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Assessment of the Impact of Dampness on Buidlings Constructed In Akure Local Government Ondo State

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Abstract
This study investigated the effect of dampness in terms of condensation, rain penetration and capillary rising dampness on buildings constructed in Akure south local government. A total number of 129 buildings were thoroughly investigated through the use of structured questionnaire, observation and literature review.
After the investigation and assessment, it was discovered that most of this buildings experienced dampness due to non- use of damp proof membrane and damp proof course during the construction of the buildings. Also, most of these buildings were constructed in water-logged area and were not constructed by professionals.
The results of this observation and structured questionnaire showed that dampness occurred in the buildings due to the following factors: Pipe leakages, water-logged area of site, non-use of D.P.M and D.P.C.poor drainage, use of poor quality of concrete (permeable concrete), holes in roof, defective construction e.g. joints, rain penetration, poor foundation, design errors in building, condensation in bathroom area of buildings, poor communication or coordination by owner with other parties involved in the construction of the buildings, poor house maintenance and construction moisture.
The study further showed that accumulation of moisture in the buildings and its components leads to the physical, biological and chemical deterioration of the building and its respective components which reduces the life span of a building. As a result of this, dampness causes mould in the interior and exterior parts of buildings, peeling of paint on internal and external wall of building, spots and discoloration on the floors and walls, rising damp on the internal and external walls of buildings, efflorescence of brick tiles, mould on the wall of building, reduction in the life of structures, offensive smell in building, deteriorate electric installations, reduce the life of structures, cracks and holes on building walls, flaking off of plastered walls, growth of fungi and moss on the wall of building, difficulty in breathing due to microbial organisms diseases such as; asthma, lung infection, sneezing, whizzing. etc.
This research concluded that dampness is a problem in most buildings constructed in Akure south local government and must be tackled effectively before it ruins or damages a building.
Hence, it shows that the solution to dampness in buildings constructed are guniting (shotcrete), selection and use of standard quality building materials, water proof surface treatment, use of D.P.M and D.P.C, use of building construction orientation, use of good and reliable roof materials, injection of a liquid or cream chemical D.P.C, use of professional builder and good designing team, use of cavity walls, use of damp proof rods, use of ventilating equipment and leaving door open, proper site investigation to check for soil drain ability, reduction in the washing and drying of clothes in indoor environment

Keywords: *buildings, dampness, Moisture, rising damp, surface condensation, water penetration*

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I. Introduction

One of the major problems Buildings encountered in the construction industry in Akure city is Dampness due to rain penetration, slope of the soil, type of soil (that is; presence of salts in the soil), materials used for the flooring. Etc.

Dampness in a simple term is when excess water is on building which results to visible growth of mould and destruction or disturbance of wall surfaces and materials.

A high proportion of damp problems in buildings are caused by ambient climate dependent factors of condensation and rain penetration. Capillary penetration of fluid from the ground up through concrete or masonry is known as Rising Damp and is governed by the shape and porosity of the construction materials through which this evaporation limited capillary penetration takes place.

Despite the lasting qualities of buildings, all buildings, be it old or modern types of construction are susceptible to natural and man-made mechanisms of deterioration (Noy and Douglas, 2005; Watts et al., 2001;

Hollis, 2000; Massari and Massari, 1993). If these buildings are not properly maintained they would not survive in an acceptable state beyond the generation that built them (Watts et al., 2001). Of all defects associated with buildings, moisture is the most frequent and dangerous, and contributes more than 50% of all known building failures (Halim et al., 2012; Watts et al., 2001).

Accumulation of moisture or dampness in buildings or components of a building leads to physical, biological or chemical deterioration of the building or its materials (Haverinen-Shaughnessy, 2007). Damages to buildings caused by dampness pose a serious risk to the performance of the building (Oliver, 1997). Dampness in buildings is moisture that should not be present in that building (Burkinshaw and Parrett, 2004). According to Burkinshaw and Parrett (2004), a building is described as having a dampness problem when the materials in that building becomes sufficiently damp to cause material damage and visible mould growth. The sources of dampness are classified to include rising dampness, penetrating dampness, condensation and pipe leakages (Hollis, 2000).

The ultimate objective of any dampness study is to identify the lead source of moisture in order to recommend actions to remedy the problem (Halim et al., 2012). According to Hollis (2000), sources of dampness can be classified as rising dampness, penetrating dampness, condensation and pipe leakages. According to Burkinshaw and Parrett (2004), dampness can be classified as air moisture condensation, penetrating dampness, internal plumbing leaks, below ground moisture or building specific sources.

Dampness spoils paint, interior decorating, encourages mold and rot growth, hampers aesthetics, poses a threat to the health of the occupant, bacterial and fungal growth. The causes of dampness are however numerous and before the effect can be adequately rectified the source must be located (Aukrust, 1979). Moisture gets into building and instead of disappearing, becomes trapped into the structure. Once inside, it remains where it is or find its way into more vulnerable areas, by which time the damage has been done.

The issues of dampness related to; damp and musty smell, damp rise in buildings components (walls, floors, ceilings, windows and doors), condensation, humidity, occurrence and symptoms of dampness, causes of dampness, effect of dampness, dampness and economy, dampness and health, peeling of wall and rain penetration. A damp and musty smell, walls, floors or ceilings that feel cold or damp. The occurrence of dampness and mold in the indoor environment is associated with respiratory-related disease outcomes. Thus, it is pertinent to know the magnitude of such indoor environment problems to be able to estimate the potential health impact.

Furthermore, most people first notice an issue with rising damp on walls, the water from the ground often contain salts that are deposited on the walls when water evaporates. These salts can cause the paint to bubble and a white fluffy deposits to be left on the surface. Hence, this study aimed at assessing the impact of dampness on buildings constructed in Akure south local Government of Ondo State.

II. Methodology

2.1 STUDY AREA

This study was carried out in Akure the capital of Ondo State. The State was one of the three states created from the old Western Region of Nigeria in 1976 in order to bring the government closer to the people. It was an emerging city before its creation. It has a population of 360,268 (2006 census figure). Using 2% yearly increase, it is expected that by 2020 it would rise to 475,365 and 504,375 by the year 2025. It is located some 311 km North East of Lagos, about 370 m above sea level and lies on longitude 5° 18' East and Latitude 7° 17' North of the equator.

Akure is a city in South-western Nigeria and is located in the rainforest region of the country. Rainforest regions of Nigeria are characterized by heavy tropical rainfall for more than half of the year. Due to this fact, it usually enjoys an annual rainfall of over 2413 millimetres (95 inches). this indicates that in such region the ground is likely to be wet for this relatively long period of the year, hence the need to adequately protect buildings structures from incursion of water.

This study sought to identify areas in the buildings (with its components) constructed in Akure south local government that are severely affected by dampness through visual observation. This will assist in a detailed investigation later which will aid in the recommendation of appropriate methods to address the problem. The investigation consists of series case study of buildings reported to be experiencing severe dampness problems.

There are four major stages or approaches to any dampness investigation, these include: visual inspection; investigations using moisture meters (non-destructive tests); a more detailed investigation (destructive tests) and homing in on the problem (laboratory assessment study) (Halim et al., 2012; Burkinshaw and Parrett, 2004). A holistic approach to dampness investigation which involves observing symptoms in relation to the whole building, the site and what can be gathered about the locality was adopted (Burkinshaw and Parrett, 2004).

This investigation requires a person to inspect the defect closely and it is the first of the four stages involved in any dampness investigation. This investigation may be subjective and the experience of the personnel involved is very important (Halim et al., 2012). In this stage being able to identify a dampness problem depends on the symptoms of the defect i.e. staining of water, cracking, rotten timber, decay, blisters, etc. (Halim et al., 2012; Burkinshaw and Parrett, 2004). During the diagnosis, knowledge of the behavior of relevant building materials, construction knowledge and knowledge on the use (past, present and future) of the building is highly required. There is a need to record the defect by description, photograph or sketch drawings, etc. (Halim et al., 2012; Burkinshaw and Parrett, 2004)

III. Research Design

This research work uses a case study sampling techniques where dampness and it causes were observed and profer solution to accordingly, using a questionnaire distributed on environmental condition around the selected area as well as initial construction method at the sub structural level.

3.1 Study Population

The target population used for this study comprises of the list of houses located in the Akure south local government that are affected and severely damaged by dampness.

3.2 Sampling Technique

The purposive sampling technique was used in the selection of the dampened buildings (houses) to be investigated and observed so as to ensure good coverage of the area within the scope. Purposive selection of respondents was done in order to get the right answer from the occupants of these buildings with the letter attached for observation and questionnaire, which was well explained to them.

3.3 Sample Size

The sample sizes of any survey study is very important to make correct inferences about a population from a sample. Sample sizing is the process of choosing the number of observations to include to a statistical sample. A Sample size of 129 was considered. Questionnaires were given and shared to occupants.

3.4 Sources of Data

Both primary and secondary sources of data are used for the purpose of this study, this will improve the quality of the study and also provide comprehensive knowledge of the area of study. It allows for researchers to have wide range of information in terms of available data from past researches and present phase of the research area.

3.5 Primary Data

The primary data for this study was collected from the respondents through a questionnaire survey. The questionnaire survey was directed to the contractors (construction firm), clients and occupants of the buildings in Akure south local government.

The contactors are the one responsible for erecting the buildings to build the plan and desire of the owner or client to reality. The clients comprise of the customers and people responsible for financing or sponsoring construction of the buildings, they have a huge influence on the mode of construction.

3.6 Data Collection Instrument

This study is a survey research makes use of questionnaire The questionnaire contains a well-structured set of information on the causes of dampness in buildings, effects of dampness, problems of dampness to human health and properties also, the treatment with prevention of dampness in buildings. The questionnaire adopts the use of Likert scale for its respondents to rank the various outlined factors and points.

Oral interview was conducted in order to have a direct contact with the respondents and get first-hand information, also field observation carried out to check the state of the dampened buildings. All these were done in order to get exact opinions of the stakeholders and also achieve the objectives of this research study.

IV. Method of Data Analysis

The data gathered was analyzed using inferential and empirical statistics. These was be analyzed using statistical package for social science (SPSS) after carefully completing the imputing of the extracted data correctly into the data collector. The inferential statistical technique involve the use of Relative importance index (RII) while spearman's rank correlation was used for the empirical analysis of the data collected. The method of analysis used by Tsegay and Hanbin (2017) to determine the relative importance of the causes and effects of dampness in buildings constructed in Akure south local government will be adopted for this research project. The five-point scale of relevance used to identify the importance values (RII) for each factors are as follows:

RII= EW/A

Where; RII= Relative Index;

W= Weighting given to each factor by the respondents (ranging from 1 to 5)

A= The highest weight (i.e. 5 in this case);

N= Sample size (i.e. total number of respondents).

The mean score will be employed to calculate the mean of the effects highlight by the respondents and to determine the variance contractors and occupant responses.
Since Likert of 5-point scale was employed for the collection of data, the formula for mean is written
--Efx/ (Ef)
Where f is the frequency of each class and x is the midpoint of each class interval.
Similarly, the summation of fx gotten from the multiplication of frequencies of the respondent and the ratio of the range of options between 1-5; fx was divided by total number of questionnaires analyzed to get the mean factor which will be then ranked from the highest to the lowest.
Mean score equation used for the calculation
M = (5fx5 + 4fx4 + 3fx3 + 2fx2 + fx1) / (x5 + x4 + x3 + x2 + x1)
Where M= mean score,
X= range 1-5 with 5 been the highest and 1 been the lowest.
f= frequency of respondent in each factor.
Ranking was used to represent the behaviour of the respondent to the questionnaires in ranking the system and correlation for the case study.

4.1 Respondents' Demographic Information

4.2 Respondents' academic qualification

With regards to the frequency and percentage of the academic qualification of the respondents, Holders of B.Sc. were the most with 44counts (48.4%), next is M.Sc. (28.6%), HND and Ph.D. carries 8.8% and 5.5% respectively, while 8.8% do not possess any of the listed academic qualifications.

Table 1: *Respondents academic qualification*

	Frequency	Percent	Valid Percent	Cumulative Percent
H.N.D	8	8.8	8.8	8.8
B.Sc	44	48.4	48.4	57.1
M.Sc	26	28.6	28.6	85.7
Ph.D	5	5.5	5.5	91.2
NONE	8	8.8	8.8	100.0
Total	91	100.0	100.0	

Respondents' professional affiliation

From Table 2, NIOB members have 35.2% in all, NIA follows with 24.2%, NIQS, NIS and NSE all with 18.7%, 9.9% and 9.9% respectively. Respondents who are not affiliated are just 2.2%.

Table 2: *Respondents' professional affiliation*

	Frequency	Percent	Valid Percent	Cumulative Percent
NIA	22	24.2	24.2	24.2
NIOB	32	35.2	35.2	59.3
NSE	9	9.9	9.9	69.2
NIS	9	9.9	9.9	79.1
NIQS	17	18.7	18.7	97.8
NONE	2	2.2	2.2	100.0
Total	91	100.0	100.0	

Age of respondents

Table 3 depicts that the grade age of the respondents are well distributed across the various age range that were listed in the questionnaire. 18 respondents are between 20-30years, 31 respondents between 31-40years, 21 respondents between 41-50 years, 12 respondents between 51-60 years and 9 respondents between 61-70years.

Table 3: *Age of respondents*

	Frequency	Percent	Valid Percent	Cumulative Percent
20-30	18	19.8	19.8	19.8
31-40	31	34.1	34.1	53.8
41-50	21	23.1	23.1	76.9
51-60	12	13.2	13.2	90.1
61-70	9	9.9	9.9	100.0
Total	91	100.0	100.0	

4.3 Assessment of Dampness in Buildings

With regards to the problems encountered as a result of dampness, this research aims to assess the causes of dampness in buildings located in Akure South Local Government.

Series of questions were asked in the research instrument, and those questions were intended to discover the strongest factors causing dampness in the study area. The frequency and percentage of each response to each factors were recorded in the table below.

Table 4: *Assessment of dampness in buildings*

Questions	**YES** (Freq. & %)		**NO** (Freq. & %)	
Is the building area water-logged?	38	41.8%	53	58.2%
Was D.P.M and D.P.C used during construction?	48	52.7%	43	47.3%
Was the level of the site taken and the building orientation known before the construction process of the building begin?	61	67.0%	30	33.0%
Was there thorough supervision during the construction process?	74	81.3%	17	18.7%
Were quality materials used for construction?	75	82.4%	16	17.6%
Was building constructed by professional builder?	35	38.5%	56	61.5%
Were other building professional team involved in the construction process?	67	73.6%	24	26.4%

Analysis from Table 4

- When asked about the building area being waterlogged or not, 41.8% of the respondents responded that their building area is waterlogged while 53(58.2) responded that it is not waterlogged.
- 52.7% marked that DPM and DPC were used during construction of their building and the remaining 47.3% did not use DPM and DPC during their building construction.
- 67% (61respondents) took the level of their site and knows the building orientation known before the construction process of their house begins while the remaining 33% did the opposite.
- 81.3% responded that there was thorough supervision during the construction of their building, while 18.7% of the respondents said there was no thorough supervision in the construction process.
- When asked if quality materials were used for the building construction, 75(82.4%) of the respondents responded YES while the remaining 16(17.6%) responded NO.
- 38.5% of the respondents' building was constructed by a professional Builder, while the remaining 61.5%was not.
- 73.6% of the respondents replied that other building professionals were involved in the construction process, while 26.4% had exactly the opposite.

4.4 Identification and Investigation of Dampness in Building

This section discusses findings of the questionnaire survey in relation to identification and investigation of dampness in buildings. The data provided by participants was analyzed using the Relative Importance Index (RII) which was used to rank factors responsible for dampness in buildings. RII was computed based on the formula provided by Adnan *et al.*, (2007) as:

RII = (5n5 + 4n4 + 3n3 + 2n2 + 1n1) / 5(n5 + n4 + n3 + n2 + n1)

Table 5 below depicts the result of the analysis of the result of causes of dampness. Likert Scale was used to make requisition for the respondents' opinions. The scale is in form of 1- Not severe 2- Partially severe 3- Severe- 4- Very severe 5-Extremely severe.

All the factors have a significance of 0.000, therefore they are all significant because 0.000 is less than 0.05. Mean and Relative important Index were used to rank the variables. Pipe leakages is first in the ranking with a mean of 3.90 and RII of 0.78. This indicates the criticality of mechanical pipes in the building. Water logged area of site comes second in the criticality of the listed variable with a mean and RII of 3.84 and 0.77. Out of the 12 factors, Non-use of DPM and DPC and Poor drainage came 3[RD] and 4[TH] respectively. They have fairly strong means of 3.81 and 3.77, RII of 0.76 and 0.75respectively. Condensation in bathroom area of buildings and construction moisture were found at the bottom of the ranks. They have means of 3.22 and 3.21 respectively. We can infer that Bathroom areas does not necessarily experience condensation as finishing such as tiles may be used to prevent that.

Table 5: *Identification and Investigation of Dampness in Building*

Causes of dampness	Mean	RII	Sig. (2-tailed)	Rank
Pipe leakages	3.90	0.78	.000	1
Water-logged area of site	3.84	0.77	.000	2
Non-use of D.P.M and D.P.C	3.81	0.76	.000	3
Poor drainage	3.77	0.75	.000	4

Use of poor quality of concrete (permeable concrete)	3.57	0.71	.000	5
Holes in roof	3.53	0.71	.000	6
Defective construction e.g joints	3.38	0.68	.000	7
Rain penetration	3.35	0.67	.000	8
Poor foundation	3.33	0.67	.000	9
Design errors in building	3.29	0.66	.000	10
Condensation in bathroom area of buildings	3.22	0.64	.000	11
Construction moisture	3.21	0.64	.000	12
Valid N (listwise)			.000	

4.5 Effects of Dampness on Buildings Constructed in Akure South local government.

As table 6 depicts, the paint on the internal and external walls of building is the most affected by dampness according to this study. Dampness peels the paint materials, distorting the aesthetics of the building. Next is spots and discoloration on the floors and walls of affected buildings with a strong mean and RII of 4.15 and 0.83(83%). Flaking off of plastered walls, growth of fungi and moss on the wall of buildings and difficulty in breathing of occupant area the bottom of the table (10th, 11th and 12th positions) with means of 3.65, 3.64 and 3.48.

This indicates that those effects are not so severe to the occupants and their building. The significance level of all the variables is 0.000, therefore they are all significant.

Table 6: *Effects of Dampness on buildings constructed in Akure South local government.*

Effects of dampness	Mean	RII	Sig. (2-tailed)	Rank
Peeling of paint on internal and external wall of building	4.24	0.85	.000	1
Spots and discoloration on the floors and walls	4.15	0.83	.000	2
Rising damp on the internal and external walls of buildings	3.97	0.79	.000	3
Efflorescence of brick tiles	3.92	0.78	.000	4
Mould on the wall of building	3.91	0.78	.000	5
Reduces the life of structures	3.89	0.78	.000	6
Offensive smell in building	3.88	0.78	.000	7
Reduce the life of structures	3.85	0.77	.000	8
Cracks and holes on building walls	3.79	0.76	.000	9
Flaking off of plastered walls	3.65	0.73	.000	10
Growth of fungi and moss on the wall of building	3.64	0.72	.000	11
Difficulty in breathing	3.48	0.70	.000	12
Valid N (listwise)			.000	

4.6 Recommendations to minimize dampness

When asked to choose the recommendations to minimize dampness, the respondents ticked the various proposed recommendations according to their knowledge and exposure. Table 6 below gives us the result of the data analysis.

From the table, uniting (shotcrete) is the most agreed to by the respondents with a strong mean of 4.32. Shotcrete is a sprayed concrete or mortar conveyed through a hose and pneumatically project at high velocity onto a surface, which makes the surface very hard.

Selection and use of standard quality building materials is ranked second with a mean of 4.27. this shows the respondents value quality building materials because they think it can reduce damping in buildings. Use of waterproof surface such as oil paints comes third in the ranking (4.25). Proper site investigation to check for soil drain ability ranks second to the last white reduction in the washing and drying of clothes indoor is found at the rock bottom (2.91).

The bottom line of the investigation on most suitable recommendations to minimize dampness in buildings is the use of quality materials such as DPM, DPC concrete constituents and water proof surface.

Table 7: *Effects of Dampness on buildings constructed in Akure South local government.*

Recommendations	Mean	RII	Sig. (2-tailed)	Rank
Guniting (shot crete)	4.32	0.86	.000	1
selection and use of standard quality bldg materials	4.27	0.85	.000	2
water proof surface treatment	4.25	0.85	.000	3
use of D.P.M and D.P.C	4.24	0.85	.000	4
use of building construction orientation	4.23	0.85	.000	5
use of good and reliable roof materials	4.18	0.84	.000	6

injection of a liquid or cream chemical D.P.C	4.15	0.83	.000	7
use of professional builder and good designing team	4.05	0.81	.000	8
use of cavity walls	3.86	0.77	.000	9
use of ventilating equipment and leaving door open	3.60	0.72	.000	10
proper site investigation to check for soil drain ability	3.56	0.71	.000	11
reduction in the washing and drying of clothes in indoor	2.91	0.44	.000	12
Valid N (listwise)			.000	

V. Conclusion

This research assessed the impacts of dampness on buildings constructed, using Akure south local government, Ondo state as a case study through the analysis and interpretation of data obtained using observation and questionnaire survey. The objectives that guided this research were the factors causing dampness, the effects of dampness on buildings constructed and the remedies to these dampness effects.

This study has revealed the major pressing factors that lead to dampness in buildings constructed in Akure south local government. It showed that condensation, rain penetration, rising damp due to improper foundation and construction moisture were the main causes according to the knowledge and experience of the respondents. Other major factors were poor house maintenance, poor site management, design errors, poor communication and coordination by owner with other parties involved in the construction of the buildings.

Also, according to the results of the analyzed data from questionnaire, it can be concluded that there are some common effects dampness have on buildings. They are; Condensation in buildings, peeling of paints, flaking off of walls, spots and discoloration, deterioration of furniture, offensive smell in buildings, growth of fungi, moss and blue-green algae. These effects stated are agreed to be the most recurring based on the results from the data.

Furthermore, this research and observation studied, identified ways by which effects of dampness can be avoided, minimized and prevented in buildings constructed in Akure south local government. This data was also collected with questionnaires and analysis shows that the respondents agree to some recommendations put forward. The highly ranked remedies or preventions for dampness include; Proper site investigation to check for soil drain ability, selection and use of standard quality building materials and products available, use of building construction orientation, use of damp-proof membrane D.P.M and damp-proof course D.P.C during building construction, use of cavity walls for buildings, water proof surface treatment, injection of a liquid or cream chemical damp proof course (DPC Injection) and guniting (shot crete). Most importantly, it is necessary and required for contractors to use damp proof materials during building construction.

Recommendation

The following recommendations were made based on the findings and conclusions drawn from this research, they include;

1. During the construction of a building, there should be measures put in place to tackle any form or traces of dampness.
2. Damp proof course and damp proof membrane should be used for the block work and foundation.
3. It should be mandated that clients are aware of the benefits of using damp proof course and damp proof membrane, quality materials and the need for professionals during building construction.
4. It is necessary to carry out proper site investigation and building orientation before a building is constructed.
5. It is important to reduce the washing and drying of clothes in the indoor environment of the building and rather an electrical washing machine should be used at home.
6. Humidifiers should be installed in the house and also bathroom should be well ventilated so as to reduce the effects of condensation.

Dampness should be understood by the occupants as this will help them to be aware about the effects of dampness and also, occupants should be able to identify various causes of dampness in order to be careful about the use of water in their home.

References

[1]. Burkinshaw, R. & Parrett, M. (2004). Diagnosing damp, Coventry: RICS BOOK, ISBN-13: 978-1842190975.
[2]. Halim, A. A., Harun, S. N., and Hamid, Y. (2012). Diagnosis of dampness in conservation of historic buildings. *Journal Design Built, 5*.
[3]. Haverinen-Shaughnessy, U. (2007). Moisture as a source of indoor air contamination, In Proceedings: En VIE Conference on Indoor Air Quality and Health for EU Policy, Helsinki, Finland, 12-13 June 2007.

[4]. Hollis, M. (2000). Surveying Building, Coventry, *RB-RICS Books*.
[5]. Massari, G. and Massari, I. (1993). Damp buildings, old and new. In ICCROM, Rome, Italy: ICCROM (English translation RisanamentoIgienicodeiLocaliHumidi. Milan, Italy: UlricoHoepli,1985.
[6]. Noy, E. and Douglas, D. (2011). Building Surveys and Reports, 4th Edition. ISBN: 978-1-405-19761-8.
[7]. Oliver, A.C. (1997). Dampness in buildings, 2nd Ed., Cambridge, Mass, USA.
[8]. Watts. D.C., Colston. B. and Bulow, A. (2001). Predicting damp-related problems in historic buildings and monuments used for library and archive purposes. In proceedings COBRA 2001.
[9]. Www.ghanadistricts.com. Ghana districts- A repository of all districts in the Republic of Ghana. Accessed 05/08/13.

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