NIPES

Journal of Science and Technology Research

Journal homepage: www.nipesjournals.org.ng

Preliminary Assessment of Building Failures in Civil Engineering Construction

Stephen A. O[1], Alhassan A. I[2] Omenaimen Ikhide[2] and Stephen Opeyemi. O[2]

[1]Department of Civil Engineering Technology, Auchi Polytechnic, Auchi, Edo State, Nigeria

[2] Department of Biomedical Communication Centre, College of Medicine, University of Ibadan

Correspondence:tsikenu2005@yahoo.com,+2348034914394

ahmedalhassan001@gmail.com; +2347032071120

Article Info

Keywords: *Construction, Building, Engineering, workmanship, substandard materials*

Received 16 March 2022
Revised 18 May 2022
Accepted 22 May 2022
Available online 10 June 2022

https://doi.org/10.37933/nipes.e/4.2.2022.13

https://nipesjournals.org.ng

Abstract

Over the years, the Civil Engineering practice in Nigeria and Worldwide is one of the professions among others that have greatly contributed to the infrastructural development of many nations of the world. Nonetheless, cases of structural and functional failures of physical infrastructures essential for human sustenance and economic development; particularly, cases dealing with building collapses are obviously the harbinger of serious environmental challenges which are critical issues in Nigeria at present. Generally, there are many factors that are responsible for building collapses and structural failures in Civil Engineering Construction in Nigeria and other developing nations. Moreover, the review of this paper unfolds the major causes of building collapse; two of which are principally the use of substandard building materials (SBM) and poor workmanship (PW) in the construction phase of engineering in Nigeria. In order to ascertain this fact, questionnaire survey method with a total of thirty-two (32) questionnaires were distributed but twenty-nine (29) questionnaires were retrieved from the respondents at the proposed construction site. The questionnaire consists of two sections which are namely: sections A & B. Section A is the demographic characteristics of respondents which comprises: sex, age, marital status, educational qualification and work experience was adopted to collect useful data which was descriptively analyzed using simple statistical tools such as: tables and percentages. Besides, the already analyzed historical data revealing the causes of building failures in Nigeria (1974- 2011) was used to justify the facts that SBM and PW are the dominant indicators of building failures. Interestingly, a total of thirty-two (32) questionnaires were distributed but twenty-nine (29) questionnaires were retrieved from the respondents at the proposed construction site. The questionnaire consists of two sections. Section A is the demographic characteristics of respondents and it comprises: sex, age, marital status, educational qualification and work experience. Section B deals with relevant research questions. The data generated from section A were analyzed via simple statistical tools viz: tables and percentages to identify and establish the principal factors that may likely be responsible for the grave effect of using low quality or substandard building materials and poor workmanship at any stage of work in Civil Engineering Construction. The results obtained in correlation with the analyses of the historical data which reveals the causes of building collapse between the period of the year (1974-2011) confirmed that the use of substandard building materials (SBM) and poor workmanship (PW) contribute over fifty percent (50%) to building collapse at many construction sites in Nigeria. In conclusion, possible measures that will help to preclude the detrimental effect due to the usage of substandard building materials and poor workmanship to lives and properties in Nigeria at large were recommended.

1. Introduction

Construction industry in Nigeria and worldwide is becoming indispensable as it plays a pivotal and dynamic role in the process of sustainable economic growth and development of any nation. In fact,

the civil Engineering Construction is broader in its scope of construction as it deals with different types of development of structure on land and across water. Obviously, land and water are important components of the environment. Besides, the development of land and water deals with putting building structures, hydraulic structures, highway structures etc in place. According to [1], more than fifty percent (50%) of the gross fixed capital budget in Nigeria normally takes the form of construction output. This implies that the construction sector is well known as the provider of physical infrastructure essential for human sustenance and economic development. The term Building was described by [2] as "an enclosure for spaces designed for specific use and also meant to control local climate, distribute services and evacuate wastes. In another perspective [3] defined buildings "as structures for human activities which must be safe for the occupants" Unfortunately, the use of low quality or substandard materials and poor workmanship in addition to poor design and construction malpractices has resulted to a great deal of compromise of standard which indeed is lack of compliance with the ethics of the engineering profession as it relates to Civil engineering construction. Moreover, buildings have suddenly become objects of threats posing dangers to people either during or after construction as a result of its collapse. According to the Oxford Advanced Learner Dictionary, the word collapse was described as 'an act of falling suddenly; often after breaking apart". Moreover,[4] described; building collapse as an extreme case of building failure. It means the superstructure crashes down totally or partially. Building failure also occurs when there is a defect in one or more elements of the building caused by deficiency of building material which is also unsuitable for the building components and elements (beams, columns, slabs, walls etc.) to perform their original functions effectively, which may finally lead to building collapse.

According to [5], the building industry is a sub-sector of the construction industry which is notably the most complex of all the industries in Nigeria economy today. The basis of its complexity is due to the fact that all other industries (whether small scale or large scale) sectors of the social-economy depend on it in their respective environment for a successful operation. It is an industry where all manners of local and foreign materials, professionals and equipment co-habit in order to achieve high quality buildings of reputable standard. Whether a country is categorized as developing e.g Nigeria or is already developed like Britain; buildings all over the world, constitute the most valuable assets of mankind [6].

Globally, Structural failures are perceptible. The rate of collapse and the extent of destruction are low in developed nations where strict adherence to building codes and ethics of professionalism are obtainable; even under severe natural hazards like earthquakes, catastrophic destructions are often contained or controlled [7]. However, in developed nations, natural factors are usually the predominant causes of building collapse and perhaps progressive collapse where a particular cause leads to consequent collapse [8]. In reality, the problems associated with building collapse in Nigeria have been one of the shocking and noticeable incidences which for over three (3) decades have continued to take place unabated in most major cities of the Country. Hence, these incidences of building collapse occurring in some parts of the country are increasingly alarming and also battering the image of the Construction industry in Nigeria. Globally, Shelter or housing is the first basic needs of humans that must be met even before food [9]. This is the reason; it is imperative to avoid poor workmanship and the use of substandard materials at every construction site. Furthermore, [2] practically identified the five (5) major causes of building collapse in Nigeria viz: Natural Phenomenon, design error, the use of substandard material and poor workmanship, procedural error with poor maintenance and abuse of buildings. The upshot of the research survey conducted shows that substandard building materials and poor workmanship contribute about forty-five percent (45%) of the overall causes of building collapse in Nigeria. Some building materials are usually naturally occurring while some others are mixtures of materials in the proportion suitable for the intended purposes. From the beginning to the end of building construction, materials of varying shapes and sizes are extensively used. According to [3], most buildings materials that are primarily used on site are referred to as "star" materials. These star materials are namely: cement,

aggregate of various classes, iron rods, water and timber (hard or soft wood). These materials are usually mixed together to give different components and elements found during the erection of any building structures. It is an indispensable fact that every kind of building has a lifespan and all components and elements must be put together to make it functional and sustainable.

Besides, it is clear that the experience and competency of different workmen in the Nigerian Construction Industry vary from one place to another and this is as a result of different levels of training received by them. The workmen in the Construction sector of Nigeria can be grouped into skilled (e.g. general foreman), semi-skilled and unskilled. They are employed to carry out activities that may range from laying of brick or concrete to general handling of materials on site. The sight of building collapse scattered across the length and breadth of Nigeria is quite alarming that; it is unimaginable what effects it will have on the Nigerian Building Industry and the nation's economy as a whole now and in the near future.

The aim of this paper is to reveal the impacts or effects of using low quality or substandard materials and inefficient or workmanship on building collapse in Nigeria with practical measures to forestall or eliminate the incidences.

The objectives are majorly the assessment of the following indices such as: the quality of building materials in Nigeria, the effects of tests/inspections of structural building materials on building collapse and the quality of workmanship in the Nigerian Building Industry.

1.2 The Theoretical Framework

1.2.1 The key players in the Nigerian Building Industry

The following professionals namely: Architects, Engineers, Quantity Surveyors and Builders play major roles in the Nigerian Building Industry. Any Structures constructed will be up to standard and adequate if there are no anomalies on the part of the key players in the Nigerian Building Industry. Safety which is one of the hallmarks in the construction industry will also be guaranteed and the number of cases of building collapse in Nigeria will be abated. Furthermore, [10] revealed that quackery which is a function of poor workmanship is the most frequent cause of building failure in Nigeria while supervision is a lesser cause. [11] also shared the same view revealing that buildings fail mainly through ignorance, negligence and greed. Apart from quackery, ignorance, negligence and greed, majority of investigations among many researchers namely: [12,13,14,15] attributed the major causes of building collapse to the use of poor quality or substandard materials in connection to poor construction supervision. Conclusively, most investigations on the causes of building failure tend to focus on the lapses with respect to the key players of the Nigerian Building Industry.

2.0 Methodology

2.1 Data Collection

The collection of data was obtained through questionnaire survey method. The sample data via questionnaire were gathered from the workers of two different construction company at two different construction sites viz: Genny's Glow Nigeria (an ongoing construction project for a cream manufacturing company) and Hartland Construction Company dealing with a road construction project along the Open University; located in Benin City Edo State.

Actually, the survey too used was designed as a closed ended type of survey questionnaire from which Tables 2,3,4 and 5 were drawn. Besides, the historical data which revealed building failure and their causes in Nigeria from the year (1974-2011) was extracted from a paper titled: an Examination of the causes and effects of Building Collapses in Nigeria. The data as shown in Table 1 is a product of many studies and analysis carried out via: The Nigerian Institute of Building (NIOB), previous research works from various media (newspapers and websites) were also consulted [16]. Furthermore, the data in table 1 and other tables were used to analyse and corroborate the fact that the major causes of building or structural failures especially in Nigeria are due to indices such as: poor workmanship, poor supervision, use of substandard building materials,

quackery etc. In reality, poor workmanship and poor supervision to a large extent are sometimes the harbinger of quackery. Besides, Table 1 furnishes the fact that the highest frequency of failure in civil engineering construction especially the aspect of building is attributed to quackery which is equal to thirty-nine percent. Moreover, the questionnaire used which is the source of other relevant tables consists of two parts or sections The first section deals with the demographic characteristics of the respondents which include; sex, age, marital status, educational qualification and work experience. The second section actually addressed four relevant questions thus: (i) What is the quality of building materials in Nigeria? (ii) what is the effect of failure to carry out various laboratory tests/inspection of materials of structural members on building collapse? (iii) What is the quality of workmanship in the Nigerian Building Industry(NBI)? and lastly is; how effective are the various bodies and organizations that are responsible for material standardization in Nigeria? Besides, relevant question such as; what is the relationship between the quality of materials and workmanship? However, for the purpose of this paper, two of the research questions thus: What is the quality of building materials in Nigeria? What is the quality of workmanship in Nigerian building industry? These two pertinent questions were addressed as means of evaluating the preliminary assessment of building failures in civil engineering construction

2.2. Sample size

A sample is a subset of the population selected for the study. [17], defined sampling as the act, process and technique of selecting a representative part of a population for the purpose of determining the characteristics of the whole population. Therefore, the sample size refers to the total number of respondents representing the sample population of the study. The sample size can be calculated using the formula:

$$n = \frac{N}{1+Ne^2} \quad \text{or } n = \frac{z^2 \star p(1-p)}{e^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

where n = sample size, N = Population size or Total number of respondents, e = Margin of error which is usually 5%(0.05), Confidence levels are usually taken at 90%, 95% and 99%.
z- score as shown in the second formula is an alternative way of calculating sample size (n).
z- score is a function of the chosen or preferred confidence level.
p-is the standard deviation or the sample proportion as shown in the second formula.
Considering a total population (N) of thirty-five (35) people at the construction site.
The least formula for computing sampling size was used thus: $n = \frac{N}{1+Ne^2}$
Hence, by computation; n = 32

2.3 Data analysis

Data analysis is the process of systematically applying statistical or logical techniques to describe and illustrate, condense and recap and evaluate data.
The data collected through questionnaire was simply analyzed using simple statistical methods such as percentages presented in tabular format. A total of thirty-two questionnaires were distributed to skilled and semi-skilled workers at the two different construction sites of which only twenty-nine (29) questionnaires were retrieved.

3.0. Results and Discussion

Table 1, is a secondary data which is actually the upshot of a thirty-seven (37) years records which were collated from studies, field survey and comprehensive analyses. The table reveals the major causes of failures in civil engineering constructions particularly buildings. Quackery among many other possible building failures was identified as the index with the highest frequency of failure which was estimated as thirty-nine percent (39%). Besides**,** it was discovered that the menace happened to be mostly with private residential buildings built by local contractors [16].

Table 1: Building failures and their causes in Nigeria (1974 – 2011) [10]

Causes of failure	Frequency of failure	Prevalence	Occurrence of failure in percentage
Structural failure	16	05	2.4
Carelessness	05	02	7.5
Poor workmanship	05	02	7.5
Poor Supervision	03	01	5.0
Poor materials	11	04	17.0
Quackery	26	08	39.0

Source: Excerpt from American Journal of Engineering Research (AJER)

Furthermore, [18] classified causes to building collapse under seven major factors that could be related to: poor design; fault at construction; poor material quality and method of construction; foundation failure; fire disaster; natural phenomena, and inadequate maintenance.
The descriptive analysis of the demographic characteristics of respondents in section as derived from the sample questionnaire in Appendix 1; comprises: sex, age, marital status, educational qualification and years of work experience as shown in Table 2.

Table 2: Sex Distribution of Respondents

Sex	Frequency	Percentage (%)
Male	3	10.3
Female	26	89.7
Total	**29**	**100**

Table 3: Age Distribution of Respondents

Age	Frequency	Percentage (%)
20-29 years	2	6.9
30-39 years	18	62.1
40-49 years	7	24.1
50 years and above	2	6.9
Total	**29**	**100**

In Table 3, the age distribution of the respondents based on the questionnaire administered shows that the number of respondents whose age range are within 20-29 years is 2 which represents 6.9%, 30-39 years is 18 which represents 62.1%, 40-49 years is 7 which represents 24.1% and 50 years and above is also 2 which represents 6.9%. It may be inferred that respondents within the age caveat as shown on the table are physically matured to be involved in construction work on site. However, being physically matured does not translate most times to good workmanship at any construction sites.

Table 4: Educational Qualification of Respondents

Educational Qualification	Frequency	Percentage (%)
Ph.D	_	_
MSc/MA/MBA/MED	4	13.8
BSc	5	17.2
PGD	5	17.2
HND	15	51.7
Others	-	-
Total	**29**	**100**

Table 4 shows that none of the respondents had a PhD degree. Four (4) respondents representing 13.8%, MSc/MA/MBA/MED holders, 5 respondents representing 17.2% are BSc graduates, PGD ,5 respondents representing 17 % are holders of Postgraduate Diploma (PGD) 17.2% while 15 respondents representing 51.7%. are HND. From all indications in Table 4, it is evident that workers at this particular site are all educated and have basic requirement that may be technically needed to ensure good workmanship for buildings and relevant structures. It also portends that quackery according to [10] could not have been the reason for cases of building collapse. However, the educational qualification of the construction site workers (respondents) as shown in Table 4, actually substantiates the findings according to [11] that building or structural failures are mainly due to ignorance, negligence and greed. Negligence as it relates to poor workmanship and greed which results in the use of substandard or poor quality materials at construction sites.

Table 5: Years of Work Experience of Respondents

Years of Work Experience	Frequency	Percentage (%)
0-5 years	2	6.9
6-12 years	7	24.1
11-16 years	5	17.2
16 years and above	15	51.7
Total	**29**	**100**

The work experience of professionals at different construction sites is a pertinent index that sometimes determine the quality and adequacy of service delivery in the construction industry. Table 5 shows the work experience of respondents, two (2) respondents representing 6.9% have 0-5 years work experience, seven (7) respondents representing 24.1% have 6-10 years work experience, five (5) respondents representing 17.2% have 11-15 years work experience and fifteen (15) respondents representing 51.7% have 16 years and above work experience. Table 5 showing work experience probably indicates the portrait of the Civil Engineering Construction industries in Nigeria and it implies that about seventy percent (70%) of construction workers have work experiences of more than ten years which also infers that major causes of building collapse or structural failures may be attributed to the use of poor quality building materials and poor workmanship according to: [11, 12, 13, 14].

Table 6: Causes of Building failure in Nigeria

S/No.	Causes of Failure	Total No.	(%)	Types of Building		Calamities	
				Private	Public	Death	Injury
1	Poor maintenance Culture	4	6.67	3	1	23	10
2	Design error	9	15	6	3	125	41
3	Substandard materials and poor workmanship	31	51.67	25	6	111	112
4	Natural Phenomenon	4	6.67	3	1	72	40
5	Excessive loading	12	20	9	3	95	28
	Total	**60**	**100**	46	14	426	231

Source: Gathered historical data of building collapse in Nigeria [16]

Tables 6 is an addendum obtained from the collated historical data of building collapse in Nigeria [16]. Furthermore, Table 6 shows the types of buildings namely: Public and private with their intended uses which may be residential(Re),commercial(Co),religious(Rel),Educational(Ed) and Institutional(In).Pragmatically, Table 6 unveils the major causes of building failures which are popular with Nigeria and many other developing nations thus: poor maintenance culture, design error, substandard materials and poor workmanship, natural phenomenon and excessive loading contributed to about 7%, 15%, 52%, 7% and 20% respectively of building collapse in Nigeria with most of them being private residential buildings executed by indigenous contractors. Besides, Table 6 also reveals the casualties or calamities resulting into either death or injury. From the statistics of calamities as shown in Table 6, it is palpable or evident that the highest frequencies of calamities with respect building failures is due to the use of substandard building materials (SBM) and poor workmanship (PWM). Moreover, from analysis based on the data gathered from respondents, thirteen respondents representing forty-five percent (45%) attested to the fact that most materials do undergo standard laboratory testing which confirms that the quality of materials is adequate for construction work. On the contrary, sixteen (16) respondents representing fifty-five percent (55%) indicated the uncertainty as well as reliability of the quality of materials used at construction site. Besides, ten (10) respondents representing 34.5% testified to good workmanship in the Nigerian Building Industry while Nineteen (19) respondents representing 65.5% upheld the fact that poor workmanship in the Nigerian Building industry is palpably one of the major contributory indices to building collapse and structural failures in Nigeria. Basically, poor workmanship is surely due to lack of basic education and training but may be attributed to poor supervision which in some cases is interlinked with construction malpractices, negligence of duty on site.

4.0 Conclusion and Recommendations

4.1 Conclusion

In conclusion, this paper from facts and figures gathered, establishes the importance of uncompromising standards with respect to preliminary and general assessments of building failures in Civil Engineering Constructions (CEC). Practically, various parameters (adequate design, good supervision, good workmanship, high quality building materials etc) that are imperative to upholding standards and that will aid in attenuating the frequencies of failures in Civil engineering construction practices should be regularly in place. Moreover, standards in everything as touching constructions works or any capital projects is indispensable and must be recognized, the bar must be strictly upheld in the building and construction industries in Nigeria. From previous and current researches, it is conspicuous that whenever the quality of materials is compromised or inadequate for any engineering projects with poor workmanship and poor supervision against the required

standard, certainly, there would be detrimental effects which result in the huge loss of lives and properties which invariably affect national economy and development in all spheres.

4.2 Recommendations

Based on the findings and conclusions of the study, the followings are some of the recommendations thus:

i. The Standard Organization of Nigeria should ensure strict compliance to the use of standard materials of good and high quality at every construction site as this will help to attenuate building collapse in Nigeria.

ii. The various professionals should be up to doing by ensuring that they visit construction sites regularly to supervise the quality of jobs carried out as this will enhance good workmanship and further mitigate building collapse.

iii. Finally, engineering companies (construction and consultancy) especially the indigenous contractors should create avenues for capacity building of their staff from time to time as this attitude will help to adequately equipped their staff with basic and current knowledge of engineering specifications and standard practices.

References

[1] Wase, John (2004). Process of Sustainable Economic Growth and Development in the Construction Industry. Science Journal of Building Construction

[2] Fadamiro, J.A. (2002). An assessment of Building Regulations and Standards and the Implication for Building Collapse in Nigeria. In D.R. Ogunsemi (Ed.), Building Collapse: Causes, Prevention and Remedies (pp. 28-39). The Nigerian Institute of Building, Ondo State.

[3] Odulami, A.A. (2002). Building Materials Specification and Enforcement on site. In D.R. Ogunsemi (Ed.), Building Collapse: Causes, Prevention and Remedies (pp. 22- 27). The Nigerian Institute of Building, Ondo State.

[4] Arilesere, D. (2000). The Role of Professionals in averting Building Collapse. Proceedings of a workshop on Building Collapse: Causes, Prevention and Remedies (pp. 60-68). The Nigerian Institute of Building, Lagos State.

[5] Akindoyeni, A. (2002). Professionalism in Building Design and Construction. In D.R. Ogunsemi (Ed.), Building Collapse: Causes, Prevention and Remedies (pp. 1-13). The Nigerian Institute of Building, Ondo State.

[6] Chinwokwu, G. (2000). The Role of Professionals in averting Building Collapse. Proceedings of a workshop on Building Collapse: Causes, prevention and remedies (pp. 12-28). The Nigerian Institute of Building, Lagos State

[7] Ede AN, (2011): Measures to reduce the high incidence of structural failures in Nigeria. Journal of Sustainable Development in Africa; 13(1) pp 153-161

[8] Ellingwood BR, Dusenberry DO. (2005): Building Design for Abnormal Loads and Progressive Collapse. Computer- Aided Civil and Infrastructure Engineering; 20(3) pp 194-205.

[9] Mansur Hamma-adama, Tahar Kouider,(2017): Causes of Building Failure and Collapse In Nigeria: Professionals' View American Journal of Engineering Research (AJER);6(12), pp 289-300

[10] Tanko JA, Ilesanmi FA, Balla SK, (2013): Building Failure Causes in Nigeria and Mitigating Roles by Engineering Regulation and Monitoring. Engineering; 5(02): pp 184

[11] Bolaji, E.O. (2002). Building Materials Specification and Enforcement on Site. In D.R. Ogunsemi (Ed.).

[12] Ayininuola G, Olalusi O. (2004). Assessment of Building Failures in Nigeria: Lagos and Ibadan Case Study'. African Journal of Science and Technology; 5(1).pp. 4-15

[13] Orie OU, Aniekwu AN.(2006). The Determination of Severity Indices of variables that cause Collapse of Engineering Facilities in Nigeria: A Case Study of Benin City.

[14] Dimuna KO, (2010): Incessant Incidents of Building Collapse in Nigeria: A Challenge to Stakeholders Global Journal of Researches in Engineering; 10(4), pp 75-84.

[15] Usman N, Chen J, Lodson J, (2010): Environmental Sciences and the Challenges of collapse buildings in Nigeria. Journal of Environmental Sciences and Agriculture in Developing Countries, 2(2)

[16] Ayodeji O. (2011). An Examination of the Causes and Effects of Building Collapse in Nigeria. Journal of Design and Built Environment; vol.9, pp 37-47.

[17] Fridah, Mugo, (2002): Sampling in Research; Semantic Scholar retrieved on (www.semanticscholar)

[18] Olagunju R, Aremu S, Ogundele J, (2013) Incessant Collapse of Buildings In Nigeria: An Architect's View. Civil and Environmental Research; 3(4) pp 49-54.

Appendix 1: **Questionnaire**

INSTRUCTIONS:

Please answer the following question by ticking the boxes ( ) which represent your answers.

SECTION A: BACKGROUND INFORMATION

Sex: Male ( ) Female ( )

Age: 20-29 years ( ), 30-39 years ( ), 40-49 years ( ), 50 years and above ( ).

Academic qualification: PhD ( ), MSc/MA/MBA/MED ( ), BSc ( ) PGD ( ) HND ( )
Others ( )

Years of work experience 0-5 years ( ), 6-12 ( ), 11-15 years ( ), 16 and above( )

SECTION B: GENERAL INFORMATION

(1) How many materials undergo testing at site to ascertain the structural integrity and the engineering properties of the materials before using them on site?
A. Some ( ) B. All ( ) C. None of the above ( )

(2) Is material testing a very vital component for the quality of job done at construction site?
A. Yes ( ) B. No ( )

(3) How often do professionals viz: Engineers, Architects, Estate Managers, Surveyors and town planners come to the site to inspect the progress of work?
A. Not often ( ) B. Very often ( ) C. None of the above ( )

(4) How has the visit / non visit of town planning personnel to site during construction job influenced the, pattern and method of construction at site?
A. Positively ( ) B. Negatively ( ) C. None of the above ( )

(5) Do Construction workers have basic level education as required for civil engineering construction?
A. Yes ( ) B. No ( )

(6) How has the level of education of workmen affected construction work at site?
A. Positively ( ) B. Negatively ( )

(7) How will you rate the impact of the professionals in the way construction is handled at site?
A. Positive ( ) B. Negative ( ) C. Fair