutiny and are chosen on the basis of price and quality.

⁹Restrictive Tendering is a procurement method that limits the request for tenders to a selected number of suppliers, contractors or service providers.

of the work.

2.6.4. Monitoring and Reporting

Monitoring is a systematic continuous activity that is achieved by collecting data on specific indicators in order to provide the relevant authorities with progress, weakness achievements and interventions on an ongoing activity. It is also defined as a regular observation and recording of activities taking place in an ongoing project or program (Bartle, 1998). Constant monitoring of work in progress is the only way of ensuring that work is done according to plan. It enables management or authorities have knowledge on whether the objectives and goals of that particular activity are being met.

Any informational work¹⁰ made with the specific intention of relaying information or recounting certain events in a widely manner is called a report. In maintenance management, reporting of works¹¹ is essential in that, it provides feedback to people.

A good maintenance management system should be able to provide reports on closing work orders. These reports would give details on how labour and materials were allocated; challenges met and propose steps to attend to future orders.

2.7 Structuring Maintenance Management

There are different ways of organizing the maintenance management process depending on the frequency of work reports (Choka, 2012). In recent times, a growing number of organizations are incorporating maintenance activities in their organizational structure through the Facilities or Estates Management Unit. Although this is not the only responsibility of the Facilities or Estates Management Unit, maintenance is regarded as another integral part of the unit, as it assists in preserving the intended use of the available buildings.

Figure 11, shows an example of an estates department structure at Kenyatta University, where maintenance activities have been considered and personnel duly incorporated.

¹⁰Usually of writing, speech, television, or film.

¹¹Can be work in progress, completed or about to start.

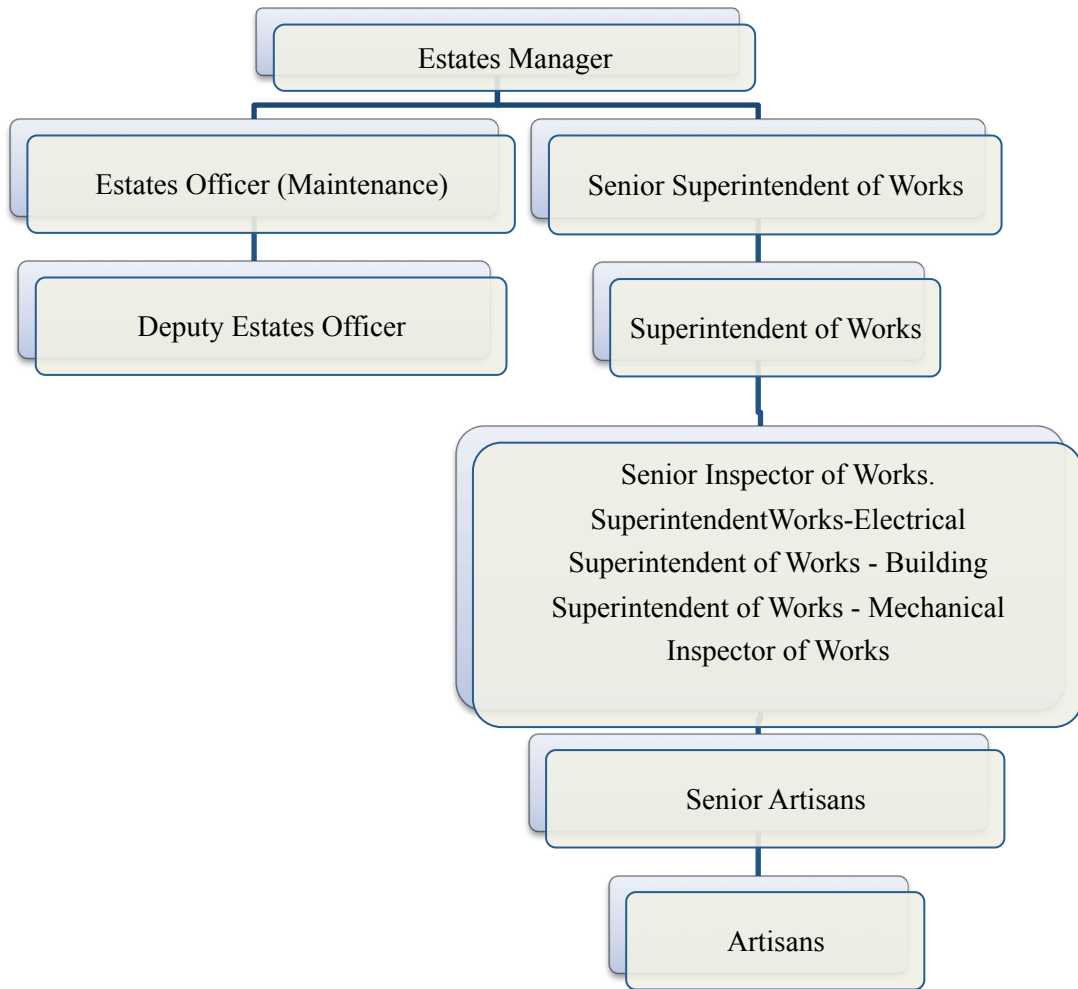


Figure 11- An Estates Management Unit Structure at Kenyatta University (Choka, 2012)

It is worth noting that the type of departmental structure adopted for maintenance management in any organization is also determined by the functions of the particular organization (Shake, 1995). Thus, the goals and objectives of an organization will dictate the type of buildings to use in maintenance management. Proper staffing with well-defined roles will ensure that work orders are handled at the appropriate time with the appropriate persons.

2.8 Maintenance Management Structure at the Polytechnic

The structure of maintenance unit at The Polytechnic was been changed from 1999 with recommendations from Malawi Institute of Management (MIM) Report. Previously, the College used to have full time maintenance personnel who could respond to maintenance queries and were headed by a Maintenance Supervisor. Figure 12 illustrates how the maintenance unit used to be.

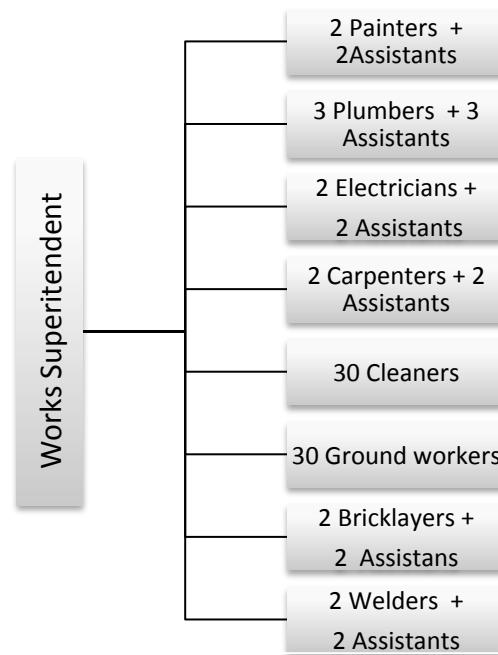


Figure 12- An organogram of the maintenance section before abolishment.

A Works Superintendent who was reporting to the Registrar headed the section. Materials were kept in the stores department waiting for dispatch in case of emergency.

The MIM Report (1999) recommended that all non-core functions within the UNIMA should be outsourced to pave way for the concentration of core functions. This saw the abolishment of the maintenance unit and the birth of contractors to handle maintenances. However, after some years, it was realized that handling maintenances using contractors was costly and lacked expertise hence the birth of an Estates Section. The section was introduced to handle all issues concerning the built infrastructure of the College with maintenance included.

Maintenance of buildings at Polytechnic is basically rectifying, replacing, renovating and extending. Majority of these works are done when a query is raised.

2.9 Factors affecting Maintenance of buildings in Universities of Africa

Literature has revealed that many institutions in Africa especially in the universities are using “management by crisis” way of handling maintenance activities, thus, handling maintenance when a crisis has fallen. Some factors that have been mentioned to affect the proper administration of maintenance activities in UNIMA, as described by (Bowazi & Buys, 2012), are similar to those affecting Kenyatta University in Kenya as elaborated by other researchers

(Choka, 2012; Shake, 1995). These authors summarized the generic problems as being:

a. Financial constraints - inadequate finances because of less allocation in the budget. Many organizations perceive maintenance as a resource drainer or resource waste (Siyabola, Ogunmakinde, & Akinola, 2013; Zawawi & Kamaruzzaman, 2009). Because of these perceptions, many organizations allocate little provision to the maintenance budget (Flores-Colen & Brito, 2010). In fact, the maintenance budget is the first most likely budget line to be reduced when there are calls to scale down on the budget. Surveys in Malaysia and Ghana also identified the same as contributing to the poor maintenance of buildings (Talib, Ahmad, Zakaria, & Sulieman, 2014; Ofori, Duodu, & Bonney, 2015).

b. Unavailability of skilled labour-the available personnel to handle maintenance requirements is always on the low side and in most times unskilled.

c. Lack of Preventive Maintenance Methods - unavailability of standard methods and guidelines to assist in the implementation of maintenance activities is a drawback.

d. Misuses of buildings after completion -majority of the occupants do not use the available facilities with care. There is no sense of ownership in most buildings.

e. Availability of materials – refers to poor selection of materials that will suit the environment in which the building is constructed. Modern materials have also affected the availability of materials for old buildings rendering the later obsolete, hence need for replacement of the entire system.

f. Design maintainability – most building designs pose difficulties in maintaining due to some in considerations during the design stage. A good design should provide easy access to facilities within building for maintenance and cleaning.

2.10 Chapter Summary

This chapter has reviewed available literature on the existing practises, which are relevant to the research problem. The review has looked at the building, maintenance concepts, significance of maintenance and types of maintenance.

The chapter has also described the essence of maintenance management and analysed the processes involved in managing maintenance of buildings. In the course of analysing the maintenance management process, the researcher had the opportunity to investigate in detail the different maintenance plans that have been described and used by various researchers. An overview on the reporting, monitoring and evaluation of maintenance management has also been outlined.

The chapter concludes by identifying alternative organizational structuring of a maintenance unit. In analyzing the unit structure, the researcher has also identified some of the problems that have contributed to the dilapidation of university buildings in sub-Saharan Africa.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methods the researcher has used to answer the research questions, as derived from the research problem. The chapter also outlines research design methodology, sampling approach, data collection and analysis, ethical issues and limitations encountered in undertaking this research.

3.2 Research Design

This study is an exploratory research, which evaluates the existing maintenance management system currently being used at the University of Malawi – The Polytechnic. The research questions and objectives that have been raised and stated respectively have been answered through a case study approach. By using this approach, the researcher has undertaken an in-depth investigation and unearthed accurate information on how the outlook and status of the buildings at The Polytechnic affect the daily operations and image of the College.

Although the case study method is time consuming, it is believed that the results obtained, closely represent the true and accurate information of the case under study (McNiff, 1992). Answering the “WHY” and “WHAT” questions in this study was also important in providing clues to the research problem hence solving the hypothetical belief that “poor maintenance of buildings in tertiary education is as a result of lack of funding”. The study has therefore, explored, identified and analysed the maintenance management system (policies, strategies, standards) being used at the College.

3.3 Methodology

The research has used both primary and secondary data sources to get information. Primary data was collected through the administration of questionnaires to users of various buildings to obtain their perception on how maintenance activities are handled. Face to face interviews were also conducted in cases where further information was required as this gives the interviewer and interviewee the opportunity to freely ask and answer any question about events, behaviour and beliefs in relation to the topic under study (Saunders, Lewis, & Thornhill, 2000).

The secondary data helped in complementing and validating results from primary data. The main sources of data were maintenance request forms, approved budgets and local purchase orders (LPOs) for the past five years. These three tasks provided the linkages between the maintenance task, budget and procurement. They also provided means of tracking and comparing number of maintenance requests from various disciplines or trades. Furthermore, this information assisted in determining how the available resources were used and whether they had impacted on the status of the building.

3.4 Sampling

The research used both probabilistic and non-probabilistic techniques in sampling the population. In the probabilistic technique, the population was clustered into three categories: teaching and learning, accommodation and administrative; so that data on these could be analysed and concluded as such. However, in handling data for the groups, non-probabilistic approach was used through purposive¹² judgment sampling by virtue of their positions and institutional memory they have (Crossman, 2015).

The samples were obtained randomly using representatives of each group independent of the building conditions. The facilities were divided into three categories, thus;

- a. **Accommodation;** data under this category was obtained from the residents of these facilities. They were selected randomly for the staff housing units and purposively for the student's hostels – by using the students' body because reaching to them was much easier and the majority of members have been with the college for more than two years.
- b. **Teaching and learning facilities;** data under this category were obtained from the academic staff members who were selected purposively; only Heads and Deans were targeted to represent the college. Similarly, heads of sections under Administration department were purposively approached to represent the users amongst administrative staff members. Data collected in this category would cover all areas that are connected with recreation; teaching and learning including staff offices, workshops, classrooms, laboratories, sports grounds, students' common rooms and staff common rooms.

¹²Purposive Sampling is the selection of a sample basing on the knowledge of a population and the purpose of the sample.

- c. **Administrative Category**; this category reviewed how policies, strategies and standards are developed and complemented. Data was obtained through purposive and selective sampling and included College Executive Management¹³. However, in cases where it was necessary to get data from outside sources, only purposive sampling was used.

Table 1 illustrates how the participants were selected for the chosen categories.

Table 1 - Categories of selected participants

Category	Area Required	Participants	Population	Number
Accommodation	Students Hostels	PSU Executive	17	17
	Staff Housing	Poly Village	19	19
		Chichiri Flats	26	13
		Mount Pleasant	10	10
		Other Locations	12	12
Teaching and Learning facilities	Classrooms, Workshops, Laboratories and Offices	Deans of Faculties	6	6
		Heads of Faculties	17	17
Administrative Category	Strategic plans and policies	Executive management	8	8
	Implementation	Estates personnel	4	4
TOTAL			119	106

3.5 Data Collection

Data was collected through various avenues. In addition, recent pictures of the buildings within the case study were part of the data that was collected.

¹³**College Executive Management** includes Principal, Vice Principal, Registrar, Finance Officer, Librarian, Assistant Registrars and Estates Development Officer.

3.5.1 Primary Data

Primary data was collected using questionnaires, which contained both structured¹⁴ and unstructured¹⁵ questions (Selvaraja, 2014). Two research assistants to all the three sampling categories to unearth some issues to be used as variables for further investigations administered the questionnaires. The purpose of engaging research assistants was two-fold; to mitigate the potential for bias by the researcher, who is a member of staff and ensure smooth collection of data. Structured questions were intended to unearth issues that could assist in investigating the users' views on how maintenance activities, within the premises they are residing in and/or using, are being handled. This would include determining the users' perception on responsiveness to queries.

The unstructured questions provided clues on whether there is a maintenance management system that is currently being followed by the university. Questionnaires and interviews were administered to the College Executive Management and the University Estates Development Officer (UEDO) who are the planners and implementers respectively. In addition, there was identification on how the available policies and strategies are being implemented. Views of the Works Supervisors and the Foreman were gathered using different questionnaires that were administered to determine daily maintenance routines.

3.5.2 Secondary Data

Records to be reviewed or analysed included; maintenance requisition forms, local purchase orders, maintenance plans, housing policies, student accommodation policies, university strategic plan and college budgets for the past five years.

Cleaning of data was done to remove all double requisitions to ensure that only one request was considered.

3.6 Data Analysis

Collected data was presented and analysed using tabular, graphical, statistical and narrative methods. By using the three phases of the Maintenance Management Process model, data was summarized and conclusions were drawn (DHPW, 2012).

- a. Tables, graphs and charts - Microsoft excel was used in analysing all empirical data that was obtained from primary and secondary sources.

¹⁴These are closed ended questions and are analyzed quantitatively.

¹⁵These are open-ended questions where there are no lists of answers from which to choose.

- b. Pictures – the pictorial views were also be analysed to provide information on the current outlook of the buildings.
- c. Correlation analysis was used to gauge relationships of primary data.
- d. Narrative methods were used to descriptively present the data using Microsoft word.

3.7 Limitations

Some records for the past years up to 2011 were missing and hence past information was obtained from interview with people who were around during those years. Availability of stakeholders in providing feedback by completing the questionnaires was difficult. As such, face-to-face interviews were limited to top management.

3.8 Research Ethics

The study considered several ethical issues, which included privacy of respondents, by excluding names on the questionnaires and not personalizing individual feedbacks whether positive or negative. Permission was sought from management to conduct the survey on the campus. Data collected has been used for the purpose of this thesis only and would remain the property of the College.

3.9 Chapter Summary

This chapter has discussed the methods the researcher used in obtaining the required information to answer the research questions. Methods of data collection and analyses were identified and discussed to give the researcher direction on how the research was going to be conducted. It has also discussed study limitations and how they were mitigated. Furthermore, the chapter has discussed application of research ethical issues.

CHAPTER 4

RESULTS AND DISCUSSIONS

4.0 Introduction

This chapter presents results of the findings from the data collected in the study by using the Maintenance Management Framework developed by the (DHPW, 2014). The collected data has provided answers to the research questions and has been presented by descriptive narrations, tables, graphs and charts.

4.1 Administration of questionnaires

A total of 106 questionnaires were administered to staff members and students. Out of the 106 questionnaires that were administered, a total of 95 were responded to representing a 90 percent response rate as shown in Table 2.

Table 2 - Questionnaire Response Rate

Category of Respondents		Number of copies distributed	Number of copies Received	Percentage of responses received
Administrative		12	9	75
Teaching and Learning		23	17	74
Accommodation	Staff Housing	54	52	96
	Students Hostels	17	17	100
TOTALS		106	95	90

The overall response rate was above 70 percent as such, the results were considered to represent the views of the majority of the stakeholders. The higher response rate in the accommodation category could be explained in terms of sense of ownership of the living space allocated to the respondents, which is difficult for common space like in administration and teaching and learning facilities.

4.2 Estates Personnel Staffing Levels

The College abolished the Maintenance Section and established an Estates Management Section in 2009 to take charge of the College's maintenance activities. Table 3 presents the details of the section's staffing profile.

Table 3- Personnel in the Estates Section at the Polytechnic

Type of Qualification	Number of People	Percentage of total Workers.	Type of employment
Degree in Architecture	1	4	2year Contract
Diploma in Construction Technology	2	9	2year Contract
PG Diploma in Business Administration	1	4	Tenure
Advanced Diploma in Bricklaying	1	4	Temporary – daily paid
Grade 1 to 3 Artisans (various field)	8	35	Temporary – daily paid
Unskilled assistants	10	44	Temporary – daily paid
TOTAL	23	100	

The section has a total of 23 members of staff, 96 percent of which are either on contract or temporary employment terms. The study, found that staff members on temporary employment¹⁶ constitute 83 percent of the whole section whilst only 4 percent of the staff population in the section is on tenure basis. The study realised that all staff members on temporary employment are artisans, who are the major key players in maintenance of buildings, since they are assigned specific tasks during the period of their engagement. These short-term employments of artisans, has attributed to the challenges of getting skilled artisans on the market to engage and the college loss on institutional memory, which has made it difficult for subsequent workers to follow up on previous maintenance works.

The study also looked at the number of artisans available in the past years when maintenance personnel were employed on tenure and the number of maintenance personnel during the five-

¹⁶ Staffs on temporary employment are paid on a daily basis and are not entitled to pension.

year period of study to check whether the employment method is affecting maintenance operations. Table 4 demonstrates the findings;

Table 4 -Illustrates variances in maintenance personnel

Trade	Before restructuring	After restructuring	Variance
Bricklayers	2	1	1
Carpenters	2	2	0
Electricians	2	2	0
Plumbers	3	2	1
Welders	2	1	1
Totals	11	8	3

The study observed that before restructuring, the Maintenance section had eleven artisans compared to eight after the restructuring. Thus a total variance of 3, which could be marginal, and need not have great impact on the operations of the Estates Section if the trades affected do have much work to do. However, the gaps could mean either some essential sections are not handle properly due to shortage of staff or were over supplied in the past.

The results indicate that there should not be any difference on how maintenance of works are handled since the numbers are equally the same. But the difference in engagement method could bring positive and negative results. Thus before restructuring, all artisans were employed on tenure whilst after restructuring, the same artisans were engaged on a daily basis payment. This could mean high staff turnover making works not to be completed on time with different qualities whilst on the same time, the college could be saving on wages.

4.3 Project Implementation Team

The study established that major projects at the College are awarded to contractors after competitive bidding and are managed by a Project Implementation Team (PIT) that is composed of nine College members of staff from different disciplines as outlined in Table 5 below;

Table 5 - Composition of Project Implementation Team (PIT) at the Polytechnic

POSITION	PROFESSION	Number
Team Leader	Quantity Surveyor	1
Electrical Engineer	Engineer	2
Mechanical Engineer	Engineer	2
Architect	Architect	1
Works Supervisor	Estates Management	2
Secretariat	Procurement, Finance, Registry	3
TOTALS		9

As it can be seen from table 5, composition of the PIT is skewed towards technical experts at 67 percent, which has resulted in the College making savings on its infrastructure projects with regard to professional services; this has accordingly reduced the overall cost of the college's construction projects.

4.4 Maintenance Policy, Strategy and Standards

In the quest to determine whether the College had a maintenance policy or not to guide its maintenance activities, questionnaires were administered and their response rates are outlined in Table 6.

Table 6 - Response rates to the questionnaires

QUESTION	AVAILABLE		Total number of Respondents	Frequency	
	YES	NO		YES	NO.
College documented Policy on Maintenance of Buildings	0	13	13	0.0	100.0
College Strategic Plan for Maintenance	0	13	13	0.0	100.0
College have a maintenance strategy	3	10	13	23.1	76.9
College minimum building condition Standards	0	13	13	0.0	100.0
Departmental Staff training Policy at all cadres	4	9	13	30.8	69.2
Frequency Average				10.8	89.2

Table 6 indicates that 100 percent of the respondents indicated that the College did not have a defined maintenance policy in place. Furthermore, the respondents advised the researcher to check this out with the University Central Office (UCO), which coordinates policy issues affecting the University's constituent colleges. An interview with the University estates Officer (UEO) revealed that even the UCO did not have the maintenance policy but was making arrangements to work on it.

Despite the College not having a defined maintenance policy in place, the study found that the maintenance section had developed its own guiding procedures for managing students' accommodation and staff housing maintenance activities. These were mistakenly referred to as strategies as can be seen that 23 percent agreed to have seen maintenance strategies at some point. It was also found that the estates office uses its discretion that is vetted by college management from time to time, to determine which activities to prioritize. The estates section confirmed that maintenance requirements are dealt with based on date of order by which they are presented to the section and also based on the urgency of the matter.

The study also found that the College is devoid of laid down standards for inspection of buildings to determine maintenance needs. Just as was the case with maintenance policy, the UEDO was expected to have developed these standards to ensure that there was direction in management of university property. The interview with the UEDO revealed that the standards were not developed owing to a shortage of expertise and personnel in the UCO. In the absence of set standards, maintenance of College buildings was done without any benchmarks to gauge the adequacy of the works done.

The study found that consequent to lack of defined university maintenance policy and inspection standard, the College did not have a Maintenance Strategy to inform its maintenance activities. Nonetheless, it was found that the maintenance section did produce annual maintenance plans that would help the section in the development of its annual budgets.

Non-availability of standards, policies and strategies has a negative impact on maintenance activities since employees will be working without knowledge of policies and their implications on budgetary and other constraints. However, one can speculate that the college has an opportunity to develop proper quality assurance guidelines because the personnel to do the work are available.

4.5 Maintenance Budgeting and Funding

The study showed that the section's annual budgets did include plans for routine and preventive maintenances, rehabilitation works as well as provision for corrective and deferred maintenances. The study further showed that for the section to carry out its planned activities, it depended on flow of revenue from three major funding sources, which are depicted in table 7:

Table 7 - Proposed Maintenance funding sources for the period 2010 – 2014

Source of Funds for five Years	Total per category (MK)	Percentage Contribution
Government Subvention & Other sources	248,341,544.00	61.48
Staff Housing Rentals	129,388,000.00	32.03
Students Hostels Rentals	26,193,120.00	6.48
TOTALS PER YEAR	403,922,664.00	100.00

The results show that almost 61.48 percent of the expected financial resources for the maintenance section were from Government subvention and other sources. The next significant funding source (32.03 percent) lies in the proceeds of staff housing rentals (this includes some commercial housing areas). The remaining funding source only account for less than 10 percent of the financial resources to the section.

The study sought to understand how the availed financial resources were collected over the five-year period. It transpired that Government funding remained the significant source over the period at 50 percent, and this is true even though there was no flow from this funding source in 2011. It was interesting to realise that hostel rentals only became a source of funding maintenance operations in 2013. Table 8 shows contribution of each funding source, over the period 2010-2014.

Table 8 - Actual Estates funding for the period 2010 – 2014

Source of Funding	Percentage contribution per year					Average Percentage Contribution
	2010	2011	2012	2013	2014	
Govt. Subvention and other sources	77	5	59	71	75	57.4
Housing rentals	23	95	41	19	18	39.2
Hostel Rentals	0	0	0	10	7	3.4
Totals	100	100	100	100	100	100

The study found that out of 57.4 percent Government contribution, 7.6 percentage of it comes from other College’s funding avenues (departmental centres), operating from its buildings. However, this funding source is not within the College’s control as the release of the funds is at discretion of the centres’ management. The implication is that maintenance of other College buildings – other than those rooms being used by centres; would get nothing if the centres decided to channel the resources to other priority areas of its choice.

The study also established that contribution of the housing commercial sector, which includes 3 houses of two rooms each, was minimal amounting to 0.4 percent. These housing units were rented out to non-college staff members and rentals were pegged at the market rates as opposed to subsidized rates for College houses rented to College staff members. Looking at the two tables (7 & 8) the researcher realised that funding for section is not according to its plans. The tables indicate a deficit of an overall average of -0.01 over the years as shown in Table 9;

Table 9 - Actual Estates funding for the period 2010 – 2014

Source of Funding	Average Percentage Budget	Average Percentage Allocation	Overall Average Percentage Difference
Govt. Subvention and other sources	61.48	57.4	4.08
Housing rentals	32.03	39.2	-7.17
Hostel Rentals	6.48	3.4	3.08
Totals	100	100	-0.01

It is evident from the table that funding in the housing area was more than what was anticipated and this was realised from an increase in the rentals over the five-year period. Whilst in the hostel rentals, what was anticipated was less than what was allocated just the same as Government contribution. Still more, the findings indicate that there is over dependency in government funding as compared to own generated income like the rentals.

4.6 Expenditure Over the years

The study went further to probe how the available resources were applied to the identified four maintenance areas; these were detailed in Table 10.

Table 10 - Expenditure over the period 2010 - 2014

Used Funds (Mk) / Years	Total Expenditure (MK)	Percentage Usage
Teaching and Learning	69,383,842.92	22.40
Staff Housing	55,484,596.26	17.91
Student Hostels	184,932,994.16	59.69
TOTALS	309,801,433.34	100.00

It was found that contrary to the finding on funding sources, student hostels, which contributed a paltry 3.4 percent as a funding source, absorbed close to 60 percent of the available resources. Staff and commercial housing took nearly 18 percent, whilst teaching and learning (which encompasses even the general areas like Administration blocks, cafeteria, library) which takes its funding from government pocket used 22.40 percent out of 57.4

percent allocated. This entails that hostels are consuming the majority of the available resources but their contribution is minimal. This is negatively affecting maintenance activities as the concentration is on one area. Figure 13 summarises the findings in Table 9 and 10 to say that usage of resources does not necessarily tally with funding avenues.

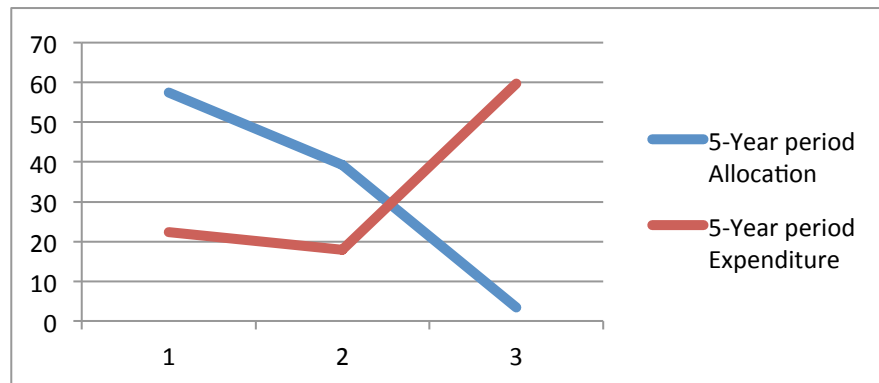


Figure 13-Relationship Diagram of Allocation and Expenditure from 2010 to 2014.

In Figure 13, the “Y” axis represents the overall percentage of funds allocated and used whilst the “X” axis represents the source of funding and expenditure. A correlation of -0.906 indicates that there is no relationship between the source of funding and the area it is being used. This could mean that maintenance was done according to demand not available funds in all service areas albeit at varying scales. The big gulf in expenditure between the highest 60 percent and the next 18 percent expending service area prompted the researcher to explore more on how maintenance is handled.

4.7 Handling of Maintenance Requests

The study found that the Estates section handles both planned and unplanned maintenances. It was learnt that College maintenances were supposed to be guided by the (University of Malawi Strategic Committee, 2012). However, Strategic Goal number 2 which is the most applicable to the maintenance function falls short in giving direction as to what activities maintenance should focus on.

The study noted that the college picked a cue from the strategic plan and developed a “maintenance request form” which is used to receiving maintenance requirements from facility users. The completion of this form is a key requirement for the department to commence any maintenance activity. The form is a generic tool that identifies maintenance needs of the requested and location of the activity. Upon receipt of forms, the maintenance

section categorizes the works according to trade. The study found that there are no specific days or times for receiving the form.

Table 11 shows the number of maintenance request forms received by the maintenance section over the five-year period by trade.

Table 11- Maintenance requests by trade over the period 2010 - 2014

Type of Work	Number of requests per Year						Percentage per Trade
	2010	2011	2012	2013	2014	TOTAL	
Carpentry	71	108	372	363	238	1152	39.7
Electrical	41	74	273	299	280	967	33.3
Plumbing	52	57	232	240	150	731	25.2
Welding	0	7	8	9	2	26	0.9
Builder's Work	1	1	9	3	2	16	0.5
Painting	3	2	3	3	0	11	0.4
Total Number	168	249	897	917	672	2,903	100
Percentage per Year	5.8	8.6	30.9	31.6	23.1	-	100

As it can be seen from Table 11, almost 40 percent of the maintenance requests were related to carpentry works, 33 percent pertained to electrical works and 25 percent were in relation to plumbing requirements. The remaining 2 percent of the requests were shared amongst builder's work, painting and welding. A review of the distribution of the maintenance requests shows a slow traffic in 2010 and 2011, which increased significantly by nearly four times in 2012 and peaked in 2013 with 32 percent and reduced to 23 percent in 2014. This could mean that funding in these years increased hence reduced requests in year 2014

Additionally, the use of this type of form is having a negative impact on recording (it does not really indicate clearly how many items need to be handled and the time it took the artisans to fix the problem) of queries hence need to redesign the form to reflect the various trades or disciplines. The distribution of work was further tracked to compare with the number of

artisan to determine whether maintenance requests were depending on number of artisans available or it was because of defects. It was found that the majority of the maintenance calls were in the disciplines with the most artisans. For instance, the carpentry discipline which has 25 percent of the entire staffing had an annual average of 10 maintenance calls per artisan; the plumbing discipline which had a comparable staffing proportion (25 percent) had an annual average of 6 maintenance calls per artisan; and, similarly, the electrician discipline that also had 25 percent staffing proportion, registered an average of 8 maintenance calls per artisan. Comparably, the welding and the builder disciplines that have a staffing proportion of 12.5 percent each had average annual maintenance calls per artisan of 5 and 3, respectively. In trying to relate the findings above, a relationship diagram was developed to see whether the average maintenance calls were related to expenditure lines as shown in Table 12.

Table 12–Comparison of maintenance requests with expenditure from 2010 to 2014

Service Areas	Average Percentage Expenditure	No. of Requests
Government Subvention & Other sources	22.4	25.2
Staff Housing Rentals	17.91	22.6
Students Hostels Rentals	59.69	52.2
Totals	100	100.0

The study further tracked the maintenance requests to establish service areas from which they originated. It was found that student hostels had the most calls for maintenance at 52.2 percent of all requests. Maintenance requests from the Teaching and learning service area was the next area with 25.2 percent of the total requests followed by the housing estate at 22.6 percent.

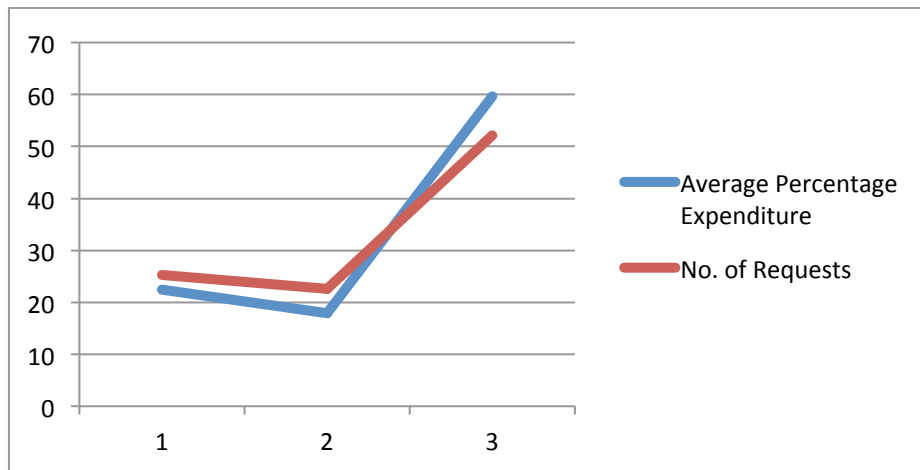


Figure 14-Relationship Diagram of Expenditure and maintenance calls from 2010 to 2014.

In Figure 14, the “Y” axis represents the overall percentage expenditure and requests whilst the “X” axis represents the service area. A correlation of 0.99 indicates that there was a relationship on where the maintenance requests were originating and how funds were allocated for expenditure. Table 12 findings agree with Table 10 where majority of the expenses were on hostel maintenance and yet do not reflect the same in the funding source as per Table 9 and 8 where proposed and actual contribution are less than the rest of the avenues.

There is therefore need for the college to devise a way of ranking and handling work according to funding so that concentration during maintenance is spread accordingly. In addition, to reduce maintenance requests of carpentry issues, there is need to look at the finishes of the buildings to replace the existing timber members.

The study team took a sample of pictures of the college buildings and hostels’ furniture to further corroborate the finding on the number of maintenance requests made per service area. The study asserted that 75 percent of fittings and furniture in the student hostels were made from wood and that almost 50 percent of these were exposed to weather conditions.

The study learned that when handling the maintenance requests, the Estates Section used a system for categorizing requests received, which allows the section to carry out maintenance works according to their respective priority. Table 13 is a sample of categorization of maintenance works in the section.

Table 13 - Sample of maintenance request categorization in the Maintenance Section

Item	Type of work Reported	Handling time	Responsible person
1	Emergency Work (like burst pipe, unclosing tap, fire).	Immediately	Artisan, Work Superintendent
2.	Repair / replacement of amenities (like locks, taps, sockets).	Within 24 hours	Artisan, Foreman
3.	Inspection of faulty area (like non-working toilet).	Within 12 hours	Work Superintendent

As can be seen from Table 13, the maintenance section treats the maintenance calls according to their urgency and assigns responsibilities to relevant personnel to carry out the works such that it becomes easy for the supervisor to determine if activities are carried out in tandem with the maintenance request made or not. However, the use of this approach in handling maintenances has greatly changed the state of buildings though fairly adequate.

4.8 Monitoring of Maintenance Works

The study learned that a work schedule template, as depicted in Table 14, is used to monitor maintenance works. The template clearly defines the nature of work to be handled, the date it has been reported or identified. The schedule also indicates the activities that have been performed and the people that have carried out the activities requested. The study learned that each maintenance activity was given a code to enable the section produce a report at the end of the month. The template is completed on a daily basis and as maintenance calls are reported.

Table 14 – Illustration of work distribution

Order No.	Place of Work	Description of Work	Date Reported	Progress of Work	Trade
15/001	KC / 12	Repair of kitchen sink tap	03/08/015	Tap closed. To be replaced.	Plumber A.
15/002	Room 13 Annex	Replacement of lock – keys lost	3/08/015	Lock replaced	Carpenter B
15/003	Room 4 – T6	Tap not closing – Gents toilet	5/08/015	Tap washer replaced	Plumber B
15/004	Library Outside toilet	Doorframe being eaten by termites.	9/08/015	Termite fountain removed. Waiting for total termite treatment.	Supervisor

The study discovered that a Work Schedule Template that serves as a tracking system to identify shortfalls in the execution of maintenance works. The EDO, Works Superintendents and the foreman are responsible for monitoring of the completed works. The system requires that the originator of a maintenance request sign off the request form after the works have been completed and is satisfied with the work done. The template is also used as a record for identifying the artisan who worked on a problem for purposes of following up on specific issues later on; it will be recalled that artisans in the section are on short-term employment.

The use of the template was seen to be a good start in following up of issues but there is need to develop a standard monitoring procedure where the stipulated response times indicated in Table 13 are indeed followed. In addition, the system is not capable of showing where the workmanship was according to the required standards.

4.9 Procurement of Materials

The study established that the Procurement Section procures all maintenance materials. And that it is mandatory for each section or department within the College to submit its procurement plan to the Procurement section at the beginning of the financial year. Table 15 depicts the programme of procurement of maintenance materials that was devised and agreed.

Table 15–Sample programme for procurement of maintenance materials

Type of Requisition	Time of Submission	Expected Date of Purchase
General Housing Requisitions	5 th of the preceding month	16 weeks after submission
Overall Hostel Maintenance	3 weeks after students close	3 weeks before school opening
General Campus Buildings Maintenance	5 th of the preceding month	16 weeks after submission
Emergency Issues	As soon as they come	Within 24hours
Planned Maintenances	Once funds are available for the works	16 weeks after date of submission.

The study found that the Estates Section only planned for stationery, equipment and staff uniforms. The study learned that the section found it difficult to plan for maintenance materials as these could only be used when need arise. To reduce the time lag in commencing maintenance works when requests are presented, procurement and estates section devised a programme for procurement of maintenance materials. When applied, this programme allows the Estates Section to receive materials within the shortest time possible.

According to Table 15, it takes the College approximately four months to procure materials once a purchase requisition was made. Only purchase of materials for emergency maintenance requests were handled within 24 hrs.

This way of operation and procurement cause delays in carrying out maintenance activities, as works could not commence until the materials were procured. This had negatively affected the operations on timeliness, quality of materials and their cost as can be seen from findings in the user perception graph.

Table 16- Summarised average perceptions of users of buildings at The Polytechnic.

Ranking Issues	Summarized Issues / Findings	Percentage of Respondents in agreement with Summarized Issues			Average Percentages
		Staff & Students	Estates Personnel	Management	
1	Late delivery of materials	70	74	60	95
2	Long process in procuring materials	55	96	80	77
3	Poor quality of materials	67	75	80	74
4	Lack of Ownership	5	100	100	68
5	Lack of Policy/standards/	35	50	100	62
6	Lack of materials	20	94	60	52
7	Lack/inconsistencies in funding	25	15	40	50
8	Federation System	20	45	80	48
9	Uncompleted Works	50	30	40	40
10	Late response to calls	75	5	0	27
11	Use of Old Buildings	15	5	20	13

4.10 Perception of users on Maintenance of Buildings

The study reviewed the perception of users of the College buildings on the way maintenance of College facilities was handled by engaging the community. Views were also solicited from all members of the community whether they thought it would be necessary to enhance the maintenance function at the College and how they feel maintenance is being handled.

As it can be seen from Table 16, the ranking shows that 95 percent of the respondents had concerns with the late delivery of maintenance materials. This concern featured highly amongst all respondents, namely: users; Estates Section staff members and even College management. The study found that the long process of procuring materials ranked second at 77 percent, whilst the concern of poor quality of materials ranked next at 74 percent. From these results, there is need to revisit the way materials are procured to ensure that materials are available when needed.

The research also revealed that the federal system of governing the college scored 48 percent, and it was connected with the lack of maintenance policy or standards, which was ranked at 62 percent. 68 percent of the respondents, especially college management and Estates personnel who scored 100 percent each, said that there is lack of ownership of the buildings.

The inconsistency in funding which was ranked at 50 percent was also considered to contribute towards the lack of maintenance of materials, which was ranked at 52 percent. This could also be the reason why 40 percent of the respondents indicated that maintenance works are not completed. Although the difference in the size of the maintenance team is marginal, the study found that stakeholder perceptions were that the post-restructuring performance on maintenance calls was seldom satisfactory or response to maintenance tasks was oftentimes delayed.

These results show that there is need to develop procedures to regularly get feedback and measure the level of satisfaction of customers. It will also be appropriate to address the needs of customers by addressing their complaints believing that this process will facilitate the process of continuous improvement. The results also could form a good basis to start the development of a policy.

4.11 Conclusion

The chapter has outlined and discussed the findings that have been obtained by checking through the maintenance request forms, estates budget presentations and expenditures, materials requisition forms, local purchase orders over the past five years and questionnaires. Questionnaires were distributed to such stakeholders as management, staff, students and estates personnel.

The chapter looked at various issues including composition of the Estates personnel, handling of maintenance calls, funding sources, and how funds are used. It also looked at how maintenance requests are handled and how the required materials are procured. The chapter concluded with how the community perceives the issue of maintenance of buildings at the Polytechnic.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents conclusions that have been drawn from the survey findings and discussions. These have been made to provide the College with a standard way of operationalizing maintenance activities in its buildings. The chapter has also identified the areas that need more attention in the current system and highlights areas requiring enhancing in the development of a comprehensive maintenance management framework for the College.

The research found that though the college has its own maintenance process being followed; it is only meant for adhoc activities. It was found that the establishment of a dedicated Estates Section at the Polytechnic was the first step for setting up a properly guided Maintenance Management System at the college though majority of the members in this section, who are on the operational side, are engaged on daily wage and yet they are key in maintenance operations. The employment system engaged poses a challenge in retaining reliable and skilled artisans, which compromises on level of quality work besides losing out on institutional memory, as the workers are frequently changed. There is need to work on this system if the college is to retain competent personnel.

Lack of a well-defined maintenance management system has attributed to the mishandling of maintenance hence rate of deterioration of buildings has grown high. In addition, the efficiency of these buildings has lessened affecting the effective production of the main goals of the college – thus teaching and learning.

5.2 Maintenance policies and practices

The study found that the lack of maintenance policy and standards has affected the development of strategies to guide the college in developing its maintenance budgets. It was found that the handling of works is on “as they come” basis making it difficult to plan and implement maintenance activities resulting in poor prioritization of work. The research determined that, over the five-year period, majority of the works at the College were concentrated in students’ hostels. Irrespective of the significant amounts being invested in hostels year in year out, the maintenance expenditure on hostels continues to increase every year.

The study found that the College does not have a maintenance plan to govern the daily maintenance works in the Estates Section. Instead, the section uses a maintenance request form, which is completed by the complainant to direct the section's maintenance activities.

This practice subjects the maintenance sections to handling ad hoc works, which are oftentimes treated as emergencies, hence cause for panic buying of maintenance materials. This has contributed to procurement of substandard materials as materials are bought in a rush to address the maintenance call. Besides, it was found that, the long procurement procedure does not help the cause for ad hoc maintenances.

5.3 Physical Condition of Infrastructure

The physical conditions of majority of the buildings need attention. The study found that majority of the materials used for construction of the buildings were made of materials that could not last the test of time considering that the locations of the buildings are in dumpy areas with high population of termites. In addition, it observed that timber was used as a major material in both fitted and loose furniture (which was eminent that they have outlived their use), hence prone to termite attacks and rotting, as can be seen from Appendix 1. With the passing of time and limited maintenance, the fittings could not stand the environmental pressure hence failing to provide the required service.

5.4 Stakeholders evaluation

The study established that there was an outcry on the way maintenance of buildings at the college is being handled. Lack and late delivery of materials has proven to be the biggest worry coupled with long procurement procedures, which have compounded the problem. This has made the maintenance team to respond late to calls and not fully addressing the problem. of stakeholders resulting in faults being repaired late. Contributing to the deteriorating state of the buildings was lack of ownership by the community, as they do not bother to care for the buildings. Availability of funds did not really cause a big challenge in handling maintenance activities but priotisation of work and response to queries were a problem due to lack of policies and guiding standards. The use of temporary artisans has seen the college having uncompleted and substandard works due to inability to retain competent persons.

5.5 Application of Policies in response to stakeholders

Since the college does not have policies, standards or procedures to use when maintaining the college buildings, it was certain that work was done as per requirement. The College needs to develop a maintenance policy to govern maintenance operations. The community should also be sensitized on the importance of caring for the buildings and the environment as they are key to facilitating the transfer of knowledge and carrying out of other academic activities (Olanrewaju, Khamidi, & Idrus, 2010).

5.6 Other findings

The study discovered that funding of maintenance activities was basically from three areas; Government, hostel and housing rentals. The other avenues contribute minimal which is insignificant and yet there is an opportunity for the college to enhance its funding base by engaging these centres in providing for maintenance activities yearly.

5.7 Recommendations from the study

This chapter presents recommendations that have been drawn from the survey findings, discussions and conclusions. These recommendations could be adopted or adapted for use in the whole UNIMA. The study brought out the hidden importance of institutions having well defined building standards in achieving teaching and learning goals in higher learning institutions. It also provided a critical and analytical perspective for appreciating the factors affecting the decision making in carrying out building maintenance to the academicians and management. The study also intended to bring to the fore the major inhibiting factors in the maintenance of buildings in the University of Malawi.

The study therefore recommends that;

- a. The college should develop maintenance policies and define the standards, which should be used in handling all maintenance activities.
- b. The Estates section should develop a standard maintenance plan for all its activities despite their nature. In addition, there is need to have regular inspections of the premises to identify faults in advance before they cause damage; thus, preventive maintenance.

- c. The engagement of key personnel in the Estates Section must be either on permanent or contract to ensure that skilled labour is retained hence maintain good workmanship.
- d. The college should embark on an exercise to replace majority of timber fittings with steel or aluminium to address the issue of rotting and regular breakages.
- e. In order to bring out a sense of ownership within the users, the following are recommended:
 - i. Teaching and learning spaces should be managed centrally and each faculty should pay for the utilization of these spaces.
 - ii. Occupancy of residential properties should be for a period of five years renewable upon mutual consent of the college and the occupant.
 - iii. Occupancy of hostel should be on an annual basis, with rentals paid in advance and a refundable deposit of one-month rental.
- f. To address the problem of sub-standard materials, Sustainable Procurement¹⁷ procedures should be used in purchasing maintenance materials and works (ECO-Buy Limited., 2013).

5.8 Recommendations for further research

Further investigations could be made in the following areas:

- a. The possible implementation of a Computerized Maintenance Management System (CMMS) in handling maintenance operations.
- b. The effect of centralizing all buildings so that each faculty should pay for the space it is using. This will ensure that maintenance funding is available.
- c. The possibility of outsourcing the management of all residential properties, thus hostels and housing estate.

¹⁷Sustainable Procurement means making sure that the products and services that are bought achieve the value for money and generate benefits to the organization, the environment, the society as well as the economy.

REFERENCES

- 2020 Business Insight. (2015). What is a Critical path? *Optimizing projects and people performance* . United Kingdom.
- Adebayo, O. A. (2010). A study of tenants' maintenance awareness, responsibility and satisfaction in institutional housing in Nigeria. *International Journal of Strategic Property Management* , 10 (4), 217-231. doi:10.1080/1648715.
- Adenuga, O. A., Odusami, K., & Faremi, J. (2007). Assessment of factors affecting maintenance management of public hospital buildings in Lagos State, Nigeria. *The construction and building research conference of the Royal Institution of Chartered Surveyors*. (pp. 1-9). London: RICS,.
- Al-Ahmmad, A.-M. D. (2008). *King Fahd University of Petroleum and Minerals; Principles of maintenance*. Retrieved May 28, 2015 from King Fahd University of Petroleum and Minerals: <http://faculty.kfpm.edu.sa/ARE/amhammad/teaching.htm>
- Ali, A. S. (2009). Cost decision making in building maintenance practice in Malaysia. *Journal of Facilities Management* , 7 (4), 298-306. doi:10.1108/14725960910990044.
- Attack Placements. (2014, December 11). *Procurement made hassle free by SAP*. Retrieved August 18, 2015 from Attack Placements: Home: <http://attackplacements.blogspot.com/2014/12/procurement-made-hassle-free-by-sap.html?m=1>
- Bartle, P. P. (1998). *Handbook of Monitoring*. Uganda.
- Becker, T. P. (2011). *Operational guidelines for educational facilities maintenance* (Second Edition ed.). (S. Glazner, Ed.) Alexandria, Virginia, U.S.A.: APPA.
- Bowazi, K., & Buys, F. (2012). Maintenance of university facilities in developing countries. *Delivering value to the community*, (pp. 681-690). Cape town.
- Bowazi, M. K. (2011). *Maintenance of university facilities in Developing countries*. Nelson Mandela Metropolitan University, Built Environment and Information Technology. Port Elizabeth, South Africa: Nelson Mandela Metropolitan University - Faculty of Engineering, the Built Environment and Information Technology.
- British Standard Institution [BSI 3811]. (1974). *Glossary of terms used in tero technology*. London: BSI.
- British Standard Institution [BSI 3811]. (1994). *Glossary of terms used in tero technology*. London: BSI.
- Business Dictionary. (n.d.). *Definition of Open Tendering*. Retrieved May 10, 2017 from businessdictionary.com: <http://www.businessdictionary.com/definition/open-tender.html>
- Campbell, J. D. (2006). *Uptime: Strategies for excellence in maintenance management*. Retrieved March 13, 2015 from Uptime-3-Planning-and-Scheduling-Resources: <http://faculty.kfupm>

- Choka, D. G. (2012). *A Study on the impact of maintenance management systems on maintenance condition of built facilities (case study of public universities in Kenya)*. University of Nairobi, Department of Real Estate & Construction Management. Nairobi: University of Nairobi.
- Cobbinah, P. J. (2010). *Maintenance of buildings of public institutions in Ghana. A case study of selected institutions in the Ashanti Region of Ghana*. Kwame Nkrumah University of Science and Technology, Kumasi., Department of Planning. Kumasi: Kwame Nkrumah University of Science and Technology.
- Crossman, A. (2015). *Understanding Purposive Sampling. An overview of methods and its applications*. United States of America.
- ECO-Buy Limited. (2013). *Sustainable procurement guide*. Commonwealth of Australian , Department of Environment and Energy. Melbourne, Australia.: Department of Sustainability, Environment, Water, Population and Communities.
- Flores-Colen, I., & Brito, J. d. (2010). A systematic approach for maintenance budgeting of buildings facades based on predictive and preventive strategies. *Journal of Perfomance of Constructed Facilities* , 24 (9), 1718-1729. doi:10.1016.
- Gawande, A. (2009). *The Checklist Manifesto - How to get things right*. Boston, New york, U.S.A.: Metropolitan Books.
- Hackman, H. Y., & Scott, D. (2008). Overview of maintenance strategy, acceptable maintenance standard and resources from a building maintenance operation perspective. *Journal of Building Appraisal* , 4, 269-278. doi:10.1057.
- Her Majesty's Stationery Office (HMSO). (1972). *Research and development bulletin, building maintenance*. The report of the Committee, Department of the Environment. London.: Amazon.
- Institute of Maintenance Management Education. (2013, July 21). *Definition and types of maintenance*. Retrieved August 11, 2015 from Maintenance Management: <http://www.immeinstitute.org>
- Investopedia . (2016). Gantt Cart. Investopedia, LLC.
- Lateef, O. (2008). Building maintenance management in Malaysia. *Journal of Building Appraisal* , 4 (3), 207-214. doi:10.1057.
- Liyanange, P. J., & Kumar, U. (2003). Towards a value-based view on operations and maintenance perfomance management. *Journal of Quality in Maintenance Engineering* , 9 (4), 333-350. doi:10.1108/13552510310503213.
- Lynch, J. (2017). *The Procurement classroom*. Retrieved May 10, 2017 from Procurement methods: <https://procurementclassroom.com/restricted-tendering.html>
- McNiff, J. (1992). *Action Research: Principles and Practises*. London, Britain: Routledge, London.
- Melvin, E. (1992). *Plan, predict, prevent: how to reinvest in public buildings*. American Public Works Association, Building Research Board. Illionolis: Chicago III. : American Public Works Assosiation, 1992.

- Microsoft Developer Network [MSDN]. (2015). *Microsoft*. Retrieved 02 16, 2016 from Maintenance Plans: <https://msdn.microsoft.com/en-us/library/ms187658.aspx>
- Mjema, E. A. (2002). An analysis of personnel capacity requirement in the maintenance department by using a simulation method. *Journal of Quality in Maintenance Engineering* , 8 (3), 253-273. doi:10.1108/13552510210439829.
- Msukwa, Y. (2015). *Malawi has no legal instruments to enforce 'Red Star' campaign - Surveyors Institute*. Blantyre: Nyasa Times.
- New South Wales Heritage Office. (2004). The maintenance series. *Preparing a maintenance plan* . Adelaide, Australia: Heritage Publication.
- Nyman, D., & Levitt, J. (2006). *Maintenance planning, scheduling and coordination* (Second ed.). Industrial Press Inc., 2001.
- Office of the Director of Public Procurement [ODPP]. (2003, June 20). The Malawi Public Procurement Act. *Public Procurement Act* , 8 . Lilongwe, Malawi: Government of Malawi.
- Ofori, I., Duodu, P. M., & Bonney, S. O. (2015). Establishing factors influencing building maintenance practices: Ghanaian perspective. *Journal of Economics and Sustainable Development* , 6 (24), 184-193. <https://www.iiste.org/Journals/index.php/JEDS/article/view/27920>.
- Olanrewaju, L. A., Khamidi, M. F., & Idrus, a. A. (2010). Quantitative analysis of defects in Malaysian university buildings: Providers' perspective. *Journal of Retail & Leisure Property* , 9 (2), 137-149. doi:10.1057/rlp.2010.2.
- Pintelon, L., & Parodi-Herz, A. (2008). Maintenance: An evolutionary perspective. In K. A. Koback, & D. P. Murthy, *Complex system maintenance handbook* (pp. 21-48). London, United Kingdom: Springer London.
- Queensland Department of Housing and Public Works [DHPW]. (2012). Building maintenance budget. In W. D. Public, & T. S. Queensland (Ed.), *Maintenance Management Framework* (Second ed., pp. 1-12). Brisbane, Australia: Queensland Department of Housing and Public Works.
- Queensland Department of Housing and Public Works [DHPW]. (2014). Building maintenance policy, standards and strategy development. In W. Q. Public, & T. S. Queensland (Ed.), *Maintenance Management Framework* (p. 2). Brisbane, Queensland, Australia: Department of Housing and Public Works.
- Rouse, M. (2011, March). *WhatIs.com*. (TechTarget, Producer) Retrieved June 2, 2016 from Pareto Chart (Pareto distribution diagram): <http://whatis.techtarget.com/definition/Pareto-chart-Pareto-distribution-diagram>
- Saunders, M., Lewis, P., & Thornhill, A. (2000). *Research methods for business students* (second ed.). Harlow, England: Pearson Education Limited.
- Schokry, A. D. (2010/2011). *Introduction to maintenance*. Retrieved May 15, 2015 from Islamic University of Gaza - Palestine: site.iugaza.edu.ps

- Seeley, I. H. (1976). *Building maintenance* (Fourth ed.). London: Macmillan Press Ltd.
- Selvaraja, A. (2014). Questionnaire - Types of questions, structured and unstructured questions, cautions regarding questions and questionnaires. *DOS in Library and Information Science* (p. 12). University of Mysore.
- Shake, R. H. (1995). *An evaluation of maintenance management and organisation in Nairobi City.ouncil*. Unpublished B.A. Research Project, University of Nairobi., Department of Real Estate and Construction Management, Nairobi.
- Shane, M. (2011). *Environmental audit, University of Malawi - Polytechnic*. Environmental Audit, University of Regina, Department of Facilities Management, Saskatchewan.
- Shardy, A., Razak, A. A., & Hanafi, M. H. (2012). Towards implementing property asset management: assessing current government practises in property management. *International Journal of Social Science* , 4 (1), 1-8. <http://www.Tijoss.com>.
- Siyanbola, A., Ogunmakinde, O., & Akinola, A. (2013). Analysis of the factors affecting building maintenance Government residential estate in Akure, Ondo State, Nigeria. *Journal of Environmental Science and Resources Management* , 5 (2), 89-103. <https://www.researchgate.net/publication/282846405>.
- Stonegate Property Inspections LLC. (2011, December 28). Retrieved May 07, 2015 from <http://www.stonegatecommercial.com/types-of-building-maintenance-1284>
- Strawn, T. T. (2011, April 04). What are the savings if an organisation moves from breakdown maintenance to more planned and scheduled maintenance? *Maintenance planning, scheduling deliver to the bittom line*. Raleigh, North Carolina, U.S.A.: Marshall Institute.
- Switzer Daily. (2012, November 20). *The Experts*. Retrieved April 05, 2017 from m.switzer.com.au: <http://m.switzer.com.au>
- Tahboub, K. K. (2011). An assessment of maintenance practices and problems in Jordanian Industries. *Jordan Journal of Mechanical and Industrial Engineering* , 5 (4), 315-323. <http://eacademic.ju.edu.jo/ktahboub/Lists/Published Research/DispForm.aspx?ID=26>.
- Talib, R., Ahmad, G. A., Zakaria, N., & Sulieman, M. Z. (2014). Assessment of factors affecting building maintenance and defects of public buildings in Penang, Malaysia. *Architecture Research* , 4 (2), 48-53. doi:10.5923/j.arch.20140402.03.
- University of Malawi - The Polytechnic Strategic Planning Committee. (2011). University of Malawi Strategic Plan for 2011 - 2015. *University of Malawi Strategic Plan for 2011 - 2015* . Blantyre, Malawi.
- University of Malawi Strategic Committee. (2012, July 01). University of Malawi Strategic Plan: 2012 - 2017. Zomba, Malawi.
- Wood, B. J. (2009). *Building maintenance*. (John Wiley & Sons Ltd, Ed.) New Dheli, India: Blackwell Publishing Ltd.
- Wordsworth, P. (2001). *Lee's building maintenance management*. (Fourth, Ed.) Liverpool, United Kingdom: Wiley-Blackwell.

- Zacharias, T. (2015). *Measurement and evaluation of the contribution of technical services within organizations*. Master Thesis, University of Macedonia, Department of Management Business Administration, Thessaloniki.
- Zawawi, E. M., & Kamaruzzaman, S. N. (2009). Personnel Characteristics of Maintenance Practice: A Case of High-Rise office buildings in Malaysia. *Journal of Sustainable Development* , 2 (1), 111-116. doi:10.5539/jsd.v2n1p111.

APPENDICES

Appendix 1 - College Buildings

a. Polytechnic Library



Wooden window fittings in the Library are made of timber and exposed to outside weather conditions.

b. Students Hostel



Hostel window fittings also made of timber fittings and exposed to outside environment

c. Staff Housing



Housing estate window fittings also made of timber and exposed to outside environment

Appendix 2 - Research approval request



UNIVERSITY OF MALAWI – THE POLYTECHNIC
ESTATES DEVELOPMENT UNIT

TO: Principal

Through: The Registrar

FROM: Mrs. Blessings Chaphadzika Hudge

DATE: 02nd July, 2014

IDM DISSERTATION

I enrolled in 2011 for Masters in Infrastructure Development and Management. I finished course work and remaining is the dissertation. I presented my proposal in 2013 and it was accepted. The topic, which I proposed to work on, is titled “Maintenance of buildings and ancillary services in higher learning institutions in Malawi – A case study of The Polytechnic”

For me to achieve this, I would need to ask questions and do some findings within the campus. I therefore write to ask for your permission to conduct the survey. Information obtained from this study will purely be for academic purposes and with your permission, could be used to improve some maintenance operations within the campus. All confidential information will be treated as such and no person will be mentioned in the research. Attached is the approved proposal for your information.

I am waiting for your favourable response.

Appendix 3 - Structured questionnaire for College Management

Maintenance policy and strategic planning

1. Does the College have a well defined and documented policy on the maintenance of University buildings?
 Yes NO
If **Yes**, how would you evaluate its implementation?
 Very Good (5) Good (4)
 Average/Fair (3) Poor (2)
 Very Poor (1)
2. Have you formulated a strategic plan for maintenance of the university buildings?
 Yes NO
3. Does the College have a Maintenance Strategy?
 Yes NO
4. If **Yes**, What is the Maintenance Strategy:
 Planned preventive maintenance
 Corrective maintenance
 Maintenance by crisis/ adhoc
 Unplanned maintenance
 Condition based maintenance
 other (Please specify) -----

5. Does the University / College set minimum condition standards at which various buildings should be maintained?
 Yes NO
a) If NO what challenges hinders this-----

b) If **YES** how regularly do you review and evaluate the above condition standards
 Monthly Quarterly
 Annually
 Other (Please specify)
6. How would you describe the organization structure for the Estates Section/
 Centralized
 Decentralized
 Other (Please specify).....
7. Does the department have a policy on the training of staff at all cadres?
 Yes NO

8. In your evaluation how would you rate the sufficiency of funding provided for maintenance works against the maintenance needs of College buildings?

Very Adequate (5)

Adequate (4)

Fairly Adequate (3)

Barely Adequate (2)

Insufficient (1)

9. In your evaluation how would you rate the university's system for procurement for materials and services for maintenance works?

Exceeds Expectations (5)

Meets Expectations (4)

Barely Meets Expectations (3) Below Expectations (2)

Doesn't meet expectations (1)

Appendix 4 - Structured questionnaire for Estates Officers

1. Does the department have in place a Maintenance Management Manual, which outlines all information regarding maintenance of buildings and other facilities?
 Yes NO

2. Does the department maintain an asset register of all buildings maintained?
 Yes NO

3. If **Yes**, which of the following information does it contain
 Building name Location and Age
 Construction details Functions of buildings
 Maintenance history-maintenance work done on it
 Replacement cost of building Previous and current condition assessment reports

4. Is the asset register updated regularly?
 Yes NO

5. Do you have a computerized data base of maintenance records?
 Yes NO

6. Do you have in place a Computerized Maintenance Management system (CMMS)
 Yes NO

7. Briefly enumerate the challenges faced in developing a Maintenance Information System for The department
.....
.....
.....

8. Does the department prepare an Annual Maintenance works program?
 Yes NO
If **Yes**, how would you rate its implementation
 Very Good (5) Good (4)
 Average/Fair (3) Poor (2)
 Very Poor (1)

9. Please indicate by what proportion (%) maintenance is executed?
a) By DirectLabour.....
b) By Contract (Outsourcing)

10. Please indicate number of staff in the department at the various levels
[] Senior Managers [] Middle level managers
[] Technical staff [] Supervisors

- Foremen
- Operatives (painters, masons, plumbers, carpenters, welders, electricians)

11. Please indicate of the above how many with qualifications at the following levels

- Postgraduate degree Professional qualifications
- Undergraduate degree Higher Diploma
- Diploma Grade Tests
- Other (Please specify) -----

12. What is your evaluation of the sufficiency of the number of staff at the various cadres given the needs of the department in relation to human capital? [Please tick as appropriate]

POSITION	Very Adequate (5)	Adequate (4)	Fairly Adequate (3)	Barely Adequate (2)	Insufficient (1)
Senior Managers					
Middle level Managers					
Technical staff/Supervisor					
Foremen					
Artisans					

13. Briefly enumerate the challenges faced in organization of maintenance works

.....

.....

.....

14. How long does the department respond to maintenance requests [Please specify]

- Less than one month
- 1-3 months
- 6-12 months
- More than 1 year

15. Does the department conduct Condition Assessment or physical inspections of buildings (assessment of the current physical condition of building, component, fabric or element)

- Yes NO

16. If **Yes**, How frequently do you conduct condition assessments?

- Annually Every two years
- Every five years Every ten years

Other (Please specify) _____

17. In your evaluation how would you rate the sufficiency of funding received for maintenance works against the maintenance needs of College buildings?

Very Adequate (5)

Adequate (4)

Fairly Adequate (3)

Barely Adequate (2)

Insufficient (1)

18. In your evaluation how would you rate the university's system for procurement for materials and services for maintenance works?

Exceeds Expectations (5)

Meets Expectations (4)

Barely Meets Expectations (3)

Below Expectations (2)

Doesn't meet expectations (1)

19. Briefly enumerate other challenges faced in the implementation of maintenance works.

Appendix 5 - Interview schedule for maintenance supervisors/ foremen

1. What trade are you trained in?.....
2. What is your level of training.....
3. Do you keep a record of all your daily activities?
Yes NO
If **YES**, are these records filed or stored also as computer records?
Yes NO
4. Are you computer literate?
Yes NO
If **YES**, do you have knowledge of computerized maintenance systems?
Yes NO
5. How are requests for maintenance handled by your department?
.....
6. Would you rate the department's response as being effective and timely?
Yes NO
7. How would you rate the current maintenance state of the institution's buildings?
Very Adequate (5) Adequate (4)
Fairly Adequate (3) Barely Adequate (2) Insufficient (1)
8. Has the situation improved or worsened in the last 2 years?
.....
If it has worsened whatin your opinion is impeding effective maintenance of buildings?
.....
.....
9. What in your opinion would you rate as the greatest challenge in maintaining the University buildings?
.....
.....
10. Would you say that you are sufficiently facilitated in your work?
.....
If no what is yourgreatest deficiency?
.....
11. Would you say that you have sufficient training and skills to execute your work?

Yes NO

IF no, what way can this be improved?

.....

12. In your opinion are the colleges' maintenance processes and procedures effective in addressing maintenance needs of the university buildings?

.....

13. Does the department have acceptable levels of materials to adequately support Maintenance and repair works?

Yes NO

14. In your view, is the college or section management committed to building Maintenance section.

.....

.....

15. Any suggestions on how Maintenance Management Process can be improved given challenges faced at implementation stage?

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Appendix 6 - Tenant satisfaction questionnaire

General satisfaction

1. How satisfied are you with the way the buildings are being managed?

Very satisfied Satisfied Neutral a little
unsatisfied

Very unsatisfied: Please explain:

A. For those staying in college houses / hostels

1. How long have you lived in a College House? (*If in College house / Hostels*)

0-2 years 3 – 5 years More than 5 years

2. Are you satisfied with its status?,

Very satisfied Satisfied a little unsatisfied

Unsatisfactory Neutral

3. Have you had any repairs completed in the last 12 months?

YES NO

If yes, answer to all questions; if NO, skip Q. 4 & 5.

4. What repair work did the maintenance unit last work on?

Don't know General building Plumbing Sewerage

Electrical Other

5. How could you rate the last repair from the time you reported it to the time it was completed?

Note: For respondents who had a repair completed in the last 12 months

Excellent Very good Good Fair poor Very Poor

B. For all respondents

6. Within the past 3 years, what maintenance activity have you reported most often?

Don't know General building Plumbing Sewerage

Electrical Other

7. Were you satisfied with the way the College addressed the problem reported?

Yes No

8. What is your view about the service you receive from the maintenance unit?

Excellent Very good Good Fair Poor Very Poor

9. Which of the following best describes you;

I report repairs immediately no matter how small

I take my time in reporting repairs which I consider not very serious

I would rather fix minor repairs myself

I only report repairs if it is a threat my own health.

I never report repairs

10. Taking everything into account, how satisfied or dissatisfied are you with the overall service provided by the Maintenance Unit?

Very satisfied Satisfied a little unsatisfied

Unsatisfactory Neutral

C. Contact with maintenance staff

11. The maintenance staff who dealt with me were;

Disagree	Partly		Strongly		
	Agree	Neither	Agree	Agree	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	I found them easy to contact
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	It was easy to get hold of the right person
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The staff who dealt with me were helpful
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	I felt the staff understood my Needs
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The staff was able to deal with my query
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If someone needed to get back to me, they made contact when they said they would
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The staffs were polite
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Overall, I was satisfied with the final outcome of my query.