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MAINTENANCE OF RESIDENTIAL BUILDINGS OF SELECTED PUBLIC INSTITUTIONS IN GHANA

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ABSTRACT
Public residential buildings represent significant investment of tax payers' money, hence the need for their preservation. Owing to the neglect of maintenance practices in the country, many public residential buildings are in the state of disrepair. The purpose of this paper is to examine the maintenance practices being employed on residential buildings of public institutions within the Cape Coast Metropolis. The field investigations focused on the Ghana Police Service (GPS), Ghana Prisons Service (GPS) and Ghana Health Service (GHS). Bungalows, block of flats and single-unit houses were the three housing types defined for data collection and analyses. A mixed sampling technique was used to sample 179 buildings for the study, by means of stratified, systematic and two-stage cluster sampling techniques. The findings revealed that 75.9 percent of buildings surveyed needed some form of maintenance to put them in good condition. With regards to housing types, bungalows were found to be in good condition. The study makes the following conclusions: that public institutions must embrace preventive maintenance practice as a high priority rather than unplanned maintenance; managers are to oversee periodic inspections of buildings and create inventory of building components and facilities for effective maintenance; there is the need for the establishment of a maintenance fund to maintain public buildings; and a national policy on maintenance should be formulated and implemented to protect public buildings in the country.

Keywords: Maintenance, residential buildings, public institutions, Ghana

1.0 INTRODUCTION

1.1 Background of Study

The physical appearance of public institutional buildings gives an impression of the quality of service they offer. Maintenance of residential buildings of public institutions is imperative. The rationale behind the maintenance of such buildings is to serve both designed and aesthetic functions. Afranie & Osei-Tutu (1999) posit that one of the critical problems confronting the housing industry in Ghana is poor maintenance practice. Elements of buildings deteriorate at a greater or lesser rate dependent on materials and methods of construction, environmental conditions and the use of the buildings. Dann et al. (1999) and Wordsworth (2001) emphasized that neglect of maintenance has a cumulative result which rapidly increases deterioration of the building fabrics and finishes accompanied by harmful effects on the occupants. In the hierarchy of needs theory, Maslow (1954) identified five basic needs which were organized into successive levels of importance. He identified physiological needs as the most basic needs of human beings, which include shelter (housing).

Maintenance brings about improve utilization of buildings. Hence, the safety of occupants who live in a regularly maintained building can always be assured. When buildings are neglected, defects occur and they result in extensive and avoidable damage to the building fabric. Some residential buildings of public institutions have not seen any significant maintenance since they were constructed, some dating back from the colonial era. This has resulted in damages and deterioration to some public residential buildings in the country. Melvin (1992) argued that lack of maintenance can result in reduction of the lifespan of a building which invariably defeats the purpose for which they were built.

According to Hamilton and Wan Salleh (2001), a good maintenance system is also a good disaster mitigation system. Therefore, well operated system of building maintenance has the effect of being an effective disaster mitigation measure in terms of cost and facility usage. Marks and Pickard (1996) postulated that when buildings are neglected, defects can occur and may result in extensive and avoidable damage to building elements. Poor maintenance has resulted in damages and deterioration to most public residential buildings in Ghana. Many of these buildings have not seen any significant maintenance after their construction. Evidence of lack of maintenance and repair are frequently demonstrated on roof, windows, doors, and other building elements and facilities.

Public buildings are usually regarded by public servants who are privileged to occupy one as state property and, therefore, handle them with little or no care. This attitude has brought about the poor condition of most public residential buildings. In some cases, occupants show passive attachment in relation to the efficient use and maintenance of the buildings. Maintenance programme, according to Odediran et al. (2012) has received little attention in the past because emphasis is most often placed on new developments. A preliminary survey to the study areas depicted an abhorring situation of the state of residential apartments of these three public institutions. The dilapidated nature of these residential facilities has left most occupants at the mercy of the weather. The state of these buildings can affect the psychological morale of personnel and reduce their efficiency.

1.2 Aim and Objectives

The paper aims at studying the maintenance practices of residential buildings of selected public institutions within the Cape Coast Metropolis of Ghana. The objectives are to:

i. identify the current state of residential buildings of public institutions.
ii. find out the existence of maintenance policies and standard practices, and
iii. ascertain the underlying principal causes of maintenance problems in public residential buildings.

2.0 LITERATURE REVIEW

2.1 Current State of Residential Buildings

Buildings serve several needs of society; primarily as shelter from weather and as general living space to provide privacy. Smith (2003) and Sani et al. (2011) stressed that, the state of public residential buildings are not maintained because of privatization without relevant simultaneous and systematic changes in maintenance and management issues. The visible result of the current situation is the critical condition of the housing stock disorder with financial, economic, administrative and social issues.

This is coupled with how much people should pay to achieve timely maintenance of building elements. Information on system of maintenance being practised clearly defines the difference between private and public housing. Abdul-Manan (2011) emphasized the poor maintenance culture exposing the current state of public buildings in Ghana in a deplorable state. The state of disrepair and deterioration of public buildings in Ghana is, therefore, of great cause of concern. Kindred (2004) expounded that the structural life of a building is the period which it expires, that is when it ceases to be an economic proposition to maintain the building. On the contrary, the economic life is concerned with the earning power of the building and it is that period of effective life before replacement. Buildings which lack maintenance affect the comfort, performance and productivity of occupants who live or work in such buildings.

2.2 Maintenance Policy and their Standards

BS 3811(1993), defines maintenance policies as a strategy within which decisions on maintenance are taken. Alternatively, it is the ground rule for the allocation of resources between the alternate types of maintenance actions available to management. Closer examination further revealed that maintenance policy is influenced by some criteria which occasionally could be conflicting. These are social – providing a quick service to high standards of quality; financial – investing funds in activities in the most efficient manner with due regard to the effects on debt charges, subsidies and rent. Technical criteria deals with the maintenance of a property at a level deemed necessary after thorough and regular technical survey; to provide continuous employment for certain operatives within a fixed budget. British Standard (BS 3811:1993), as cited in (Afranie and Osei-Tutu, 1999) defines maintenance as "a combination of any actions carried out to retain an item in or to restore it to an acceptable standard".

The concept of 'acceptable standard' may be construed as acceptability to the person paying for the work, to the person receiving the benefit or to some outside body with the responsibility of enforcing minimum standards. Additionally, it can also be construed more widely as acceptability to the public at large or to specific sections of the public. Clearly, there are no absolute standards which would be equally acceptable to everybody and remain acceptable to the same group of people over period of time. The standards acceptable at the time of undertaking the work may be higher or lower than the initial design standards. In many cases, the standards deemed acceptable would be higher than the originally provided and the work includes an element of improvement. Buildings, however, with the passage of time are modified to accommodate new uses and it becomes increasingly unrealistic to think in terms of keeping or restoring the initial standards. Clearly, standard is related to safety and efficiency determined by the amount of money allocated rather than the results of assessing the benefits obtained from maintaining the building to a particular state. Seeley (1993) stated that maintenance is the combination of all technical and associated administrative actions intended to retain an item in or restore it to a state in which it can perform its required functions to an acceptable standard.

A more functional definition proposed by Lee & Yuen (1993) is that, "maintenance is synonymous with controlling the condition of a building so that its pattern lies within specified regions". The word "control" suggests a positive activity which is planned so as to achieve a defined end result while the term "specified regions" presumably has a similar meaning to "acceptable standards". The definition envisages a range of acceptability with upper and lower limits between which the conditions of the building should be maintained. Maintenance, therefore, is all the necessary work done to preserve a building so that it can continue to provide the same or almost the same facilities and amenities, and serve its purpose as it was first built. This includes the expenditure necessary to maintain the rental value of the property and involves day-to-day repairs such as leaking taps, electrical effects, periodic up-keep and major repairs requiring heavy expenditure and services of technical experts.

2.3 The Underlying Principal Causes of Maintenance Problems

The culture of maintenance according to Chanter and Swallow (2007) requires correct diagnosis of defects, current remedial measures, sound technical knowledge of material usage, management resources and formulation and implementation of integrated plan and policies to sustain utility. The authors further argued that the absence of these qualities has led to the decay of nations' physical, social, aesthetic and economic environment which forms the principal dictator of the well-being of man; therefore, maintenance like the last leg

of a relay team and the lubricating oil of an engine remains the component of a conclusive phase of sustainable development.

3.0 RESEARCH METHODOLOGY

The study covered all residential buildings of the Ghana Police Service, Ghana Prison Service and the Ghana Health Service within Cape Coast Metropolis. The statements in the questionnaire described a particular condition of the facility. These were scaled as: good condition, fairly good condition and bad condition. Facilities described as being "in good condition" were those that were well maintained and operational. Those that have served many years of useful life and were fairly maintained but have some problems with functionality and yet operational were described as "in fairly good condition". The facilities that were not well maintained and were either not operational or operational for limited periods of time due to maintenance problems were said to be "in bad condition". In the case of the maintenance state of some facilities in the buildings and individual elements, general assessments of the buildings surveyed were carried out to establish an overall picture of the maintenance conditions. The buildings were as well classified into "good", "fairly good" and "bad condition," respectively. They were classified as in good condition if components were structurally sound with no defects (cracks, peel-off, tilted, broken down, leakages etc.) and require only minor repair; little or no deferred maintenance. Those in fairly good condition had the following characteristics: components show signs of slight deterioration and require some corrective maintenance and major repairs and existence of some deferred maintenance. Buildings in bad condition were those that had components showing signs of severe deterioration, requiring corrective and emergency repairs and where deferred maintenance is extensive.

Table 1.1 Population of the Study

INSTITUTION	HOUSE TYPES			
	Bungalows	Block of Flats	Single-Unit Barracks	Total
Ghana Police Service	4	144	176	324
Ghana Prison Service	8	80	80	168
Ghana Health Service	43	302	54	399
TOTAL	55	526	310	891

Stratified sampling technique was used to categorize the residential buildings based on the different managerial levels and the housing types within the institutions. The housing types were single storey detached bungalow, block of flats (tenement) and single-unit barracks for the Ghana Police and Ghana Prison Services. This was done to determine how maintenance works are undertaken at different levels and within the different housing types, its impacts on their residential accommodation within the three selected public institutions. The levels were: top level management, middle level management and low level management. A systematic sampling technique was, thereafter, used to select the sample for the study. In the case of Ghana Health Service, a two-stage cluster sampling technique was used to select the building types. Buildings were put into four clusters and were systematically selected from these clusters.

The sample size formula (n) = $Z_{1-\alpha/2}^2$ p (1-p)/d^2 by Charan and Biswas (2013) was used to calculate the sample size for the study. Here, $Z_{1-\alpha/2}^2$ = Is standard normal variate (at 5% type 1 error ($P<0.05$), p = expected proportion in population and d = absolute error or precision. With a (p) value of 13.5% and (d) of 0.05, the sample size (n) was estimated to be 179. Data

on general maintenance condition of buildings in the three public institutions and building type was analysed using simple percentages to depict the situation on the ground. The percentage of buildings in good condition for a particular institution was calculated using the number of buildings in good condition over the total number of buildings in that institution all multiplied by 100). However, descriptive analysis was employed for interview questions and observations made.

Secondary information was gathered from books, journal articles, records from the three selected public institutions relating to their building types, and location within the Cape Coast Metropolis. Annual maintenance reports by the estate and maintenance departments were used to obtain extra useful information for the study. Questionnaires were self-administered to Heads of households and Estate Managers/Workshop/Maintenance Officers of the various institutions to solicit views on the form of maintenance they expect from Management. The questionnaire was employed to solicit information on the condition of the households with regards to the current state, maintenance policy and standard practice and the underlying principal causes of maintenance problems of these selected public residential buildings. Observations and interviews were conducted to supplement the information that was gathered using the questionnaires. Below is a table showing the various compositions of the sample.

Table 1.2 Sample Size

INSTITUTION	HOUSE TYPES			
	Bungalows	**Block of flats**	**Single-unit terrace**	**Total**
Ghana Police Service	1	29	35	65
Ghana Prison Service	2	16	16	34
Ghana Health Service	9	60	11	80
TOTAL	**12**	**105**	**62**	**179**

4.0 RESULTS AND DISCUSSION

The survey results as presented in Table 1.3 below revealed that, 49.2 percent of the Ghana Police Service buildings were in bad state due to poor maintenance culture with only 32.3 and 18.5 percent in fairly good and good condition respectively. This situation demands that buildings in fairly good and bad conditions need to be maintained urgently before they deteriorate and become worse with time. Based on the responses from the three institutions, it can be assumed that Ghana Health Service has good maintenance practice compared to the Ghana Police Service and Ghana Prisons Service since only about 8.7 percent of their buildings were in bad condition.

The Ghana Police Service was worse in terms of maintenance with almost half of their buildings in bad condition. The institution with well maintained buildings was the Ghana Prisons Service representing 52.9 percent. An assessment of maintenance conditions of the various house types revealed that block of flats were well maintained (27.6 percent) compared to bungalows (25 percent) and single-unit houses (19.4 percent). Maintenance was very poor among single-unit houses with 41.9 percent in poor condition. In terms of maintenance needs, 75 and 80.6 percent of bungalows and single-unit buildings, respectively need some form of maintenance to bring them into good condition.

The assessment of maintenance conditions identified major defects such as cracks and exposed foundation, corroded and roof leakages, crack, peel-off and dusty floors, faded and dirty painting on buildings, broken down windows and doors, torn mosquito nets, broken louvre blades, damaged door locks and fixtures. Observations carried out confirmed that

(36%) of the buildings of these public institutions are in bad condition. This agrees with the response given by the respondents in connection with the current state of public buildings.

Table 1.3 General Maintenance Condition of Buildings in the three public Institutions and building Type

Institution	Good		Fairly Good		Bad		Total	
	No.	%	No.	%	No.	%	No.	%
Ghana Police Service	12	18.5	21	32.3	32	49.2	65	100
Ghana Prison Service	18	52.9	12	35.3	4	11.8	34	100
Ghana Health Service	32	40	41	51.3	7	8.7	80	100
Total	62	34.6	74	41.3	43	24.0	179	100
House Type								
Bungalows	3	25.0	7	58.3	2	16.7	12	100
Block of Flats	29	27.6	39	37.1	37	35.2	105	100
Single-Unit Terrace	12	19.4	24	38.7	26	41.9	62	100
Total	44	24.6	70	39.1	65	36.3	179	100

4.1 Maintenance Policy Practices and their Standards

The survey revealed through that Ghana at present has no national maintenance policy to regulate building maintenance of public institutions. However, the Estate and Workshop Departments of various institutions in consultation with the Building Management Committee (BMC) have developed maintenance guidelines to ensure regular maintenance of buildings. These guidelines therefore, do not take care of preventive maintenance to prolong the lives of buildings and restore components' efficiency. The responsibility of preventive maintenance therefore, rests largely on the Estate/Maintenance office that oversees maintenance work for all buildings owned by the institution. This office is mostly responsible for the external maintenance such as painting, replacing of wooden members, major roof repairs, electricity, sewerage, and plumbing work. Occupants, on the other hand, are responsible for the following internal maintenance such as: replacement of all burnt-out bulbs, lost keys or locks and broken louvre blades; keeping the institutional properties and the surrounding, thereof, in good sanitary condition by weeding around and disposing off refuse regularly to avoid any nuisance; fumigation of the internal portions of dwelling units to get rid of ants, mosquitoes, cockroaches, flies etc. However, Occupants are not permitted to alter the external walls or allow for any renovation to be done to any part of the building without the written consent of the institution.

4.2 Underlying Principal Causes of Maintenance Problems in Public Residential Buildings

According to interviews granted, it was revealed that governments since independence have provided residential apartments for use by public institutions. Some date back to the colonial era. Public institutions have the obligation to preserve, protect and maintain these properties. This is, however, not the case as the study revealed. Respondents listed the following as the five factors that create maintenance problems in public residential buildings.

1. Age of the buildings,
2. Lack of maintenance culture,
3. Funding for Maintenance Activities of Public residential buildings,
4. Apathy and ignorance of maintenance responsibility and
5. Capacity of the maintenance unit.

4.2.1 Age of the Buildings

From the survey, bungalows of the Ghana Police Service were between 20-50 years. All other house types, that is, block of flats and single-units were above fifty (50) years. Bungalows and single-unit terrace from the Ghana Prisons Service are above fifty (50) years, with block of flats falling below twenty (20) years. Buildings of the Ghana Health Service surveyed were between 20-50 years. Buildings deteriorate with age. However, lifespan of most buildings are constructed to last at least sixty (60) years. Approaching the lifespan of sixty (60) years, most buildings exhibit serious maintenance problems which demand at least major renovation, rehabilitation, replacement or repair. However, many exceed this period if the buildings are well maintained over time. The present state of public residential buildings in fairly good and bad condition was attributed to age of the buildings since they were approaching their lifespan limit.

4.2.2 Lack of Maintenance Culture

Respondents pointed out that having acquired the properties, Management of the institutions do not show much readiness towards their maintenance. According to the study, the root cause of maintenance problems were that Estate/Maintenance Managers do not undertake regular inspection of the buildings to ascertain their conditions, neither do they undertake routine and periodic maintenance on the buildings. Findings from the Ghana Health Service indicated that though they pay house rent as an institutional policy demands, the external maintenance work take a long time. This creates inconvenience and safety problems for occupiers of such apartments. In the case of Ghana Police Service and Ghana Prisons Service, personnel of ranks below Assistant Superintendent do not pay rent and, therefore, external maintenance is carried out by the State. Expressing their views on lack of maintenance culture by the institutions, respondents from the Ghana Health Service said; “all that they do is to bring in labourers to weed around the compound at regular intervals to the neglect of the buildings.” In situations where maintenance request were put in by occupants as per the institution’s policy, the request received no attention.

4.2.3 Funding for Maintenance Activities of Public Institutions

Maintenance of buildings requires huge capital expenditure. Public institutions rely on central government funds to cover maintenance incidentals. This was captured in the annual budget of the institution’s general maintenance and repair funds submitted to the government. Government funding of activities of public institutions have been dwindling over the years, thereby making it difficult for managers of public institutions to set aside adequate funds for maintenance work. This has led to the situation of deferred preventive maintenance which can generate higher costs over the long term.

In the case of Ghana Health Service, the fund is supplemented with part of its internally generated fund because funds from central government are woefully inadequate to meet the maintenance needs. The survey revealed that occupants’ inability to maintain the buildings was attributed to high cost of maintenance with respect to cost of materials and labour. Inadequate funds and high maintenance cost were cited as the two main reasons for building deterioration in these public institutions. Maintenance problems become more expensive when not attended to on time. Therefore, institutions should be proactive in raising funds for maintenance of their buildings. Stakeholders argued that government should take a second look at its rent policy to reflect current economic realities. The rent rates which were set some thirty years ago cannot currently sustain the building maintenance needs of today. Therefore, management of the rent should and the creation of maintenance budget should be left in the hands of managers of public institutions. Presently, rents are paid into consolidated account

but institutions are to undertake maintenance from their annual budgets which put pressure on them.

4.2.4 Apathy and Ignorance of Maintenance Responsibility

Apathy and ignorance of maintenance responsibility on the part of occupants was found to play a major role in the current maintenance problems of public residential buildings. Occupants refuse to undertake internal maintenance as directed by the maintenance policies of the various institutions. Some respondents exhibited their ignorance of maintenance responsibility by the neglect of de-silting choked gutters, cleaning dirty floors and clearing of weeds around their surroundings. The study observed that lack of enforcement of maintenance policies have resulted in deterioration of most public buildings.

4.2.5 Capacity of the Maintenance Unit

The capacity of the maintenance unit in these three institutions in terms of personnel and expertise was found to be inadequate. This problem has resulted in most of these institutions relying on private maintenance companies who come with their associated cost implications.

5.0 CONCLUSION AND RECOMMENDATIONS

Close to three quarters of the public buildings were in bad condition and prominent among them were the Ghana Police Service and the Ghana Prisons Service. Building maintenance problems were more pronounced in single-unit houses than block of flats and bungalows. Single-unit apartments are occupied by junior officers and, therefore, maintenance is given little attention. On the contrary, maintenance of block of flats and bungalows are given extra consideration because they are being occupied by senior and middle level management. The most widespread maintenance problem found were cracks in walls, faded painting, partly broken windows and doors, exposed foundation and roof leakages. These problems are influenced by the age of the buildings, lack of maintenance culture, inadequate funding for maintenance activities, apathy and ignorance of maintenance responsibility, insufficient capacity of maintenance units, pressure on the buildings due to the number of users, among others.

Public institutions should embrace preventive maintenance practices as a high priority rather than adhoc maintenance. Optimum benefits from preventive maintenance is gained when building managers incorporate preventive maintenance tasks into a work-order system and keep systematic maintenance records, either manually or computerized. This programme has to be evaluated to improve it over time.

Maintenance departments of public institutions should have adequate staff with the requisite manpower and appropriate training to undertake maintenance tasks. Periodic inspections of the conditions of buildings should be carried out by the maintenance departments to create inventory of building components and facilities. This inspection should be planned since proper planning and inspection is the surest way to provide insight into future maintenance needs to reduce cost of maintenance.

National Maintenance Fund similar to that of the Road Fund should be set up to mobilize funds to meet maintenance needs of public institutions. The current rents paid by users of public buildings in various institutions should be reviewed to reflect current economic trends to generate enough funds to undertake maintenance works. Where a national maintenance fund is set up, all rents generated by public institutions should be paid into.

REFERENCES

Abdul-Manan, D. (2011). *Tackling the Poor Maintenance Culture in Ghana through Green Retrofits.* http://www.modernghana.com/news/315701/1/tackling-the-poor-maintenance-culture-in-ghana-thr.html (Retrieved January 4, 2016)

Afrane, S. K. and Osei -Tutu, E. (1999), *Building maintenance in Ghana: analysis of problems, practices and policy perspectives.* Ghana: World Bank.

British Standards Institution. (1993). *BS 3811: Glossary of Terms used in Terotechnology.* *http://shop.bsigroup.com/ProductDetail/?pid=000000000000319632* (Retrieved January 4, 2016)

Chanter, B. and Swallow, P. (2007). *Building maintenance management*. (2nd ed.). Oxford, UK: Blackwell Publishing.

Charan, J. and Biswas, T. (2013). How to Calculate Sample Size for Different Study Designs in Medical Research? Indian Journal of Psychological Medicine, 35(2), 121–126. doi: 10.4103/0253-7176.116232

Dann, N., Worthing, D., and Bond, S. (1999). Conservation maintenance management – establishing a research agenda. *Structural Survey,* 17(3), 143-153.

Hamilton, B., & Wan Salleh, M. (2001). Maintenance of building important. http://www.hba.org.my/news/2001/601/maintenance.htm (Retrieved January 4, 2016)

Kindred, B. (2004). Maintaining value through maintenance. http://www.maintainourheritage.co.uk/pdf/kindred_article.pdf (Retrieved January 15, 2016)

Lee, H. S and Yuen G. C. S. (1993*). Building maintenance technology*. London, UK: Macmillan Press.

Marks, S. (1996). *Concerning building*. London: Butterworth-Heinemann.

Maslow, H. A (1954). *Motivation and personality*. New York: Harper and Row Publishers.

Melvin, E. (1992). Plan, predict, and prevent: How to reinvest in public buildings, Special Report #62, American Public Works Association Research Foundation, Chicago, IL.

Odediran, S. J., Opatunji, O. A., & Eghenure, F.O. (2012). "Maintenance of residential buildings: Users practices in Nigeria." *Journal of Emerging Trends in Economics and Management Sciences*, *3*(3), 261- 265.

Pickard, R. D. (1996). *Conservation in the built environment*. Singapore: Longman Publishers (Pte) Ltd.

Sani, S. I. A, Muhammed, A. H, Shukor, F. S and Awang, M (2011). Development of maintenance culture: A conceptual framework, " International Conference of Management Proceeding". 1007-1013

Seeley, I.H. (1993). *Building maintenance.* London, U.K: Macmillan Press Limited.

Smith, R. (2003) 'Best maintenance practices', *Journal for Maintenance and Maintenance Management,* 16(1), 10-15.

Wordsworth, P. (2001). *Lee's building maintenance management*. Oxford: Blackwell Science.