



**THE STUDY OF BUILDING FACILITY MANAGEMENT PRACTICES IN HIGHER
EDUCATION INSTITUTES**

**(A CASE STUDY ON BAHIR DAR, GONDAR, DEBRE TABOR AND DEBRE MARKOS
UNIVERSITIES IN AMHARA REGION, ETHIOPIA)**

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LIST OF ACRONYM

BIFM	British Institute of Facilities Management
BIM	Building Information Models
CAD	Computer-Aided Design
CAFM	Computer-Aided Facilities Management
CC	Campus Construction
CDP	Campus Development and Planning
CMMS	Computerized Maintenance Management System
CS	Campus Services
FIS	Facility Information Systems
FM	Facility management
FMA	Facilities Management Association
FMAA	Facility Management Association of Australia
GIS	Geographic Information Systems
HEI	Higher Education Institute
HKIFM	Hong Kong Institute of Facility Management
HVAC	Heating, Ventilating, and Air Conditioning
IT	Information Technology
IFMA	International Facilities Management Association
JFMA	Japan Facility Management Promotion Association
MIT	Massachusetts Institute of Technology
MU	Maintenance and Utilities
O&M	Operation and Maintenance
PIMD	Property and Infrastructure Management Division
SAFMA	South African Facilities Management Association

ABSTRACT

Facility management is an integrated approach to maintaining and improving the buildings of an organization in order to create an environment that strongly supports the primary objectives of that organization.

In Ethiopia, so far, there are no enough studies undergone to identify problems in building facility management practice and there is also no suggestion to improve this practice. Therefore, this research aims to investigate building facility management practices in Bahir Dar, Gondar, Debre Tabor and Debre Markos universities located, which are located in the Amhara region of Ethiopia.

The findings of the study revealed that there is lack of: building operation and maintenance policy that are used in the practices of building facility management, professional experts in building facility management, organized facility management, proper planning in facility management, training for building maintenance staffs, regular building condition survey, technologies like computerized maintenance system to simplify building facility management practice ,specific organization or separate body that provides guidelines and preventive building maintenance type except Bahir Dar University Marine Campus.

Keywords: *Building facility management*

CHAPTER ONE

1. INTRODUCTION

According to Barret and Baldery (2003), facility management is an integrated approach to maintaining and improving the buildings of an organization in order to create an environment that strongly supports the primary objectives of that organization. Facilities management field emerged from buildings maintenance management. Maintenance of the buildings and engineering services is a long standing interest within the field.

Facilities management as an emerging profession and the practice has advanced in many of the developed countries but still in its elementary stages in Africa and other developing countries. It is a profession which includes multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology (Ogebeifun, 2011).

As a facility management experts in the UK discussed, facility management contributes to the delivery of strategic and operational objectives. On a day-to-day level, effective facilities management provides a safe and efficient working environment, which is essential to the performance of any business – whatever its size and scope (Expert Knowledge Facilities Management in UK, 2010).

Facility management is the integration and alignment of the non-core services, including those relating to buildings, required to operate and maintain a business to fully support the core objectives of the organization. Although facility management services are non-core in nature, if managed correctly, they should have a strategic importance of adding value to an organization's core business delivery. Higher learning institutions are recognized as a service industry, which place greater emphasis on meeting the expectations and needs of their customers and support services are vital for institutions in providing better quality (British Institute of Facility Management, 2010).

Facility management practice in higher education buildings, places emphasis on the management of the building portfolio, and the environment and further suggests some practical steps for

effective facilities management operations in Texas A and M university in USA. In his words: “Business success is characterized not only by annual revenue and profit margins, but also by the way various aspects of the building portfolio and environment are maintained: monitoring daily maintenance, operations, and energy consumption; conducting assessments and benchmarking studies; adapting and aligning with policies; and assisting with the implementation of the organization’s strategic and tactical planning” (Lavy, 2008).

The study done in Botswana to evaluate the current practice of facilities management, particularly as it relates to building maintenance revealed that there was generally a lack of information on facilities managed due to a number of factors, there was a lack of knowledge on the different types of maintenance and that the focus was mostly on emergency and day-to-day maintenance (Moseki, 2007).

However, there is no enough study to identify how well a building facility management has been performed in universities in Ethiopia. Thus, this thesis aims to investigate building facility management practices in Ethiopia with a case study of Amhara regional universities.

1.1 Statement of the Problem

In Ethiopia, most of higher education institutions have not been studying the importance of building facility management practice for creating comfortable and efficient working environment for the success of their goal. So it is necessary to study and identify problems of building facility management practices for providing suggestions.

1.2 Research Objectives

Based on the statement of the problem the main objective of this thesis is to investigate building facility management practices in higher education institutions in the Amhara region of Ethiopia then find the possible way to improve the situation.

The specific objectives of this study include:-

- To explore how well a building facility management has been performed in selected universities of the Amhara region

- To identify gaps with respect to international facility management practices
- To assess the problems with regard to building a facility management practice and investigate the cause of the problems
- To suggest possible ways to improve existing problems based on the research findings

1.3 Research Questions

The questions it seeks to find answers to fulfill the above explained objectives are:

- How does building facility management perform at selected Amhara regional universities?
- What gaps are present in building facility management performed in selected Amhara regional universities with respect to international university building facility management practices?
- What are the problems or challenges to its operations, in realizing the functions of building facility management?
- What are the causes of problems and challenges?

1.4 Scope and Limitation of the study

Limiting the scope is necessary when studying on certain issue thus; the scope of this thesis is to identify the problems with regard to facility management practice in higher education buildings and to suggest possible ways to improve existing problems in building facility management practice in higher education institute in Ethiopia. Unavailability of adequate documented information in the field of the study is the research limitation.

1.5 Application of the result

This research result will be applicable to Higher Education Institutions by creating awareness about the importance of building facility management practice and identify problems which leads to suggest directions for improvement.

CHAPTER TWO

2. LITERATURE REVIEW

2.1 Facility Management

Facilities management is defined and analyzed in a variety of ways by associations and authors of books. The following selected definitions are based on a survey conducted via the internet to provide an overview of “what facilities management” is as perceived internationally by facility management associations:

a. International Facilities Management Association (IFMA)

IFMA is a very comprehensive association, providing comprehensive input and educational opportunities in the discipline.

The IFMA (2010) defines:

“Facility management is a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology” (International Facilities Management Association, 2008).

b. Facilities Management Association (UK) (FMA)

The following definition is provided by FMA:

“Facilities Management is located in the support services sector of the UK economy and is the efficient integration of support activities within the business environment which is essential to the successful performance of any organization” (Facilities Management association in UK, 2010).

c. British Institute of Facilities Management (BIFM)

BIFM (2010) defines facilities management as follows:

“Facilities management is the integration of processes within an organization to maintain and develop the agreed services which support and improve the effectiveness of its primary activities” (British Institute of Facilities Management, 2010).

d. Facility Management Association of Australia (FMAA)

The FMAA definition of facility management is stated by Best et al (2003:1) as follows:

–Facility management is the practice of integrating the management of people and the business process of an organization with the physical infrastructure to enhance corporate performance.”

According to Best et al (2003): the broad categories of FMAA competencies are listed as follows):

- Use organizational understanding to manage facilities
- Develop a strategic facility response
- Manage risk
- Manage facility portfolio
- Improve facility performance
- Manage the delivery of services
- Manage projects
- Manage financial performance
- Arrange and implement procurement/sourcing
- Facilitate communication

e. Hong Kong Institute of Facility Management (HKIFM)

The HKIFM (2010) defines facility management as follows:

–Facility Management is the process by which an organization integrates its people, work process and physical assets to serve its strategic objectives. As a discipline, facility management is the science and art of managing this integrative process from operational strategic to strategic levels for promoting the competitiveness of organizations” (Hong Kong Institute of Facilities Management, 2010) .

f. Japan Facility Management Promotion Association (JFMA)

The JFMA (2010) defines facility management as follows:

–It is a comprehensive management approach for the optimization of the ownership, utilization, operation, and maintenance of the business’ real properties (land, buildings,

structures, equipment, etc.) and maintain them in optimal conditions (minimum costs and maximum effects), so that they could contribute to the overall management of the business—(Japan Facility Management Promotion Association, 2010).

g. South African Facilities Management Association (SAFMA)

The SAFMA (2010) provides the following definition:

–Facilities management is an enabler of sustainable enterprise performance through the whole life management of productive workplaces and effective business support services” (South African Facilities Management Association, 2010).

h. Atkin and Brooks (2009): see Facilities Management as; –Creating an environment that is conducive to carrying out the organization’s primary operations, taking an integrated view of the services infrastructure, and using this to deliver customer satisfaction and best value through support for and enhancement of the core business”. Further, they develop this definition to describe facilities management as something that will:

- Support people in their work and in other activities.
- Enhance individual well-being.
- Enable the organization to deliver effective and responsive services.
- Sweat the physical assets, that is, make them highly cost-effective.
- Allow for future change in the use of space.
- Provide competitive advantage to the organization’s core business.

Barret and Baldry (2009) provide the following definition of facilities management: –An integrated approach to maintaining, improving and adapting the buildings of an organization in order to create an environment that strongly supports the primary objectives of that organization.”

The above definitions suggest that facilities management provides a supporting management function to the core business of an organization; concentrates on the area of interface between physical workplace and people; and requires a multi-skill approach to integrate people, place,

process and technology in executing its support functions. For underpinning this study the Barret and Baldry (2003) definition was taken; ‘An integrated approach to maintaining, improving and adapting the buildings of an organization in order to create an environment that strongly supports the primary objectives of that organization.’

2.2 Building Facility Management

According to Barret and Baldry (2003) building facility management is a management system used to operate and maintain the buildings of an institution in order to create an environment that strongly supports the primary objectives of that institution.

2.2.1 The Aim of Building Facility Management

The general goal of building facility management is to ensure the provision of attractive buildings, with properly functioning components and systems, that are properly operated, maintained and that provide surroundings and conditions conducive to quality instruction and learning. To fulfill the general goal of facility management unit (Atkin and Brooks, 2009):

- Identify and correct facility deficiencies and needs through periodic review of existing systems and system components,
- Maintain buildings at a level that ensures facilities that are aesthetically pleasing, clean, sanitary, and safe and
- Manage facilities in a manner which minimizes usage conflicts, overcrowding, and retrofit costs.
- Ensure the availability of sufficient funding and other resources to support projected facility maintenance requirements

2.2.1.1 Building Operation and Maintenance

In general, maintenance means to hold, keep, sustain or preserve the building or structure to an acceptable standard. Acceptable standard is defined as one which sustains the utility and value of the facility. The question of what is an acceptable standard? is a matter of assumption and is generally subjective. Each owner or tenant will have to establish his/her own standards based on many factors, such as (Whole Building Design Guide, 2008).

- Usage of building
- Expected life
- Availability of capital, materials and manpower
- Change in usage and personal

a. Types of Building Maintenance

British Standard 3811 classified building maintenance as follows:

1. **Planned Maintenance:** The maintenance organized and carried out with forethought, control and the use of records to a predetermined plan
2. **Unplanned Maintenance:** The maintenance carried out to no predetermined plan.
3. **Preventive Maintenance:** The maintenance carried at predetermined intervals or corresponding to prescribed criteria and intended to reduce the probability of failure or the performance degradation of an item.
4. **Corrective Maintenance:** The maintenance carried out after a failure has occurred and intended to restore an item to a state in which it can perform its required function.
5. **Emergency Maintenance:** The maintenance which it is necessary to put in hand immediately to avoid serious consequences. This is sometimes referred to as day-to-day maintenance, resulting from such incidents as gas leaks and gale damage.
6. **Condition-based Maintenance:** The preventive maintenance initiated as a result of knowledge of the condition of an item from routine or continuous monitoring.
7. **Scheduled Maintenance:** The preventive maintenance carried out to a predetermined interval of time, number of operations, mileage, etc.

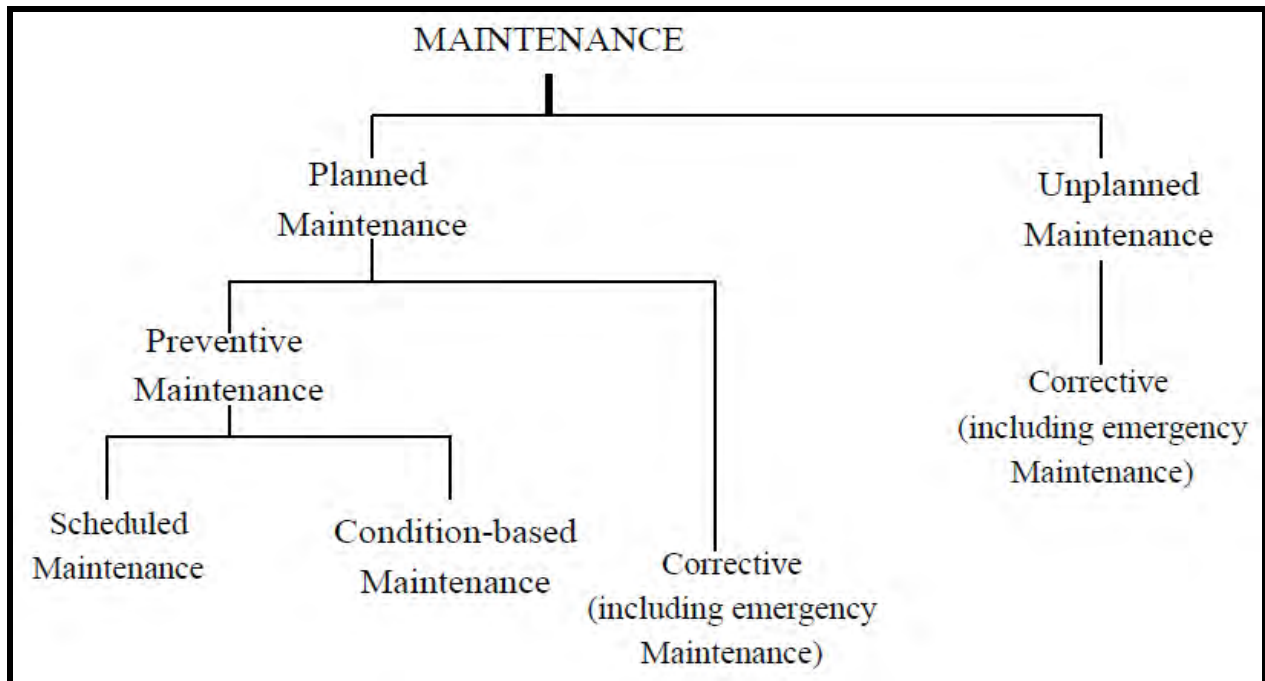


Figure 2.1 Classification of building maintenance type

Source : (Whole Building Design Guide, 2008)

2.2.2 Important Factors to Fulfill the Aim of Building Facility Management

To full fill the goal of building facility management building operation and maintenance policy ,facility history, operation and maintenance manual, training for building maintenance staff`s and information technology are important factors.

2.2.2.1 Building Operation and Maintenance Policy

Building maintenance policy is a written document, and provides a management framework for the maintenance personnel to determine appropriate maintenance strategy and standard. Building maintenance policy and strategy are one of the main aspects of management of building maintenance operation processes. The three essential elements for formulating the maintenance policy are the choice of maintenance strategies, defining maintenance standards and allocation of maintenance resources. Maintenance activities could not be planned and implemented successfully without the understanding of these elements (Chanter, 1996).

Maintenance strategy in general includes corrective, preventive or condition-based maintenance. However, there are different views on choosing appropriate maintenance strategy. Among various maintenance strategies, the effectiveness of planned preventive maintenance (PPM) is more challenged by the top management. Moreover, maintenance standard is difficult to agree with top management. Acceptable maintenance standard depends very much on available maintenance resources with consideration of common factors such as characteristics related to building, tenant, technical, administrative and political factors (Chanter, 1996).

Maintenance personnel at operational level argue that the maintenance budget is always below the needs. On the contrary, top management at the strategic level criticizes inefficiency of the maintenance organization. It is becoming more difficult to get more resources. Technology becomes a tool for assisting maintenance personnel to improve building maintenance operation efficiency. It is recommended to use intelligent equipment and automatic maintenance scheduler to enhance maintenance, quality and efficiency (Chanter, 1996).

Maintenance is defined as work undertaken in order to restore every facility, that is, in every part of the site or building to an acceptable standard. Maintenance policy is a tool for maintenance personnel to plan their appropriate maintenance strategies. However, before maintenance program is prepared, maintenance personnel and top management are required to agree on maintenance policy because it requires strategic directions, as well as resources. The maintenance policy consists of five major components, and different maintenance strategies are developed from these components. Without defining this policy, maintenance, operational processes will be in a disorganized order. According to Chanter (1996), the five major components) are as follows:

- The length of time for maintaining for their present use
- The life requirements of the buildings and their fittings and services.
- The standard to which the building and its services are to be maintained
- The reaction time required between a defect, occurring and a repair being carried out.
- The legal and statutory requirements shall also be considered

2.2.2.2 Facility History

A Facility's history includes detailed information in the form of drawing, manuals, repairs, renovations, and alterations, accumulated in the process of developing and operating the facility. In the life cycle of a typical facility, different personnel are involved in the design, construction and operation stages. Since in the life cycle of a typical facility, different personnel are involved in the design, construction and operation stages the quality of documentation at each stage will affect the performance and management of the facility. Facilities documentation is a resource for planning repairs, shutdowns and other maintenance and operations activities. Facilities operation documentation serves as an in-house tool for the facilities manager to manage his day to day operations, forward planning, budgeting and for objective management decisions (Clayton, 1996).

Higher education institutions in many developing countries grow from temporary to permanent sites; develop from makeshift to standard structures and through the process of acquisition and merger, each institution facilities of different ages with inadequate records of as-built information. This situation is heightened due to poor archiving systems, documentation and information transfer during the transition from one administration or system to another. Developing an authentic facility's history is an exercise that should commence from the construction stage throughout the life of the facility. It is obligatory upon every operator in each phase of the facility to properly document the operations in the facility for future. Commencing the documentation of facilities history through as-built drawings, the Chicago District Guideline describes as-built drawings as:

"...An official record of the project at the time of construction completion. The original „as-designed“ contract drawings and specifications are modified to show all additions, deletions and other changes made during construction. Accurate as-built drawings are very important for project operation and maintenance, and future modifications, particularly for plumbing and electrical systems, which are hidden from view..." (Chicago District Guideline, 2014).

In practice, a change made in any component during construction usually has a ripple effect on other sections or service providers. Therefore, information about intention to change or changes made should be communicated on time for necessary adjustment by all concerned and the

revised drawing produced to guide the contractor accordingly. When these procedures are followed carefully, the final as-built documents made available at the commissioning will be authentic and helpful for the preparation of the “facilities operation documents” In the event that existing buildings or facilities do not have authentic as-built information, it is possible to develop a near exact document by using either manual or digital methods (Erdener, 2001).

In the past, during the facility design/build phases, it was uncommon to devote substantial resources to life-cycle operation and maintenance (O&M) concerns. However, it is now widely recognized that O&M represents the greatest expense in owning and operating building facility over its life cycle. The accuracy, relevancy, and timeliness of well-developed, user-friendly O&M manuals are becoming increasingly important. Hence, it is becoming more common for detailed, facility-specific O&M manuals to be prepared prior to commissioning. The goal is to effectively and efficiently support the life cycle of the facility by eliminating unplanned shutdowns and realizing life-cycle cost savings. Figure 2.3 presents a typical O&M manual development process. According to figure 2.3, as-built information, comprehensive facility O&M manuals should include: (Whole Building Design Guide, 2011).

System-level O&M information:

- Physical Descriptions
- Functional Descriptions
- Troubleshooting
- Preventive Maintenance (Procedures and Schedules)
- Corrective Maintenance (Repair Requirements)
- Operation-/Maintenance-Significant Drawings
- Equipment-specific O&M information, organized into a vendor/manufacture data library

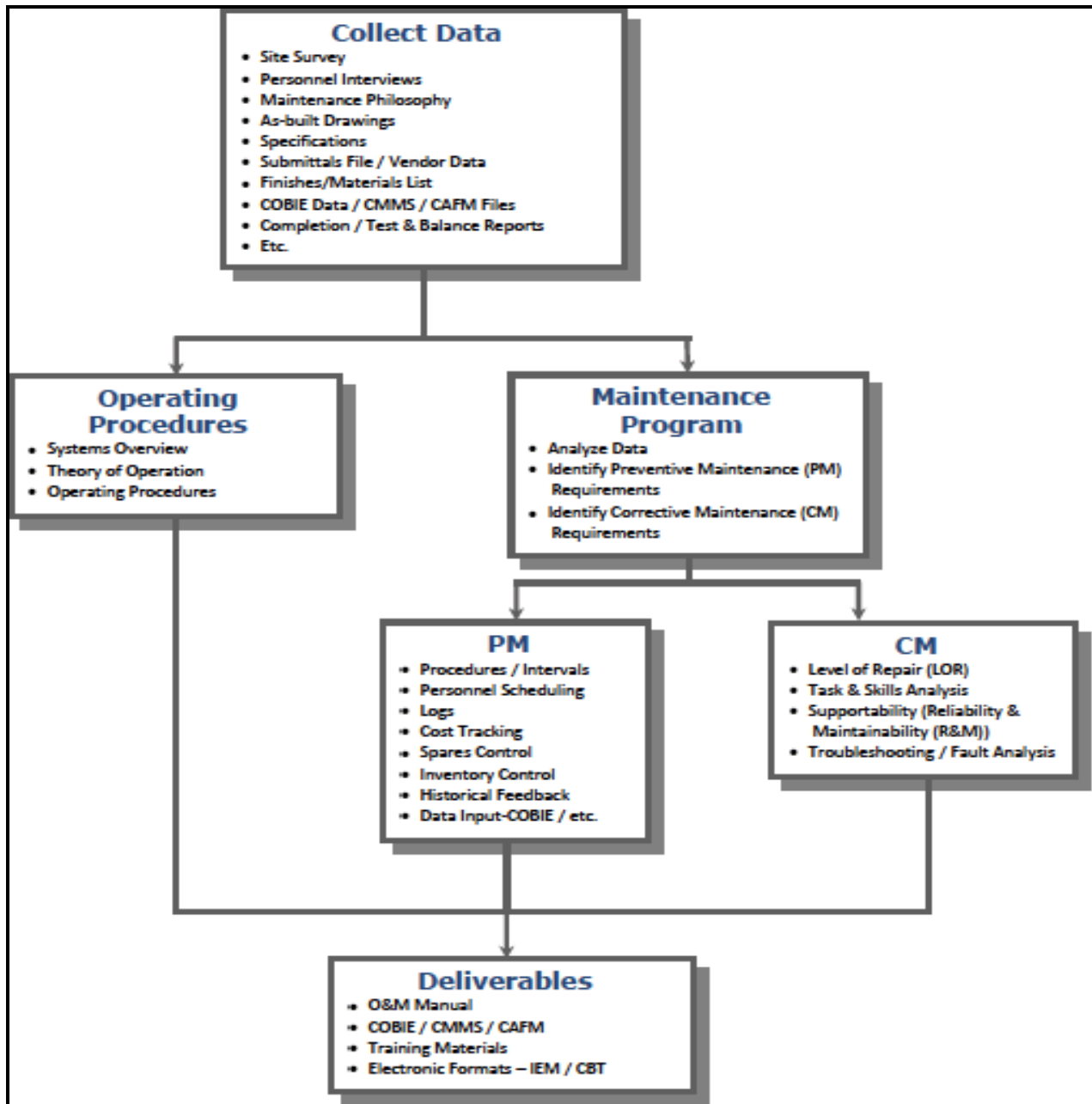


Figure 2.2 Operation and Maintenance Manual Development process

Source: (Whole building design guide, 2010)

2.2.2.3 Training for Building Maintenance Staffs

Training is considered a vital element of operation & maintenance for new personnel; especially when new equipment is installed or emerging technology is being employed. Important to the overall facility management program, facilities personnel must be properly instructed and

motivated. Training courses will familiarize personnel with the procedures necessary to operate and maintain complex systems and equipment, often using the system-level O&M manual as a basis of information. O&M manuals, likewise conducive for use in training, can be required as both paper and as an 'on-line' interactive electronic manual (IEM). Training should be ongoing to keep up with technology and equipment (Whole building design guide, 2010).

2.2.2.4 Information Technology

According to Barret and Baldry, facilities manager deal with the collection of information technologies and applications which can potentially support him in his role. For example, there are software packages which can support accommodation planning, heating and ventilation, asset tracking and capital project management. The complexity of IT can be reduced by viewing all information technologies as consisting of one or more of the following basic information handling capabilities; information capture, information storage, information manipulation and information distribution. Computer aided design /CAD, for example, allows the facilities manager to capture, store, manipulate and distribute drawings and related information. This facility is particularly use full as it allows the facilities manager to maintain and standardize a complete set of plans for the organization's building stocks (Barret and Baldry, 2009).

Computer-based information systems promote and enable; more efficient use of information at all managerial levels, improved decision making, improved managerial responsiveness, improved learning capacity and capability. These benefits will ultimately enhance both the quality and cost effectiveness of the services provided by the facilities management function. (Whole Building Design Guide, 2011).

Computer-aided Facilities Management (CAFM) includes the creation and utilization of information technology (IT) -based systems in the built environment. A typical CAFM system is defined as a combination of Computer-Aided Design and/or relational database software with the specific abilities for Facilities Management (Whole building design guide, 2010).

The purpose of a CAFM system includes:

- To help the facility's manager ensure the organization's assets are fully utilized at the lowest possible cost, while providing benefit to every phase of a building's life cycle, and
- To support operational and strategic facility management, i.e. all of the activities associated with administrative, technical, and infrastructural FM tasks when the facility or building is operational, as well as the strategic processes for facilities planning and management.

CAFM systems consist of a variety of technologies and information sources that may include object-oriented database systems, CAD systems, Building Information Models (BIM), and interfaces to other systems such as a Computerized Maintenance Management System (CMMS). Today, most CAFM systems are web-based and provide a host of features including facilities related scheduling and analysis capabilities. Data may be collected from a variety of sources through technology interfaces or human transfer processes. Data may be stored, retrieved, and analyzed from a single data-store. CAFM systems combine and analyze complex data to improve FM practices throughout a variety of industries including government, healthcare, educational, commercial, and industrial environments. The CAFM system gives decision makers the ability to automate many of the data-intensive facility management functions and typically results in continuous cost savings and improved utilization of assets throughout their entire lifecycle (Whole building design guide, 2010).

Although there is no ideal model suitable for all situations, to meet the specific demands of the facility manager, a well developed CAFM system will often include a variety of functions and features. CAFM systems typically provide and maintain information on floor plans, property descriptions, space utilization, energy consumption, equipment locations, and other critical infrastructure data that pertain to the sector it is serving (Whole building design guide, 2010).

Computerized Maintenance Management Systems (CMMS) is software that is used to schedule and record operation and preventive/planned maintenance activities associated with facility equipment. The CMMS can generate and prioritize work orders and schedules for staff to support "trouble" calls and to perform periodic/planned equipment maintenance. Upon

completion of a work order, performance information, such as the date work was performed, supplies/inventory, and many hours expended, typically is loaded into the database for tracking, to support future operations/planning.

CMMS is used by facilities maintenance organizations to record, manage, and communicate their day-to-day operations. The system can provide reports used in managing the organization's resources, preparing facilities key performance indicators (KPIs) to use in evaluating the effectiveness of the current operations, and for making organizational and personnel decisions. In today's maintenance world, the CMMS is an essential tool for recording work requirements, tracking the status of the work, and analyzing the recorded data in order to manage the work, produce reports, and help control costs. Facility professionals use tools to manage the planning and day-to-day operations and maintenance activities required for a single facility or a large complex. These tools also provide all of the information required to manage the work, the work force, and the costs necessary to generate management reports and historical data (Whole Building Design Guide, 2008).

2.2.3 Strategic Planning in Facility Management

Managing facilities efficiently and effectively requires that a tough strategy is developed within the context of the organization's business plan. These should involve development of strategic objectives and a plan for the facilities management, with proper reference to the overall business plan within which it might be contained. A strategy (or business plan) for facilities management should (Atkin and Brooks, 2009);

- Consider the needs of the organization, differentiating between core and non-core business activities;
- Analyze existing facilities in depth —including location, capability, utilization and condition; and an achievable and affordable (approved) plan that translates the goals of the business plan into an appropriate facility response.
- Identify and establish effective and manageable processes for meeting those needs;
- Establish the appropriate resource needs for providing services, whether obtained internally or externally;

- Identify the source of the means to finance the strategy and its practical implications;
- Establish a budget covering short term needs and best value over the long term; and recognize that management of information is key to providing a basis for effective control of facilities management.

According to Atkin and Brooks (2009), the three main stages in the development and achievement of a workable strategy for facilities management are:

1. Analyzing requirements – top level analysis;
2. Developing solutions – finding the best option; and
3. Implementing solutions – putting the plan to work.

The aim of the analysis is to establish a thorough understanding of the present state of the organization's facilities management. This means assembling all relevant facts, including (British Institute of Facilities Management, 2010):

- The organization's objectives, needs and policies (from the business plan);
- Physical assets and space utilization achieved (from the space/accommodation strategy);
- A review of resources, processes and systems to provide a broad picture of the current provision of services

Once information from the analysis stage has been assembled, a robust and structured approach to the interpretation of the information can be adopted. It is essential that the interpretation of information derived from the analysis is open and allows new ideas and innovative solutions to be developed.

The recommended approach is (Atkin and Brooks, 2009):

- Generating options;
- Assembly of criteria for judging options;
- Evaluating options; and
- Selecting preferred option – the organization's actual facilities management strategy.

Selecting a strategy; the starting point for managing facilities is, as previously noted, the organization's business plan and its real estate (or space/accommodation) strategy. These should be kept up-to-date and used to determine the nature and level of services support. The facilities management strategy must reflect the organization's business objectives, needs and policies, as well as practicalities, such as its current real estate in general and space in particular. This formal strategy should include descriptions of the approach to measuring how the business objectives and needs have been met (Atkin and Brooks, 2009).

2.2.3.1 Relationship between Facilities Management and Strategic Planning

According to Barret and Baldry (2003), there are four possible relationships that could exist between facilities management and corporate strategic planning.

- a) **Administrative linkage**, facilities management provides day-to-day operating support, but is itself relatively unimportant in the planning process.
- b) **One –way linkage**, facilities management largely reacts to corporate strategic initiatives.
- c) **Two way linkage**, in which there is reciprocal and interdependent relationship between facilities management and the corporate strategic planning process. Here facilities management is viewed as credible and important .It is proactive and fully involved in helping guide the development of strategic plans .For example, the facilities manager would be asked to evaluate potential acquisitions and help plan their integration into existing facilities.
- d) **Integrative linkage**, the highest level of integration in which there is a dynamic, ongoing dialogue, both formal and informal, between the facilities management planners and corporate planner's .At this level the facilities manager would be involved in all strategic business decisions, even those that do not directly concern the facility function.

2.2.4 Facilities Management Unit and Structure

There are various ways to organize the facilities department basically there is no one method that will guarantee success. Bearing that in mind, the following points should be taken into consideration when organizing facilities department (Barret and Baldry, 2003).

- **The size of the organization** is the starting point for deciding how any facilities department is to be structured. Different sized organizations will require different staffing levels. If an organization is quite small and located in just one building, for example, there is probably no need for a full time facilities manager, as the amount of facilities work undertaken will be minimal. At other end of the scale, a large organization may need correspondingly large facilities department.
- **Location** also is important. If a facility department is dealing with multiple sites it will undoubtedly require a different approach to one operating on a single site. With multiple site organization, the facilities manager will have to decide whether services are to be provided on centralized or decentralized basis.
- Another major consideration for the facility manager is what services should be provided by the facilities department. Again there is not definitive guide as to what should be included. For example, vary considerably in their choice of functions, some concentrate primarily on maintenance. Whilst others include general office services, as a rough guide, any facilities department is likely to perform some of the activities listed in Table 2.1 however facilities managers should not just select items from the list at random, but provide only those services that are needed by their particular organizations. Once established, facilities departments do not have to limit themselves to their original activities and so the list can be extended as necessary. A further decision to be made relating to the choice of services is whether they are to be provided in house or contracted out.

Table 2.1 Typical Facilities Management Unit Functions (Barrett and Baldry, 2003)

Facility planning	Building operations and maintenance	Building construction	General /office services
-Strategic space planning	-Run and maintain plant	-New building design and construction	-Provide and manage support services
-Set corporate planning standards and guidelines	-Maintain building fabric	management	-Office purchasing
-Identify user needs	-Manage and undertake adaption	-Acquisition and disposal of sites and buildings	-Non building (catering, travel, etc)
-Furniture layouts	-Energy management	-Negotiation and management of leases	-Reprographic services
-Monitor space use	-Security	-Advise on property investment	-Housekeeping standards
-Select and control use of the furniture	-Voice and data communication	-Control on capital budgets	-Relocation
-Define performance measures	-Control operating budget		-Health and safety
-Computer aided facility management	-Monitor performance		
	-Supervise cleaning and decoration		
	-Waste management and recycling		

Barrett and Baldry (2003) discuss in detail the evolution, structure and practice of Facilities Management under different settings, in the book “Facilities Management: Towards Best Practice”: Current Good Practice in Facilities Management, it is found that Facilities Management can be structured in any one of five categories or models, namely:

1. **Office manager:** In this model, the Facilities Management function is not a full time assignment, but undertaken by someone as part of their general duties. The person charged with this responsibility may not be technically literate or actively involved in the core function of the organization, but could undertake this additional responsibility. The facilities functions, mainly repairs, are executed through external service providers as the need arises. This model is suitable for a small organization.

2. **Single site:** This model depicts organizations in one location, but large enough to create a separate unit responsible for the management of its physical assets. The organization may use a

combination of in-house and contracted services in the execution of the Facilities Management functions. A manufacturing plant, independent school and independent retail outlet, are good examples.

3. **Localized site:** This model is suitable for organizations that have facilities in different locations, but operate central management control of their core functions from one site-headquarters. This model is suitable for universities or other educational institutions with multi-campus, banks, hospitality industry, etc. This model encourages partial decentralization of operations that allows a certain level of decision to be made at each site level, with major policy taking place at the central management level.

4. **Multiple sites:** This model, similar to the localized site, is suitable for large organizations that operate across widely separated geographic locations, but perform identical functions in each site. Each site accommodates a functional Facilities Management Office, while the activities are coordinated at strategic levels of effective management. Generally, health service institutions, military barracks, parks and historic sites are good examples. The model operates a structured coordinated from national through to local levels.

5. **International.** This model is similar to the previous, except that it operates across different countries. Allowance should be made to accommodate possible differences between the countries involved in terms of language and legislation (Barrett and Baldry, 2003).

The organizational structures discussed above are dynamic, reflecting the growth pattern of the organization. A typical facilities management unit starts from either the office manager or the Single Site model and expands to other models. The single site structure appropriately describes the structure of facilities management units in the formative years of any institution of higher education. Many universities commenced operation from a temporary site before moving to their permanent site, which is usually in one location with progressive development. Through the process of expansion, merger and acquisition, many universities operate from multiple sites and by extension adopt the Localized Site structure.

2.2.4.1 Staffing Facilities Management Unit

There are four generic clusters or categories of personnel needed in a Facilities Management Unit, namely; senior management, middle level management staff and technicians. Opinions have been expressed in literature that Facilities Managers do not necessarily need to possess technical skills, but that modern management skills are essential, since their main function is to coordinate and integrate the activities performed by a multi-disciplinary network (Barret and Baldry, 2003).

Facilities manager could not be anybody with modern management skills, but needs to be a certified professional who demonstrates a high level of competence in their areas of expertise. To support this, professional requirements for practitioners as stipulated by International Facilities Management Association (IFMA) and the Facilities Management Association of Australia (FMAA) which include a demonstration of knowledge, competence and ability in a wide range of technical and management areas (Ogebeifun, 2011) .

–The level of sophistication of infrastructure and technology supporting the core functions of the organization and huge investments in their development suggest strongly that Facility Managers should be professionals, competent and expert in the management of these support facilities. The quality of the support services has direct impact on the output of the core functions of an organization. Therefore, Facilities Managers in the university setting, from the middle to the senior management level, should possess professional qualifications that could enable them to communicate and relate with academic and senior management staff of the university to be able to translate the strategic objectives of the university into the development, operation and management of facilities for the pursuance of the core functions of teaching and research. Preferably, they should come from the Engineering and built environment professions and possess hard and soft skills in project management and law, with well-developed interpersonal skills”(Ogebeifun, 2011).

2.2.4.2 The Relation of Facility Manger with Other Units of the Organization

Generally the facility manager is responsible for the effective and efficient provision of facilities and services to support a company organization in achieving its primary objectives. This implies

there are two facets of a facility manager's task. One is operational, and is the continuous provision of facilities and services here and now to support employees and the company as a whole. The other is strategic with an eye to the future, to anticipating and meeting future needs (Anna, 2005).

Operational FM focuses on:

- Preventing damage and maintaining buildings and installations in good condition and security
- Providing facilities and services to employees –internal customers
- Creating and maintaining a comfortable and efficient working environment.

The facility manager's task is thus to ensure that all facilities and services, many of which are closely interrelated, are synchronized to maximize and optimize to benefit to employees and the company. His department is thus the contact point for all of these facilities and services, and for reporting malfunctions. The facility manager operates horizontally and vertically within the organization, as shown diagrammatically in figure 2.3. The internal customer is on the right-hand side of the horizontal line, with external parties such as suppliers, service providers and consultants, on the left. Under the vertical line, there is the facility organization –a broad scale of services and focal areas. Above the line is middle of top management. The facility manager is an intermediary between all these areas, which he/she and his/her team are supporting in the company's endeavors to attain its objectives (Anna, 2005).

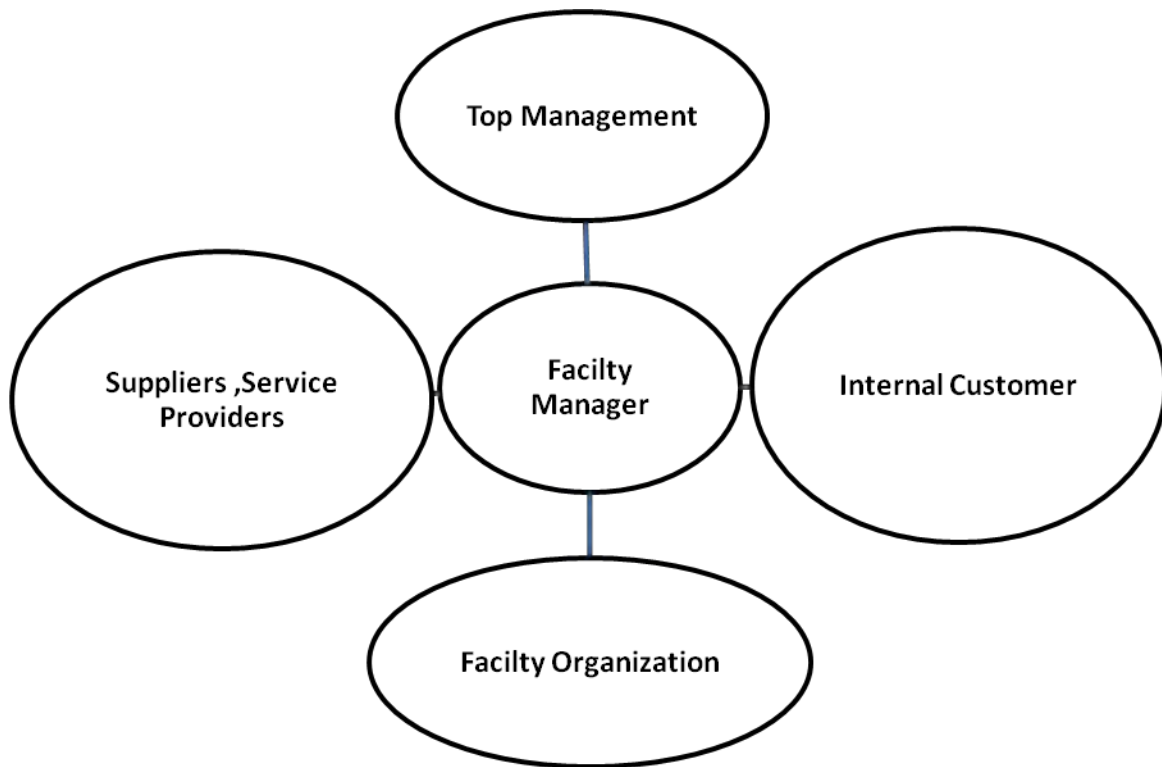


Figure 2.3 The relation of facility manager with other units (Anna, 2005).

2.3 Problems and Challenges in Building Facility Management Practice

There are various problems and challenges facing facility management professionals that require a wide range of knowledge in various areas.

2.3.1 Preventing Facilities Management Inclusion in Strategic Planning

2.3.1.1 Management structure of organization and staffing of facilities management department

Usually facilities managers are rarely high up within organizational hierarchy's. They tend to be located at the second or third management level, hence many facilities managers find it difficult to influence corporate decision making in any way. In only very few companies are facilities managers on the board and thus in a good position to fight for the inclusion of facilities issues in the strategic plan. Even when facilities managers are at quite a high level, this does not necessarily indicate that they will have equal power or influence as other staff at the same level. This may be because as a non-core service facilities are considered as nonessential. The structure of the facilities department in relation to the organization is also a critical factor. Many facilities

department have not really been planned and have therefore developed in a disorganized fashion (Barret and Baldry, 2003).

2.3.1.2 Organization's Understanding of Facilities Management

According to Barret and Baldry (2003), facilities management as a profession is still relatively new; there is a certain amount of mistrust and misunderstanding of what it is about. Support of senior management is, therefore, an essential factor that can contribute to the influence that facilities management can have. Thus when facilities issues are properly understood by senior management, it is likely that facilities managers may become more involved in strategic planning. At present, upper level managers often take a short –term view of property issues, for instance, maintenance budgets may be one of the first to be cut in times of hardship. These executives fail to see that small savings in the short term may lead to greater expenditure later.

2.3.1.3 Facilities Mangers' Understanding of Organizations Objectives

In a similar vein, facilities managers do not always have a clear understanding of the core business and hence they are not active participants when important decisions are made .It is therefore essential that facilities managers take the time to learn what the core business is really about. Without this understanding, it is impossible for facilities departments to be more proactive .If facilities mangers are unable to take the initiative, senior managers may conclude that they are happy to remain in a reactive mode. Thus facilities managers should recognize the need to provide high quality, proactive and cost –effective services to maintain credibility with their client base (Barret and Baldry, 2003).

Even though facilities management exists to support the core business, it is often this relationship that runs into difficulties .As it is a support service, many facilities managers have taken on a reactive role, waiting for instructions before they perform any action. This often means that, dialogue will only occur when problems arise .The result is that the facilities manager has to remedy the situation quickly, rather than assessing what would be the best long –term solution. It would be far better in some cases if the facilities manager has time to discuss the various implications .Such a lack of consultation is likely to result in a facilities management service that does not necessarily support the core business to the best of its capabilities (Barret and Baldry, 2003).

A typical example of this lack of communication would be an office move. Ideally in this situation the facilities team would consult with the users to find how each person worked and who they needed to be located next to. However, facilities groups are rarely given enough time to do this and so the users are often moved into an impersonal office space that does not support their particular working patterns. Consequently the whole department is likely to be demoralized and productivity may be reduced.

According to Barret and Baldry (2003), one of the ways to improve facilities services therefore is to become more proactive, i.e. actively seek out problems and requirements before they become critical.

2.3.2 Facilities Management and External Influences

Facilities management is a very wide field and consequently a continually changing one. New legislations and new techniques are appearing all the time and it would be virtually impossible for one person to keep track of all the different changes. Therefore, the facilities manager needs to employ certain methods to make this information processing task easier (Barret and Baldry, 2003).

Firstly, the facilities manager should utilize the expertise which already exists within the department. The facilities manager's role is that of coordinator, therefore, each of the functional units should ideally ensure that it is fully aware of developments within its own area of expertise and report any significant changes to the facilities manager. This should apply to both in-house personnel and contractors. The facilities manager will often have to take positive action to enable the functional units to acquire this knowledge. For example, facility management sends its maintenance technicians to regular courses to guarantee that they are fully of the latest techniques and legislation (Barret and Baldry, 2003).

Secondly, another way for the facilities manager to keep abreast of changes is to make use of existing contacts. Facilities managers have to deal constantly with many different specialists as part of their work, such as insurance firms, fire officers, building control, etc. Therefore, it makes sense to maintain good communications with these people so that they can advise on new developments in their areas.

Thirdly, facilities managers may also find it help full to make contact with other local businesses and exchange ideas.

Finally, the facilities manager can take advantage of the growing number of specialist information sources (Barret and Baldry, 2003): Professional associations – such as British institute of facilities management, Books, periodicals, conferences, short courses, postgraduate courses and Collaborative research projects joint academic and industry.

The non-existence of a specific organization to provide guidelines and control on the quality level as well as to assess the performance of FM practice is the reason why evaluations on this field is difficult to analyze. Comparisons thus cannot be made as no specific structure can be used to benchmark the performance of FM practice. (International facilities management association, 2009)

2.4 International Higher Education Building Facility Management Practice

Reviewing international practices are important to identify gaps after assessing the building facility management practices of selected Amhara regional universities, some international universities include, Texas A&M University in USA, Yale University in USA, Massachusetts Institute of Technology (MIT) in USA and the Witwatersrand in South Africa building facility management practices are investigated from literature as Summarized in Table 2.2. As Table 2.2 discussed, international building practices evaluated based on organization structure of facility management, practice of building maintenance type, training for staffs, use of data bases and way of building condition assessment.

Table 2.2 International higher education facility management practices

Building facility management practice	University of Virginia in USA	Texas A&M University in USA	Yale University in USA	Massachusetts Institute of Technology (MIT)	Witwatersrand in South Africa
Organizational structure		Facility management department heads by vice President	Facility management department responsible for the maintenance and operation of buildings as well as the planning, design and construction of new buildings.	Facility management department structured in three sections: campus Construction (CC), campus Services (CS), and maintenance and utilities (MU) (MIT Department of Facilities, 2009)	Facility management department coordinated by deputy Vice Chancellor finance and operations the functions performed by, CDP, PIMD, Services department and campus control.
		Decentralized management structure where the day to day operational functions of facilities management are localized (Lavy, 2008)	The structure of facility management department is a single unit with two main divisions. The two divisions are: Facilities Operations (FACOPS), responsible for the general maintenance and operation There is planning team to assist administrative in building operation maintenance. (Facilities Management Unit in Yale , 2007)		
Building maintenance	Preventive and corrective maintenance with detail inspections (Facilities Management University of Virginia, 2010)	Painting and patching of holes takes place regularly	Daily upkeep and condition survey of the building	Practice preventive maintenance on campus	

Training for staffs'	Provide training and education for staffs and bring news letter (related with BFM) to update themselves	Provide short courses to refresh staffs (Lavy, 2008)			
Data bases	A computer-based preventive maintenance program (Facilities Management University of Virginia, 2010)	The database stores dates of refresher courses can be taken online (Lavy, 2008)			CAD for the documentation of drawing
					Computer maintenance management
					The Archibus and building management system
Building condition assessment			Detailed records on all of the University's buildings and properties		

2.5 Local Building Facility Management Practice

The Ethiopian Government has embarked on a higher education expansion and reform program of impressive dimensions and has the vision of vastly increasing the numbers of students within HEIs and increasing the numbers of universities in the country. Since 2000 GC Ethiopia's higher education sector has grown from two public universities to 22 and then by opening 10 additional universities it reaches 32 universities in Ethiopia (Ministry of Education, 2014).

Ethiopia aims to be a middle-income country by 2025. For success, higher learning education has its own contribution by, providing in depth knowledge, seek academic development, educate students, and coordinate national development (Ministry of Education, 2014).

In order to deliver their core teaching and learning mission higher learning institutions need to have substantial facility. This often includes buildings. Inside the building, there are important elements like process, technology and people that are need and bear intricately linked relationship to each other in the organization so higher learning institutions require an efficient and effective facilities management system in terms of providing better services to the users. However, from my visualization of buildings, institutions often fail to be familiar with the importance of building facility management to their performance and success; this creates an obstacle to keep up the building within the required life of years. There is no regular survey of building condition and routine university building maintenance or they practice maintenance after problems are occurred and they only concentrate for new building construction. Thus, am eager to do my research on investigating building facility management practices in higher education universities in Ethiopia.

2.6 Summary of Literature review

Facility management is an integrated approach to maintaining, improving and adapting the buildings in order to create an environment that strongly supports the primary objectives of the universities. The general goal of facility management is to ensure the provision of attractive buildings, with properly functioning components and systems, that are properly operated, maintained and that provide surroundings and conditions conducive to quality instruction and learning.

In practice facilities management can cover a wide range of services including, facility planning, building operations and maintenance, building design and construction and general /office services. However, there is no definitive guide as to what should be included .For example, considerably vary in their choice of functions, some concentrate primarily on maintenance whilst others include general office services. There are various ways to organize the facilities department. The size of the organization, location and services provided, should be taken into consideration when organizing a facilities department.

There are different possible relationships that could exist between facilities management and strategic planning in which, facilities management provides day-to-day operating support, facilities management largely reacts to corporate strategic initiatives. There is also reciprocal and interdependent relationship between facilities management and the corporate strategic planning process. Here facilities management is viewed as credible and important. It is proactive and fully involved in helping guide the development of strategic plans.

The existence of specific organization or association that provides guidelines, support and control on the quality level is important in universities building facility management practice.

Building maintenance policy is a written document, and provides a management framework to the maintenance personnel to determine appropriate maintenance strategy and standard. Building maintenance policy and strategy are one of the main aspects of management of building maintenance operation processes.

Detail record of buildings and facility history in the universities are important. A facility's history includes detailed information in the form of drawings, manuals, repairs, renovations, and alterations, accumulated in the process of developing and operating the facility.

Continuous survey of the building is crucial to get the information about the condition of the building's major systems and public areas: plumbing, electrical, heating, structural systems, roof and windows, etc are necessary. The survey in form which repairs should be done immediately to eliminate hazardous conditions (like repairing bad electrical connections or faulty fixtures, or replacing broken windows) and which repairs can be postponed.

Generally there are different types of building maintenance, planned and unplanned maintenance of the buildings. Planned preventive maintenance /PPM is a schedule of actions aimed at avoiding breakdowns and failures .The objective of planned preventive maintenance is to prevent failure of equipment and components in service and to improve reliability by replacing worn parts. Tasks include inspections, equipment checks, diagnostics, adjustments and overhauls at specified intervals so if planned maintenance is absent this explained issues cannot do. Service personnel can record wear and other forms of deterioration so they know when to replace or repair worn parts in order to avoid failure .Periodic painting to protect building components and finishes is a common task within PPM.

Training is considered a vital element to the overall facility management program, especially for operation & maintenance staffs. When new equipment is installed or emerging technology is being employed, facilities personnel must be properly instructed and motivated. Training courses will familiarize personnel with the procedures necessary to operate and maintain complex systems and equipment. Operation and maintenance manuals likewise conducive for use in training, can be required as both paper and as an 'on-line' interactive electronic manual (IEM) developed. Training should be ongoing to keep up with technology and equipment changes in the facility.

There are problems and challenges facing facility management professionals; lack of organized facility management and lack of professional associations, conferences, and short courses to get updated information about building facility management.

2.7 Research Gap

Building facility management has not been well studied in Ethiopia. However, As Lavy (2008) studied in Texas A&M University in USA, facility management headed up to the vice president level.

In South Africa, British and Japan has specific leading body or associations of building facility management who provides guidelines and training for facility management implementers.

As Yale and MIT universities, the facilities management unit is responsible for the maintenance and operation of existing campus buildings as well as the planning, design and construction of new buildings. The maintenance unit is considered as one unit in facility management department which continuous building condition survey and preventive maintenance. This unit also has well trained staffs and maintenance manual, as built drawings and different databases like computerized maintenance system, building maintenance control system and CAD for the documentation of drawings use to manage facilities. There are service personnel who record wear and other forms of deterioration in the building so they know when to replace or repair worn parts in order to avoid failure. And also MIT University has separate unit for planning and scheduling building maintenance.

Thus, this thesis will attempt to assess the way of building condition assessment, practice of building maintenance type, availability of trained staff, the existence of building operation and maintenance policy, building facility management associations, the use of databases like computerized maintenance system, building maintenance control system and CAD for the documentation of drawings use to manage facilities, the existence of planning and scheduling team to plan and schedule all preventive maintenance.

CHAPTER THREE

3. RESEARCH DESIGN AND METHODOLOGY

3.1 Overview Of Research Process

This thesis desire to contribute knowledge towards solving problem, to higher education institutions by creating awareness about importance of facility management and it identifies problems in the building facility management practice to suggest improvement. Experience and observations form the ground for formulating the research statement of problem. Based on the statement of problem, first an extensive review of literatures on the subject was undertaken. Then, investigations on the four selected universities in Amhara region have been held to matches to what has been discussed in the literature.

3.2 The Research Instrument

In order to find answers to the research questions and to achieve the objectives of the study, the case study method of qualitative and quantative research is used to collect the research data. This is achieved through the combination of referring literature written on facility management and gathering data through questionnaire and structured interview. This questionnaire survey has both open-ended and closed-ended questionnaires.

3.3 The Research Questionnaire Design

The research investigated, building facility management practices in Higher Education Institute in depth by addressing questions focused on building facility management system and practice, building operation and maintenance, documentation and information technology applicable to facility management, problems and challenges in facility management practice and causes of problems and challenges in facility management. The questionnaire design was based on a combination of an extensive review of literatures dealing with building facility management. Questions were developed from the information gathered from literature and on best practices of facility management supplemented to achieve the research objectives. The questionnaire form, which was accompanied by a cover letter, was a mix of structured (closed) and unstructured (open) type of questions for obtaining as much information as possible.

3.4 Research Sample Selection

In the case of population it is known that there are 32 universities currently in Ethiopia. But this thesis emphasis and considers on the universities situated in Amhara region. There are 7 universities in this region, namely: Bahir Dar, Gondar, Debre Markos, Debre Berhan, Woledia, Wollo and Debre Tabor. The research samples consists the 4 from 7 universities which are selected by systematic sampling method by dividing with recently build universities and universities established many years ago relatively existing in the region. Out of the total number of the universities in the region; Bahir Dar and Gondar universities are established in 1964 and 1954 respectively, Debre Tabor and Woledia universities are established in 2001, Debre Markos, Debre Berhan and Wollo universities are functioning in 1997.

Among Debre Tabor and Woledia universities Debre Tabor University is randomly selected and Debre Markos University selected from Debre Berhane, Debre Markos and Wollo universities. From the oldest universities Bahir Dar and Gondar are taken as a sample for the study.

3.5 Research Analysis

The descriptive statistics are a method of analysis that provides a general overview of the results and used to analyze the result of questions.

Rating scale is one of the most common formats for questioning respondents on their views or opinions of an event or attribute. In this regard, participants were asked to indicate the level of the implementation components of facility management and causes of problems on building facility management implementation by rating them on five point scale, (1 = very low, 2 = low, and 3 = medium, 4 = high, 5 = very high).

CHAPTER FOUR

4. DATA COLLECTION, ANALYSIS OF FINDINGS AND DISCUSSION

4.1 Introduction

This chapter deals with the analysis and interpretation of collected data. As discussed in the methodology part of the thesis, data were collected from selected samples of universities of main participant's which are Vice President for Administration or for Business and Development, Managing Director, Service Administration Director of Directorate, Administrator/ Service Administration cost center/facility management staffs /team leader and Ministry of Education Capacity Building Program. The data were collected using questionnaire and structured interviews with the concerned officials. Thus, the analysis is done on the data collected through questionnaires and structured interviews.

4.2 Respondents Position and Response Rate

During the survey, different peoples are participated in order to fulfill the objective of the paper. The respondent's position and number of returned questionnaires are shown in Table 4.1.

Table 4.1 Respondent's position and Distribution of questionnaires

Universities	Position of the stakeholders				
	Vice President for Administration or for Business and Development	Managing Director	Service Administration Director of Directorate	Administrator/ Service Administration cost center /facility management staffs /team leader	Total
Bahir Dar	1	7	-	7	15
Gondar	1	-	1	5	7
Debre Tabor	1	1	-	1	3
Debre Markos	1	1	-	1	3
Total	4	9	1	14	28

As shown in Table 4.1, the respondents were Vice Presidents for Business and Development or Vice President for Administration, Managing Director, Service Administration Director of Directorate and Administrators from four selected Amhara regional universities: Bahir Dar, Gondar, Debre Tabor and Debre Markos.

4.2.1 Respondents Response Rate's

A total of 28 questionnaires were distributed as shown below in Table 4.2, and all were returned. The questionnaire administered only for top management bodies which consists Vice President for Business and Development, Service Administration Director of Directorate and Managing Director. Whereas the structured interview was conducted for operating staff or team leader to get reliable data and it was better to make them understand each question easily.

Table 4.2 Distribution of questionnaires and responses rate

Respondents	Distributed questionnaire in number	Structured interview in number	Returned questionnaire and structured interviews in number	Returned questionnaire and structured interviews ,%
Vice President	4	-	4	14
Service Administration Director of Directorate	1	-	1	4
Managing Director	9	-	9	32
Operating staffs/ team leader	-	14	14	50
Total	14	14	28	100

4.3 An Overview of the Research's Data Analysis Process

The data collected ,analyzed and discussed to encounter the research's objectives which were mentioned in section 1.2, the major objective of the research were investigating building facility management practice in selected Amhara regional universities of Ethiopia then find the possible way to improve the situation. The research questions which were formulated in view of achieving this objective were:

1. How building facility management does perform in selected Amhara regional universities?
2. What gaps are present in building facility management performed in selected Amhara regional universities with respect to international university building facility management practices?
3. What are the problems or challenges to its operations, in realizing the functions of building facility management? What are the causes of problems and challenges?

Analysis of the data collected through the research questionnaire and structure interview has addressed these questions. For the purpose of relating the research questions with the analysis and also for the ease of presentation, the results and discussions are presented with three major subjects. Section 4.4 presents the first subject which is linked with research question number 1. Accordingly, it presents the research findings with respect to building facility management practice in the studied universities. Section 4.5 and 4.6 are devoted to the second and third subjects, which are related to research questions number 2 and 3. Section 4.5 presents the findings and discussions made on the gaps in building facility management practice with respect to international practices. Section 4.6 presents problems and challenges arise in implementing building facility Management and causes of problems and challenges.

4.4 Building Facility Management Practices in Amhara Regional Universities

Building facility management practices in selected Amhara regional universities are assessed to answer research question number one; by considering the management system and building operation and maintenance practice with regard to building condition survey, building maintenance type, ,training for staffs, data bases and documentation that are used for facilitating the practice.

4.4.1 The Relationship between Strategic Planning and Facility Management unit

Vice Presidents for Business and Development in studied university explained that facility management unit is only providing day-to-day operating support. This unit is not fully involved in the development of strategic planning. The responsibility of facility management focused only on day-to-day operating activities. This makes the facility management unimportant in the

planning process. But the linkage of these two areas can play a great role in influencing the decision making process for better success.

4.4.2 The Presence of Specific Leading Body of Facility Management

In the studied universities Vice President for Business and Development said that there is no specific organization or association, which provides guidelines and control on the quality level of facility management practice. However, the non-existence of a specific organization to provide training for facility managers, to advance the progress of the profession, to provide guidelines, and to control on the quality level and to assess the performance of facility management practice creates difficulty on evaluations in this field.

4.4.3 The Overall Facility Management Components in the Organizations

All the survey participants think that a facility management is implemented in their universities and it shows that each university uses a little bit different structures in order to manage the building. Facility management implementation is led by Managing Director for Bahir Dar, Debre Markos, and Debre Tabor University and by Service Administration Director of Directorate for Gondar University at third or middle level of management.

4.4.3.1 Facility Management Unit and Structure

Vice President for Business and Development in studied university explained that facility management is present under General Services Administration Department by the name of maintenance unit and there is no facility manager to lead the unit. But this unit leads by Managing Director in Bahir Dar, Debre Markos and Debre Tabor University and Service Administration Director of Directorate in Gondar University at the third or middle level of management.

Facility management leads up to Vice President Level to influence and corporate decision making within a short period of time (Lavy, 2008). However, facility management unit leads by middle management level in the studied universities makes the decision making process complicated. To solve this challenge it is better assigning Vice President for facility management with responsibility of facilities planning and management; includes the development and implementation of the university's facilities and oversight for construction projects, responsible

for planning, directing, and overseeing building operations, services and maintains the appearance of the building.

According to Best et al (2003), the facilities manager could not be anybody with modern management skills, but needs to be a certified professional who demonstrates a high level of competence in their areas of expertise. However, there is no expertise who leads the facility management department in the studied universities. To improve this thing it is better to assign professional building construction and maintenance manger under the position of Vice president for facility management. The Building manager responsibilities include: coordinates the new building construction, and building operation and maintenance.

In MIT University there is planning and scheduling team that schedules all preventive maintenance on campus and plans for building facility management. And also there is archiving team responsible for archiving all campus building documents for maintenance staffs. For improved facility management application, it is better to include these two teams in facility management department under the position of building manager in studied university.

4.4.3.2 Implementation of Facility Management

Based on planning, building operation and maintenance, building design and construction the implementation of facility management is investigated. As shown below in Figure 4.1, 50%, 43% and 7% of the respondents in the studied universities rated the implementation rate of facility planning as very low, low and high respectively. 36%, 57% and 7% of the respondents rated building operation and maintenance component as low, medium and high respectively and building design and construction is not consider as component of facility management. Generally, as Figure 4.1 presents, facility planning implementation rate is very low than the other facility management components.

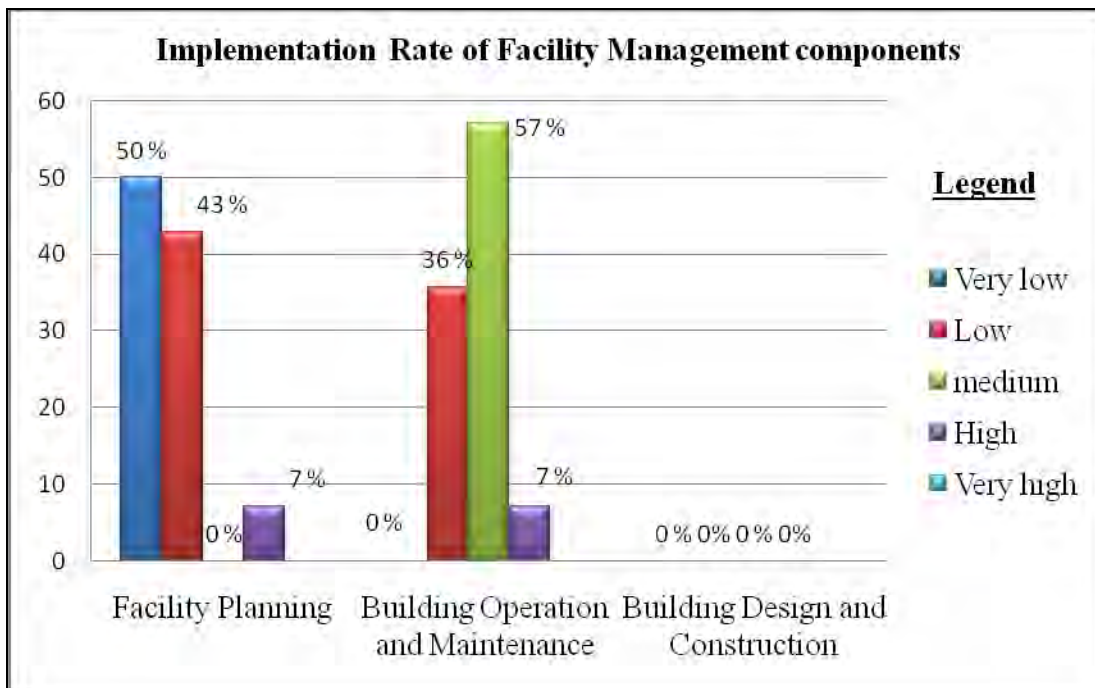


Figure 4.1 The implementation rate of Facility Management components

a. Facility Planning

The implementation of facility planning rated in a range between very low to very high. Managing Directors in Bahir Dar University clarified, the implementation rate of facility planning is 86% low and 14% high. Service Administration Director of Directorate in Gondar University said that the implementation of facility planning is 100% very low. Managing Director in Debre Markos and Debre Tabor University explained that the implementation of facility planning is 100 % very low. As presented in Figure 4.2, the larger percentage of facility planning is covered by very low implementation rate in the studied universities. However, due to facility planning implementation becomes very low it affects the effectiveness and efficiency of the implementation of other components of facility management.

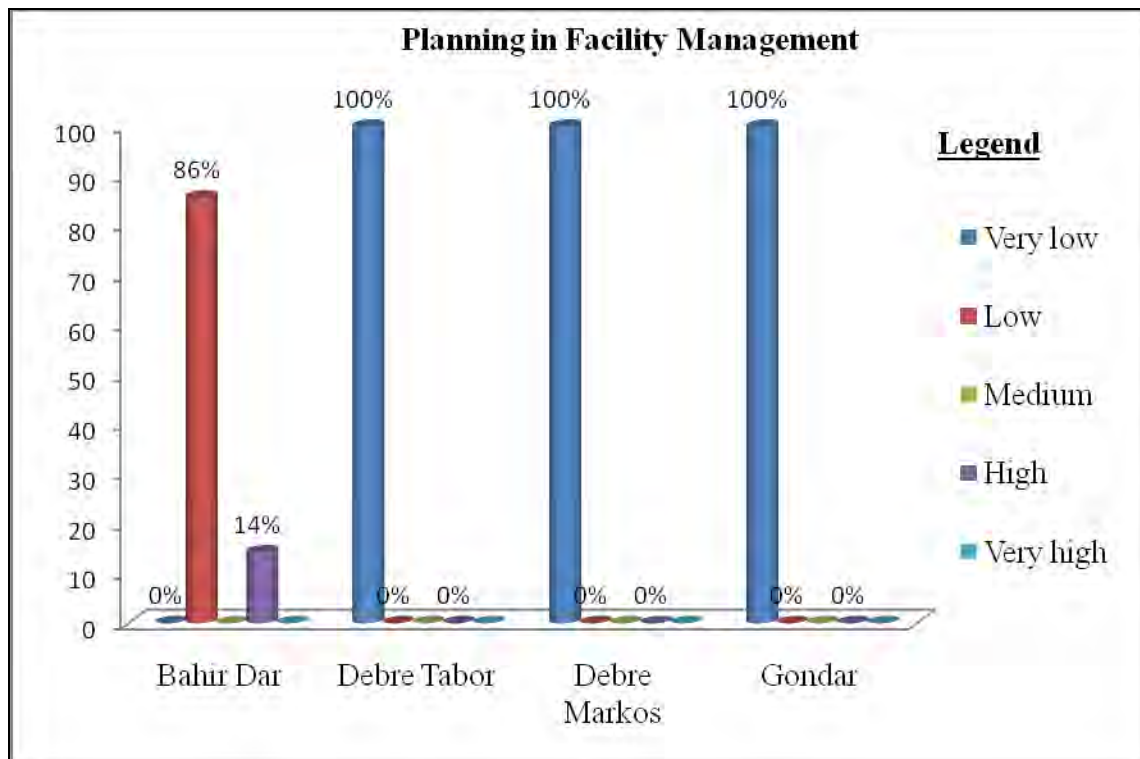


Figure 4.2 The rate of Facility planning in Facility Management

b. Building Operation and Maintenance

As shown below in Figure 4.3, the implementation rate of building operation and maintenance in a range between very low to very high. Managing Directors in Bahir Dar University explained that building operation and maintenance implementation rate is 86% medium and 14 % high. Managing Director in Debre Markos and Debre Tabor University rated building operation and maintenance 100% as medium. And Service Administration Director of Directorate in Gondar University said that the implementation of building operation and maintenance is 100% low. As revealed in Figure 4.3 the larger percentage for building operation and maintenance takes by medium implementation rate.

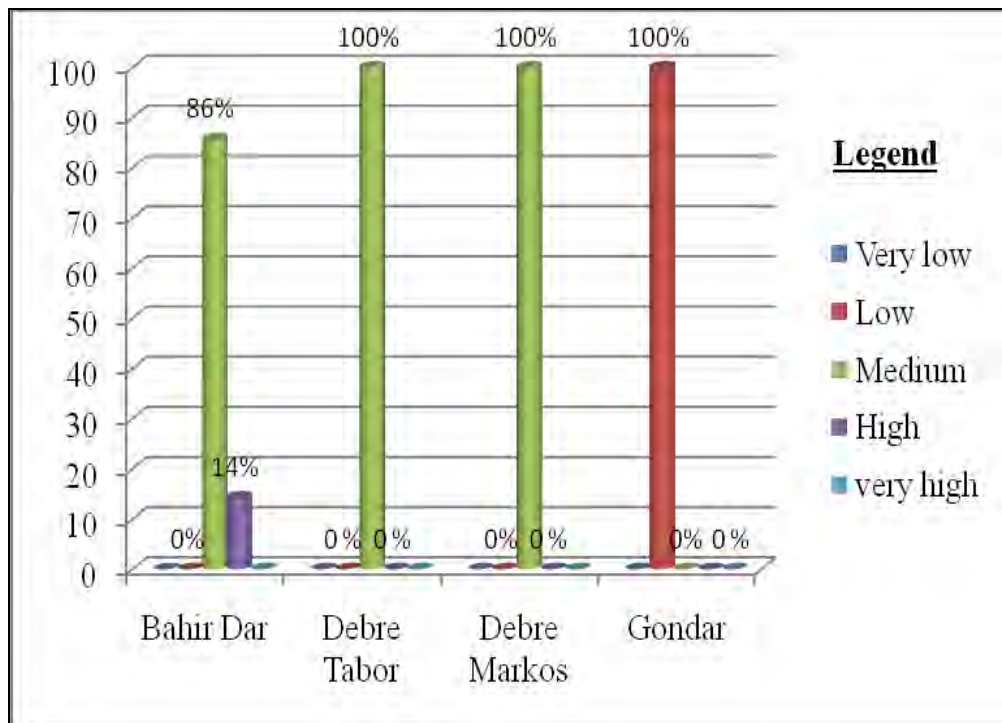


Figure 4.3 The rate of Building Operation and Maintenance in Facility management

c. Building design and construction

Managing Directors and Service Administration Director of Directorate in the studied universities explained building design and construction is not considered as one component of the facility management department. But including this unit in this department facilitates the communication between the staffs participated in new building construction and staffs responsible for maintenance. The coordination between maintenance staffs and new building construction staffs has significance for maintenance staffs to have a well organized knowledge about the new building. This makes easy to keep the building as it is.

4.4.4 Building Operation and Maintenance

Assessment of building operation and maintenance is done based on: availability of detail records of university buildings, accessibility of training for facility management staffs, the practice of building maintenance type, the way of building condition assessment and databases used for building facility management.

4.4.4.1 Building Operation and Maintenance Policy

Ministry of Education Capacity Building Program for Higher Education was interviewed about the building operation and maintenance policy. As they explained there is no policy which guides how to operate and maintain the building in Higher Education instead the maintenance will be held on the interest of universities. However, the building maintenance policy provides support to the maintenance personnel to determine proper maintenance strategy and standard.

4.4.4.2 Detail Records of University Building

Facility's history includes detailed information in the form of drawings and manuals for operating the facility. As the survey results indicated that, no detailed record of buildings, which is used to know the status of each building in all studied universities to use for maintenance purpose.

However, lack of detail record of buildings affects the performance and management of the facility. Due to lack of proper documentation, information transfer is poor during the transition from one administration or system to another.

4.4.4.3 Availability of Trained Staff for Facility Management

Building Operational staffs explained that, in Debre Tabor, Debre Markos and Gondar universities 100 % building maintenance staffs have no training. In Bahir Dar University, there is 14% a few trained staff in marine campus and the other 86% is few trained staff in the maintenance unit. Training is a vital element for building operation staffs, but as shown in Figure 4.4 majority of universities in the studied region have no trained staff. So facilities personnel must be properly instructed and motivated.

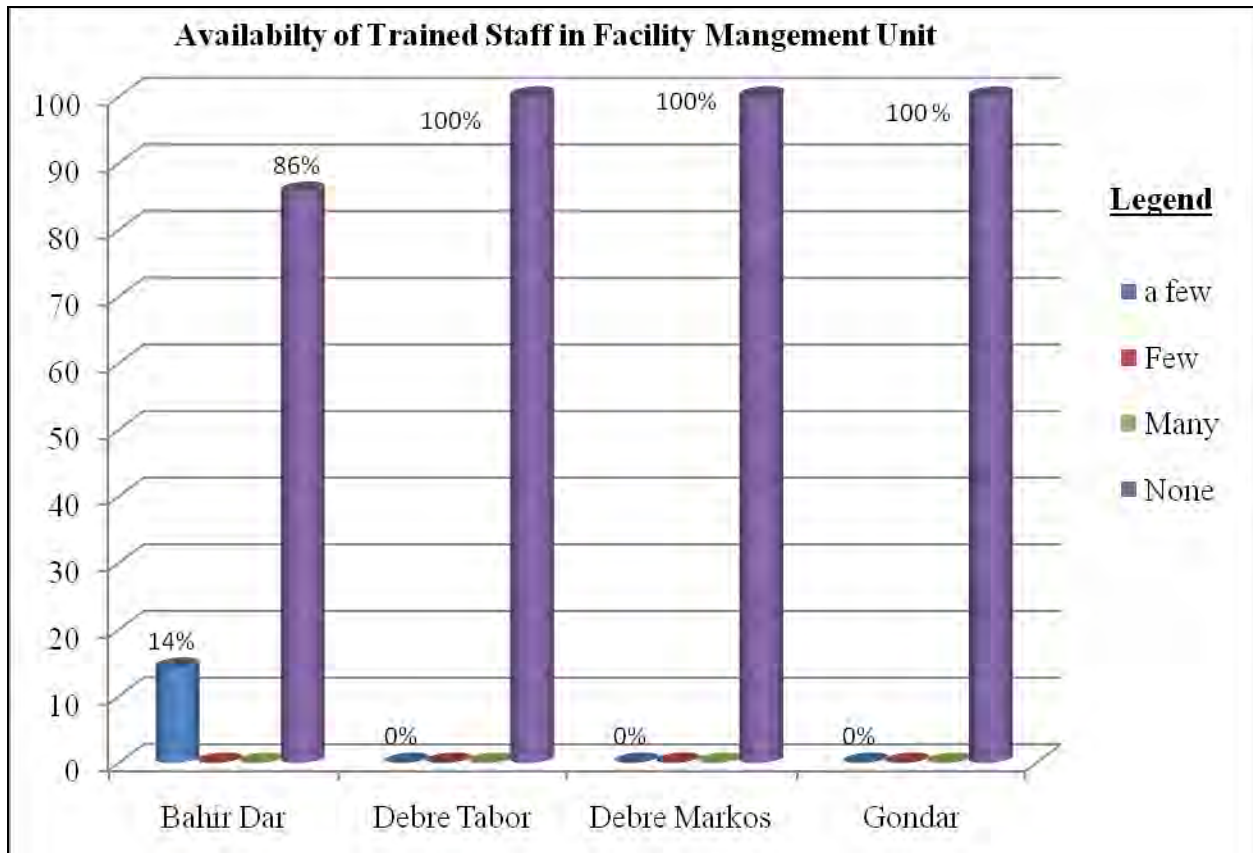


Figure 4.4 Availability of trained staff in facility management

4.4.4.4 Building Maintenance Type

As shown below in Figure 4.5, Debre Tabor, Debre Markos and Gondar universities practice only break down or emergency building maintenance type, 14% of the respondents in Bahir Dar university Marine campus practices routine maintenance type and the other 86% practices breakdown maintenance type. As presented in Figure 4.5, majority of universities practice break down maintenance type with the comparison of routine and preventive maintenance. Due to lack of preventive maintenance tasks include inspections, equipment checks, adjustments and overhaul at specified intervals cannot be done.

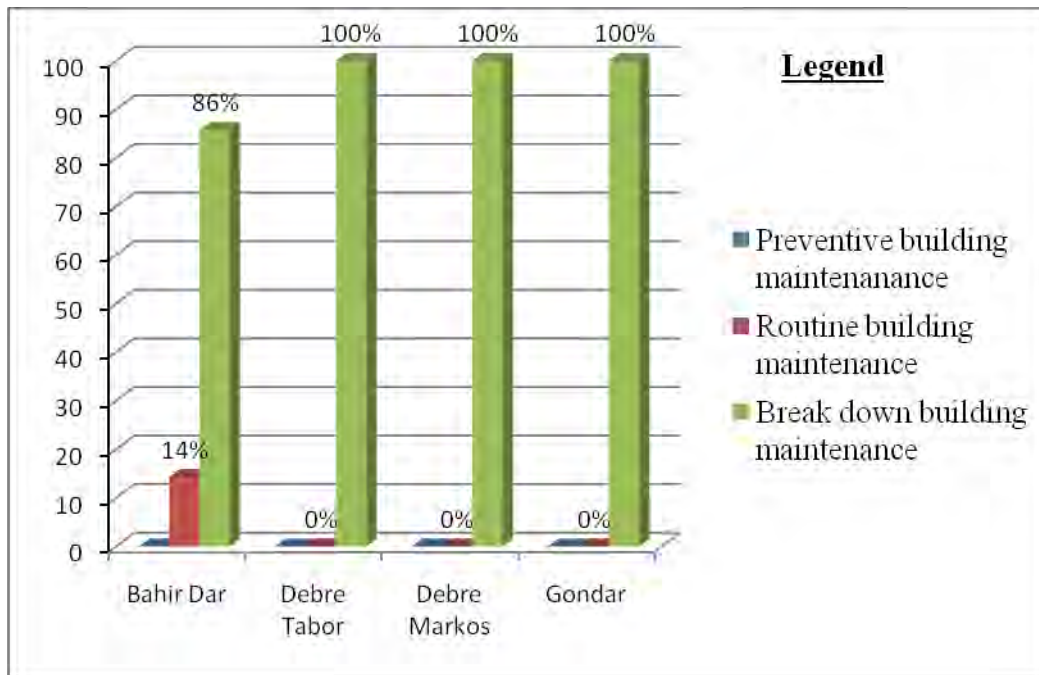


Figure 4.5 Building maintenance type practiced by studied universities

4.4.4.5 Building Condition Assessment

The practice of building condition assessment rated within the time of always, rarely and not assessed as Figure 4.6 presents, 100 % respondents of building operational staffs in Debre Tabor, Debre Markos universities said that the condition of the building assesses rarely. In Bahir Dar University, 14% respondents of building operational staffs explained that always assess the building in marine campus and the other 86% of respondent not assessing the building. 100 % of respondents in Gondar University explained that not assessing the building. Generally, as presented in Figure 4.6 building condition assessing rarely takes the larger percentage. However, information about the condition of the building’s major systems: plumbing, electrical, elevators, heating, structural systems, roof and windows is necessary to eliminate hazardous conditions (like repairing bad electrical connections or faulty fixtures, or replacing broken windows) and which repairs can be postponed. 3

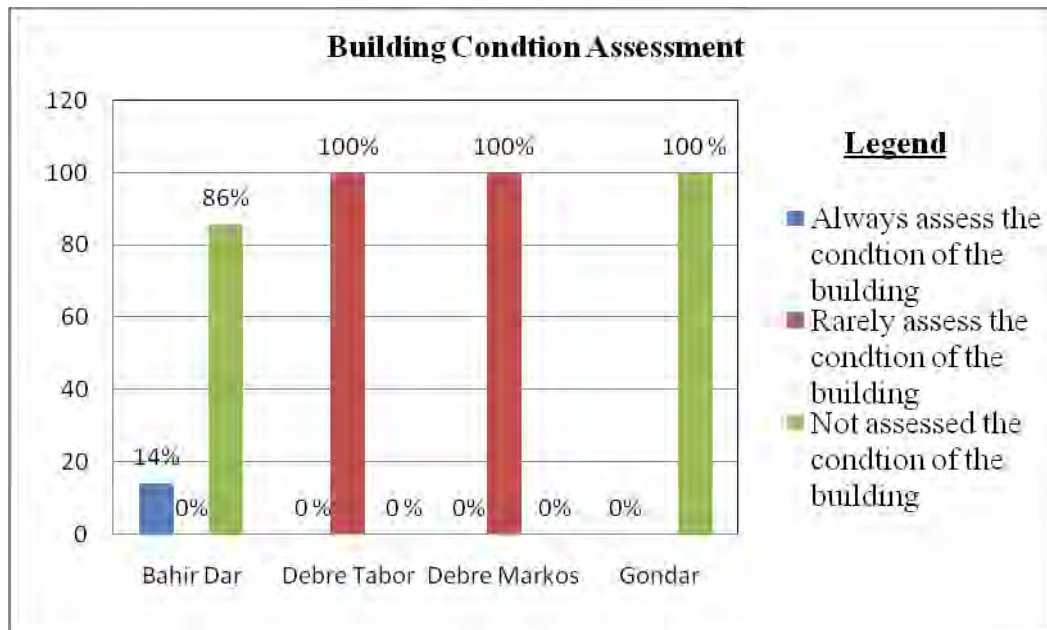


Figure 4.6 The implementation of Building condition assessment in facility management

4.4.4.6 Data Bases Used for Building Facility Management

There are different databases that are used for building facility management practice like computerized maintenance management system, building maintenance control system and CAD for the documentation of drawings but no one respondents use these or other data bases for facility management purpose in the studied universities. However, these databases will promote and enable more efficient use of information at all managerial level, and support operational and strategic facility management that is used to schedule and record operation and preventive/planned maintenance activities associated with facility equipment.

4.5 The Gaps on The Practices of Building Facility Management In Amhara Regional Universities

To answer research question number two (gaps on building facility management practice), assessing building facility management practice in selected Amhara regional universities and reviewing international practices are needed. As shown below in Table 4.10, gaps observed on the studied university is presented based on structure of facility department, building condition survey, building maintenance type, availability of senior planning and scheduling team to provide planning and scheduling for building maintenance, present of specific leading body or

separate unit to support facility management, availability of archiving team to provide necessary document, documentation of facility history and training for building maintenance staffs.

Table 4.3 Identified gaps of building facility management practices in Amhara regional universities with respect to international universities

Key words	Amhara regional universities	International universities
Facility management department	Headed by third level management(Managing Director, Service administration Director of Directorate)	Headed up to Vice President level
The responsibility of facility management	Building operation and maintenance	Building operation and maintenance including new building design and construction
Present of specific leading body or association to support facility management	Not available	Available
Building condition survey	Assess the condition of the building rarely except Bahir Dar Marine campus	Assess daily /always the condition of the building
Building maintenance type	Practice break down maintenance (after building parts are break)	Practice preventive maintenance
Availability of senior planning and scheduling team to provide planning and scheduling for building maintenance	Not available	Available
Availability of archiving team to provide necessary document	Not available	Available
Painting of the building	There is no regular painting	Planned painting
Service personnel who record wear and deterioration in the building to replace and maintain building parts	Not available	Available(in South Africa, British and Japan)
Documentation of facility history	There is no as built drawing , maintenance manual	There is as built drawing, maintenance manual
Technology or data bases availability (CAD for documentation of drawings, computerized maintenance manual) for building maintenance	They do not use	They use
Training for building maintenance staffs (short courses, conferences, magazines)	They do not provide	They provide

4.6 Problems and Challenges Arise in Implementing Building Facility Management

Problems and challenges that arise in implementing building facility management is assessed as presented in Figure 4.7 that answer the research question number three.

As shown below in Figure 4.7, fifty three percent of the respondents explained that there is lack of organized facility management department and forty seven percent of the respondents said that lack of professional associations, conferences, short courses to get updated information about building facility management is one of the problems. Figure 4.7 presents lack of organized facility management and lack of professional associations, conferences and short courses to get updated information about building facility management are the major problems and challenges in the studied universities. This means if one university has no organized facility management; it has influence for the potential to improve the physical performance and appearance of a building and its systems, as well as to increase the users' level of satisfaction, and to improve the efficiency with which the building is maintained and operated. This also has effect to the implementation of the teaching and learning process efficiently and effectively.

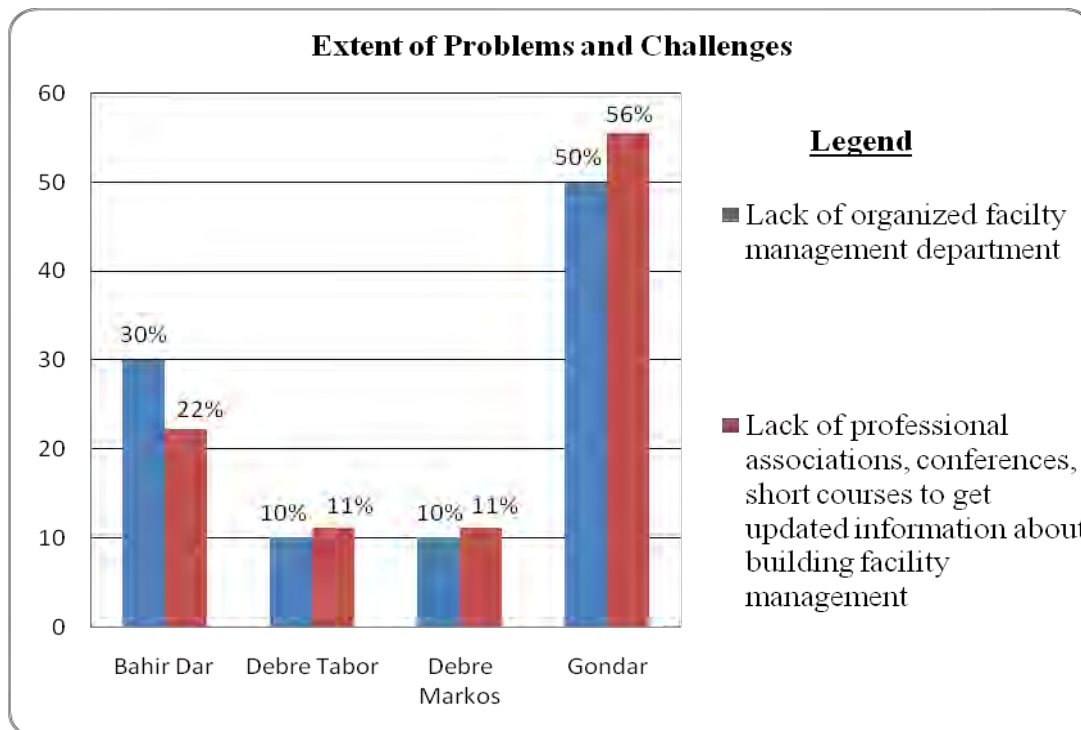


Figure 4.7 The extent of problems and challenges in Facility Management

4.6.1 Causes of Problems in Building Facility Management

The assessment shows that the respondents rate on different factors as causes for problems in building facility management implementation. As shown below in Figure 4.8, organizational challenges and professional competency are the major causes of the problems. However, to prevent or to minimize the above explained problems and challenges it needs diminishing the root causes of problems. To get competent professionals in facility management studied universities have to start opening facility management department under degree and master level and share experience from other countries professionals or associations how to develop this competency .

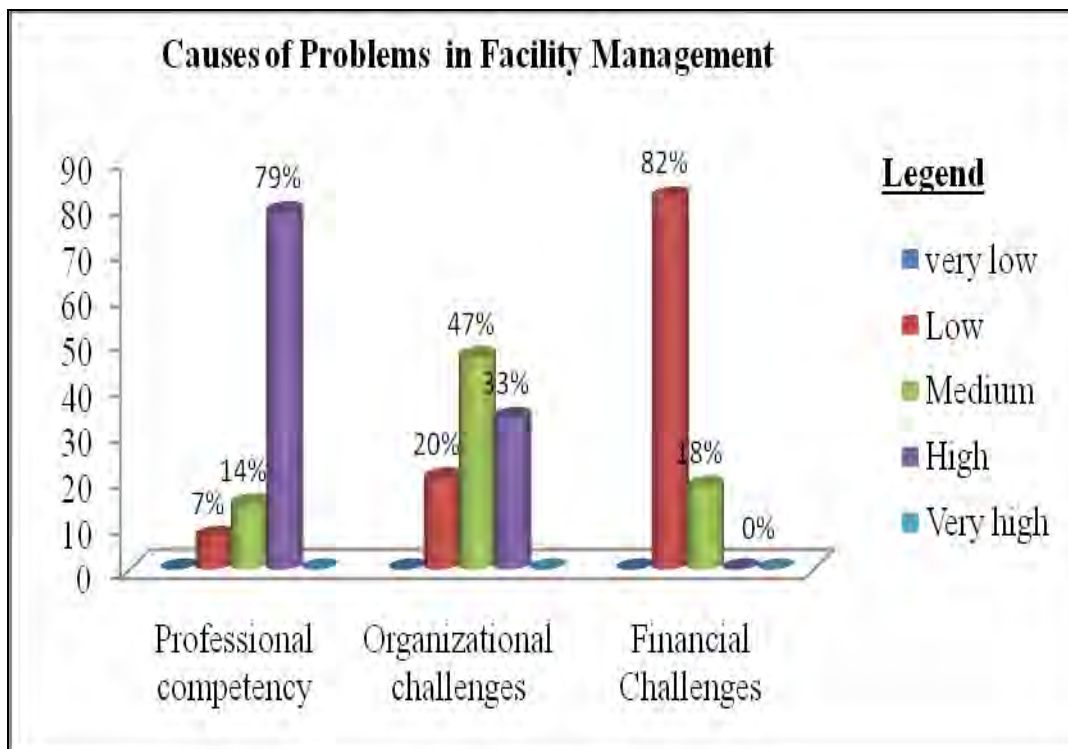


Figure 4.8 The causes of problems and challenges occur in facility management implementation

4.7 Summary of Findings and Discussions

In this section, the findings of the questionnaire survey and structured interview were compared, summarized and discussed from the perspectives of literature review about building facility management practice.

There is no building operation and maintenance policy which guides how to operate and maintain building in Higher Education; instead the maintenance will be held on the interest of universities. Due to this, university maintenance personnel cannot get guidelines to prepare maintenance strategy and standard manuals.

The study show facility planning is very low in studied universities. Efficient and effective building facility management is affected by low facility planning implementation.

Detail record of buildings in universities is used to know the status of each building. However, lacks of detail record of buildings in studied universities affect the performance of facility operation and planning.

Training is vital element for building operational staffs. It is used to build the capacity of building operational staffs by increasing skill and operational motive. But studied universities have no trained staff which result low performance of building facility management practice.

Studied universities, except Bahir Dar University Marine campus uses break down maintenance. This type of maintenance lacks regular inspection and repair for building components, which reduce useful life of building.

Regular Building condition assessment is used to collect information about buildings: sanitary installation, electrical networks, heating and ventilating system, structural strength, roof coverage, lifts, doors and windows condition. It tells which repairs should be done immediately to eliminate hazardous conditions (like repairing bad electrical connections or faulty fixtures, or replacing broken windows). However studied universities assess the condition of building rarely.

Studied universities do not use computerized maintenance management system; building maintenance control system and computer aided design. However, these databases will promote and enable more efficient use of information at all managerial level. It supports operational and strategic facility management to schedule, record operation and plan maintenance activities.

There is no specific organization or association, which provides guidelines, training for facility managers and which controls facility management practice in studied area. The absence of a specific organization creates difficulty in facility management practice.

There is no expertise who leads the facility management department in the studied universities. The facilities manager could not be anybody with modern management skills. It needs to be a certified professional who demonstrates a high level of competence in the areas of expertise. As result of this building facility management practice were given less attention in the studied area.

Organizational challenges and professional competency are the major causes of problems for building facility management practice in the studied university. To minimize problems, competent professionals in the area have to be produced. This can be done by opening facility management department under degree and master level which is used to share experience from other countries professionals or associations on how to develop competency.

Finally, the result obtained in the questionnaire survey is analyzed and discussed with the comparison of literature review. Based on this analysis and discussion, conclusion and recommendation have been stated.

CHAPTER FIVE

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Conclusions are drawn from the study by combining the findings, discussions and recommendations as to what should be done to solve problems. It should be based on objectives mentioned on section 1.2 of the introduction chapter. All the main objectives of this research have been achieved. The following conclusions are drawn from the investigation undertaken in the research or case study;

1. Lack of: proper planning, building operation and maintenance policy, detail record of the building, specific organization or association, regular training for building management staffs and facility management experts have an effect on building facility management.
2. Breakdown building maintenance type is the most frequently practice in the studied universities.
3. Marine campus in Bahir Dar University has better building facility management practice.
4. The organizational structure of the facility management department in the studied region needs rearrangement.
5. The main problems encountered during building facility management area:
 - Lack of organized facility management department,
 - Lack of professional associations, conferences, short courses to get updated information about building facility management

5.2 Recommendations

This study has dealt with the facility management practices in higher education buildings in Ethiopia a case study on Bahir Dar, Gondar, and Debre Tabor and Debre Markos universities. Based on the study the following recommendations are suggested;

1. Some higher educational institutes shall start to open facility management department under degree and master level to get facility manager professionals.
2. Rearrangement of the organization structure of facility management by upgrading the position of facility management up to Vice President level , assigning building construction and maintenance manger under the position of Vice president and handing over planning ,and scheduling and archiving team under the building manager .
3. Prepare a conference to share experiences from other international universities, providing training and short courses for the employee of facility management.
4. All Amhara regional universities need to prepare a detail record of the condition of building and prepare maintenance manual.
5. For improving building facility management practice, it is better to share experiences of Marine Campus of Bahir Dar University.

5.2.1 Recommendations for Further Works

This research has identified problems and challenges in building a facility management practice for Amhara regional universities. The research moreover, has forwarded recommendations that can improve the practice from the result of the thesis. However, including all relevant issues in the thesis makes the research vast and it became difficult to present. Therefore, the following points are recommended to be assessed in detail, as they can be important points for further research, to improve the building facility management practice.

- a) Preparation of building operation and maintenance policy
- b) The importance of establishing a facility management association

BIBLIOGRAPHY

- Anna, L. L. (2005). Public Facilities Management Services in Local Government, International Experiences.
- Atkin B. and Brooks A. (2009). *Total Facilities Management* (3rd ed.). Oxford, Blackwell Science.
- Baldry D. and Barret P. (2003). *Facilities Management Towards Best Practices* (Second ed.). Oxford, Blackwell Science.
- Becker, F. (2000). The total workplace facilities management and elastic organization. *18*, 312-322.
- British Institute of Facilities Management*. (2010). Retrieved 2014, from <http://www.bifm.org.uk>
- Chanter, B. a. (1996). Maintenance Organization in Building Maintenance Management. London: Blackwel Science.
- Clayton, M. A.-q. (1996). A study of information content of as built drawings for USA.
- Computer Aided Facility Management*. (2011). Retrieved 2014, from <http://www.wbdg.org/om/cafm.php>
- Erdener, E. a. (2001). CAD standards and the institutions of higher education. 285-295.
- Expert Knowledge Facilities Management in UK*. (2010). Retrieved 2013, from <http://www.mollearn.com/expert-articles/importancefacility manager>
- Facilities Management association in UK*. (2010). Retrieved 2014, from <http://www.fmassociation.org.uk>
- Facilities Management Association of Australia*. (2010). Retrieved 2014, from <http://www.fma.com.au/cms/index.php>
- Facilities Management Unit at Yale* . (2007). Retrieved from <http://www.facilities.yale.edu/facilitiesatyale.mht>

- Facilities Management, University of Virginia.* (2010). Retrieved 2014, from <http://www.fm.virginia.edu>
- Facilities Operations.* (2009). Retrieved 2014, from <http://www.facilities.yale.edu/facops.shtml>
- Gabriel, G. (2003). Decentralizing Asset Management in a University Environment Using Web Enabled Technology. *Facilities*, 233-243.
- Guideline, C. D. (2014). Chicago District Guideline.
- Hong Kong Institute of Facilities Management.* (2010). Retrieved 2014, from <http://www.hkifm.org.hk>
- International Facilities Management Association.* (2008). Retrieved 2014, from [http://www.ifma.org/docs/knowledge base/sfp whitepaper.pdf](http://www.ifma.org/docs/knowledge%20base/sfp%20whitepaper.pdf)
- International facilities management association.* (2009). Retrieved 2014, from [http://www.ifma.org/what is fm/index.cfm](http://www.ifma.org/what%20is%20fm/index.cfm)
- Jalal A., A. k. (2003). *Buildings Maintenance Cost.* Saudi Arabia.
- Japan Facility Management Promotion Association.* (2010). Retrieved 2015, from <http://www.jfma.or.jp/en/index.html>
- Kane, M. (2001). *Development of recommendations for Automating and IT help desk.*
- Lavy, S. (2008). Facility Management Practices in Higher Education Buildings. *Facility Management* , 303-315.
- lindholm, A. L. (2005). *Public facilities management services in local government.*
- Managment, B. I. (n.d.). Retrieved 1 20, 20014, from <Http://WWW.bifm.org.uk/>
- Ministry of Education.* (2014). Retrieved 2014, from <http://info.moe.gov.et/he.shtml>
- MIT Department of Facilities.* (2009). Retrieved 2014, from <http://web.mit.edu/facilities/about/index.html>

Moseki, L. K. (2007). *The principle and practice of facility maintenance in Botswana*.

Ogebeifun, E. (2011). facilities management in a multi campus setting acase study of the university of the Witwatersrand. Johannesburg.

South African Facilities Management Association. (2010). Retrieved 2014, from <http://www.safma.co.za>

Whole Building Design Guide. (2008). Retrieved 2014, from <http://www.wbdg.org/cmms/om.php>

Whole building design guide. (2010). Retrieved 3 11, 2014, from <http://www.wbdg.org/cafm/om manual .php>

Whole Building Design Guide. (2011). Retrieved 2014, from <http://www.wbdg.org/om.php>

APPENDIX A

Questionnaire for Vice Presidents for Business and Development

Research topic

THE STUDY OF BUILDING FACILITY MANAGEMENT PRACTICES IN HIGHER EDUCATION INSTITUTES: A CASE STUDY ON BAHIRDAR, GONDAR, DEBRE TABOR AND DEBRE MARKOS UNIVERSTIES IN AMHARA REGION, ETHIOPIA

Questionnaire

Dear /Sir

I kindly request your participation and support on ‘_STUDY OF BUILDING FACILITY MANAGEMENT PRACTICES IN HIGHER EDUCATION INSTITUTES IN AMHARA REGION ETHIOPIA’ by responding questionnaire. Any information you can provide would be greatly appreciated.

General information

The main objective of this research is to investigate facility management practice in higher education buildings in Amhara Region, Ethiopia then find the possible way to improve the situation.

The intention of the survey

The purpose of this survey is to obtain necessary data for the consumption of research paper in Construction Technology and Management at Addis Ababa institute of Technology .All data_s find from the survey will be kept, and only used for academic purpose .

The attached questionnaires are derived based on literature review. You can tick, write in words or rank when it is required on the space provided at your convince to the questionnaire.

The identity of the respondents shall be kept confidential. I would like to extend my gratitude for your helpfulness taking your precious time to respond questionnaire.

Thank you!

Section1. Respondent's position

- Vice president for Business and Development Administrator
- Service Administration Director of Directorate Facility Manager
- Managing Director

Section2. Questions about building facility management system and practice

2.1 Is there specific leading body or association of Facility management in your region or Ethiopia who provides guidelines and control on the quality level as well as to assess the performance of Facility management practice to your university?

- Yes No I do not know

2.2 Is there Facility management unit or department in your university?

- Yes No I do not know

2.3 If your answer for 2.2 is yes. What look like the relationship between strategic planning and facility management unit in your university?

- Facilities management provides day to day operating support not involved in strategic planning
- Facility management reacts to strategic initiatives
- Facility management fully involved in the development of strategic planning

2.4 In what level of management does facility management unit is headed?

- Top level of management (vice president, dean of faculty....)
- Middle level of management (Managing director, Facility manger....)
- Lower level of management

2.5 Is there facility management expert who leads a facility management unit?

Yes No I do not know

2.6 Is detail records of all university buildings?

Yes No I do not know

2.7 If your answer for 2.5 is yes, is there archiving team for archiving campus building documents?

Yes No I do not know

2.8 Is there Planning and Scheduling team for building maintenance?

Yes No I do not know

Please provide any other thoughts, information or contacts concerning building facility management practice in Ethiopian Universities

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.....
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Thank you!

APPENDIX B

Questionnaire for Managing Directors and Service Administration Director of Directorate

Research topic

THE STUDY OF BUILDING FACILITY MANAGEMENT PRACTICES IN HIGHER EDUCATION INSTITUTES: A CASE STUDY ON BAHIRDAR, GONDAR, DEBRE TABOR AND DEBRE MARKOS UNIVERSTIES IN AMHARA REGION, ETHIOPIA

Questionnaire

Dear /Sir

I kindly request your participation and support on ‘_STUDY OF BUILDING FACILITY MANAGEMENT PRACTICES IN HIGHER EDUCATION INSTITUTES IN AMHARA REGION ETHIOPIA’ by responding questionnaire. Any information you can provide would be greatly appreciated.

General information

The main objective of this research is to investigate facility management practice in higher education buildings in Amhara Region, Ethiopia then find the possible way to improve the situation.

The intention of the survey

The purpose of this survey is to obtain necessary data for the consumption of research paper in Construction Technology and Management at Addis Ababa institute of Technology .All data_s find from the survey will be kept, and only used for academic purpose .

The attached questionnaires are derived based on literature review. You can tick, write in words or rank when it is required on the space provided at your convince to the questionnaire.

The identity of the respondents shall be kept confidential. I would like to extend my gratitude for your helpfulness taking your precious time to respond questionnaire.

Thank you!

Section1. Respondent’s position

- Vice president for Business and Development Administrator
- Service administration Director of Directorate Facility Manger
- Managing Director

Section2. Questions about building facility management system and practice

2.1 Is there Facility management unit or department in your university?

- Yes No I do not know

2.2 How do you rate the facility management [FM] services in your university?

FM services	Level of implementation				
	Very low/1	Low/2	Medium/3	High/4	Very high/5
Facility Planning					
Building Operation and Maintenance					
Building Design and Construction					

2.3 If your answer for question 2.2 is yes. What look like the organization structure of the facility management unit in your university? Please mention or sketch the organizational structure of facility management;

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Section 3 Questions about problems and challenges in Facility Management practice

3.1 Are there any problems and challenges in Facility Management practice in your university?

- Yes No I do not know

3.2 If your answer for question 3.1 is yes. What problems and challenges happen in your university?

- Lack of organized facility management department
- Lack of Professional associations, Conferences, Short courses to get updated information about building facility management

Please mention if there are any other problems and challenges present in facility management practices of your university;

.....

.....

3.3 Please rate the following causes to problems arising in facility management implementation

Factors	Level of causing implementation problems				
	Very low/1	Low/2	Medium/3	High/4	Very high/5
Professional competency					
Organizational challenges					
Financial Challenges					

Please provide any other thoughts, information or contacts concerning building facility management practice in Ethiopian Universities

.....
.....

Thank you!

APPENDIX C

Questionnaire for Building Operational Staffs

Research topic

THE STUDY OF BUILDING FACILITY MANAGEMENT PRACTICES IN HIGHER EDUCATION INSTITUTES: A CASE STUDY ON BAHIRDAR, GONDAR, DEBRE TABOR AND DEBRE MARKOS UNIVERSTIES IN AMHARA REGION, ETHIOPIA

Questionnaire

Dear /Sir

I kindly request your participation and support on ‘_STUDY OF BUILDING FACILITY MANAGEMENT PRACTICES IN HIGHER EDUCATION INSTITUTES IN AMHARA REGION ETHIOPIA’ by responding questionnaire. Any information you can provide would be greatly appreciated.

General information

The main objective of this research is to investigate facility management practice in higher education buildings in Amhara Region, Ethiopia then find the possible way to improve the situation.

The intention of the survey

The purpose of this survey is to obtain necessary data for the consumption of research paper in Construction Technology and Management at Addis Ababa institute of Technology .All data_s find from the survey will be kept, and only used for academic purpose .

The attached questionnaires are derived based on literature review. You can tick, write in words or rank when it is required on the space provided at your convince to the questionnaire.

The identity of the respondents shall be kept confidential. I would like to extend my gratitude for your helpfulness taking your precious time to respond questionnaire.

Thank you!

Section1. Respondent's position

- Vice president for Business and Development Administrator
- Service administration Director of Directorate Facility Manger
- Managing Director
-

Section 2 Questions about Building operation and maintenance

2.1 Is there maintenance unit in facility management department?

- Yes No I do not know

2.2 If your answer for question 2.1 is yes. Are well trained staffs available for maintenance unit?

- A few Few Many None

2.3 If your answer for question 2.1 is yes. What type of building maintenance is practiced in your university?

- Preventive maintenance Routine maintenance Break down maintenance

2.4 How many times does the condition of the building is assessed in your university?

- Always Rarely Not assessed

2.5 If your answer for question 2.4 is not assessed. Due to what reason the condition of the building is not assessed?

2.6 Does your university use data bases for facility management purpose?

- Yes No I do not know

2.7 If your answer for question 2.6 is yes. What databases used in your university?

- Computerized Maintenance Management system Building maintenance control system
 CAD for the documentation of drawings

Please list any other databases used by your university;

2.8 Is there documentation of facilities in your universities?

- Yes No I do not know

2.9 If your answer for question 2.8 is yes. What documents are available in your university?

- As built drawings maintenance and operation manual Both None

2.10 Is there organized space inventory system that includes detail records of all university buildings and properties?

- Yes No I do not know

Section 3 Questions about problems and challenges in Facility Management practice

3.1 Are there any problems and challenges in Facility Management practice in your university?

- Yes No I do not know

3.2 If your answer for question 3.1 is yes. What problems and challenges happen in your university?

- Lack of organized facility management department
 Lack of Professional associations, Conferences, Short courses to get updated information about building facility management

Please mention if there are any other problems and challenges present in facility management practices of your university;

.....

3.3 Please rate the following causes to problems arising in facility management implementation

Factors	Level of causing implementation problems				
	Very low/1	Low/2	Medium/3	High/4	Very high/5
Professional competency					
Organizational challenges					
Financial Challenges					

Please provide any other thoughts, information or contacts concerning building facility management practice in Ethiopian Universities

.....
.....

Thank you!

DECLARATION

I, the undersigned, declare that this thesis is my original work and has not been presented for a degree in any other university. All sources of materials used for the thesis have been duly acknowledged.

Name: Belaynesh Nibret

Signature:

December, 2015