

## **An Assessment of Factors Affecting the Cost and Time Performance of Subcontractors**

**Dr. Adedayo Jeremiah Adeyekun, AIIA**

B. Tech Arch (FUTA), M.Plan (MDU) India, Ph.D. in Civil Engineering (JNUB) India,  
Faculty of Engineering and Technology, Jagannath University, Delhi – NCR, Haryana,  
(India)

**Arc. Samuel Oluwagbemiga Ishola, ANIA**

B. Tech Arch (FUTA), M. Tech Arch (FUTA), Department of Architectural  
Technology, Faculty of Environmental Studies, The Polytechnic Ibadan, Nigeria.

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### ***Abstract***

*This paper is an assessment of factors influencing the cost and time performance of subcontractors and the need for effective performance of subcontractors at the project sites. The factors influencing the performance of subcontractors are grouped, similar to those identified with the project or an organization and on another hand, there are significant factors influencing the performance of the subcontractors. These factors incorporate management level leadership, time required to complete the project, profit, staff capability/expertise, reputation, installment method, organization history, and project procurement method strategy, security, bidding technique, insurance, bond and relationship with the major contractors. The factors influencing the management of subcontractors in building development projects includes performance of significant past projects, standard of workmanship, consistence with guidelines, regular payment to labourers, adherence to program, regularity and viability of communication with main contractor, adherence to subcontract necessities. Other factors comprise adherence to statutory environmental regulations, number of experienced sites administrative staff, inspection and maintenance of good workplace, number of artisans and workers, quality of as-built and shop drawings and ability to carry out the quantity of work and so on. This study also aimed to suggest a way forward to improve the performance of subcontractors which is the reason for exceeding budget at the project sites. To carry out this study, a questionnaire was drafted to derive information on the causes of low performance of subcontractors and the implication to cost.*

### **Keywords**

Performance, Contractor, Subcontractor, Construction, Cost, Time.

## 1. INTRODUCTION

The main objectives of the contractor selection process are to reduce project risk, maximize quality and maintain strong relationships between project parties. The same concept is applied to the subcontractor selection process. Some owners regard the cost as the most important criteria to base the contractor selection process on; however, research recommends that a multi-criteria selection process should be further taken into consideration. Many main contractors and owners are merely interested in the lowest bidders. But there are other criteria that should be taken into consideration. Usually, maximizing profits and minimizing costs come as crucial objectives of a contractor. Consequently, setting the price as one of the criteria for choosing a subcontractor is essential; in the real world, a subcontractor who offers the lowest price is likely to be selected. Another important criterion is the technical skill suggesting that a subcontractor has to prove professionalism, experience and knowledge of specific technical issues; as a subcontractor is mainly hired to perform specific tasks of a project which require technical knowledge.

## 2. SIGNIFICANCE OF THE RESEARCH

The choice for the best sub-contractor is an essential procedure in building projects. There are several variables that should be considered when choosing subcontractors. Inappropriate choice of sub-contractors may result in several issues throughout work progress. These consist of poor quality of work as well as delays in project time. This paper recognizes the essential factors that influencing the choice, cost and time efficiency of subcontractors.

## 3. PROBLEM STATEMENT

Besides, various other factors such as adaptability and also collaboration when handling delays; conformity with requirements and quality; a providers capability to supply basic materials on time; capacity to complete the contract; a subcontractors physical resources; bidding price; problem in payment, and also adaptability in crucial operations. Various other issues influencing the efficiency of the subcontractor were recognized by El-khalek et alia. (2019). For instance, guaranteeing on-time shipment of materials, failing to complete a contract because of monetary issues, reimbursement problems were recognized as important factors.

Experience and item quality are important factors for ranking sub-contractors (Hartmann, Ling, & Tan, 2009). Ulubeyli et alia. (2017) provided a listing of essential factors impacting subcontractor choice, consisting of experience, previous efficiency, official partnerships, monetary strength, and work. Additional, project expertise, dependability, altruism, capacity, interest for the project, cost, quality of the technical personnel, labour, the payment strategy, and also the variety of subcontracting units required are likewise included. The subcontractors work quality was

suggested to be essential in Shivam and also Kashiyani (2018) research. The listing of their factors included the quality of work, prompt work completion, craft criteria, the most affordable proposal, and adaptability as well as collaboration when handling delays.

## **1. RESEARCH AIM**

The research study is focused on offering an evaluation of factors influencing the cost and time performance of subcontractors and the need for effective performance of subcontractors at the project sites. It aimed to suggest a way forward to improve the performance of subcontractors which is the reason for exceeding budget at the project sites.

## **2. RESEARCH OBJECTIVES**

The specific objectives of this research are:

1. To identify the factors used by general contractors in the selection of suitable subcontractors for a construction project.
2. To highlight the common factors that influences the cost and time performance of subcontractors.
3. To examine the subcontractors performance regarding the project cost.
4. To propose recommendations that will advance the performance of subcontractors in relation to project schedule.

## **5. REVIEW OF LITERATURE**

### **5.1 Factors Affecting the Cost and Time Performance of Subcontractors**

#### **1. Technical and Managerial Skills**

Breakdown of the building development project has been credited to improper managerial standards at all project individuals such as improper focus of the management system, by remunerating unacceptable activities and the absence of communication of objectives (Hughes 1986, c.f Pheng and Chuan, 2006). Based on Ng and Tang (2009), one of the most important factors that empower the subcontractors to perform their duties effectively and to accomplish the project and organizational objectives is managerial and specialized skills and the most essential resources of the organization or the building development organization is the subcontractor's abilities. As per Mahamid (2011), lack of site management could result from various factors including poor management of labour, lack of communication between labourers and managers, lack of communication between the building development parties, improper management of materials, absence of site manager experience and lack of labour skills.

## **2. Financial Capabilities of the Main Contractor and Subcontractors**

Ng et al. (2008) opined that to guarantee the survival of subcontractors, they should have great financial background to demonstrate that they are in the position to complete the work. Ng and Tang (2010) also noted that to extend their organizations and accomplish development in income, subcontractors should keep a positive income and a good record of achievement of settling liabilities.

## **3. Payment of Subcontractors**

Ng et al., (2008), suggest that the brief payment to workers is one of the factors influencing the success of building development project. Also, delayed and sporadic installment of wages unfavourably influences the morale of the labourers. Subsequently, this will lead to slow advancement of work, low quality and unfortunate deferrals to the project. Main contractors and subcontractors should hence take payment issues very serious and major contractors should improve relationship with subcontractors and workers to guarantee the accomplishment of the project and to accomplish good performance.

## **4. Subcontractors Qualification and Experience**

Ameh and Osegbo (2011) have recommended that project managers should ensure that both nominated and domestic sub-contractors on any project have the necessary experience and plan of work to meet the requirements of the project. Ameh and Osegbo (2011) explain further that pre-qualification of the subcontractors would ensure that they have sufficient experience, proficiency and capacity to deliver not only quality work but on time.

Arslan et al. (2008) advised that the criteria for selecting subcontractors should look beyond bid price. In order to reduce risks and contribute significantly to the overall success of the project, main contractors should consider other factors such as previous experience, financial stability and quality of products. This can eliminate the problem of insufficient finance; inexperienced and incompetent subcontractors.

Ng and Tang (2010) have concluded that the skill level of the workers of the subcontractor's construction team has a direct relationship with the quality of completed works achieved in a construction project. According to Mahamid (2013), normally, experience improves both the intellectual and physical capabilities of a labourer and hence improves productivity of the work.

## **5. Project Manager Relationship and Experience**

The project supervisor is the main individual in the management of each project and is essential to the project achievement (Pheng and Chuan, 2006). Avots (1969) as referred to by Pheng and Chuan, (2006) specified the primary purposes behind project disappointment like the appointment of inexperienced project managers, unexpected project termination and the absence of managerial support. Pheng and Chuan 2006) proposed that the accomplishment of a project turns on the pivots on the project manager's performance about the accomplishment of time, cost, quality and in other hand they noted that successful project completion can depend generally upon individuals having the option to cooperate successfully as a project team.

Ng and Tang (2009), a good relationship between the project administrator and all project members can likewise assist in boosting the morale of the subcontractor's team. Regularly, if labourers will work intently together to finish the work in the most ideal manner, their performance can be improved.

Prabhakar (2008) stated that the capability of the project manager is in itself a factor in the effective conveyance of project activities and again, the project manager requires being competent in those areas that have the most impact on successful outcomes.

## **6. Effectiveness of Communication**

As indicated by Zou and Seo (2006), the inaccurate and untimely communication between project's parties prompts exorbitant advancement delays in building development projects. Legitimate communication and ideal information sharing among project members lessen errors and time delays and lead to the enhancement of project productivity and ultimately advancement cooperation and teamwork.

## **7. Construction Productivity**

Chan et al. (2002) noted that productivity consideration in the development phase of a project empowers the contractors to put together the available resources productively to meet the expense and time targets of the development projects. Arditi and Chotibhongs (2005) revealed that a significant method to further develop site productivity would be to involve subcontractors who are used to the present day production and building development techniques. Ng et al. (2008), based on the point of view of subcontractors, sufficient supervision could improve work efficiency and would guarantee that the prerequisites in the subcontract are appropriately satisfied. Mahamid (2013) reiterates that work efficiency assumes a crucial part in deciding the

financial accomplishment of development projects, which reflects the high significance of works in the building development industry. Hence, any improvement in labour efficiency will contribute to project outcomes.

Ameh and Osegbo (2011) also enumerated a number of factors affecting productivity on construction site such as availability of construction materials, poor supervision, inadequate construction materials, inaccurate drawings/specification, lack of skills from the workers, tools/equipment breakdown, delay, weather condition and wages.

## 8. Collaboration

According to Abdull Rahman et al., (2014), collaboration plays an important role in the success of the construction projects and the project participants are becoming conscious that knowledge and information sharing is one of the driving factors of a successful contractual relationship. In a study on the importance of collaboration in the construction industry from contractors' perspectives, Abdul Rahman identified six important factors that lead to a willingness to collaborate among contractors such as; collaboration will encourage teamwork, comparable racial partnership establishes cooperation, promote information sharing, enhance quality and also project completion on schedule, improve service quality, and much far better interaction among project participants.

Errasti et al. (2007) noted that collaboration between all project participants have many advantages such as cost and quality savings on the project and project execution could be more efficient if the manufacturability of the project and ease of assembly were taken into account.

## 6.0 RESEARCH METHODOLOGY

In the need of getting useful information, every available strategy was put in place. The main methods adopted that were used in carrying out this research work are:

**6.1 Questionnaire:** A questionnaire was carefully drafted which contains vital questions on the research topic. The main data collected was thoroughly administered.

**6.2 Oral Interview:** Some professionals, career officers in architecture and civil engineering were interviewed to get more useful information on this research.

**6.3 Data Collection:** Primary data's were collected from contractors, specialist contractors and architectural firms by administering of survey questionnaires to a sample population.

**Table 1: Distribution of Questionnaire**

Zone/ Street	Type of Building	No of Questionnaires
Sector 12, Bus Stand	Commercial	24
Sector 42, Gurugram	Residential	15
Sector 26, Gurugram	Residential	30
Sector 55, Gurugram	Commercial	26
	<b>TOTAL</b>	<b>95</b>

**Table 1:** Distribution of Questionnaire.

Label	Frequency	%
Business	22	23
Planner	8	8
Civil Servant	34	35
Architect	15	15
Engineer	12	12
Administrator	7	7
Total	98	100

**Table 2:** Occupation of Respondent

## 6.4 Data Analysis

The use of statistical tools was adopted for analysis of data and testing of hypothesis the tools adopted are;

### 1. Frequency Distribution Table

This tool was used in bringing out results of data collected in order which is in tabulating form, with frequency to determine the more prominent information to address the aspect in which the research work is focused on. Likewise, each percentage occurrence was calculated and the cumulative percentage was also determined.

### 2. Graphical Analysis

The analysis of data collected was done with graphical aid in form of graphs and charts are used in this research work. It was done for additional analysis of the given raw data from the questionnaire and frequency distribution table.

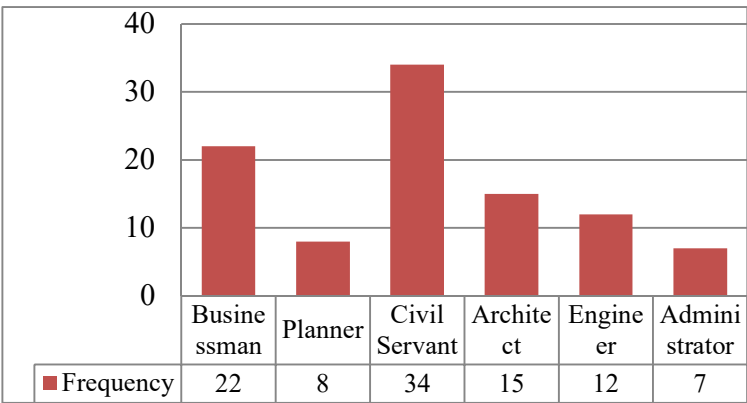
### 6.5 Data Presentation

#### Sample Size and Techniques

A sum of 120 questionnaires were prepared and distributed for administration at the selected study area of Sector 12 Bus Stand, Sector 42, Sector 26 and Sector 55 in Gurgaon, Haryana, India.

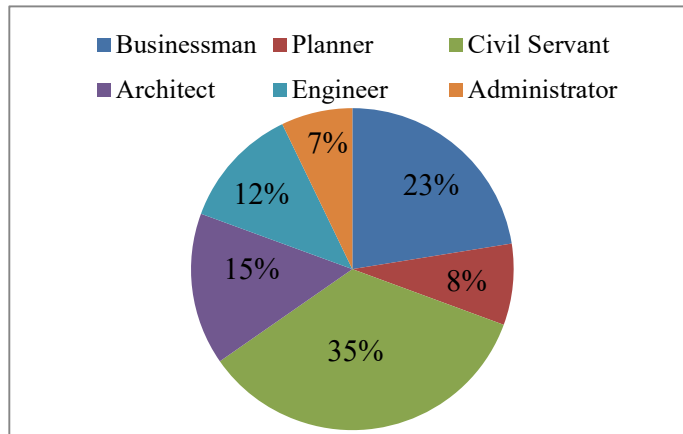
A drafted questionnaire including information related to the research was distributed and administered. Out of 120 about 98 were retrieved after proper follow-up from the respondents. 22 were not administered. Therefore, this data analysis will make use of 98 questionnaires retrieved. Random sampling technique was adopted for this research and professionals in the field of construction were interviewed to uncover their opinion about the factors influencing the cost and time performance of subcontractors. The questionnaires were administered in Gurugram, India. The arrangement is as follows:

**Table 2: Profession of Respondent**



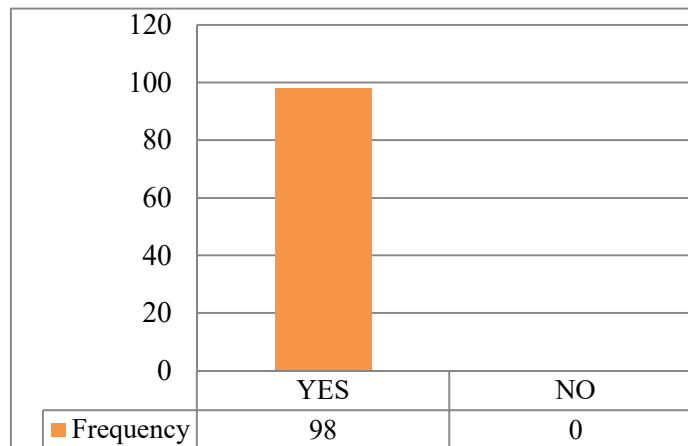
**Plate 1: Occupation of Respondents**



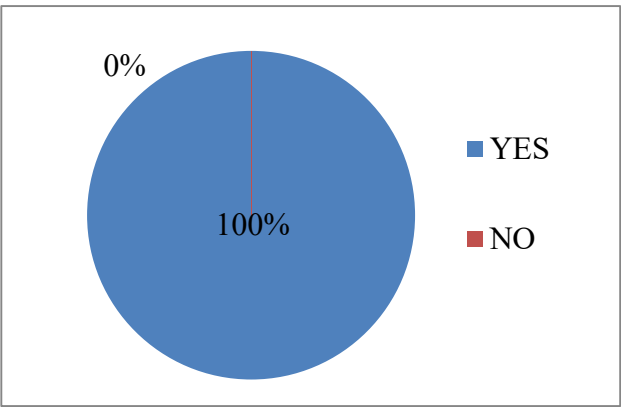


**Plate 1:** Percentage for Occupation of Respondents

From the research carried out, it was discovered that civil servant and businessman had the largest numbers of the administered questionnaires. Civil servant is having about 35% while 23% for the businessman. This was followed by Architect with 15%, the Planner with 8% and administrator with 7%.

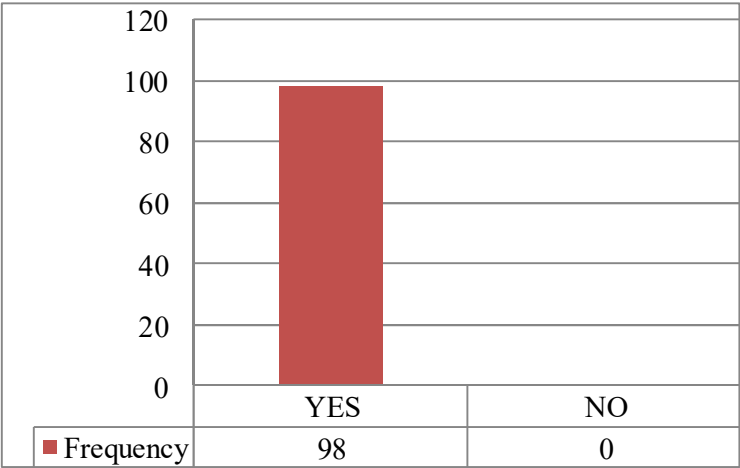


**Plate 2:** Can unskillful subcontractor cause delay at the project site?

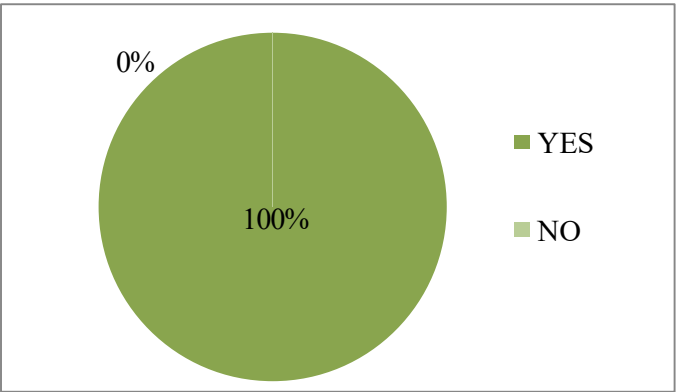


**Plate 2:** Percentage for can unskillful subcontractor cause delay at the project site?

According to the study conducted, it was discovered that about 100% of the respondent agreed that unskillful subcontractor is the reason for delay at the project site.

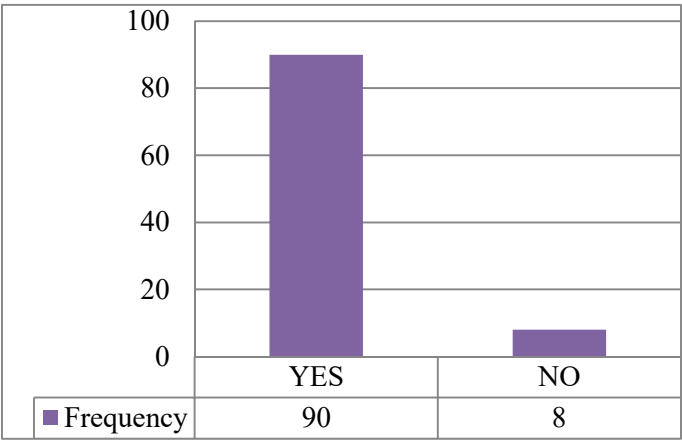


**Plate 3:** Can the use of unskillful subcontractor cause the increase in project cost?

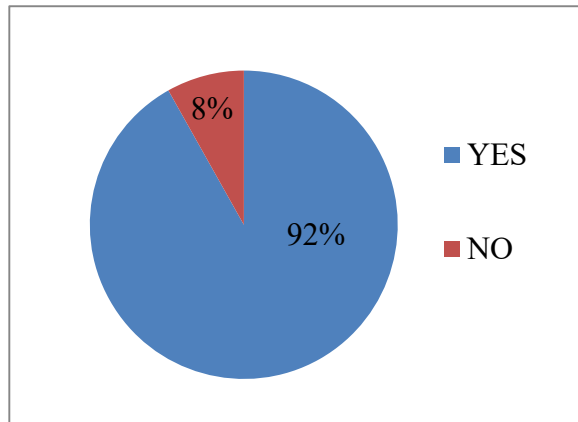


**Plate 3:** Percentage for can the use of unskillful subcontractor cause the increase in project cost?

Based on the administered questionnaire, it was discovered that about 100% of the respondent agreed that the use of unskillful subcontractor can cause the increase in project cost. It is important for the project supervisor to supervise properly to be able to determine unskillfull worker.

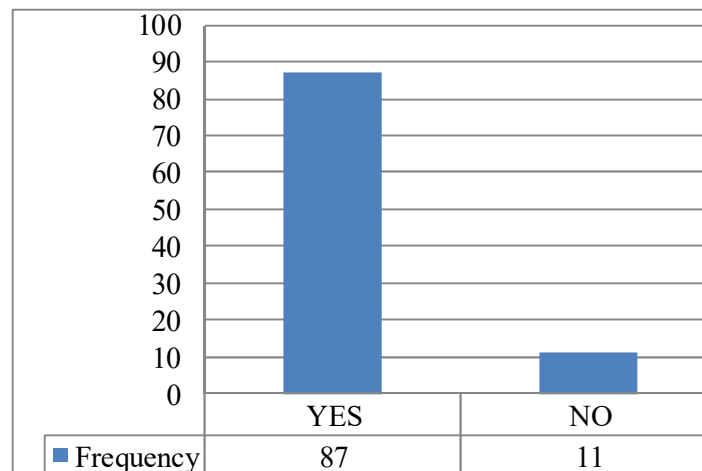


**Plate 4:** Should the contractor engage the subcontractor in training to be sure of his or her skills before employment?

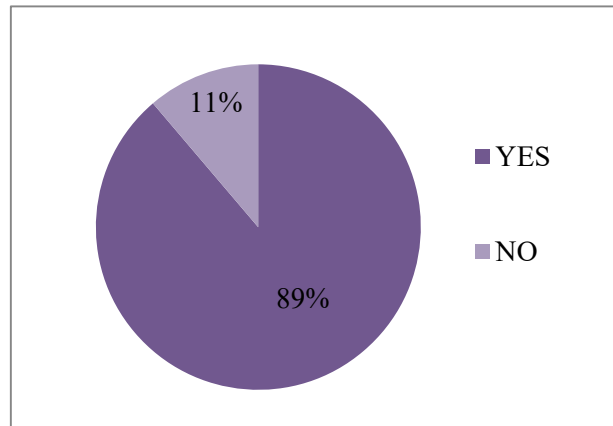


**Plate 4:** Percentage for should the contractor engage subcontractor in training to be sure of his or her skills before employment?

Based on the administered questionnaire, it was discovered that about 92% of the respondent agreed that the the contractor engage the subcontractor to be sure of his or her skills before employment while 8% admitted that it is not necessary. Therefore, it is required to be able to determine if skilfull or not. Unskillful labour is one of the reasons for construction waste at the project.

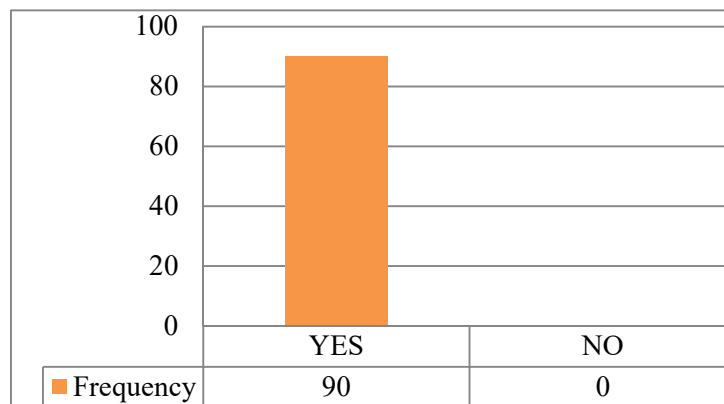


**Plate 5:** Can late payment of subcontractors by contractor cause delay during the construction of a building

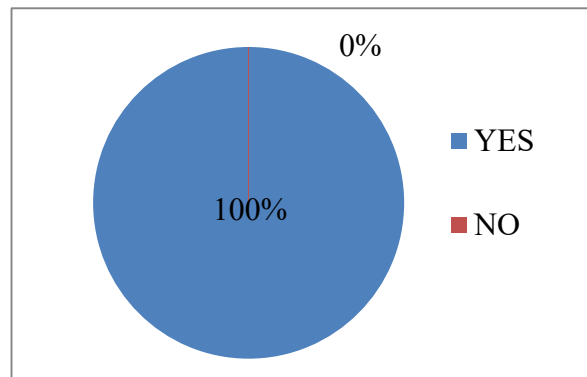


**Plate 5:** Percentage for can late payment of subcontractors by contractor cause delay during the construction of a building?

According to the administered questionnaire, it was discovered that about 89% of the respondent agreed that late payment of subcontractors by contractor can cause delay during the construction of a building while 11% admitted that it is not a reason for delay at the project sites. Therefore, it is required for the contractors to pay their workers when due for payment without further delay to avoid delay or unproductive labour.



**Plate 6:** Can lack of communication between the contractor and subcontractor affect the progress of a construction project?



**Plate 6:** Percentage for Can lack of communication between the contractor and subcontractor affect the progress of a construction project?

Based on the administered questionnaire, it was discovered that about 100% of the respondent agreed that lack of communication between the contractor and subcontractor can affect the progress of a construction project which is the reason for construction waste at the project sites. This reason can also lead to building breakdown.

## 7.0 RECOMMENDATION

In order to avoid the factors influencing the cost and time performance of subcontractors, important recommendations is given below:

1. The contractor should engage the subcontractor in a work to determine his or her skills. Lack of skills is the reason for unproductive work delivered at the project sites.
2. Regular meetings should be held with the subcontractor to motivate, determine the quality of work, as well as progress on the project.
3. The subcontractor must make sure he or she has complied with the drawings in accordance with the project schedule, including allowing for obtaining the required approvals from the contractor or the client.
4. The contractor should establish a good relationship with the subcontractor so that he or she can be free to tell when things are going wrong at the place of work.
5. Only the contractor's delegated responsible staff should communicate with the subcontractor to avoid subcontractors receive conflicting instructions from any staff resulting to confusion and errors.

6. Subcontractors must comply with the project's safety requirements, work according to the project schedule to be able to produce work of acceptable quality.
7. Subcontractors should be paid immediately after work is completed in order to motivate them to do their work diligently.

## 8.0 CONCLUSION

This research offers insight into the factors influencing the cost and time performance of subcontractors and the need for effective performance of subcontractors at the project sites. Lack of skills, lack of communication and delay in payment of subcontractors are challenges leading to decrease in project performance and site productivity. This research examines the time performance of the subcontractor and how well can he or she complete a project with time without exceeding the project cost. This study identified and briefly explained the major causes of performance of subcontractors and ways to address the challenges. It emphasised that if issues of poor performance of subcontractors are addressed, it will increase productivity and improve the quality of work at the project sites. Questionnaire were administered which contains vital questions on this research and the results were able to identify the key issues of cost and time performance of subcontractors. To attain industrialization as well as modernization, building and construction firms require a procedure and requirements for choosing a qualified subcontractor due to the fact that this choice and the performance of the selection process have a direct influence on the general project results. The evaluation of subcontractors in building and construction projects has actually become prominent and has attracted both industry professionals as well as researchers focus. This research has been carried out to discover one of the most important factors in the assessment when choosing a subcontractor from the project personnel and engineers factor of views.

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## About the Authors



**Dr. Adedayo Jeremiah Adeyekun** is a Nigerian Architect, Artist, Urban Planner, Educator and a Preacher of the Word of God. He is registered with Council of Architecture, New Delhi and a corporate member of the Indian Institute of Architects. He studied Architecture at the Federal University of Technology, Akure (NIGERIA) and graduated with the degree of B. Tech in Architecture with Honours (5years) in October, 2008. He proceeded in his career in India with the degree of Master of Planning (Hons) from MDU, Rohtak securing a Silver Medal. He received a Ph.D. in Civil Engineering with specialisation in Building Technology and Construction Management from Jagannath University, Delhi NCR, Haryana, India. He was an associate professor in the faculty of Architecture, Savera College of Architecture, Gurugram affiliated to MDU, Rohtak. He received a medal in April 2018 for the presentation of a paper titled: Technology and Management Options towards the use of Fly Ash in Civil Engineering. His research interest is spread across the discipline of Architecture, Planning and Civil Engineering and as a researcher; he has published more than 17 research papers and 7 published academic books to his credit.



**Arc. Samuel Oluwagbemiga Ishola, ANIA** is a Nigerian Architect, Educator and a Preacher of the Word of God. He studied Architecture at the Federal University of Technology, Akure (NIGERIA) and graduated with the degree of B. Tech in Architecture with Honours (5years) in October, 2008. He proceeded with a Master's Degree in Architecture from Federal University of Technology, Akure in 2012. He is an associate member of the Nigerian Institute of Architects (ANIA). A lecturer at the Department of Architectural Technology, Polytechnic Ibadan, Nigeria and as a dedicated lecturer, he has handled responsibilities at the undergraduate level. His research interest focuses on Building Construction, Building Energy Performance, Climate Change, Green Building, Environmental Sustainability, Artificial Intelligence (ML, DL), Internet of Things (IoT) and Smart Buildings and Cities. As a diligent architect, he has been active for more than 10years in the project management industry. As a project architect, he has managed several successful projects in the construction industry and currently a construction manager with DMG Nig Ltd. He is a PhD candidate in Engineering and has participated in academic workshops, presented conference papers with publications.