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An Investigation into Building Functional Failures in Delta State (A Case Study of Warri Metropolis)

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ABSTRACT: *This paper presents the results of a study of 150 commissioned residential buildings in Warri ranging from 3million to 30million Naira. The study has identified factors influencing building functional failures. While others factors are more visible, building functional failures remainundetectedproblem by the building owners and the industry. Building owners and Real Estate Agents affected, do not perceive the amount of money being wasted each year onmaintenance.The data used for this study were collected through the use of questionnaires. All questionnaires were sent and also delivered by hand to the Real Estate managers and building owners. The findings showed that none of the buildings investigated fully met the expectation of occupiers. The study has also identified that Artisans in Warri are not professionally skilled to handle professional jobs.Therefore the study recommends that Artisans in Warri be retrained to be able to handle professional jobs.*

Keywords: *Functional failure, Industry, Owner & Agents, Qualified Professionals and Artisans.*

Background
Warri Metropolitan (Delta State)

Delta State is a state in Nigeria, named afterRiver Niger. It was carved out of the former Bendel State in 1991. The state has 25 local government areas. The State capital city is Asaba. Warri is the biggest commercial city in the state. Other major towns are Agbor, Ughelli, Oghara, Sapele and Ogwashi-uku. The figure below shows the map Delta States and its Local Governments.

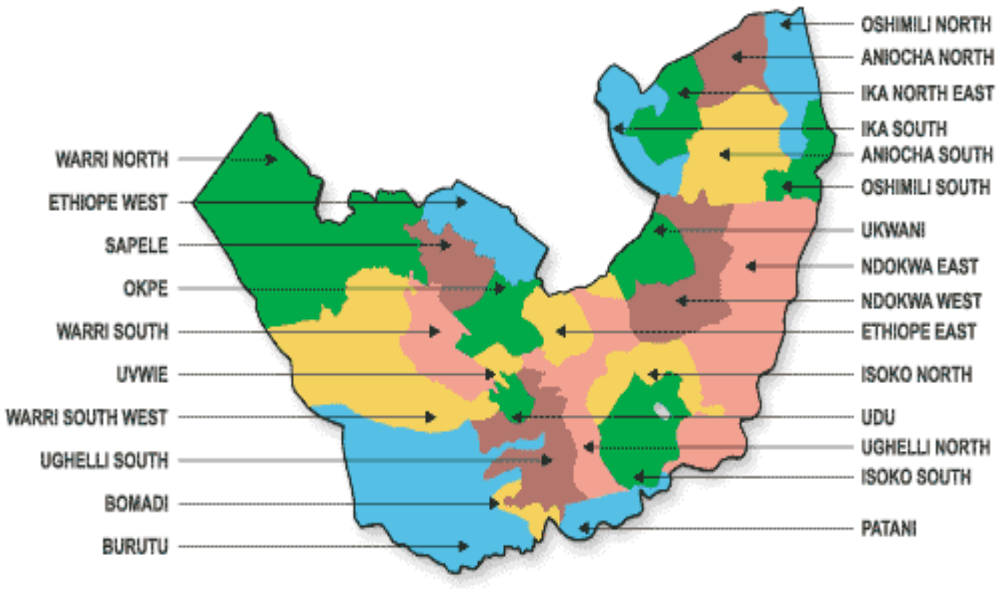

Figure 1 The map of Warri Delta State.

I. INTRODUCTION

The panorama of building functional failures is not a topic that most engineers, builders and building contractors aspire to acknowledge or discuss. In building and construction industry, building functional failures is a physical reality and possibility. The complexity and fragmented nature of the industry and its highly casual employment of labour makes it sensitive to building functional failures. Building and construction industry is unique in characteristics, the uniqueness of the industry kept this problem under the red carpet. Moreover, it has created a continuous serviceable maintenance economic glitch which the industry and building owners cannot

manage and at the same time the industry stakeholders do not know how to document the problem of building functional failure for future reference. Mistakes of a lawyer or a Doctors can be covered up but problems but created by an engineer cannot be covered up; they would be seen as National and International tragedy, a professional failure which smears the reputation of the industry and engineering professions. Without crossing the border of knowledge, to develop, improve and manage the industry successfully, the industry will continue to face different challengesin Warri Delta State. Considering the line of previous studies, building functional failure is associated with building collapsing, risk factors and project costs and time frame. In citation of previous studies, little attention is being paid to building functional failure factors. The impact of building functional failure factors have long been existing without being recognized. Building functional failures can be described as economic taxing imposedon building owners by the industry or contractors. In this context, the study will attempt to define investigate and identify the roles of artisans and other professionals contribution to building functional failures in Warri Delta State.

Building Deficiency and Failure

Lee, (1987), showed that building defects can occur in one or more of the three subdivisions of a building, foundation, wall and roof. According to this author construction industry defect is inherent in the building and construction industry. In reality building and construction industry accommodate mistakes when visible, it becomes human error and it can be corrected. Roddis (1993) described building failure as imperfection, deficiency or fault found in a building element or component which adversely affects its functional performance or appearance. Fakoalde (1994) investigated building failures factors. He found that the major factor influencing building failures were inability of engineers' failure to make right engineering decisions and judgment. Normally the aim of most engineers is that faults and defect will be found before a project is completed. If detected will be evident at the completion of the contract, if not, will be revealed some time after completion (latent defects). Latent defects can be categorized into two ways the products and the process of design and construction. Building Functional failure is worse than latent defects. Building Functional failure is more related to performance failures, crime committed under building and construction contracts which are not binding under any legislative building codes. Failure to make engineering decision does not create building functional failures. Building functional failure is being created by their inability to control the work of Artisans. Dovkaminetzky,(1991). Identified that the great liability of the engineers compared to men of other profession is that they work out in the open where all men can see them. He/she cannot argue them into thin air or blame the judge like lawyers; he cannot cover his failure with trees and vines like the architects, he cannot screen his shortcomings by blaming his opponents and hope the people will forget like the politicians. The engineers simply cannot deny he did it, if his works do not work. Building functional failures is being created and transferred to building owners, Estate Agents and their tenants by local subcontractors or Artisans supervised by engineers. Engineers cannot walkaway it is their duty to control Artisan's work.

Causes of Failures

Failure is a human act and is defined as omission of occurrence or performance, lack of success, non-performance, insufficiency, loss of strength and cessation of proper functioning of performance.The four essential elements of a construction project include concept, design, performance and use of a successful project. These elements are essentially defined as Knowledgeable (Training and Education), Competence (Experience) and Care (Control). Nearly all construction failures are traceable to human errors; which are unintended deviations from correct and acceptable practice and thus are avoidable. Human errors are associated with Errors of performance (carelessness and negligence), Errors of intent (greed) and Errors of knowledge (ignorance). Carelessness and negligence includes errors in calculations and detailing, incorrect reading of drawings and specifications and defective construction. There are other errors like execution and lack of care.Greed is another error committed with full a knowledge the offender deliberately using Worn-out and sub-standard material, equipment and tools for construction just to reduce cost, taking short cuts and risk; accepting work of poor standard to accelerate construction work.Ignorance is often the result of insufficient educations, training and experience; lack of communication is another form of ignorance. Ignorance is also evidence when we use bold new deigns on large-scale projects without thorough preparation, study and testing.

Maintenance of Building Functional Failures

The Industry has no statistically valid and proven method that accurately assessing the actual cost of maintenance relating to building functional failures. A conservative estimate of maintenance cost imposed on the building owners, Estate Agents and Occupiers on an annual basis may be run over to be more than a billion of Naira. Building functional failure is not under legislative building code, hard data not available the extent of costs of building functional failures cannot be analysed or estimated by mere observation. Building functional Failure has become a problem for the industry, building owners, Restate Agents and occupiers. The purpose of

this study is to create awareness to alert building Industry and suggest a new guidelines for future documentations specifically agreements between/among contractual parties (Owners, Builders/Artisans, Designers and Project Managers). Also to devise effective systems to deliver quality projects on time and within budget to meet owner's needs.

Overview of Major Causes of Building Function Failure

Thirty two variables were developed, investigated and analysed. The analysis showed that only 13 variables were cleared to be majorly responsible for building functional failures in Warri Delta State. All variables identified are listed in Table 1 blow and none of these variable scored less than 50% and above, except Damp which scored 49.1%. Moreover, other variables that were not included in the Table none scored less than 40%, this indicates that all these variables were equally significant.

II. RESEARCH APPROACH

The study is limited to Warri Metropolis Business districts whereits commercial/residential buildings were investigated. 150 questionnaires were mailed/ delivered by hand to commercial/residential buildings owners and Real Estate Agents in Warri Metropolis in which 70 responses were collected and analysed using a standard statistical package Microsoft Excel. Mail questionnaires were selected as a means of data collection because of financial constraint and problems of distribution and follow up questionnaires, harassments at the security post is very common in this area.

Data Analysis / Results

Table 1 shows the relative weight of 13 major factors identified in this study. Clearly these are the most significant factors responsible for building functional failures in Warri. Of these factors there are other factors not included in this table that are equally significant? However, the analysis of these factors reveals other category of building functional failures.

Table 1: Factors of Functional Failures

Damp 49.1%	**Roof Defect 51.4%**	**Roof gutter 60%**	**Ventilation problems 51.4%**	**Cracks 57.1%**
Inadequate maintenance 86%	**Plumbing 70%**	**Electrical Wiring 64.3%**	**Timber Defective 54%**	**Pest 70%**
Interior defect 53%	**Windows 54.3%**	**Doors 66%**		

Figure 1-13 present the variable lines. The Figure 1 shows the total number of participants responded to the question of Damp. There were different views among building owners and Real Estate Agents respondents (Importance to Highly Significant). However, the Figure 1 shows that 49.1% of the building owners Real Estate Agency participants have indicated Damp contributed to the functional failure of their buildings. According to respondentsmost of these buildings are newly completed buildings probably two to three years old but duration of the buildings was not declared during the cause of the study. Most of building owners complained about the skill quality of Artisans available in the job market during the time of the study. Nearly 50% of participants complained about skill problems andcommented that is creating problems for building and construction industry in the area. This problem may not be limited to Warri is yet to discover.

III. RESULTS

Figure 1 shows that 49.1% of respondents indicate that their buildings are experiencing Damp related glitches. Both Building owners and Real Estate Agents in Warri indicated that DAMP related problems are problems commonly found in residential buildings in Warri. As can be seen in the figure1 there are significance differences in percentage scores indicating that the problem is spread all over Warri Metropolis. Plate 1&2 illustrate the extent of the problem.

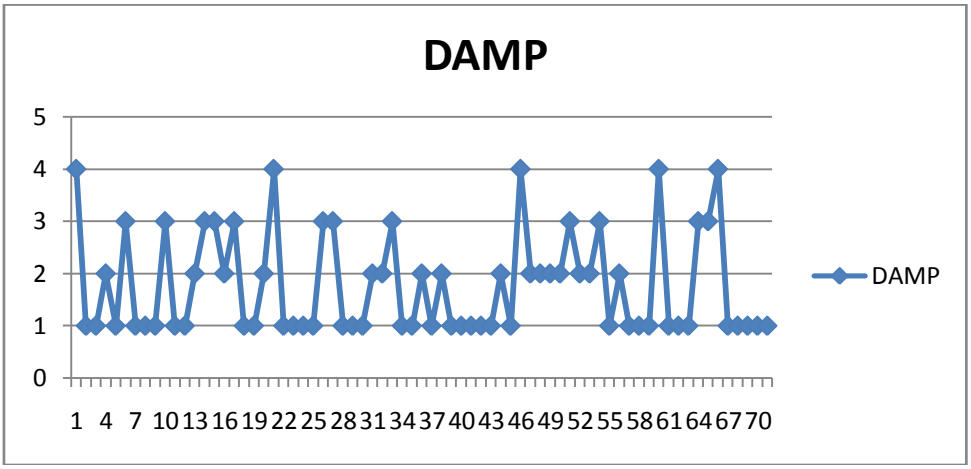

Figure 1 Damp

Plate 1: Damp in the sitting room

Plate 2 Damp in the kitchen

Figure 2 show that only 51.4% of building owners and Real Estate indicated importance to highly significant about roof defect related glitches. This problem may be linked skill artisans or material, it is beyond this research boundary. The researcher was only given permission to verify their complaints and reproduce images of the affected areas of the roof buildings. As can be seen in plate 3 & 4 below show the extent of the glitch. However, the researcher was unable to validate whether it was human error or materials used.

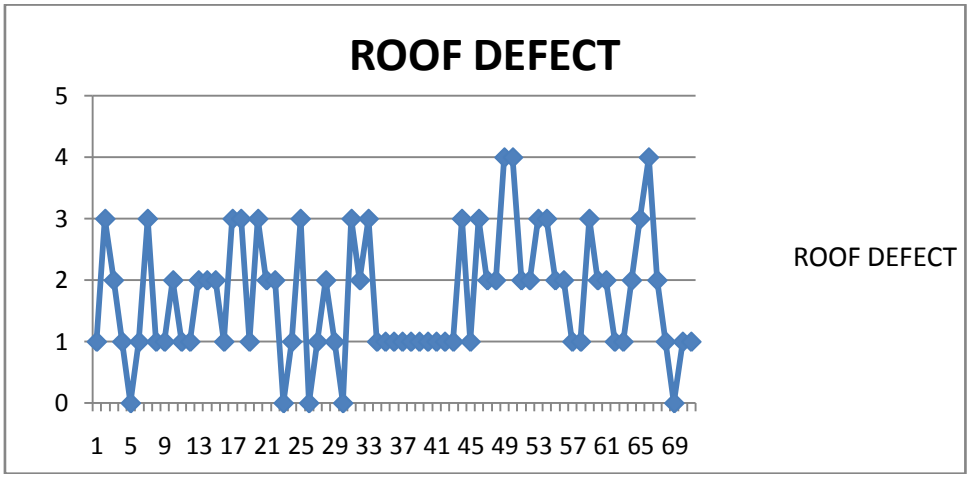

Figure 2 Roof Defect

Plate 3 Roof Defect

Plate 4 Roof defect

Figure 3 shows that only 60% of respondents indicate minor importance to highly significance of Roof Gutter related problem, most of the roof gutters are not discharging rainwater as they supposed to discharge. Specifically Flat Roofs if wrong Artisans and materials are used, the problem of retaining rainwater will surface. The researcher was not given permission to examine this further.

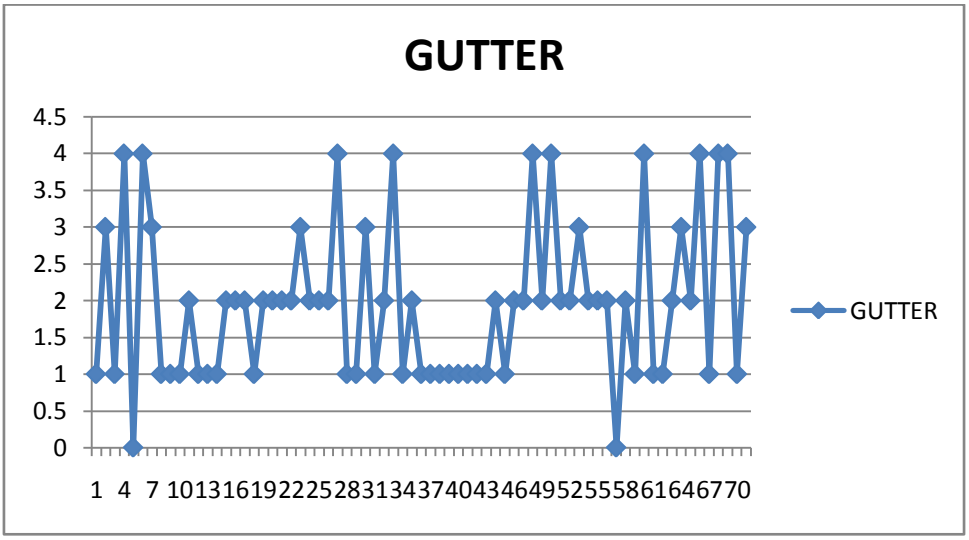

Figure 3: Gutter

Figure 4 shows that 51.4% of the building owners participated in the study indicated minor Importance to highly significance for ventilation related problems. This indicates that the problem is well spread.

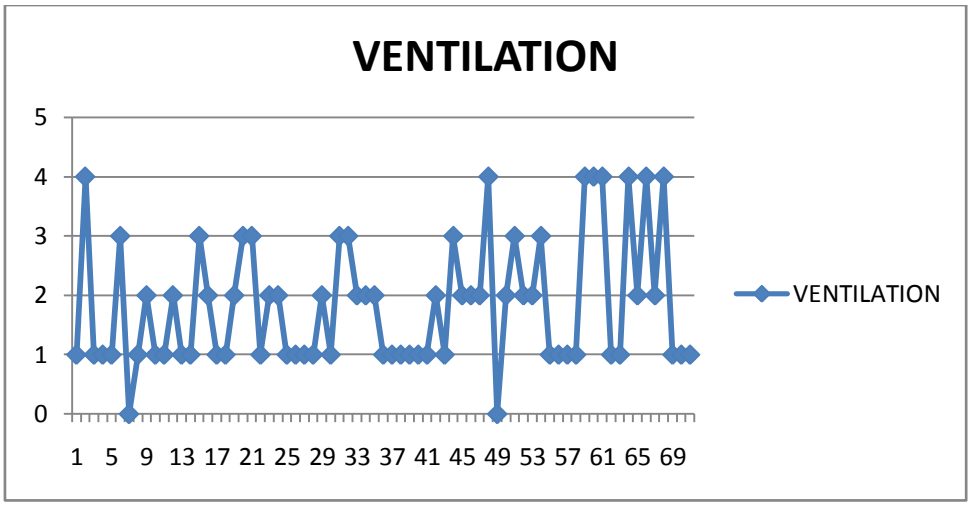

Figure 4: Ventilation

Figure 5 shows pest related problems. From the figure 5 below it can be deduced that about 70% of participants in the study complained on pest related glitch. It shows that most of the buildings in Warri have pest problems.

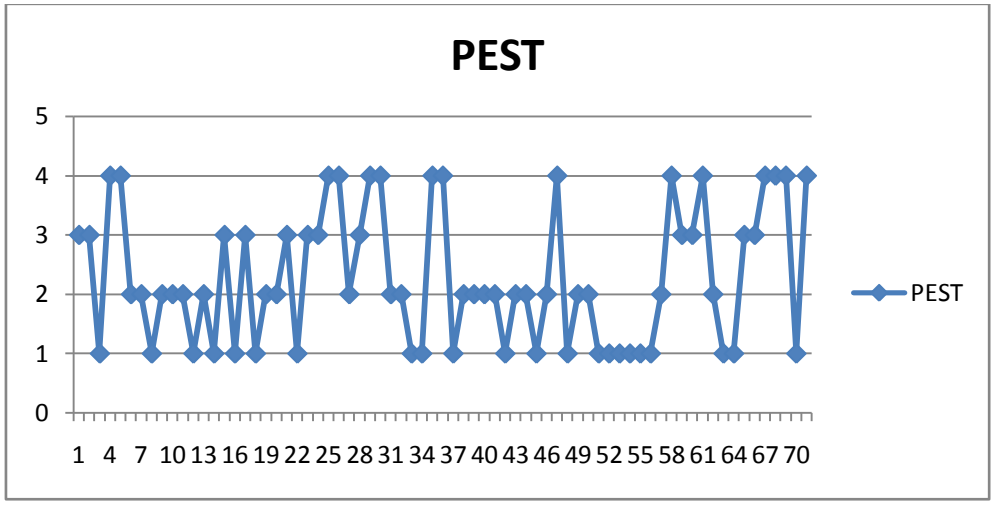

Figure 5: Pest

Figure 6 shows that about 70% of building owners and Real Estate Agents have specified plumbing problems. It shows that there are common plumbing problems in Warri Metropolis. Plates 5-7 demonstrate the extent of these problems.

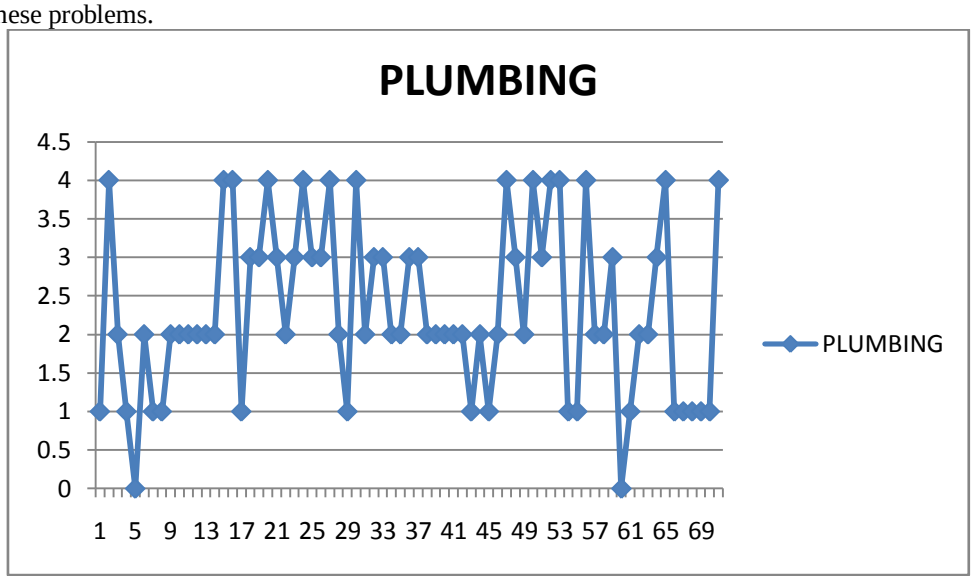

Figure 6: Plumbing

Plate 5. Plumbing

Plate 6 Plumbing Toilet

Plate 7 Plumbing

Figure 7 shows about 64.3% of building owners and Real Estate Agents complained about electrical wiring of their buildings. It shows that the problem is distributed over Warri. Plate 8 shows the extent of the problem. Most of wall sockets in most buildings in the area not functioning.

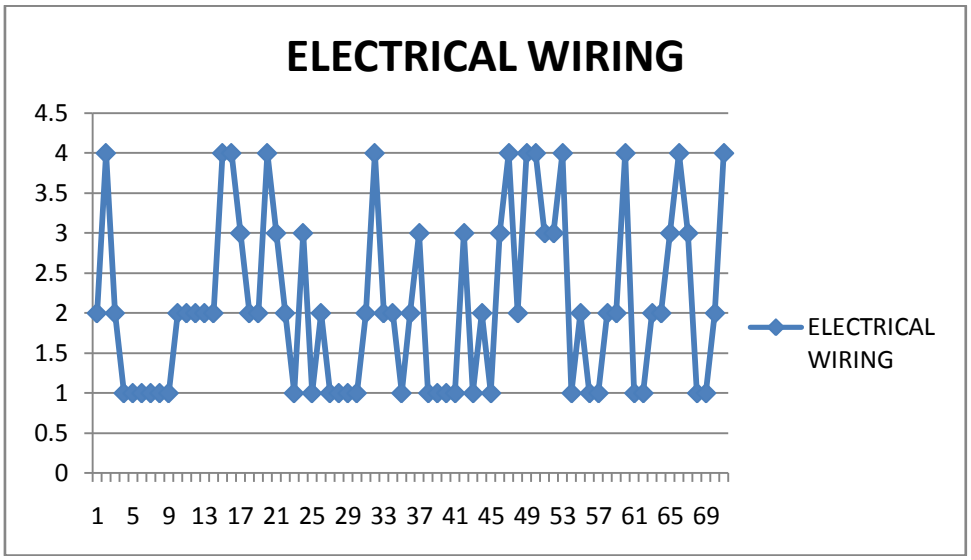

Figure 7: Electrical Wiring

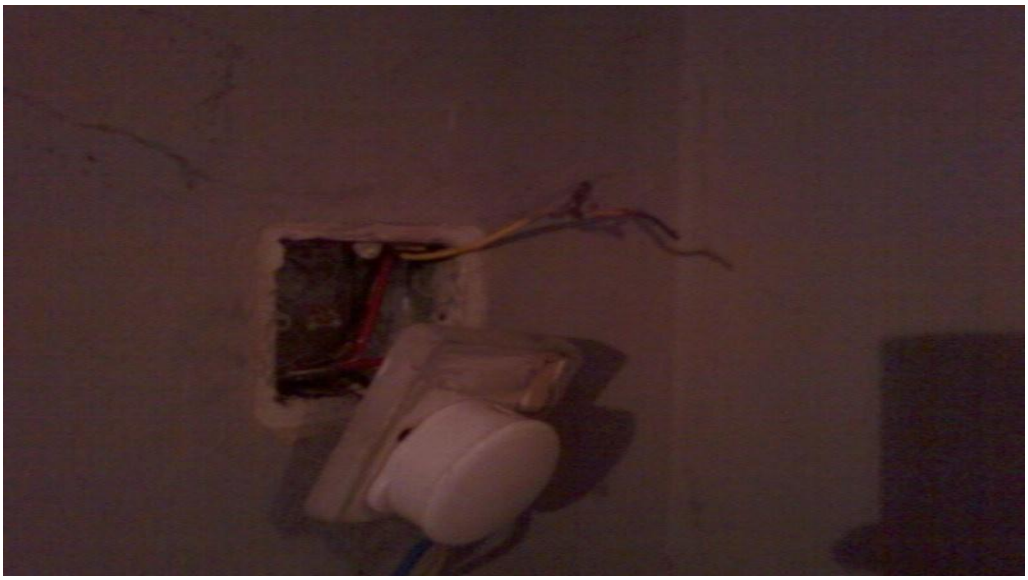

Plate 8 Electrical Wiring

Figure 8 shows that 51.4 building owners and Real Estate Agents grumbled about storm water. As can be seen from the figures, there are different opinions relating to Storm water showing from minor importance to highly Significance.

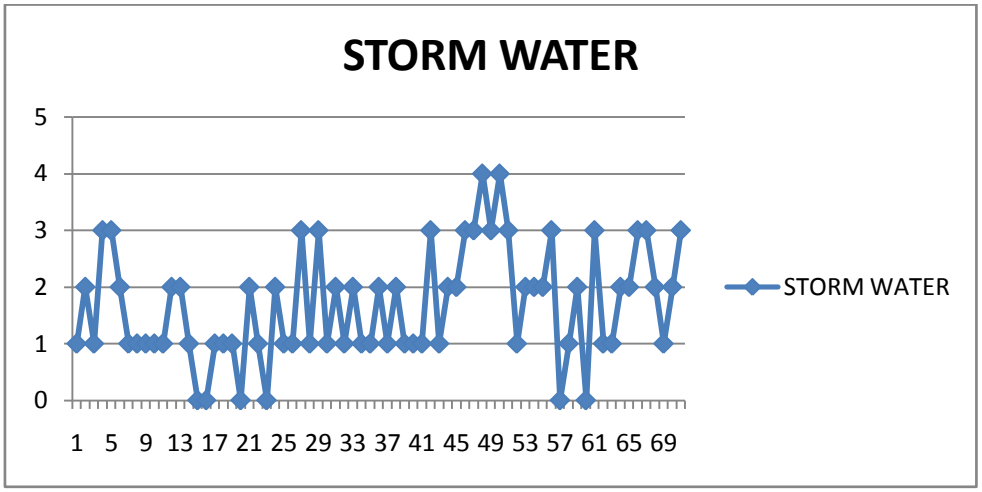

Figure 8: Storm Water

Figure 9 presents the frequency distribution of complaints by the respondents. The figure shows the spread of opinions from Minor Importance to Highly Significance. However, there are about 53% appellants. This shows that majority of buildings investigated, appeared to have common problems of Interior defects. Note that not all defects associated with the age of the buildings. Plates 9 and 10 showed the extent of Interior Defect/ damage.

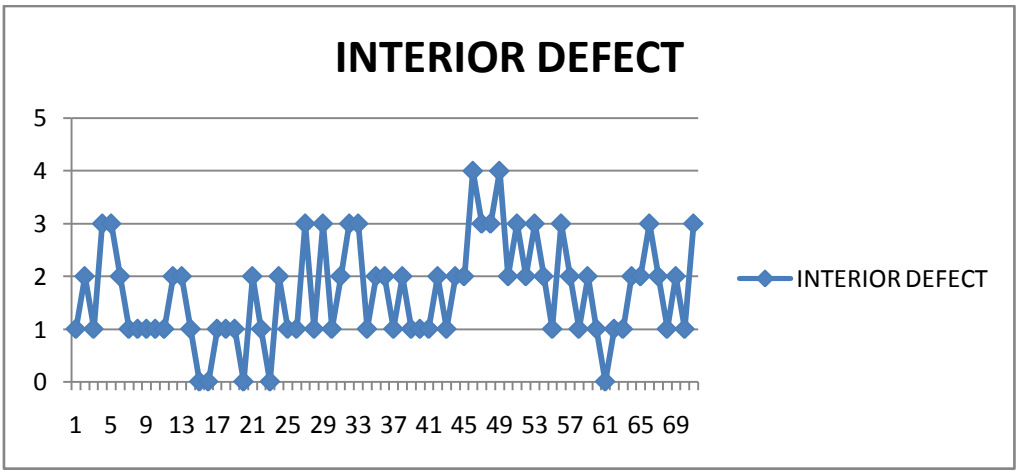

Figure 9: Interior Defect

Plate 10 Interior defect

Plate 11 Interior defect

Figure 10 shows that about 66% of building owners and Real Estate Agents protested against the extent of building doors defect in Warri (Delta state). As can been seen it seems to be a major problems as a big population of about 66% of building owners and Real Estate Agents indicated this. The analysis shows that they are not happy with the situation; however, the problem may be associated with both Artisans, Materials and weather. Plate 12 shows the extent of the problems.

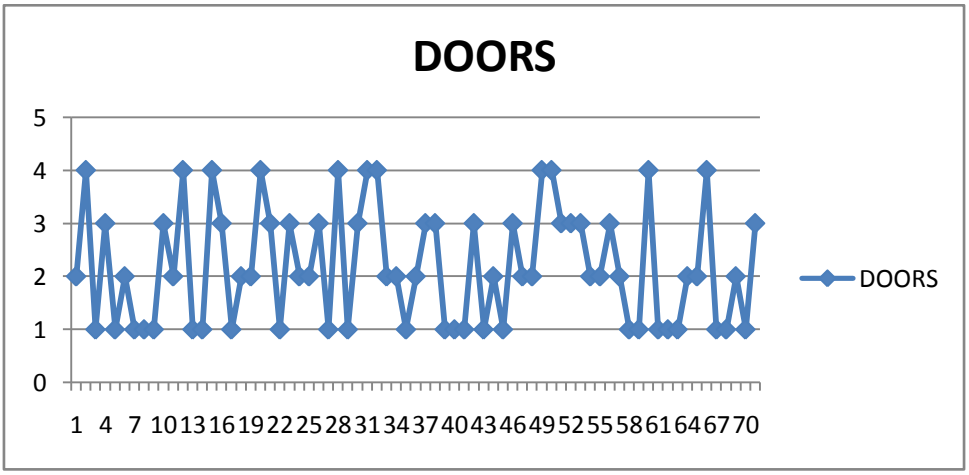

Figure 10: Doors

Plate 12 Damaged Doors

Figure 11 presents the frequency distribution of problems relating to building windows. The figure 11 showed from Minor Importance to Highly Significant, indicating that about 54.3% of both Building Owners and Real Estate Agents are highly affected. This problem may be associated with Artisans, Weather or Materials. However, the researcher was not given the chance to explore further.

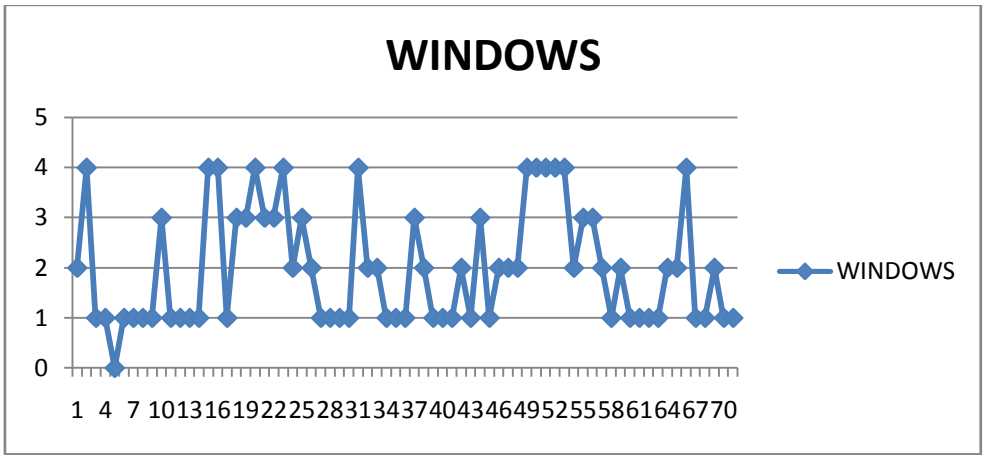

Figure 11: Window

Figure 12 shows that about 57.1% of building owners and Real Estate Agents indicated from Minor Importance to Highly Significance. This shows that building owners are facing problems relating to cracks. This problem may or not related to as design problems or contractorsincompetence but lack site investigations. Plate 13-15, show the extent of cracks damage in building in Warri Metropolitan.

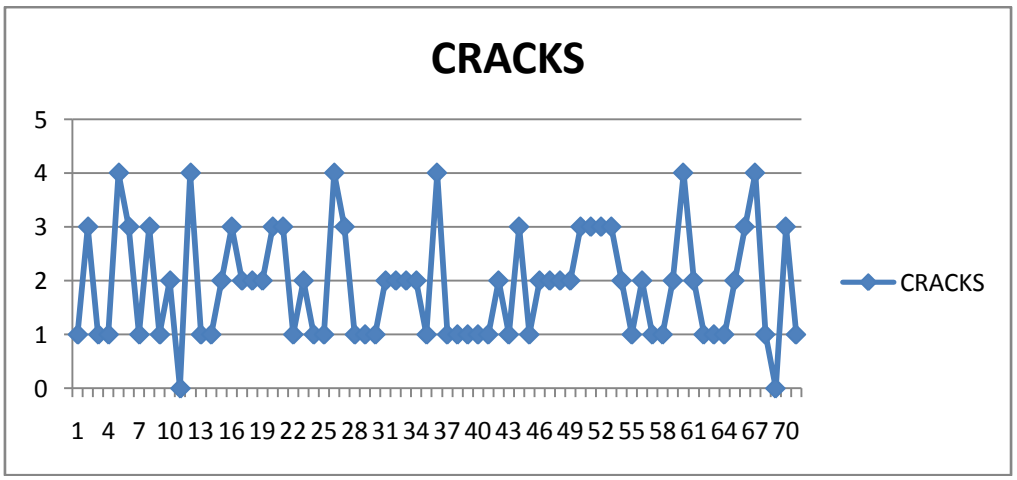

Figure 12: Cracks

Plate 13 Building crack

Plate 14 Building Cracks

Plate 15 Acceptable Cracks.

Figure 13 shows inadequate maintenance as a major problem facing the industry in Warri Delta State. The Figure 13 shows about 86% of both Building Owners and Real Estate Agents that inadequate maintenance as common problem in Warri. This problem is associated with Nigerian maintenance attitudes to maintenance. Most Nigerians do not care about their own properties, provided they are there to serve his/her needs. However, maintenance of properties is very important. As it can be seen from the figure the respondents indicated from minor importance to highly significant. As observed this a common all over the country it is not limited to Warri.

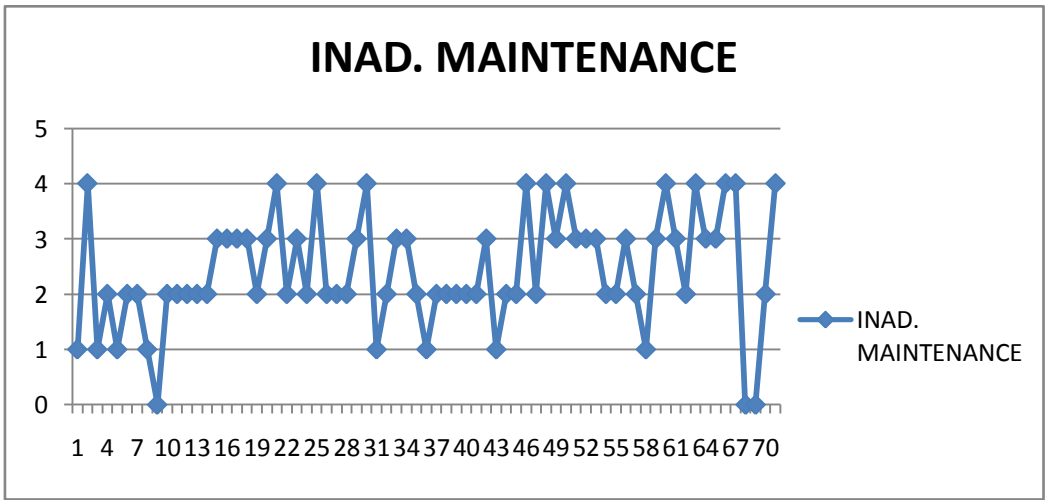

Figure 13: Inadequate Maintenance

III. CONCLUSION AND RECOMMENDATION CONCLUSION

There are various factors contributing to building functional failures in Warri, Delta State, predominant factors are indicated in the Table 1 and Figures 1-13. At the same time there other factors that are not included in the analysis that cannot be ignored, they also have direct impact to building functional failures. Most of these factors are associated withArtisan professional skills, contractor professional skills and inadequate maintenance. Cracks can be associated foundation underground movement or differential settlement andpredominantly poor quality works.Roof failures are of two dimensions in Warri. It is either deterioration of roof members due to defective overlong or total destruction under the effect of wind. Buildings that are mostly affected are those that are badly handled by inexperience contractors and lacked maintenance.. The study also identifiedthat poor design, poor supervision, poor workmanship, the use of substandard materials contribute to building functional failures in Warri.

IV. RECOMMENDATION

The study has identified that Para-professional and contractorspoorly handling of the various building construction projects has been the major cause of building functional failures in Warri Delta State. It is therefore recommended that all building and construction projects works be undertaken by qualified engineers and other related qualified professionals. Politically motivated economic contractors, or unqualified emergency contractors, they are inexperienced they should be stopped. Furthermore, thosedraughtspersons claimed to be engineers and handling professional structural designs, be stopped.The Design of proposed building project should be adequately established including the functionality of the building before embarking on construction. Finally, the study therefore recommends that construction industry should adopt and encouragedapprenticeship to occupy certain percentages of their staff strength so that effective technical knowledge may be adequately obtained.

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