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THE IMPACT OF MAINTENANCE CULTURE IN CONSTRUCTION IN PUBLIC INSTITUTIONS IN GHANA (A CASE STUDY OF SELECTED INSTITUTIONS IN SABOBA DISTRICT OF NORTHERN REGION)

BY

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JULY, 2014

DECLARATION

STUDENT'S DECLARATION

I Liwalmor Bakpiri Moses, declare that this Dissertation, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

SIGNATURE……

DATE…….....……

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of Dissertation laid down by the University of Education, Winneba.

NAME OF SUPERVISOR:.....

SIGNATURE:.....…….....

DATE:…….....

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DEDICATION

I dedicate this thesis first and foremost to the Almighty God for seeing me through in my education this far and making this masters program a dream come true. I also dedicate this thesis to my wife Theresa Bakpiri and my children.

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ABSTRACT

Buildings are great assets to individuals and the nation and can be regarded as an economic asset, which must be maintained to ensure higher value. This study assessed the impact of maintenance culture in constructions or buildings of public institutions in Ghana, a case study of selected institutions in the Saboba District of Northern Region. Questionnaires, interview schedule and observation were for data collection. The analysis of the respondents' responses was done researcher through combine method system. The total population of 150 respondents were used for the study and was sampled as follows: Staff of St. Joseph' Technical Institute (SABTECH) 45, students of SABTECH 65, Workers of Saboba Medical Centre/Ghana Health Service 23 and Workers of Saboba District Assembly 17. Random sampling technique was used to sample out 150 respondents from Workers of Saboba Medical Centre/Ghana Health Service, workers of Saboba District Assembly and Students as well as staff of SABTECH, who were administered with questionnaires personally by the researcher. Interview was conducted on managers, maintenance officers and other stake holders and observation made on services and building components of the institutions to gather data for the study The objectives of the study were to; identify the maintenance deficiencies of public buildings and the causes of poor maintenance, and to assess appropriate maintenance culture of public institutions. The study revealed that; fire outbreak, rainstorm and irregular maintenance practices were the major causes of damage of public buildings. It was also revealed that most of the buildings had exposed and hanging foundations, broken walls, cracks on floor screeds and most of the buildings had faded paintings whilst some building roofs were partly ripped off with semi functioning or faulty electrical/water fittings. The study also revealed that most maintenance departments do not undertake regular inspections of buildings, do not have maintenance budgets and also do not have laid down maintenance plans coupled with the tepid attitude of staff towards maintenance request made by occupants. The study further shows that, most institutions do not have annual maintenance schedules due to financial constraints. The study recommends that maintenance departments should be well resourced to undertake regular inspection for prompt maintenance, accept maintenance request from occupants and finally government should make funds available for maintenance of public buildings of District Assemblies and Saboba District in particular for workers to stay peacefully in order to discharge their duties.

CHAPTER ONE

1.0 Introduction

This chapter discuses the background to the study, statement of the problem, purpose and objectives of the study, research questions, significance of the study and the scope of the study.

1.1 Background to the Study

Towards the realization of effective and efficient housing systems throughout the world, building researchers and experts have designed policies and programmes of certain standards and specifications which include maintenance of buildings for the developers and clients to follow during their activities.

Maintenance is a combination of actions carried out to retain or restore the item to an acceptable condition. Maintenance is the act of putting back device to its effective use after it has broken down. It can also mean the act of reconditioning or restoring a device to an acceptable standard. It is an act of taking proper care of devices so as to prolong their life span. Maintenance is the work that is done regularly to keep a machine, building or a piece of equipment in good condition. Maintenance is an action carried out by a group of persons to protect, preserve and maintain the systems, equipment and structures to ensure to asset capability to function (Alagidede 2002). Technological change has brought the construction of modern buildings for both the private and public institutions. These buildings deteriorate after some time due to atmospheric and weather effects. Many of the structures both public and private are not maintained over the years and lose their aesthetic values. The structures deteriorate to unacceptable standard.

Maintenance is defined as work undertaken in order to keep or store any facility to an acceptable standard (Clinton 1994).

This definition is in line with the event that took place in the beginning of creation of the universe as reported by the Holy Bible – "In the beginning God created the heaven and the earth; and the earth was without form and void." (Gen.1: 1-26). God in his wisdom saw the need to restore or recondition the earth to an acceptable standard that would be conducive for man to inhabit it. The emphasis here was the need for Adam and Eve and for that matter their generation to live under a conducive and safe environment to be able to function accordingly, as the saying goes cleanliness is next to Godliness. Man depends on the building environment to work, and the place of work should meet the required standard in terms of safety, comfort and economic survival. It is important that these buildings meet such functional requirement for which they were constructed.

The subject of building maintenance in Ghana has been neglected and the Saboba district is not an exception. It is worth noting that many people fear or do not enjoy living or working in buildings showing signs of failure such as cracks, damaged components etc. The lapses that do occur in the absence of maintenance have become a major concern to society and this has informed this study into the maintenance culture in construction on public institutions in Ghana.

The maintenance of a building environment affects everyone continually for it on the state of our homes, offices, schools and factories that we depend not only for our comfort but our economic survival as well. Wood (1991), states that at the present times, it is an established economic fact that existing building must be maintained and repaired for where possible in preference to demolition and rebuilding. This type of work is now very common and is an important part of the workload of the building industry.

The main purposes of maintaining building as stated by Seeley (1993) are as follows

1. Maintaining value of investment
2. Presenting good appearance.
3. Maintaining the building in a condition in which its continues to fulfil it function.

Other purposes of effective building maintenance are to:

4. Minimize difficulties encountered by the users of the building.
5. Reduce cost
6. Reduce down time
7. Maintain job satisfaction
8. Give adequate security

It could be seen that without maintenance, the aim of the investor will end on dead rocks, for quiet a heavy sum of money is invested in building and if those buildings do not last the estimated life, then the developers cannot even retrieve the amount invested let alone gain some profit. Again no one would like to reside in a building which has deteriorated to extent that it cannot provide the requirements of the users nor meet the functional requirements.

When such a situation arises, the building will be uninhabitable. But with maintenance work being carried out on buildings they are kept in a state whereby they provide the occupant and even the environment the necessary requirements. Without maintenance building will have to be abandoned and it will be uneconomically sound to put up new buildings all the time without carrying out repair works on the existing ones.

A well maintained product/asset ensures the maximum utilization for the period of useful life especially when the product reaches the decline stage. Many writers on the economic and social significance of maintenance contend that the built environment expresses in physical form, the complex social and economic factors, which give structure and life of the community. Therefore, the condition and quality of buildings

reflect public pride or indifference, the level of prosperity in the area, social values and behaviour and all the many influences both past and present, which combine to give a country its unique characteristics. The main challenges involved in the maintenance of public buildings could be attributed to lack of maintenance policies and plans, lack of funding, lack of resources and inadequate budgetary allocations to cater for maintenance.

The District Assemblies and public institutions are not adequately resourced to carry out maintenance work as early as possible. Ownership is also a big problem in that most users and occupants of public buildings regard it as not their own property but a state property and handle it without care. In some cases users do not recognize the building as their property and hence have passive attachment in relation to the efficient use and maintenance of the building.

1.2 Statement of the Problem

Public buildings in the Saboba District are regularly not maintained and are in a very deplorable stage, some of the indicators are signs of collapse, cracks, discoloured and deterioration. Some of this buildings either residential and offices accommodations etc., in public institutions and departments have not seen any significant maintenance or shown signs of maintenance since they were constructed.

Frequent visits to the three institutions of the Saboba District by this researcher depict the abhorring situations in some public institutions with the buildings showing cracks on the walls, rotten window and door frames, leaking roofs, missing louver blades, rotten ceilings, floors wearing or peeling-off, faded and discoloured surface coating (painting). Examples of such buildings spotted was a 10-seater KVIP toilet for male students in St. Joseph's Technical School-Saboba that has been abandoned because of the danger it posed to its users. Such situations could be found in almost all the departments within Saboba District.

One of the nurses quarters at the Saboba hospital had some serious cracks on the wall such that the user complained that, when he is lying on his bed he sees objects that pass behind the room. Some of the door frames of the market stores belonging to the District Assembly have rotten beyond repairs while some roofing sheets which were destroyed by fire three years ago have not been replaced. The habit of lack of maintenance culture by the authorities and occupants of these facilities often leads to reduced lifespan of these buildings. Ghanaians lack culture of maintenance and it is an open secret. Indeed lack of maintenance in general is really causing undesired pains to citizens of this nation (Alagidede 2000).

The main challenges towards maintenance in the District could be attributed to lack of maintenance plans, lack of funding and inadequate budgetary allocations to cater for maintenance. The District works department is not resourced to undertake periodic and regular maintenance. Also, the issue of ownership is a big problem in public building in that most of its occupants regards it as not their own property but a state property and therefore not cautious in the use of public buildings. Due to the dilapidated nature of these residential facilities the occupants and their properties had always been left at the mercy of the weather whenever it rains. These unfortunate situations had affected the District as most workers refused postings to the district and few who are there, frequently agitate for transfers to other urban districts which they fill they will get decent accommodations.

Moreover, these problems arising out of the present situation as far as maintenance of building in the public sector is concerned lowers morale of the labour force and goes a long way to reduce the efficiency of the personnel. It is therefore imperative for this study to assess the maintenance challenges in the public building in

the Saboba District in order to improve upon the quality of maintenance on the District public infrastructure and in Ghana as a whole.

1.3 Purpose and Objectives of the Study

The purpose of this study was to develop maintenance culture code for public institutions in Saboba District.

The following were the specific objectives of the study:

1. To explore the condition of buildings in public institutions in the Saboba District.
2. To identify the maintenance deficiencies of the public institutions, and their causes.
3. To assess appropriate maintenance culture codes in the maintenance departments.

1.4 Research Questions

The following questions were employed in the quest of soliciting information

1. What are the conditions of public buildings in the Saboba District?
2. What are the maintenance deficiencies in public institutions?
3. What maintenance rules /codes are available in the maintenance department

1.5 Significance of the Study

- Finding of the study would serve as a source from which future researchers could access information for further studies on the topic.
- The study would provide a guideline for maintenance of public buildings.
- The study would indicate personnel who would be responsible for both regular and routine maintenance.
- Staff and students would enjoy working and living in public buildings.

- Finally, findings of the study will assist Government to embark on an education drive on the subject of maintenance culture through schools and the print and electronic media.

1.6 Scope of the Study

Chapter one deals with the introduction. It gives the background to the study, statement of the problem, the purpose and objectives of the study and research questions. It also examines the significance of the study and the scope of the study.

Chapter two also reviews the related literature, the view of the literature focuses on the following areas such as: The concept of building maintenance, definition of building, forms of maintenance, importance of maintenance, technology of maintenance, economic and social significance of maintenance, nature of maintenance, maintenance team (supervision) and managing building maintenance and finally funding of maintenance work in public buildings.

Chapter three discusses the methodology of the study. This is divided into research design, population, sampling techniques and sample size and data collection.

Chapter four is a detailed analysis, discussion and presentation of the data collected and the discussion on the results and findings.

Finally, chapter five presents the summary of findings, conclusion, recommendations and areas for further research.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviews related literature from published and unpublished books, journals, research findings and relevant information on what have been said or done about the subject. The areas for discussion in this chapter include the concept of building maintenance, definition of building, forms of maintenance and the importance of maintenance. Additionally the chapter attempts to look at technology of maintenance,

economic and social significance of maintenance, nature of maintenance, maintenance team (supervision) and managing building maintenance. Finally, funding of maintenance would be discussed.

2.1 The Concept of Building Maintenance

2.1.1 Definition of Maintenance

Maintenance has no universal definition; however, writers define it from different perspectives. Seeley (1983) defines maintenance as seeking to preserve a building in its initial state so that it continues to serve its purpose. In other words, it is maintaining a building to retain the value of investment, thus to maintain the building in a condition in which it continues to satisfactorily fulfil its function and to present a good appearance to public. These definitions emphasize on preventive measures that need to be taken to prevent major defect. The word initial in the definition also seeks to find an answer to when a maintenance work should be carried out or start.

One school of thought recommends that it must start from the day the contractor leaves the site. The contractor is required to carry out maintenance and repair works on the building during the defect liability period, which depends upon the conditions of the contract of the environment or the country after the period, the maintenance responsibility is passed onto the client. The other school of thought, however, maintains that the work must start or commence right from inception stage of the project. It also recommends that cleaning and maintenance expert must be consulted during the design costing. This implies that a team work must be under taken by the architects, structural engineers, quality surveyors and service engineers.

Seeley (1985) as cited in Ozele (2002), has equally defined maintenance as the work undertaken in order to keep, restore or improve facility in every part of a building,

its services and surrounding to a current acceptable standard to sustain the utility and value of the facility. The concept of a current acceptable standard assumes that standards may be expected to improve with the passage of time and that, users requirements will often demand higher performance level for their building than the norms where buildings were designed. This definition also centred on preventive and corrective measures that need to be taken to ensure an effective building maintenance.

A more functional definition by Hackman and Osei-Tutu (2008) is that, maintenance is synonymous with controlling the condition of a building so that its pattern would lay within specified region. The word control'' suggests a positive activity which is specified region'' presumably has a meaning similar to acceptable standards'' and would be determined in a similar way. An interesting aspect of this definition is that it envisages a range of acceptability with upper and lower limits between which the condition of the facility must be maintained.

Maintenance therefore is all the necessary work done to preserve a building with its finishes and fillings, so that it continues to provide the same or almost the same facilities, amenities and services as it did when it was first built. It also includes the expenditure necessary to maintain the value of the property and involves:

- Day to day repairs such as leaking taps and electrical effects.
- Periodic up-keep such as painting, and
- Major repair requiring heavy expenditure and the services of technical experts, for example foundation works and re-roofing.

2.1.2 Maintenance in Ghana

A careful look around the community Kakpeni a suburb of Saboba in which the researcher lives and works shows that some of the buildings were built over 15 to 20

years before the researcher was born 48 years ago and the buildings can still be described as good while some may not meet the standards which can be described as acceptable.

Buildings are expected to exist for a long time, regardless of whether or not they have actually been designed and constructed properly to do so. The building industry is responsible for maintaining, improving and adopting the existing stock of buildings in addition to the construction of new ones. It appears that in Ghana the neglect of maintenance of our housing stock has resulted in much public concern as in some cases defects/failures have occurred in relatively new buildings. Some of the problems are lack of concern shown by clients and users as well as poor design habits and execution. There is evidence that a substantial part of our building stock, roads and other physical facilities are in danger of deteriorating below the point of economic repair.

This is particularly true of government buildings, roads and other facilities scattered all over the country where no efforts have been consciously made to budget against their maintenance, The policy of maintenance which should be enforced for buildings to be maintained is neglected in Ghana. Ahwoi (2012) has said that, the lack of maintenance culture in the country was causing the nation a great deal of money which could have been channelled into development projects. To him the attitude of Ghanaians now is to build, neglect and rehabilitate instead of giving by the axiom "a stitch in time saves nine." Mr, Kwesi Ahwoi, minister for Food and Agriculture an Old Boy, was addressing the 82nd Speech and Prize-Giving Day Celebration of St. Augustine's College in Cape Coast Under the theme "The Culture of Maintenance as an Integral part of Infrastructural Development." Undoubtedly every institution in Ghana is guilty of this menace. Indeed lack of maintenance in general is really causing undesired pains to the citizens of this nation.

Maintenance which could bring back the beautiful building environment is not done, so most buildings within the country including Saboba District continue to deteriorate with time. It is therefore imperative to assess the maintenance culture in public institutions in order to improve upon maintenance practice by individuals and the public as a whole.

2.1.3 General Concept of Maintenance

In Ghana the neglect of our housing work has resulted in much public concern that, defect/failures have occurred in relatively new buildings. In most cases, the lack of maintenance is blamed on the lack of concern shown by the clients/users as well as poor design habits by the architects. It is especially so with properties where property owners do not include running cost in their expenditure when in fact they should factor their maintenance expenditure.

Experience shows that property owners do not show the same concern that they give to their automobile in respect of maintenance. A telling comparison is that of the amount of time spent by the average motorist on cleaning his car with the average time spent on cleaning the external paint work of the house.

2.1.4 Aims of Maintenance

The primary aim of maintaining a building is to ensure that the building continues to serve the purpose for which it was put up. Afranie and Osei-Tutu, (1999) identified some of the main purposes of maintaining buildings as follows:

- To maintain the value of a building: a better maintained building normally has greater value, however increased value may be marginal as location and size of site all play an important role in the determination of value..

- To ensure optimum use of buildings: good maintenance should allow building to be used to their full potential.
- To create or maintain suitable appearance: can make a positive contribution to external environment and social conditions. Dilapidated buildings can contribute to social deprivation and bad resources and affect the environment.
- To minimize the life of maintained services and facilities main components: maintenance can reduce cost of subsequent maintenance by extending periods between repairs and replacement.
- To ensure that buildings do not detract from surroundings and also maintain a suitable appearance.

2.1.5 Factors Affecting the Decision to Carry Out Maintenance

- Availability or non-availability of resources whether physical or economic greatly affects the decision to carry out maintenance works especially major renovation works which require huge funds.
- Urgency of the work: investors consider whether delayed work in the short run will require more expensive work at a later stage.

  This usually takes into consideration the safety of users and any possible damage to structural as well as finishing and furnishing in the building.
- The use of a building: the use to which a building is put also affects the decision to carry out maintenance. A building such as those of schools and hospitals require more attention than a mere residential unit due to the amount of pressure and use of it.
- The age of the building: capital expenditure on buildings is in anticipation of returns. It is therefore prudent to consider the age of the building to avoid spending on

a building which has outlived its usefulness or will not yield returns proportionate to the amount expended on it, (Aha, 2009).

2.1.6 The Maintenance Challenges in Ghana

The main challenges of maintenance of buildings in Ghana are lack of funds. The budget allocation does not cater for maintenance, hence the District Assemblies are not resourced to undertake or carryout maintenance periodically and regularly.

Another problem is ownership of these buildings, where occupants and users regard it not as their own property but a state property and handle it without due care and maintenance. In some cases occupants do not recognize the building as their property and therefore have passive attachment in relation to the efficient use and maintenance of the building.

Afranie and Osei-Tutu, (1999) states that the decision to carry out maintenance is affected by many factors among which are.

Cost: investors would want to have the most economic method for carrying out maintenance work whether, corrective or preventive, thus they look at.

1. Actual cost of maintenance of the building to the cost of maintaining, similar building.
2. Consideration of money spent to achieve acceptable standard at present.
3. Cost of maintaining same standard in future and economies of replacing facilities, and
4. Amount of work available and priority of work to be executed.

Availability of physical resources: The availability or non-availability of physical resources affects decision in that, when suitable materials for maintenance are not available it becomes difficult to undertake maintenance. Again even if suitable

materials are available but not in adequate quantities and the alternative materials are not available it will deter people from undertaking maintenance activities. The level of craftsmanship in terms of both skills and efficient numbers can also affect decision to carry out maintenance.

Urgency of work: This is also a challenge to carrying out of maintenance in that investors consider whether delayed work in the short run will require more expensive work at a later stage. This usually takes into account.

1. Safety of building users, and
2. Possible damage to structures and finishes used in the building.

2.2 Definition of Building

A building is an artefact erected by artisans and fixed upon or over the ground, composed of blocks, wood, stone, brick or any other proper substance connected together and designed for use in which it is fixed (Wikipedia, 2014).

2.2.1 Lives of Buildings

The lives of existing buildings are difficult to assess as all properties from the date of their erection, have been the subject of varying amounts and standards of maintenance, besides being constructed with the intention that they should last at least sixty (60) years. Many exceed this period (Seeley, 1987)). Seeley asserts that even cheap buildings generally have a substantial life in the order of fifty (50) to sixty (60) years. This possible physical life of a building is often much greater but may be demolished before the end of this period to permit a more profitable use of the site or because it is found more economical to clear and rebuild rather to adopt the building to meet changed requirements, because of physical or technical obsolescence.

The life of a building can be categorized into "structural life" and "economic life". The structural or physical life is the period which expires when it ceases to be an economic proposition to maintain the building, while economic life is concerned with earning power and it is that period of effective life before replacement; replacement taking place when it will increase income absolutely.

However, the actual physical life of a building is frequently much greater than its economic life, but buildings are often demolished before their physical life is expired in order to permit a more profitable use of the site, or because it is found cheaper to clear and rebuild rather than to adopt the building to the changed requirement. As a general rule the capital asset of building is so valuable and is often appreciating, so that in practice maintenance is frequently directed to prolong effective life.

In our society, organizations are set up to carry out a whole range of activities. In order that these activities which include maintenance are carried out efficiently, various forms of maintenance systems are devolved and organized to deal with the problems of building maintenance as a whole to curb maintenance costs. Below is the diagram of forms of maintenance.

2.3 Forms of Maintenance

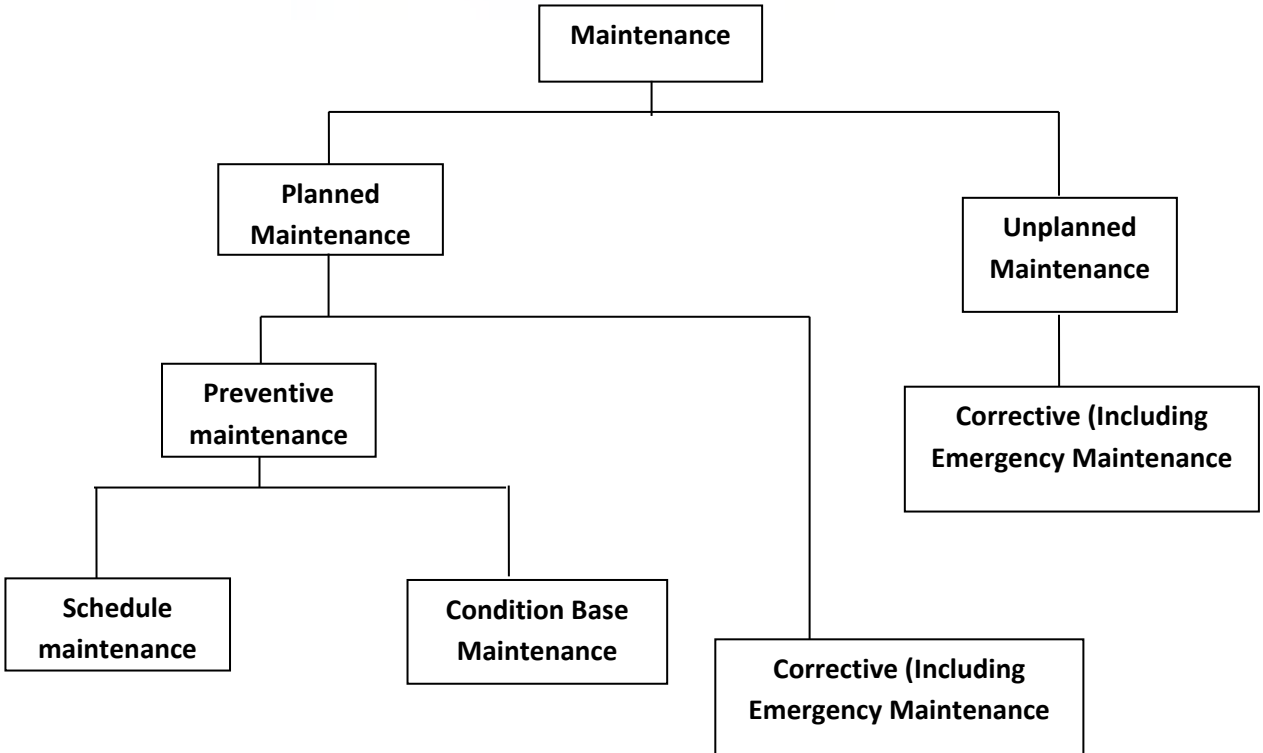


Fig 2.1 Forms of Maintenance (source BS 3811.1984)

Johnson (1985) classified maintenance into two, they are

- Planned maintenance
- Unplanned maintenance

2.3.1 Planned Maintenance

This form of maintenance is organized and carried with forethought control and records to a predetermined plan. It is split into two main activities, preventive and corrective. In this instance the need is foreseen or forethought and the work is normally scheduled in advance by the maintenance officer as part of the overall scheme of maintenance management based upon past records of building or facility performance and the extent of a particular job will normally be quite well defined.

2.3.2 Preventive Maintenance

This maintenance was introduced to overcome the disadvantages of corrective maintenance by reducing the probability of occurrences of failure and avoiding sudden failures. This strategy is time- based maintenance, planned maintenance or cyclic maintenance. Preventive maintenance tasks are performed in accordance with a predetermined plan at regular fixed intervals which may be based on operating time (David and Arthur, 1989). The outlined three types of preventive maintenance as follows;

2.3.2.1 Running Maintenance

This form of maintenance is carried out while the item or the building is still in production or providing service. In this case the occupants will still be using the building or the facility while the maintenance work goes on.

2.3.2.2 Routine Maintenance

This is in the form of servicing which include cleaning, checks and adjustments operations undertaken at regular intervals of varying frequency in the owner's manual or schedule maintenance under attention. The routine could be hourly, daily, weekly fortnightly, monthly or yearly cleaning, lubrication, polishing, painting etc, as a result of the effect of weather and atmospheric conditions in the components of the building.

2.3.2.3 Shutdown Maintenance

In this situation the maintenance work can only take place when the item or building is out of service. This calls for the vacation of the occupants to pave way for the maintenance to be carried out successfully. It should be noted here that the building under shutdown is not out of use or breakdown, yet it needs to be maintained to an acceptable standard as already scheduled.

2.3.3 Corrective Maintenance

Corrective maintenance is the simplest type of maintenance strategy, where an element in a building is used until it breaks down. It covers all activities, including replacement or repairs of an element that has failed to a point at which it cannot perform its required function. Corrective maintenance is sometimes referred to as failure based or

unplanned maintenance. Corrective maintenance tasks often take place in an adhoc manner in response to breakdowns or user requests (David and Arthur 1989).

It is defined as maintenance carried out to restore (including adjustment and repairs) an item or building which has ceased to meet an acceptable condition. It involves the repairs of short term planning that may crop up between inspection and schedule time also planned overhaul/renovations, the extent of which it will have been planned in details on a long-term basis as a result of preventive inspections. There are three types of corrective maintenance, these are:

2.3.3.1 Breakdown Maintenance

This occurs when there is a failure of an item without any warning; but the failure is anticipated and therefore planned for. All reasonable advance provisions necessary to deal with the breakdown have been put in place before such failure.

2.3.3.2 Shutdown Maintenance

In this instance the item or the building is faulty-breakdown has occurred which calls for a vacation of the users or occupants to allow the faulty or the effect to be rectify.

2.3.3.3 Overhaul/Renovation

This is a comprehensive examination and restoration of an item, or major part therefore, to an acceptable condition. It involves a complete examination of a faulty equipment or building to know what item or part that is needed and skills required to restore the facility to an acceptable standard.

2.3.4 Condition – Based Maintenance

Condition-based maintenance is the maintenance carried out in response to a significant deterioration in a unit as indicated by a change in monitored parameter of the

unit condition or performance. The condition-based maintenance concept recognizes that a change on condition and/ or performance of an item is the principal reason for carrying out maintenance.

In this strategy, maintenance tasks are determined and planned by efficiently monitoring the buildings elements such as walls, floors, roof and service equipment such as boilers, pumps, and heating system, to identify which element or piece of equipment requires maintenance before a major failure occurs. To gain the full advantages of applying condition-based maintenance, the condition of an item must be monitored to identify whether there is any evidence of change from a normal to an abnormal condition (David and Arthur, 1989).

2.3.5 Scheduled Maintenance

Scheduled maintenance: "The preventive maintenance carried out to a predetermined interval of time, number of operations, mileage, etc."

2.3.6 Unplanned Maintenance

This is an emergency maintenance which is defined as maintenance necessary to put in hand immediately to avoid serious consequence. It is an unforeseen breakdown of a facility and therefore the resources needed to put it back or repair may not be available at the time of breakdown; because it is not anticipated and therefore planned for. It thus occurs when your preventive maintenance work has been neglected or over worked altogether and the result turned out to be very costly. This type of maintenance is also referred to as emergency maintenance, (Johnson 1985).

2.3.7 Emergency Maintenance

The maintenance which is necessary to put in hand immediately to avoid serious consequences. This is referred to as day-to-day maintenance, resulting from such incidents as gas leaks and gale damage. In such a situation, the maintenance has not been planned in advance but it is necessary to organize maintenance of the facility or equipment to avoid serious loss of production, major damage to the facility or cause of accidents to the personnel using the facility. Another approach to maintenance classification cited in 'Seeley (1987), subdivided maintenance into three broad categories:

i. **Major Repair Restoration:** Such as re-roofing or rebuilding defective walls and often incorporating an element of improvement.

ii. **Periodic Maintenance:** A typical example being annual contracts for decorations and the like.

iii. **Routine or Day-to-day maintenance:** This is largely of the preventive type such as checking rainwater gutters and servicing mechanical and electrical installations.

2.4 Importance of Maintenance

The maintenance of a building environment affects everyone continually for it on the state of our homes, offices, schools and factories that we depend not only for our comfort but our economic survival as well. Wood (1991) states that at the present times, it is an established economic fact that existing building must be maintained and repaired where possible in preference to demolition and rebuilding. This type of work is now very common and is an important part of the workload of the building industry. Alzabaidi (1997) identified some of the main purpose of maintaining a building as follows:

- To preserve a building in its initial state as long as practicable so that it serves effectively the purpose for which it is built.
- To assist in the minimization of production cost.
- To maintain an acceptable quality standard in terms of structural stability to meet the current taste and demand.
- To keep down time and maintenance costs themselves to a minimum.
- To maintain and retain aesthetic value.
- To improve the general condition of such buildings.

From the discussion, it could be seen that without maintenance, the aim of the investor will end on dead rocks, for quiet a heavy sum of money is invested in building and if those buildings do not last the estimated life, then the developers cannot even retrieve the amount invested let alone gain some profit. Again no one would like to reside in a building which has deteriorated to extent that it cannot provide the requirements of the users nor meet the functional requirements.

When such a situation arises, the building will be uninhabitable. But with maintenance work being carried out on buildings they are kept in a state whereby they provide the investor, the occupant and even the environment the necessary requirements. Without maintenance buildings will have to be abandoned and it will be uneconomically sound to put up new buildings all the time without carrying out repair works on the existing ones.

2.5 Technology of Maintenance

This is concerned with all the factors that influence and cause the need for maintenance work; ideally that a structure should be maintenance free is one of several properties aimed at in design. This has to take place alongside such need as stability and

safety generally, comfort including thermal and acoustical installation and hygiene. Seeley (1995) contended that new buildings have to meet the performance standards prescription by the building regulation 191. For instance, to strengthen stability of a building is covered by "part A of the building regulation".

The technology of maintenance is seldom of finding the best solution in materials components and structures to give maximum durability for given external and internal conditions but must often find the best solution within the restraints imposed by the other factors some of which may be regarded as more important. Technology of maintenance accounts for the absence of any completely system way of dealing with future maintenance needs and minimizing them at the design stage or even at the construction stage.

Seeley continued to say that it is virtually important that the problem of maintenance and running cost of a building should be considered at the design stage. Furthermore, the occurrence of defects in the fabric of a building might be due to a variety of unrelated design decisions, such as:

- Unsuitable materials
- Incorrect assessment of loads
- Inadequate appreciation of conditions of use
- Incorrect assessment of exposure

The amount of fabric exposure is influenced by rain fall, direction of prevailing winds, microclimate, atmospheric pollution and the height of the building.

Lee (1976) says that defects may also occur from faults other than structural and result in inconvenience and discomfort to the occupant. For example, Cracks in buildings normally result from failure or defective construction, the cracks giving rise to air

infiltration, heat loss and reduced sound insulation all of which result in reduced efficiency of the buildings.

The durability of the building material is also influenced by frost action, crystallization of salts, sunlight, biological agents, abrasions and impact chemical action and corrosion and incompatibility of modern building material. Furthermore cracking in general is caused by tensile stresses in excess of the tensile strength of the material, produced by externally applied loads or internal movements arising from temperature or moisture changes.

It is highly essential that the cause of failure must be carefully diagnosed before carrying out the repair work. The very important area is the roof, a good roof which is well maintained should last the life span of a building and it is false economy to save money on roof during construction, because if it ever requires replacement, it will cause serious dislocation of production, occupancy or other activities within the building. A leaking roof apart from causing considerable inconvenience to users, can lead to accelerated deterioration of other parts of the building such as ceiling, floors and walls cracks and cause serious damage to decoration and electrical installations.

As a result of these, traffic over a roof should be kept to a minimum and where it is possible, essential appropriate walk ways and access ladders must be provided. Roof should be inspected at least once every three (3) years to ensure maintenance.

2.6 Economic and Social Significance of Maintenance

When the resources to carry out maintenance work effectively are in short supply a scale of preference always needs to be followed. As a result of this the more functionally pressing needs are met and the less essential one forgone.

Frequent maintenance of the built facility brings such benefits as comfort and satisfaction to its inhabitants. Maintaining the physical structures of a property ensures that investments made do not only yield the highest possible returns over the life of the property but also fulfil the ultimate responsibility of providing the needed human satisfaction and comfort. Stone (1975) reported that it should be borne in mind that the inter-dependency and interrelationship of initial and running cost are of great importance when planning maintenance expenditure. In considering the cost of building therefore, the initial cost must be considered relative to the level of maintenance that is required with the choice of materials and types of constructional methods that will bring about a balance between limited expenditure and future maintenance expenditure. The life of the building generally also determines how the balance between initial and maintenance cost is to be made.

Seeley (1995) emphasized that, generally, there is an inverse proportion between initial cost and maintenance cost that is the higher the initial cost, the lower the maintenance cost. In combining the life of building with the initial cost or future maintenance emphasis should be laid on a choice of material to last the life of the building. A house is regarded as an economic asset, which must be maintained to ensure that it appreciates in value and results in a return either socially or economically to the owner. In effect the primary aim of maintaining a building is to preserve it in its original state as practicable as possible so that it effectively serves that purpose. As a role the capital asset of a building is so valuable and is often appreciating so that in practice, maintenance should frequently be directed to prolong effective life. Therefore the purpose for maintaining a building are: Retaining the value of investment, maintaining the building in a condition in which it continues to fulfil its function and presenting good appearance.

No wonder many writers on the economic and social significance of maintenance contend that the built environment expresses in physical form, the complex social and economic factors, which gave structure and life of the community. As a result, the condition and quality of buildings reflect public pride or indifference, the level of prosperity in the area, social values and behaviour and all the many influences both past and present, which combine to give a country its unique characteristics.

The nature of development as emphasized by Seeley also has an influence to a large extent on the level of either initial or maintenance cost speculative development with the view of sale will undoubtedly show regard to economizing initial cost although cost-in-use may be very high. In the light of the above building maintenance cannot be left out of the economics in the wake of the current depression in economy.

2.6.1 The Effects of Lack of Maintenance of Building

Alagidede (2000) states that "Ghanaians lack culture of maintenance and is an open secret". He added that it is rather unfortunate that valuable assets like buildings are allowed to deteriorate openly before an attempt is made to rectify the situation, which attracts a huge amount or resources which has political, social and economic effect on the nation and cannot be ignored. The government of the day becomes unpopular and can even lose power, its members MPs, Ministers and other heads of institutions lose their seats and others are demonstrated against due to the deteriorating nature of the state owned properties for which they are responsible. Investors come into the country and are scared to invest due to unfavourable environment.

Moreover people are exposed to danger of weather hazards and some even become homeless due to the extent at which their places are deteriorating. The users of public buildings are always disturbed due to the state of the buildings they occupy. The

most worrying aspect is the loss of precious souls which often occur when buildings collapse due to its deteriorating state or when electric system of a building becomes faulty causing fire outbreak. This could bring untold hardship to the families of those lost souls if they were only bread winners as well as the nation loses important citizens who have lived and contributed immensely to the development of the nation.

Finally lack of maintenance also leads to high commitment of funds or resources when a building is to be renovated after deteriorating. These scare resources could have been used to develop other sectors of the economy if preventive or periodic maintenance is adopted earlier on to savage the situation, nevertheless it is wasted due to sheer negligence.

One thing that baffles the writers mind is that even if the individuals are ignorant or do not see the need to maintain their buildings what about the government which is supposed to know better.

2.6.2 Procedure for Carrying Out Maintenance

In order to carry out maintenance work effectively the following procedures normally must be followed:

- Identify the problem: this can be done, through examination of the building, critical observation and inspection.
- Study the problem and analyze it to identify possible cause; this will help find the solution.
- Plan the cause of action and list the various tasks that will be required in renovating the building (operational sequence)

- Estimate the cost of the maintenance work if it is an organization then write officially to the authorities for the maintenance work, which should include the problem and the cost of the maintenance work.
- Carry out maintenance work using appropriate skills and after the request has been approved and the necessary materials and funds provided.
- Test or evaluate the project
- Write a report

2.6.3 Organisation of Maintenance Department

The maintenance department in an organization is managed by a maintenance manager. The maintenance manager is responsible for the planning and control of maintenance operations. In a small firm, the functions of the maintenance manager which include supervision, report writing, planning and control of maintenance operations may be undertaken by a member of staff in addition to his other duties, while in a larger firm there would be a separate group of people solely responsible for maintenance.

2.6.4 The Functions of the Maintenance Department

The maintenance department among other things performs the following basic functions:

1. **Advisory function:** this involves liaison with occupants and users and consultation with upper management on such matters as:
   - The standards to be maintained and the effect on user activities of deviations from these standards.
   - The relative merits of alternative maintenance policies and the extent to which it would be advantageous to employ operatives directly for executing the work.

- Clarification of any constraints in relation to limits of expenditure, desirable cash flow patterns acceptable delay times or restrictions on and method of carrying out work.
- Estimates of maintenance expenditure both long and short term, including, where appropriate, the cost of initially bringing up to the required standard and the possibility of phasing out any such backlog over a period of years.
- Provision of cost and other data to assist upper management in deciding whether to repair or renew.
- Technical requirement for minor works involving alterations or small additions to the building; although not strictly maintenance it is usual for the maintenance organization to assume full responsibility for this type of work
- Advice on the maintenance implications of designs for proposed new buildings.

2. **Organization Function:** this may be in relation to the central administrative and supervisory system or to the execution system whether by direct labour or contract.
3. **Control Function:** the control functions are dependent on the timely receipt of accurate information relating to the state of the system. The control functions operate in the following areas.
    - Work output: identifying the extent of work necessary to achieve the required standards within the constraints laid down. The processes involved would include planned inspections approval of user requests and assignment of labour force.
    - Time of execution: programming the work load so that carrying out of the work is timed in accordance with the needs if the user and the available labour force.
    - Quality: supervision of work during execution and by subsequent control inspections to detect lateral defects.

- Cost: Budgetary control system including estimating resource requirement in cost and performance terms for later comparison with actual cost and performance achieved.
- Feedback: this is an inherent feature of all the control functions and involves keeping such words as are necessary for the proper control of the operations.

4. **Miscellaneous functions:** the maintenance organization may have responsibility for other matters such as safety and security principally in relation to compliance with statutory fire precautions and the maintenance of fire fighting equipment for refuse disposal, cleaning, etc.

2.6.5 Maintenance Policy

BS 3811 (1974), defines maintenance policies as a strategy within which decisions on maintenance are taken. Alternatively, it may be defined as the ground rules for the allocation of resources (men, materials and money) between the alternative types of maintenance actions that are available to management. In order to make a rational allocation of resources the benefits of those actions to the organization as a whole must be identified and related to the cost involved. Issues under consideration in a policy include: objectives, benefits and policies.

2.7 Nature of Maintenance

The proper maintenance of buildings covers many aspects of work which may be divided into four categories. Firstly, there is the planning and execution of day-to-day maintenance, which includes such activities as servicing and cleaning and the inspection of facilities and components. The frequency of cleaning varies for example, floors are usually swept daily and polished weekly; painting is done every 3 to 5 years.

Secondly, rectification work may be needed quite early in the life of the building because of design shortcomings, inherent faults in the use of materials or faulty construction. These shortcomings often affect the performance of the component.

Thirdly, there is the need to consider the replacement of costly items in a building. Thus, the flat roof coverings to an apartment block may be re-laid or the air-conditioning System in a hotel may be replaced once every 10 years.

Finally, maintenance may also embrace aspects of retrofitting or modernization. This sector of the market is concerned with alteration, addition and enhancement to existing buildings on both a small and large scale. Retrofitting work includes all work designed either to expand the capacity of a facility or to enable facility to perform some new function. Building maintenance involves a considerable amount of work which Siyanbola (2013) has categorized into three separate components namely: servicing, rectification and replacement.

2.7.1 Servicing

Servicing is essentially a cleaning operation undertaken at regular intervals of varying frequency and is sometimes termed day-to-day maintenance. Daily sweeping of floors, monthly washing and cleaning of windows and regular painting for decoration and protection every four years are some examples of servicing.

However, as more sophisticated equipment are introduced so more complicated service schedules become necessary. Servicing becomes necessary as a result of constant use of facilities, the effect of the weather and atmospheric conditions on the components of the building.

2.7.2 Rectification

Rectification work usually occurs fairly in the life of a building, but it can also occur sometimes within the life span of the building. It arises from shortcomings in design, inherent faults in or unsuitability of components, damage of goods in transit or installation and incorrect assembly. Rectification is avoidable and presents a fruitful point at which to reduce the costs of maintenance at any level. All that is necessary at any rate in theory is to ensure that components and materials are suitable for their purpose and are correctly installed.

2.7.3 Replacement

Replacement occurs at all costs in buildings. This is because the extent of exposure of materials to the vagaries of the weather varies, and the weather in specific locations also varies while the capacity of element of buildings in withstanding changes and different intensities of the weather also vary. Replacement is inevitable because service conditions cause materials to decay at different rates, much replacement work stems not so much from physical breakdown of the materials or element as from deterioration of the appearance. This therefore becomes necessary as a result of material decay due to these differential rates of weather conditions.

However, this brings the problem of distinguishing between maintenance and improvement which has not been resolved satisfactorily by many definitions. It is, however, generally conceded that maintenance should include reasonable elements of improvement, for example, the replacement of worn out components with up-to-date versions. Where the intention of work done is to increase efficiency in the use of the building by adding facilities, which were not previously present, the work should be classified as improvement. Maintenance can also embrace renovations which consist of

work done to restore a structure, service and equipment by a major overhaul to the original design and specification, or to improve on the original design.

2.8 Maintenance Team (Supervision)

Supervision of any work is very necessary. This ensures that work is done on time, that the right material or tools are used, that the overall cost stays within the planned budget and the work is given quality finish. Seeley (1996) specifies that to supervise large contracts, it is customary to employ a clerk of work who is constantly in touch with the job, but with smaller jobs, periodic supervision only can be obtain often through the medium of architects, surveyors or other supervision staff who are called the maintenance team.

Supervision is watching over an activity, job or something to ensure that the right thing is done. As such supervision is very important aspect of maintenance work to ensure that correct procedure is followed, quality workmanship skills are exhibited for good work done. In every organization, there should be a maintenance team which comprises of maintenance officer, maintenance supervisor, foreman, artisans and labourers to take in charge of the supervision work on professional basis. The absence of supervision will result in omission of important details, poor work done due to poor workmanship and additional expenses to the government or the private individual people.

2.8.1 The Role of Maintenance Officer

In developing nations, the construction sector usually ranks among the largest sectors of the economy and is typically characterized by high levels of investment in new buildings and infrastructural facilities. As a country become developed, construction will slow down and upkeep of existing buildings and other facilities become increasingly

more important and hence the need for maintenance officer. Maintenance department in an organization should be headed by a fairly senior civil engineer who should take full charge of all maintenance activities. (Lee and Yuen, 1993) emphasized that the maintenance officer should be able to draw the attention of management to items, which are very expensive to maintain and those with persistent maintenance problems and organize training to improve the skills of members of the organization. His functions should include the preparation of annual estimates for all expenditures

2.9 Building Maintenance Objectives

The maintenance of the physical structures of a property ensures that the investments made may not only yield the highest possible net returns over the life of the property but also fulfils another ultimate obligation of providing the required human comfort and satisfaction. The main objective of maintenance is to preserve a building, so as to continue to serve the purpose for which it was put up. Hackman and Osei-Tutu (2008) identified the following purposes for which maintenance are undertaken:

1. **To maintain the value of a building**- normally a better maintained building has greater value. However, increase value may be marginal as location and size of site all play an important role in the determination of value.
2. **To ensure optimum usage of buildings**- good maintenance should allow buildings to be used to their full potential;
3. **To create or maintain suitable appearance**- can make a positive contribution to external environment and social conditions. Dilapidated buildings can contribute to social deprivation and badly maintained services and facilities , waste energy and resources and can affect the environment;

4. **To maximize the life main components and materials** – maintenance can reduce cost of subsequent maintenance by extending periods between repairs and replacement;
5. **To ensure that buildings do not detract from surroundings**. In sum, no one would want to live in a house, which has deteriorated to the extent that it cannot meet the functional requirements of its users. But the objectives

2.10 Funding For Maintenance Work

Funding is the means of providing money for an activity. In this case it is the means of mobilizing money to carry out maintenance work. Seeley (1996) states that building maintenance work uses extensible resources of labour and materials and this therefore suggests that a lot of resources are needed for the maintenance work and as such the means of funding can also not be overlooked because it is the perception of most people that the funding of building maintenance is one of the causes of lack of maintenance work in Saboba District and Ghana as a whole.

In government organizations, the funding has been the responsibility of the Government, although sometimes it seeks donor support. In private sectors, the private investors are the sources of funding for the maintenance work in their establishment. In some organizations the beneficiaries, for instance, students of tertiary institutions contribute through the paying of the academic user fees. Some non-governmental organizations (NGOs) also help in funding maintenance work.

In public sector such as schools and community based facilities, churches, parent teacher associations (PTA), old students association and philanthropists also help in the funding of maintenance work. Ghana education trust fund (GET Fund) is also other sources from which funds are sought to maintain schools in the country.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the research methodology of the study. The chapter is presented under the following sections namely; research methodology, research design, population, sampling techniques and sample size and data collection methods.

3.2 Research Design

The research design for this study was a descriptive case study approach. Since the study seeks to gather information so that a description of what is going on can be made. Kumekpor (2002) stated a case study method can be conceived as a method of investigation which aims at studying the facts of a particular case from all aspects and from all angles. It is thus a critical and systematic examination into the circumstances and factors that resulted in a particular condition or situation. The purpose of a case study is to probe deeply and to analyze intensively the complex phenomena that constitute the life of the unit with a view to establishing generalization about the wider population that unit belongs.

However a case study design approach adopted for this research is to investigate the concept of maintenance culture in construction on public institutions in Ghana with particular reference to the following public institutions in Saboba District: St. Joseph's Technical Institute, Saboba District Assembly and Saboba medical centre /Ghana Health Service.

3.3 Population

The target population for the study included members of staff and students of St. Joseph's Technical Institute (SABTECH), Workers of Saboba Medical Centre (SMC)/Ghana health service and Workers of the Saboba District Assembly (SDA). The population also involved the type of buildings in used in the institutions in Saboba, as shown in table 3.1.

3.4 Sampling Techniques and Sample Size

Simple random sampling was adopted to select the occupiers and users of public buildings of the three institutions in the Saboba District, namely: Staff of SABTECH, SMC/GHS, S.D.A workers and students of (SABTECH) which enabled every individual member of the population an equal and independent opportunity of being selected to be member of the sample.

The simple random sampling method was used to sample residential accommodation and the other building types within the organizations. The housing and building types identified in the institutions are: bungalows/quarters, office, toilet and workshop common in the three institutions, in the case of SABTECH the following buildings were found, classroom block and dormitory. At the District Assembly there were market stores and while in SMC/GHS, there were wards for patients.

This helped the researcher to determine how maintenance is carried out at the different levels and within the different housing or building types in the three public institutions. Simple random sampling technique was then used to select the sample size for the study.

Considering the sample frame in terms of the daily activities and schedules, a sample of one hundred and fifty five (155) questionnaires were administered and one

hundred and fifty was retrieved (150) representing approximately ninety percent (97%) of the target population. The sample size of the study is as follows:

Sabtech Staff: 45, Students of Sabtech 65, SMC/GHS workers 23 and workers of SDA 17.

Table 3.1 Building types in the three Institutions

Source: Field work 2013

Institution	BUILDING TYPES						
	Workshop	**Office**	**Toilet**	**Bungalow**	**Dormitory**	**Classroom block**	**Market store**
St. Joseph Tech. SHS, Saboba	7	2	2	4	6	6	_
SMC/Ghana Health Service, Saboba	_	1	1	12	_	_	_
District Assembly, Saboba	_	4	5	15	_	_	7
Total	7	7	8	31	6	6	7

3.5 Data Collection Techniques

The data collection techniques adopted by the researcher for this study are:

- questionnaires
- interviews
- Observation

3.5.1 Questionnaires

The questionnaires were developed and administered personally by the researcher to the respondents (Staff and students of SABTECH, SMC/GHS workers and SDA workers).

The questionnaires for the staff and students of SABTECH, SMC/GHS and S,D.A workers.

The issues involved in the questionnaire included the components that are attacked by fungi and decay, the age of buildings; design of the buildings, cracks, faded paintings and associated maintenance problems. It also involved the following:

- The condition and state of maintenance of public building.
- Occupants and users of public buildings,
- Workshop and maintenance officers of the institutions.

3.5.2 Interview

Researcher interviewed managers, maintenance officers and stakeholders of St. Joseph's Technical School, Saboba Medical Centre/Ghana Health Service and Saboba District Assembly. The Interview was to enable the researcher obtain information from respondents about maintenance activities in public institution on maintenance policies, effects of lack of maintenance, funding of maintenance and the role users play in the maintenance of public buildings.

3.5.3 Observation

The researcher undertook field observation of defects on buildings in the selected institutions of Saboba District as follows.

At St. Joseph's Technical school-Saboba. The researcher observed the following: Cracks on the wall of the 10 seater KVIP toilets, the condition of the roof of dining hall, ceiling, rafters, ceiling joist and painting. The writer also observed the state of the floors, electrical fittings and facial board of the classroom blocks. Window and door frames, sills and louvres blades were also observed by the researcher.

At the Saboba Medical Centre/Ghana Health Service. Researcher also observed the following: Cracks on the walls and septic tank, the state of the roof, ceiling, floor, painting and electrical fitting of the nurse's quarters.

At Saboba District Assembly: The researcher observed the following: Condition of door and window frames of the market stores, roof (rafters, purlins, and roofing sheets) of market sheds. The state of door frames of town area council and floor cracks was also observed.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the results and discussions of the study obtained from questionnaires, interviews and observations.

4.2 Results and Discussion of Questionnaires

4.2.1 Staff, students of St. Joseph's Technical Institute (SABTECH), workers of Saboba Medical Centre/Ghana Health Service (SMC/GHS) and workers of Saboba District Assembly (SDA)

4.2.1.1 Data of the Respondents

Under this section, the researcher used questionnaires to obtain data on gender of the participants and number of years they have served in their institutions for as indicated in table 4.1. Out of the 150 respondents, 116 of them representing 77.3% are males while the remaining 34 representing 22.7% are females. This result indicated that there were more males who responded to the questionnaire as compared to females.

Concerning the views of respondents on the number of years they have been in their institutions, 82 respondents representing 54.7% indicated that, they have been in their institutions from 3-5 years, 26 respondents representing 17.3% stated about 6-8 years, and 24 of them representing 16% also indicated they have been in their institutions from 1-2 years and 18 of them representing 12% indicated over 9 years.

This result shows that, majority of the respondents constituting 54.7% have worked in their institutions from 3 to 5 years. .

Table 4.1 Data of Respondents

Gender		
Sex	**Frequency (%)**	**Percentage (%)**
Male	116	77.3
Female	34	22.7
Total	150	100.0
Number of years in the Institution		
Year	**Frequency**	**Percentage**
1-2 years	24	16
3-5 years	82	54.7
6-8 years	26	17.3
9-11 years	18	12
Total	150	100.0

Source: Field Survey, 2013

4.2.1.2 Conditions of Public Buildings Elements and Causes of Damages on Buildings in Saboba.

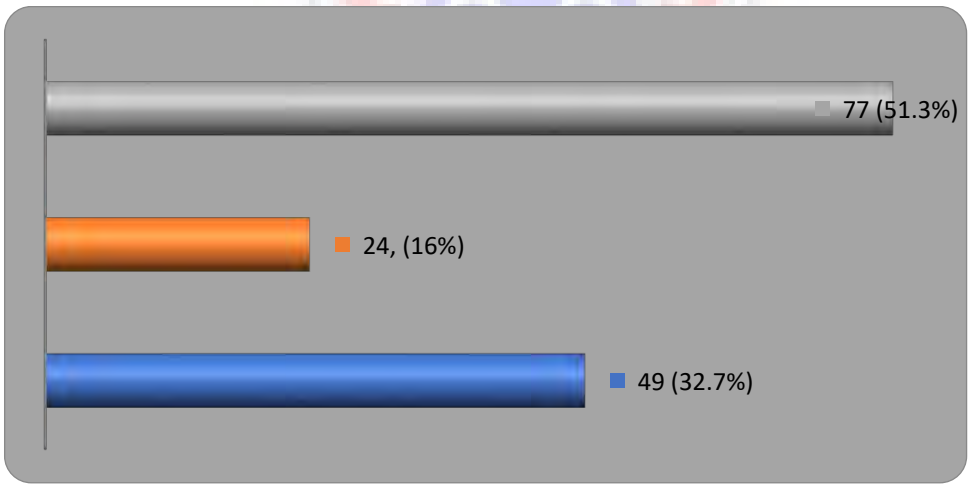
Table 4.2 outlined causes of damage on public buildings in Saboba. Out of 150 respondents, 29 of them representing 19.3% indicated weather effect, 55 respondents consisting of 36.7% stated rainstorm while 29 of the respondents representing 19.3% endorsed fire outbreak and 37 0f them said all the factors outlinend. This result showed that majority of the respondents agreed that rainstorms are the major causes of damage to public buildings in Saboba.

Table 4.2 Causes of Damage on Public Buildings in Saboba

Options	Frequency	Percentage (%)
Fire Outbreak	29	19.3
Weather Effect	29	19.3
Rainstorm	55	36.7
All of these	37	24.7
Total	150	100.0

Source: Field Survey, 2013

From figure.4.1, respondents were asked to state the condition of public buildings foundation. Out of the 150 respondents, 77 participants representing 51.3% indicated that their building foundations have developed cracks, 49 of them representing 32.7% indicated that they had exposed or hanging foundations while 24 representing 16% said their building foundations had no problems. The result indicated that most of the buildings foundations developed cracks, whilst some also had exposed foundations.



Source: Field Survey, 2013

Figure 4.1 Conditions of Public Building Foundation

Table 4.3 displayed responses on the condition of public building roofs. Seventy two (72) of the participants representing 48% said their roofs had leakages, 42 of the

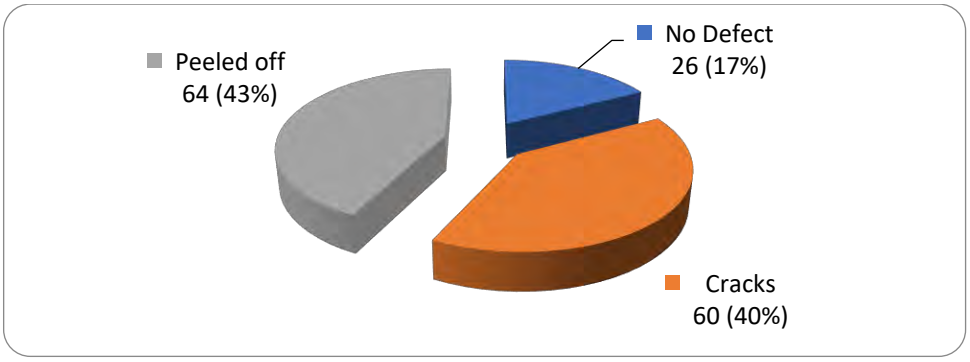
respondents representing 28% said their roofs are partly ripped off, and 18 of the participants representing 12% indicated their building roofs were rusty, while 18 of the of the remaining participants representing 12% indicated their building roofs had no problem. It was revealed that, most of the respondents are of the view that their building roofs have leakages and some also stated partly ripped off roofs.

Table 4.3 Conditions of Public Building Roof

Options	Frequency	Percentage (%)
Leakage	72	48
Rusty	18	12
Partly Ripped Off	42	28
No Problem	18	12
Total	**150**	**100.0**

Source: Field Survey, 2013

On the condition of public buildings floor screed, 60 of the participants representing 40% said their floor screeds had cracks, 64 respondents representing 42.7% indicated their floor screeds are peeled off, and 26 of them representing 17.3% indicated their floor screeds had no defects as shown in figure 4.2. This result meant that most of the public buildings floor screeds have peeled-off and some have developed cracks.



Source: Field Survey, 2013

Figure 4.2 Conditions of Public Building Floor Screed

On the state of conditions of public building walls, 40 of the participants representing 26.7% indicated their building walls were partly broken, 56 of the respondents representing 37.3% said their walls have developed, 34 participants (22%) said their walls are peeled off and 20 of them representing 13.3% indicated that their walls are tilted. It is clear from the result that most building walls had developed cracks and some were also partly broken.

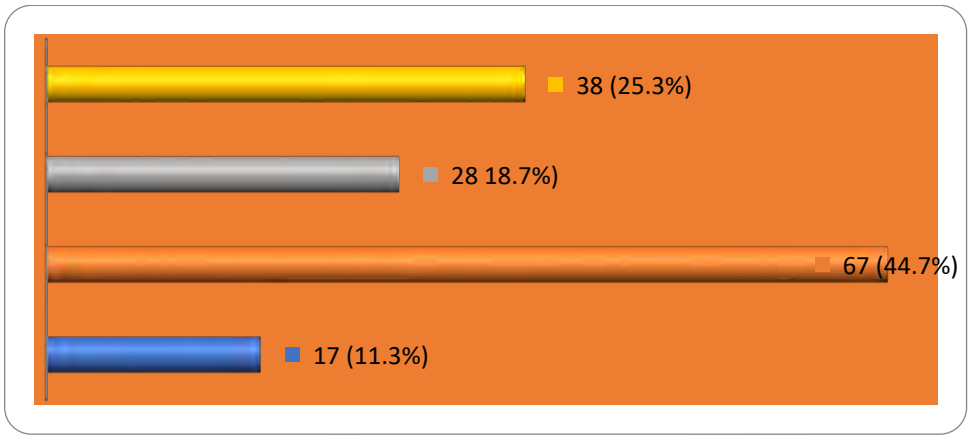
Table 4.4 Conditions of Public Building Walls

Variables	Frequency	Percentage (%)
Partly Broken	40	26.7
Developed Cracks	56	37.3
Peeled-Off	34	22.7
Tilted	20	13.3
Total	**150**	**100.0**

Source: Field Survey, 2013

Figure 4.3, showed the painting status of public buildings. Out of the 150 participants, 67 of them representing 44.7% said their buildings had faded paintings, 17 of them representing 113% indicated their buildings are not painted, 28 of the respondents representing 18.7% said the walls of their buildings are dirty and 38 of the respondents representing 25.3% indicated their buildings were well painted or had no problem.

The result showed that most of the participants observed that their buildings had faded paintings.



Source: Field Survey, 2013

Figure 4.3 Condition of Public Building Painting

Table 4.5 outlined the state of public buildings windows and doors. 63 participants representing 42% said their buildings windows and door frames were partly broken down, 35 of them consisting of 23.3% agreed their windows and door frames were completely broken down and 52 of the rest of the participants consisting 34.7% indicated their windows and door frames had no problem.

This result revealed that, public buildings windows and door frames are partly broken whilst some window/door frames were also completely partly broken down.

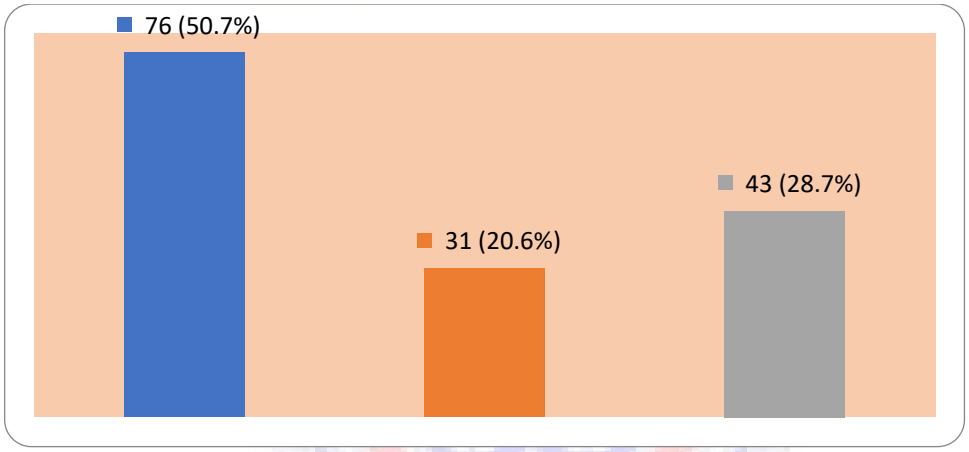
Table 4.5 Conditions of Public Building Windows and Doors

Variables	Frequency	Percentage (%)
Partly Broken Down	63	42
No Problem	52	34.7
Completely Broken Down Frames	35	23.3
Total	**150**	**100.0**

Source: Field Survey, 2013

Figure 4.4, displayed the condition of public buildings electrical installations. Out of the 150 participants, 76 representing 50.7% indicated that their electrical installations were faulty. 31 of them consisting 20.7% said their electrical installations were non - functioning and 43 participants representing 28.6% indicated that their electrical installations had no problem.

The result revealed that majority of the public building electrical fittings were faulty and not functioning.



Source: Field Survey, 2013

Figure 4.4 Conditions of Public Building Electrical Installations

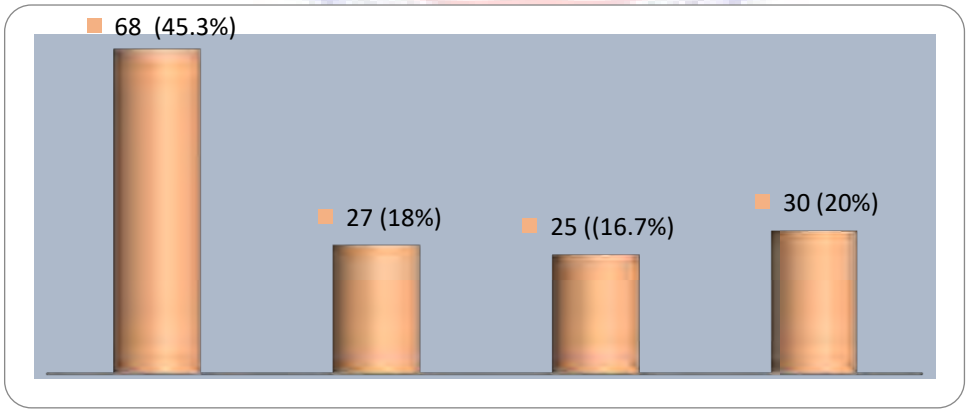
Table 4.6, indicated the responses of the participants on the state of plumbing/water system of public buildings. Out of the 150 participants, 65respondents representing 43.3% said they had leakages with their plumbing or water system, 46 participants constituting 30.7% indicated they had no problems, and 39 participants consisting of 26% indicated that their buildings plumbing and water systems were broken down. This result showed that respondents agreed that their buildings had leakages with their buildings plumbing or water system and their water systems were not functioning up to expectation.

Table 4.6 Condition of Public Building Plumbing/Water System

Conditions	Frequency	Percentage (%)
Leakage	65	43.3
No Problem	46	30.7
Broken Down	39	26
Total	**150**	**100.0**

Source: Field Survey, 2013

Sixty eight (68) respondents representing 45.3% said their building toilets were leaking, 27 participants consisting of 18% indicated their building toilets were broken down and, 30 of the participants representing about 20% said their building toilets were not functioning. Meanwhile, 25 (17.8%) of them indicated that their building toilets were functioning well and had no problems. The result in figure 4.5 indicated that most of the respondents' building toilets were leaking followed by those who said their toilets were not functioning.



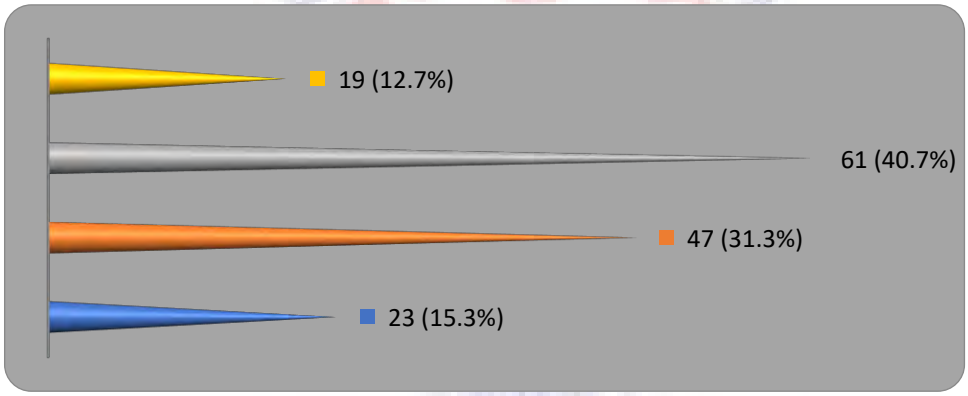
Source: Field Survey, 2013

Figure 4.5 Condition of Public Building Toilet Facilities

4.2.1.3 Deficiencies in Public Institutions in Saboba.

The views of respondents were solicited on how long it took for maintenance request to be responded to in their institutions. As indicated in figure 4.6, 47 of the respondents representing 31.3% said that it took them between 6-12 months for maintenance request to be responded to in their institutions, 23 of them consisting 15.3% indicated more than 12 months whiles 61 of them representing 40.7% stated it took them between 1-3 years for maintenance request to be responded to in their institutions and finally 19 of the respondents representing 12.7% indicated it takes less than a month for maintenance request to be responded to in their institutions..

The responses of the participants indicated that it takes a long time for maintenance request to be responded to by respondent's maintenance teams.



Source: Field Survey, 2013

Figure 4.6 How Long it took for Maintenance Request to be Honoured

As indicated in table 4.7, participants were asked about the period before maintenance work was to be done after construction and handing over of projects. Out of the 150 respondents, 53 of them representing 35.3% affirmed that it took them between 3-5 years to do maintenance work after construction and handing over of projects, 33 of the respondents consisting 22% said between 1-2 years, 25 of them representing 16.7%

said as soon as handing over when there was a fault and 39 respondents representing 26% said it began from beyond 5years.

It can be deduced from the results that, it takes about 3-5 years duration for maintenance work to be done after construction and handing over of projects in the study area.

Table 4.7 Period before Maintenance Work was to be Done after Construction and Handing over

Options	Frequency	Percentage (%)
1-2 years	33	22
3-5 years	53	35.3
As Soon as Handing Over	25	16.7
5 Years and Above	39	26
Total	**150**	**100.0**

Source: Field Survey, 2013

4.2.1.4 Maintenance Rules and Practices of Buildings in Public Institutions in Saboba.

The participants' opinions were solicited to know the people responsible for maintenance of public building in the district. Out of the 150 respondents, 42 of them representing 28% stated that the Local Authority-thus the District assembly was in charge

of maintaining the public buildings in the district, 41 respondents consisting 27.4% indicated all the above variables, that is client, the user and the local authorities; 32 of them consisting 21.3% said the client (that is, building owner), and 35 (23%) respondents stated the user was responsible as indicated in table 4.8.

This result showed that most respondents are of the view that the Local Authority (the District assembly) should be in charge of maintaining the public buildings in the district followed by those who agreed that all of the above should be responsible for maintenance of public buildings.

Table 4. 8 Those Responsible For Maintenance of Public Building in the District

Options	Frequency	Percentage (%)
The Client	32	21.3
The User	35	23.3
The Local Authority	42	28
All of the Above	41	27.4
Total	**150**	**100.0**

Source: Field Survey, 2013

The varying opinions of respondents were sought for in table 4.9 on whether maintenance is done annually in public institutions. Thirty one (31) participants representing 36.5% of the respondents disagree that maintenance is done annually on public buildings while 48 respondents (9.4%) said they were not sure; 20 respondents representing 23.5% agreed to the statement, while 24 participants consisting 28.2% strongly disagreed that maintenance was done annually and 2of the respondents representing 2.4% strongly agreed to the statement.

On the statement of whether competent personnel are involved in carrying out maintenance work on public buildings, 36 respondents representing 42.4% of the respondents disagree that competent personnel were involved in carrying out maintenance work in public buildings with only 23 respondents consisting 27% agreed that competent personnel are involved in carrying out maintenance work on public buildings, while 19 of them consisting 22.4% said they were not sure of the statement and 17 of the respondents consisting 20% stongly disagreed to the statement.

In answering the question on whether maintenance is done through regular inspection and monitoring, 44 respondents representing 51.8% of the total number of respondents disagreed that, maintenance was done through regular inspection and monitoring and 13 respondents representing 15.3% agreed to the statement, 16 of them also constituting 18.8% said they were not sure and while, 23 respondents representing 27.1%.strongly agreed that maintenance is done through regular inspection and monitoring

The views of respondents were sought on whether maintenance is done through report on condition of building to the client, 29 representing 34.1% of the respondents agreed that this was the norm in most of the public buildings where maintenance request are always obtained through report on the condition of the building to the Client, 5 of them representing 5.9% said they were not sure, while 41 of the respondents consisting 48.2% strongly agreed to the statement and 10 of the respondents representing 11.8% disagreed to the idea.

Finally, on whether maintenance work on public buildings was done through the use of maintenance schedule, 5 of the respondents representing 5.9% stated strongly agreed, 9 of them consisting 10.6% agreed that maintenance is done through the use of maintenance schedule and 7 participants representing 8.2% strongly disagreed that

maintenance work on public buildings was done through the use of maintenance schedule, 13 consisting 15.3% said they were not sure of the statement and 51 respondents representing 60% strongly disagreed that maintenance was done through maintenance schedule which further agrees with the earlier point raised that, unless the client or user lodge a lot of complaints before maintenance work is done on public buildings and if possible too ,it was done based on seniority in the organization.

The above discussions show that generally, respondents agreed that maintenance was not done annually on public buildings, there were no competent personnel involved in carrying out maintenance work on public buildings and the institutions did not also have maintenance schedule of public buildings.

Table 4. 9 Procedure for Maintenance Work in Public Institutions

Procedures	**Strongly Agree**	**Agree**	**Not Sure**	**Disagree**	**Strongly Disagree**
Maintenance is Done Annually	2(2.4%)	20(23.5%)	8(9.4%)	31(36.4%)	24(28.2%)
Competent Personnel Does Maintenance	--------	23(27%)	19(22.4%)	36(42.4%)	17(20%)
Maintenance is Done Through Regular Inspection and Monitoring	--------	13(15.3%)	16(18.8%)	44(51.8%)	23(27.1%)
Maintenance is done through Report on Condition to Client	41(48.2%)	**29(34.1%)**	5(5.9%)	10(11.8%)	.....
Through the use of Maintenance Schedule	5(5.9%)	9(10.6%)	13(15.3%)	51(60%)	7(8.2%)

Source: Field Survey, 2013

In Table 4.10, the views of participants were solicited on what necessitates or call for early maintenance in their institutions, 40 of the respondents, representing 26.7%, indicated that all the above points raised are responsible for the problem (poor design, poor construction and fire outbreak), 35 respondents constituting 23.3% said poor construction necessitate early maintenance, 33 respondents representing (22%) stated fire outbreaks and 42 of them representing 28% endorsed that poor design is a factor that calls for early maintenance. The result revealed that things which call for early maintenance are due to accidental fire outbreak, lack of correct design skills and lack of quality materials which result in poor construction work.

Table 4.10 Things that Necessitate or Call for Early Maintenance

Variables	Frequency	Percentage (%)
Poor Design	42	28
Poor Construction	35	23.3
Fire Outbreak	33	22
All the Points Raised	40	26.7
Total	150	100.0

Source: Field Survey, 2013

4.3 Results and Discussion of Interview

4.3.1 Results and Discussion of Interview from Managers of Institutions.

4.3.1,1 Number of years in the Institution

In all, the researcher interviewed three (3) managers of the institutions under the study in the Saboba District. On how long they have been in their institutions, one (1) of

the respondents indicated 8 years, the second respondent said he was 4 years and last one stated that, he was 7 years in his institution.

4.3.1.2 Conditions of Public Buildings of Institutions in Saboba

On the state of the condition of public buildings foundations 2 of the respondents said their foundations were bad, have developed cracks and were also weak and the remaining respondent indicated that, his building foundation were good. On the roofs situation, those interviewed stated that, most of their building roofs, ceilings and facial boards were only better because some have rusted, others had leakages and while some are partly ripped off respectively.

The views of the 2 of the people interviewed shows that most of the public buildings floor screed in the study area has developed bad cracks on them including the walls too, which some were partly broken down, and only one (1) respondent said that, the floor screed and the walls were in good condition.

On the painting status of public buildings, one of the participants queried indicated that, some buildings had worst faded painting; one also stated that, the buildings had bad faded painting and the remaining one said, the painting on the buildings were better. The result shows that most of the buildings had their paintings faded in the study area.

When the researcher also interviewed respondents on the state of public buildings windows and doors frames and electrical installations, it was revealed by majority of the respondents that the buildings windows/door frames and louvers were badly broken whilst some window/door frames were also rotten badly. On the part of electrical installations most of the electrical fittings were in bad state and with some cables being exposed and faulty.

The result of the interview shows that, even though some respondents indicated their window/door frames and electrical fittings were either good or better. It was considered to be in bad condition.

They further added that, their building plumbing and water systems were badly broken down which affected the functioning of their toilet facilities and brought about an untold hardship on dwellers especially during the dry season.

4.3.1.3 Deficiencies in public Institutions in Saboba.

Touching on the ages of public buildings, the respondents stated their buildings ranges from 4, 15 and 48 years respectively. The result indicated that the oldest buildings are 48 years while the newly constructed buildings are about 4years ago.

Soliciting the views of respondents on whether their institutions have maintenance budget, all the participants interviewed said they do not have budgets and that they only prepare estimates for maintenance as and when funds are available to execute maintenance activities.

The views of participants were sought for as whether maintenance departments under take regular inspection of buildings. 2 of the respondents stated that, they do not under take regular inspection on buildings because of lack funds for maintenance work. The remaining respondent said that the maintenance departments in his institution do not undertake regular inspection on buildings due to delay of release of funds for maintenance activities.

On the issue of whether maintenance department does maintenance work on buildings without request, those interviewed all indicated that the maintenance departments of institutions do not perform maintenance work on buildings without

request, except after occupants have lodged complains before maintenance work can be done on such buildings.

4.3.1.4 Maintenance Rules and Practices of Buildings in Public Institutions in Saboba.

Respondents were asked to tell if the institutions in the study area have maintenance policy. 2 of the participants stated they do not have maintenance policy and that they embark on emergency and corrective maintenance policies but the remaining respondent said that his institution have maintenance policy. He further explained that, management of the institution formulates the policies.

When a question was asked whether maintenance of buildings was important, all the respondents advocated the idea and said maintenance of buildings is a very good practice and need to be embraced by the construction industry. They further gave their reason that when buildings are maintained, would increase their lives span, provide beauty environment, provide comfort, health and safety to the users and reduce cost.

Respondents' views were sought on the attitude of the users towards the maintenance of public buildings in the study area. The three (3) respondents lamented that, and said the users have lackadaisical attitude towards maintenance of public building and have the feeling that the buildings belong to the state and therefore, maintenance of such buildings should be done by the government.

The participants' opinions were solicited on how maintenance is funded in the institutions in Saboba. Two (2) of the respondents endorsed that, maintenance was funded through Government Budgetary allocation. The remaining respondent was in support that, maintenance in the study area was funded through internally generated fund (IGF).

4.3.2 Results and Discussion of Interview from Maintenance Officers

The three (3) maintenance officers who were interviewed from three institutions namely (SABTECH, SMC/GHS and SDA) were all males. They gave the number years they made in their various institutions as 13, 3 and 5 years respectively.

4.3.2,1 Condition of Public Buildings in Saboba

As regards the state of public buildings foundation, 2 of the respondents indicated that the foundations of the buildings were bad due to irregular maintenance of the buildings. They said some of them had exposed/weak foundations whiles others also developed cracks. Only one of the 3 respondents stated that, the building foundations were better in the study area.

Concerning the condition of public building roofs, all the respondents were of the view that their building roofs were only better and indicated that, some roofs have leakages, some rusted and some also were partly ripped off. They further added that, some of the facial boards and the ceiling boards including ceiling joists were badly rotten due to the leakage of the roofs.

Touching on the current state of building floor screed, one (1) of the 3 participants said that floor screeds of public buildings were good, the second respondent stated that, the floor screeds were better in the district, while the remaining person indicated that, the building floor screeds in the study area were bad.

On the condition of building walls all the respondents indicated that most building walls were bad and had developed cracks and some were also partly broken down. The walls had faded paintings leaving the affected walls looking unattractive. Interviewing participants on the state of public buildings windows and door frames, they stated that, the windows and door frames were bad with some of them being partly broken whilst

some window/door frames were also partly rotten and windows had very bad broken louvers.

Seeking the views of the interviewees on public building electrical installation, 2 of the respondents stated that their electrical fittings were just good but do not function effectively all the time. The remaining one respondent indicated that, electrical installations (fittings) in the public buildings were bad and faulty with very bad exposed cables, posing danger to the users.

From the interview conducted with the maintenance officers, on plumbing/water system, all the interviewees accepted that some of the pipes had bad leakages and supply of water was only better, that means there were some worst breakages of water supply in the study area and that affect the use water closets especially during the dry season.

The question on the ages of public buildings in the institutions, respondents gave ranges as between 4-49years, 5-35years and 6-42 years. The result indicates that, the latest buildings are about 4years while the oldest buildings are about 49years of age.

4.3.2.2 Deficiencies in Public Institutions in Saboba.

When the opinions of maintenance managers were solicited on whether their institutions have maintenance budgets, all the respondents said they do not have maintenance budget solely for maintenance but rather they prepare estimates for maintenance works as and when funds are available.

In finding out whether respondents undertake regular inspections on maintenance needs of buildings, 2 of those participants interviewed stated emphatically that, they do not undertake regular inspections on maintenance needs of buildings because they do not have annual maintenance plans for their buildings as they occasionally undertake annual inspection on maintenance needs all because they do not have laid down maintenance

plan/manuals in their institutions. The remaining respondent stated that they do undertake regular inspection of maintenance needs of buildings and that a long delay in releasing funds from the government discourages maintenance officers from regular inspection of public buildings.

Finally, as to whether maintenance was performed on buildings without request but based on the assessment of the maintenance team, the respondents all revealed that maintenance work was usually done on some key buildings annually and the rest when the need arose after the occupants had reported severally which at times took a while for maintenance work to be done on such buildings and usually senior officers first.

4.3.2,3 Maintenance Rules and Practices of institutions on Public Buildings in Saboba.

On the issue of whether the institutions have a maintenance policy, the number of respondents totalling three (3) interviewed indicated that, institutions in the District do not have maintenance policy. They revealed that institutions adopt emergency, corrective unplanned maintenance practices

The views of maintenance officers were sought to ascertain if maintenance of buildings was important. There was a unanimous response by the participants that maintenance of buildings was necessary in public institutions. Buildings when maintained could last long, provide beautiful environment, provide comfort, health, safety and reduce the expenditure of the government in putting up new buildings.

Concerning the attitude of the users towards the maintenance of public buildings in the study area, the entire respondents indicated that, the users have lookwarm attitude towards the maintenance of public buildings with the reason that public buildings belong to the state and for that matter their maintenance should be done by the government.

On the issue of how maintenance is funded in the institutions one (1) of the 3 respondents said that, was funded through internally generated fund (IGF), while the rest of the 2 respondents endorsed that maintenance was funded through Government budgetary allocation for the execution of maintenance activities in public institutions in the study area.

4.3.3 Results and Discussion of Interview from Stake Holders

4.3.3.1 Number of years in the Institution

In all six (6) stakeholders were involved in the interview with two (2) each from one of the three institutions under study. For the number of years, 3 of the respondents indicated they had equal number of years of 5years each, 2 out the participants stated their number of years in their institutions as 7 and11 respectively. The remaining stake holder said he was 8 years old in the current institution.

4.3.3.2 Conditions of Public Buildings in Saboba

On the condition of public buildings foundation, 4 out of the 6 respondents indicated that the buildings foundation were in a deperiorable state, some have developed cracks whilst some also had weak foundations. 2 of the rest of the stake holders stated that their building foundations were better.

Concerning the condition of building roofs, 3 out of the 6 participants said their building roofs had leakages, rusted, partly ripped off and also rotten ceiling boards. Two (2) of the respondents indicated that their building roofs were in good condition could last for another five years and while the remaining one (1) respondent endorsed affirmed that the roofs of the buildings were only better. Seeking the views of the stake holders on the condition on floor screed, 3 of the participants said that, the building floor screeds had

peeled off and need serious maintenance, 2 out of the 6 stake holders confirmed the floor screeds were better need minor repairs works. The remaining one respondent said there were no floor screed problems..

Upon commenting on the state of walls, 4 respondents said public buildings walls were in bad state if not worst and that that has led to serious cracks on most walls. The rest of the 2 persons confirmed that the walls were in good state.

On the issue of painting status of public buildings in the study area, 3 of the stake holders confirmed that most of their buildings had faded paintings look unpleasant 2 out of the 6 respondents said the paintings on the buildings was better while one respondent accepted the paintings on the walls was showing good appearance.

The opinions of participants were sought for on condition of window/door frames, 2 of the interviewees agreed that the condition of windows//doors frames were good while the remaining other 4 respondents indicated that most the windows and door frames were partly broken and some louver blades also badly broken.

Concerning the condition of electrical fittings 2 out of the 6 participants stated that they had good electrical installation fittings in their institutions, the rest of the 4 respondents lamented and said their electrical works were faulty and not functioning, while some cables were exposed and posing danger to users.

Participants' views were solicited on plumbing or water systems, out of the 6 of the stake holders indicated there was no frequent flow of water due to the problem that plumbing/water supply system, they get water after every seven days (7), the other 5 respondents said the water systems were badly broken down, making supply of water difficult. The participants said occupants could not use their water closets (wc) due to lack of water supply especially during the dry season.

On the ages of public buildings in the study area, 3 of the stake holders noted that, their buildings were between 3 to 35 years old, 2 out of the participants stated that the ages of their buildings were from 4 to 49 years and one (1) respondent said the age of buildings in his institution ranges between 5 to 46 years. The result revealed that institutions in the study area had serious maintenance works to execute to prevent further deterioration of services and facilities.

4.3.3.3 Deficiencies in Public Institutions in Saboba.

Participants were asked whether institutions have maintenance budget, 4 out of the 6 respondents said they do not have maintenance budget and that they only draw estimates for maintenance work as and when funds and resources were available. The 2 other respondents said the institutions have maintenance budget but the problem is availability of funds from the central government to institutions at the right time was the worrying factor.

The opinions of the stakeholders were sought on whether maintenance department under take regular inspection of buildings. The respondents all agreed that, maintenance departments do not undertake regular inspection of buildings but rather they wait till when funds are available for maintenance activities. The investigation revealed that maintenance departments in public institution do not undertake regular inspection of building and that can lead simple situations to more complex ones.

The researcher further contacted respondents to ascertain whether their institutions maintenance departments perform maintenance work on buildings without request. All the six (6) respondents endorsed that, maintenance departments do not perform maintenance work on buildings without request and it is usually done on some key buildings annually and the rest until the occupants have lodged several complains before maintenance work can be done on such buildings.

4.3.3.4 Maintenance Rules and Practices of Buildings in Public Institutions in Saboba.

Touching on whether institutions have maintenance policy, two respondents affirmed that the institutions have maintenance policies which were formulated by management of the institutions. The other four participants were of the view that institutions in the study do not have maintenance policy and added that the institutions adopt corrective, emergency and unplanned maintenance strategies.

The participants were asked if maintenance of buildings was important. All the respondents indicated that maintenance of buildings was necessary as far as public institutions were concerned. To buttress their answer that maintenance was important, they were of the view that maintenance can provide comfort, health and safety to the users, provide beautiful and pleasant environment, prolong the life span of the structures and reduce government expenditure on constructing new buildings.

The views of the respondents were solicited on the attitude of the users towards the maintenance of public buildings in Saboba. The stakeholder interviewees confirmed that generally users and occupants of public buildings have reluctant attitude in maintaining those buildings with the common reason that, the buildings belong to the state and therefore their maintenance should be handled by the government.

On the issue of how maintenance was funded, four respondents indicated that maintenance in public institutions was funded through Government budgetary allocation. The other two respondents said maintenance was funded through Internally Generated Fund (IGF).

The result revealed that, maintenance of public buildings is funded in the study area through government budgetary allocation. The interviewees stated that due to long

delay in releasing funds for maintenance, some maintenance problems do grow from bad to worst making affected buildings more deteriorating.

4.4 Results and Discussion of Observations

The researcher under took field observation of the state of condition of building elements of the study area on institutions such as St. Joseph' Technical school-Saboba (SABTECH), Saboba Medical Centre (SMC)/Ghana Health Service (GHS) and the Saboba District Assembly (SDA).

4.4.1 Results and Discussions of Observations at SABTECH

The researcher undertook field observation of the state of condition of building elements of SABTECH and the following observations were made:

4.4.1.1 Development of cracks in public buildings

The researcher observed that the ten (10) seater KVIP in St. Joseph's Technical school was spotted with serious horizontal cracks on the back elevation wall, which part of it has collapsed and the remaining part is posing danger for it users. Students are compelled to go to bush for free range on the farm lands and is bringing problems between the farmers and the school authority.

4.4.1.2 Leakage roof: The rafters and purling in the dining hall have deflected and some of them are rotten. This has made the whole roof take a concave shape, hence whenever it rains the water leak onto the floor, the ceiling and the rest of the water rather sink into the walls instead of, to the eaves to drop to the ground.

4.4.1.3 **Rotten ceiling:** A good number of ceiling boards in the dining hall including the ceiling joists have rotten and deteriorated due to the leakage of the roof. Some of the ceiling boards are being removed and that has paved way for small bats to house themselves there, and their droppings produce bad odour in the dining hall.

4.4.1,4 Faded painting: The paint of the dining hall, the classroom Blocks C and D are badly faded and the deterioration has discoloured the surfaces of the building as well as destroying the beauty of the buildings. The wooden sills of the window frames to the carpentry and joinery workshop are badly rotten to the extent that the vertical frames are left hanging and leaving the area opened. The louvers to the windows of the workshop were also broken; leaving the windows opened and poses insecurity to the property in the workshop.

4.4.1.5 **Exposed electrical fittings:** The classroom D (yellow block) has almost all its electrical sockets in the classroom broken, the wires left exposed and posing danger to the users.

Finally, the floors of the six (6) classrooms Block have developed cracks and some peeled off due to lack of quality, skill and incorrect usage of materials. This makes it difficult for the sweepers and poses danger to the health of the users because of the dust they .inhale during sweeping.

4.4.2 Results and Discussion of Observation at SMC/GHS.

At the Saboba Medical Centre/Ghana Health Service, the researcher also observed a host of issues concerning the public buildings at the Saboba Medical Centre. The researcher observed a number of issues concerning cracks on the walls and collapsed

septic tank, leaking roofs/ ceiling, cracks on the floor, faded painting and poor electrical fitting of the nurse's quarters and in some of the wards as discussed below.

The walls of the nurse quarter's No. 1 of Ghana Health Service have developed cracks such that the occupants were worried and complained they had to use rags to seal cracks to prevent insects and other creatures from entering the rooms, especially during rainy days. In the same nurse quarters No. 1, cables were seen with wires exposed to the atmosphere whereby no warning notice is put to alert people of possible danger of the exposure.

At the Ghana Health Service nurses quarter's No. 2, the leakage of the roof has caused ceiling to deteriorate and also damage to the user's property. The nurses quarters No. 2 belonging to Ghana Health Service has had its ceiling damaged by water due to leakage. Some of the roofing sheets have also rusted due to effect of weather and lack of maintenance. The nurses' quarters' No. 1, 2, 3 and 4 of the Ghana Health Service has not been repainted for over thirty years. The old paint has faded leaving the buildings look unpleasing and also destroys the beauty of the environment.

4.4.3 Results and Discussions of Observations at Saboba District Assembly

The researcher observed the following from the Saboba District Assembly (SDA). At SDA Rotten window and door frames: The stores No. 3, 5 and 7 at the Saboba market belonging to Saboba District Assembly have their door frames and lids rotten beyond repairs. The hinges can no more hold the frames; instead battens are used to brace the frames and lids to prevent them from falling down. The door frames to the two (2) of the town area council rooms were also in a bad state and need repairs.

The floors of the town area council were also seen to be full of cracks and some peeling off, which was an eye sore due to poor material ratio usage, poor construction

and lack of regular maintenance. Proportion of cement, sand and stone for a mix either for concrete or mortar is material ratio. Peeling off of the floor in question was clear that cement quantity use was less hence no quality work done resulting from poor material ratio.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the main findings of the study, conclusion and recommendations of the study and for further research.

5.2 Summary of Findings

The following are the findings of the study.

- The study revealed that, most electrical fittings, plumbing/water systems, floor cracks, and wall cracks, ripped off roofs occur due to lack of funds to maintain them.
- The study indicated that, most toilets were broken down due to wear and tear, so respondents attend nature's call in the bush.
- The result of the study shows that it takes long time for maintenance department to respond to maintenance request and they do not also perform maintenance work without request.
- The study also revealed that because some institutions do not have maintenance budget they therefore not found it necessary to have maintenance schedule to monitor the duration period for maintenance of buildings after construction and handing over projects.

- The study shows that most of the buildings are damaged early due to lack of quality materials used and the shoddy work done by some contractors because of lack of effective monitoring.
- Finally, the study revealed that, public building maintenance is funded through government budgetary allocation and some internally generated fund.

Conclusion

From the study, it was deduced that, some people have been rendered homeless, some buildings have also been destroyed and deteriorated due to the effect of fire outbreak, weather effect, rainstorm and irregular maintenance practices.

The study also revealed that some fire outbreaks are caused by electrical faults, people do not operate television sets, and stay in darkness during night due to electrical faults and respondents do not get portable water to drink and bath because of the breakdown of plumbing/water system which could not function.

Drawing of maintenance plan and schedule to guide maintenance department to perform maintenance without request, undertake regular inspection of buildings, respond promptly to maintenance request, employ competent personnel to carry maintenance work were all affected due to lack adequate budgetary fund allocation solely for maintenance to institutions

Furthermore, accidental fire outbreaks due to electrical faults, natural disasters such as rainstorm and inappropriate skills used during design and construction are the thing that necessitate or call for early maintenance of buildings in the study area.

Finally, the study revealed that, the District Assembly is in charge of maintenance of public buildings in the study area, which is not well resourced to handle maintenance activities.

Recommendations

The following are the recommendations of the study

- It is recommended that competent persons should be involved design and construction of buildings, so that appropriate skills are applied. Quality and suitable materials should be used to withstand weather effect, such as rainstorm and be fire proof.
- The study also recommends that government should have funds solely for maintenance to enable maintenance departments respond promptly to maintenance request for execute of early maintenance problems to avoid them progressing from bad to worst.
- The study recommends that District Assemblies should be well resourced to undertake maintenance activities in the District, since effective maintenance promote health and safety environment, makes the life of occupants/users comfortable, prolong the life span of buildings and also reduces any untold expenditure of government in case of routine maintenance.
- The Government should allocate funds for all Public Institutions to be able to carry out maintenance works according maintenance schedule.
- The government should set up a monitoring team to over the activities of maintenance departments in all the District Assemblies.
- Finally, the study recommends that Government should encourage public institutions to embark on projects for internally generated funds to enable them execute maintenance activities without depending solely on the state for funds.

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APPENDICES

Appendix 1: Photographs of Maintenance problems in Public Institutions in Saboba

Figure 4.23

Deflected Roof at St. Joseph's Technical Institute

ank at Saboba
re/GHS

Figure 4.24

Rotten Ceiling Joists at St. Joseph's Technical Institute

Figure 4.25

Rotten Ceiling Boards at St. Joseph's Tech. Inst.

Figure 4.26

Cracks on KVIP Walls at St. Joseph's Technical Institute

Figure 4.27

Wall Faded Painting at St. Joseph Technical Institute

Figure 4.29

Wall Faded Painting at Saboba Medical Centre/GHS

Cracks on Wall at St. Joseph Technical Institute

Figure 4.30

Cracks on Walls at Saboba Medical Centre/GHS.

Cracks on Floor at Saboba District Assembly

Figure 4.32

Cracks on Floor at Saboba Medical Centre /GHS

Figure 4.33

Cracks on Floor at St. Joseph Technical Institute

Figure 4.35

Peeled off Floors at Saboba Medical Centre/GHS

Figure 4.36

Peeled off Floors at St. Joseph Technical Institute

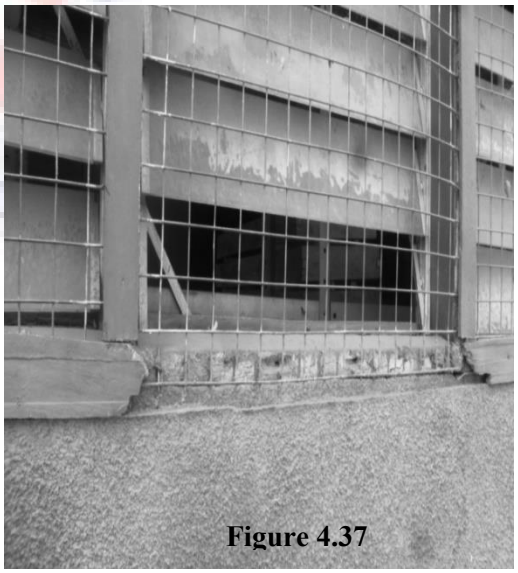
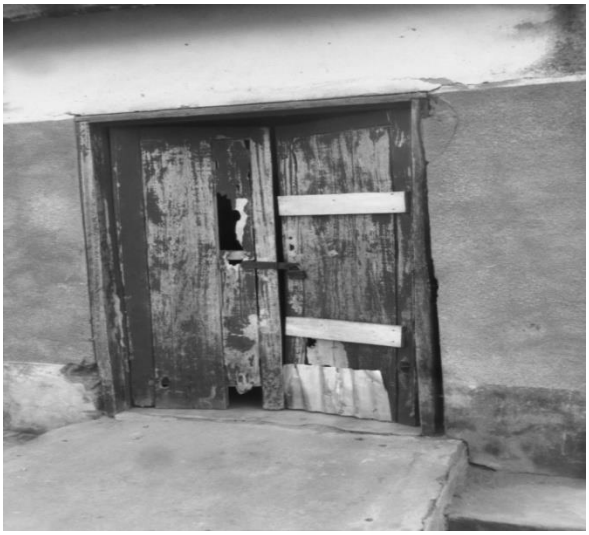


Figure 4.37

Rotten Window Wooden Sills at St. Joseph's Tech. Inst.

Figure 4.37



Rotten Doors Frames and Lid at Saboba District Assembly

Figure 4.39
Exposed Electrical Cables at Saboba Medical Centre/GHS

APPENDIX II

QUESTIONNAIRES FOR STAFF OF SABTECH, WORKERS OF SMC/GHS AND SDA. OF PUBLIC INSTITUTIONS IN SABOBA.

UNIVERSITY OF EDUCATION, WINNEBA KUMASI CAMPUS

DEPARTMENT OF DESIGN AND TECHNOLOGY EDUCATION

PROJECT TOPIC: The Impact of Maintenance Culture in Construction In Public Institutions In Ghana (A Case Study of Selected Institutions in Saboba District of Northern Region)

The attached questionnaire is to help me in writing up the project. I am kindly asking you to give some information about the topic. This series of questions in the questionnaire is intended for only academic work. All information collected will be treated confidentially, utilized solely for the purpose of this study and therefore Safely Discarded. Thank You

Please tick ☐ ✓ or fill in where appropriate

Information about Respondent

1. Sex Male ☐ Female ☐
2. For how long have you been in this institution? 1-2years ☐ 3-5years ☐
   6-8years ☐ 9-11years ☐

Condition of public buildings in Saboba.

3. What causes damages on public buildings in Saboba?
   fire out break ☐ weather effect ☐ . rainstorm ☐ All of these ☐

Please tick ,[√] appropriately how do you consider the state of the following element of your building?

4. What is the condition of your building foundation? It has developed cracks ☐ It has no problem ☐ Exposed/hanging foundation ☐

5. How is the condition of the roof of your building?

It leaks ☐ It is rusty ☐ partly ripped off ☐ No problem

6. What is the current state of the floor screed of your building?

It has cracks ☐ It has peeled off ☐ Screed has no defect ☐

7. What is the condition of the wall of your building?:

It is partly broken down ☐ It has develop cracks ☐ It has peel-off ☐

It has tilted ☐

8. How will you consider the current painting condition of your building?

No painting ☐ Painting has faded ☐ The painting has become dirty ☐ Painting has no problem ☐

9. How will you consider the current condition of windows and doors of your institution? ☐ ☐

They are partly broken down They have no problem

They are Completely broken down ☐

10. How is the state of electrical fittings in your institution? It is not functioning ☐

It is faulty ☐ It has no problem ☐

11. What is the water/plumbing situation in your institution?

It leaks ☐ It has no problem ☐ It has broken down ☐

12. What is the condition of the toilet/facilities of your institution?

It is leaking ☐ It has broken down ☐ It has no problem ☐

It is non functioning ☐

Deficiencies in the buildings of the Institutions at Saboba.

13. How long does it take for maintenance request to be responded to?

less than a month ☐ 1-3 months ☐ 6-12months ☐

more than 12 months ☐

14. At what duration do you begin maintenance on your building after construction and handing over?

1 -2 years ☐ 3 – 5 years ☐ as soon as handing over ☐ 5years and above ☐

Maintenance rules and practices of buildings in public institutions.

15. Who should be responsible for maintenance of public building in the District?

The client ☐ the user ☐ the local authority ☐ all of the above ☐

To what extent do you agree with the Maintenance Procedure of Public Buildings?

16	PROCEDURES	RESPONSES				
		AGREE	STRONGLY AGREE	DISAGREE	STRONGLY DISAGREE	NOT SURE
	Maintenance is done annually					
.	Competent personnel does maintenance					
	Through regular inspection and monitoring.					
	Through report on condition to client.					
.	Through the use of Maintenance schedule.					

17. What call for early maintenance in your opinion?

Poor design ☐ Poor construction ☐ fire outbreak ☐

All of the above points ☐

THANK YOU VERY MUCH!!!

APPENDIX III

QUESTIONNAIRES FOR STUDENTS OF SABTECH

UNIVERSITY OF EDUCATION, WINNEBA, KUMASI CAMPUS

DEPARTMENT OF DESIGN AND TECHNOLOGY EDUCATION.

PROJECT TOPIC: THE IMPACT OF MAINTENANCE CULTURE IN CONSTRUCTION IN GHANA.

(A case study of selected institutions in the saboba district in the northern region).

The attached questionnaire is to help me in writing up the project. I am kindly asking you to give some information about the topic. These series of questions in the questionnaire is intended for only academic work. All information collected will be treated confidentially, utilized solely for the purpose of this study and there safely Discarded. Thank you.

Please tick ☐ or fill in where appropriate.

Information about respondent

1. Sex male ☐ female. ☐
2. For how long have been in this institution? 1-2 years ☐ 2-3 years ☐ 3-4 years ☐ 4-5 years ☐

Condition of public building at Saboba.

3. What causes damages to public buildings in Saboba? Fire outbreak ☐ . weather effect ☐ rainstorm ☐ All of these ☐

   Please, tick appropriately, how do you consider the condition of the following elements of your building?

4. Foundation: cracks developed ☐ exposed/hanging ☐ No problem ☐

5. Roof: leakage ☐ rusty ☐ partly ripped off ☐ no problem ☐
6. Floor screed: cracks ☐ peeled off ☐ no defect ☐
7. wall: partly broken down ☐ developed cracks ☐ peeled off ☐
   tilted ☐ Not painted ☐
8. painting: faded painting ☐ y walls w ☐ ainted/no problem Not ☐
   painted
9. Windows and doors: partly broken down ☐ broken down ☐ No problem ☐
10. Electrical fittings: Non-functioning ☐ faulty ☐ no problem ☐
11. Plumbing/water: leakage ☐ broken down ☐ No problem ☐

Deficiencies in the buildings of the public institutions in Saboba.

12. How Long it took for maintenance Request to be Honoured

More than 12 months ☐ 6-12 months ☐ 1-3 years ☐ Less than a month ☐

13. At what duration do you begin maintenance on your building after construction and handing over?. 1-2 year ☐ 3-4 years ☐ as soon as possible ☐
    5 years and above ☐

Maintenance rules and practices of building in public institutions at Saboba

14. Who should be responsible for maintenance of public building in the District?
    The client ☐ The user ☐ The local authority ☐ All of the above ☐
15. What call for early maintenance in your opinion?
    Poor design ☐ Poor construction ☐ Fire outbreak ☐ All the points raised ☐

THANK YOU VERY MUCH;

APPENDIX IV

INTERVIEW SCHEDULE FOR MANAGERS, MAINTENANCE OFFICERS AND OTHER STAKE HOLDERS OF INSTITUTIONS

UNIVERSITY OF EDUCATION, WINNEBA KUMASI CAMPUS

DEPARTMENT OF DESIGN AND TECHNOLOGY EDUCATION

The Impact of Maintenance Culture in Buildings of Public Institutions.

The series of questions in the questionnaire are designed to obtain responses impact on maintenance culture in construction on public buildings. Please, answer the questions that follow by ticking the appropriate option (if provided) or writing unrestrictedly for open-ended questions. Please, feel free to respond to the issues. The information is for academic purposes only and will be treated with the strictest confidentiality.

Please, answer the questions that follow by ticking the appropriate option (if provided) or writing unrestrictedly for open-ended questions. Please, feel free to respond to the issues.

The information is for academic purposes only and will be treated with the strictest confidentiality.

Information about respondent

1. How long have you been in this institution?

   .....

Condition of building in public institutions in Saboba.

FACILITY/ELEMENT	CURRENT STATE			
	Good	**Bad**	**Better**	**Worst**
Foundation				
Roof				
Floor Screed				
Walls				
Painting				
Window/door frames				
Electrical Installation				
Pipe/Water				

2. How will you consider the current state of the buildings of your institution in terms of the following elements and facilities?

3. What are the ages of your buildings? .....

.....

Deficiencies in the buildings of public institutions in Saboba

4. Do you have maintenance budget?
5. Does the maintenance department under take regular inspection of building?
6. Does the maintenance department come in to do maintenance work on the buildings without request?

Maintenance rules and practices of building in public institutions at Saboba.

7. Does your institution have a maintenance policy?

If yes, who develop the policy? .....

.....

8. Is maintenance of buildings in your opinion important?

   Please, give reason to your answer .....

   ……..……

9. What is the attitude of the users towards the maintenance of public buildings at Saboba?.....

   .....

10. How is maintenance funded in your institution?

THANK YOU VERY MUCH;