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## CONSTRUCTION AUDIT-AN ESSENTIAL PROJECT CONTROL FUNCTION

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### ABSTRACT

Construction projects are known to overrun their budgets and schedules, poor quality of works, wastages, loss of value and experiences increase in financial frauds. Construction audit is a critical tool for the control and monitoring of frauds and other corrupt practices. The failure of construction organisations to recognise how critical auditing and its practices are in the management of construction projects have been blamed for the poor project performance outcome. The purpose of this study is to assess the benefits of construction audits to establish that it is a useful tool in controlling projects. Data were gathered from experts in consulting and contracting organizations using the well-structured questionnaire and purposive sampling technique in Port Harcourt, River State, Nigeria. With reliability of above 0.90, the collected data were analysed using frequency, percentage, mean score, and Mann-Whitney U test. It was found that the level of use of auditing is high and it is recognised as a significant project control tool. The main benefits of audit application in construction are; to reduce cost overrun, financial probity and accountability, aid in the recovery of cost to promote cost savings, to protect the clients from avoidable and unnecessary claims from contractors, and ensure that projects are delivered in accordance with the project contract provisions. Auditing should be encouraged in the delivery of private and public projects to ensure that value for money is achieved and losses reduced.



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### I. INTRODUCTION

In both the developed and developing economies of the world, the construction industry plays an appreciable and recognisable role in stimulating the growth and development of nations. The construction sector proved to be useful to the national development and economic growth of countries, and the most obvious impacts are in the provision of housing and infrastructure, wealth creation, employment creation and contribution to the income of nations [1, 2]. However, construction projects are known to overrun their budgets and schedules, poor quality of works, wastages, loss of value [1], and experiences increase in financial frauds. This is attributed to the multiple stakeholders involved [3], the number of companies and huge monies involved in the delivery of construction projects [4].

The failure of construction organisations to recognise how critical construction audits and their practices are in the management of construction projects has been blamed for the poor project performance outcome. According to [5] privately and publicly financed building and engineering construction projects in developed and developing nations are confronted by a myriad of problems such as corruption, frauds, poor procurement practices, poor quality, design deficiencies, lack of attainment of value for investors/clients monies, cost and time overruns, and project delivery issues. These ultimately result in the dissatisfaction of the clients/investors and other critical stakeholders in the construction sector. An audit is a planned and documented activity of ascertaining via investigation, evaluation of objective evidence, compliance with established processes and standards, or applicable documents and the implementation

effectiveness [6, 4]. Construction audit involves the review of a project to ensure it is performing as planned and contained in the contract. It is therefore a crucial tool for keeping activities under check and within the approved budget. The job of auditing must be carried out without any interference. Construction auditing is carried out in all newly approved construction contracts whether it is publicly or privately owned and in renovation and expansion projects [4]. Whether in new or refurbishment projects, auditing should be not stopped after the final account but should extend to the post-contract stage.

Construction contract administration often ends at the final measurement and final account [7]. Cross-checking of work executed is an important post-construction cost control system that should not be neglected. A construction project audit is meant to reconcile the value of work done with the resources committed to it during the construction stage. According to [8] project audit is carried out to make sure that the value of monies received during the execution of a project is proportionate to the amount spent. The ultimate aim was to ensure that the principles of economy, efficiency and effectiveness are attained during the construction phase. The audited project must show that the contents of the contract documents reflect that the contract is not inflated [9]. While construction auditing has gained ground in the top developed nations of the world, developing countries in Africa have not embraced this system appropriately. Nigeria is a developing country where the performance of construction managers is below satisfactory, especially in carrying out construction audits (4, 8). The role of auditing is however adjudged to be cumbersome and confusing as a result of inadequate knowledge and training on how to effectively carry out construction auditing.

A review of construction management literature shows that construction auditing is less explored by researchers and academia. This lack of appreciation of construction audit and practices as an essential aspect of project management responsibilities as submitted by [5], has led to continuous use of defective procurement, financial related fraud and corruption and other social and contractual ills that lead to poor project performance. This is despite how critical construction project audit is in ensuring that clients achieve value for money and controlling fraudulent and corrupt practices by contractors and other construction experts. It is based on the foregoing that this study entitled 'construction audit-an essential project control function' is embarked upon. This study aim will be achieved through an assessment of the benefits of construction audits with a view to showing how useful it is in control of the project. This study leveraged the experiences of the consultants and contractors in the delivery of publicly funded construction projects to achieve its aim. Public construction clients (both state and federal governments), academia and construction experts will find this study useful in areas of checking improper and fraudulent practices across the entire supply chain management. This study will also add to the scanty literature on construction audit, especially in developing countries like Nigeria and others.

## **II. BENEFITS OF CONSTRUCTION AUDIT**

Construction projects are usually time-consuming and involve huge capital outlay and with most of the projects having 1 to 2% overcharges [10]. With multiple activities and stakeholders and tasks being carried out simultaneously, it becomes a difficult and tedious job to manage construction works effectively and steer it out of trouble when it is derailing out of budget and plans.

Construction audit (CA) is a relevant and effective measure of unearthing good and failed or bad project performance practices, be it in new or refurbishment construction projects [5, 11]. Construction audit is conventionally involves accounting, auditing and construction management disciplines [5].

Independent construction audits help to ensure that overcharges and fraud are avoided in construction contracts. Construction audit helps the project to know its place in the industry. It enables comparison of project management processes, schedule and cost control with best practices in the industry. [4] reported that the topmost vital importance of CA is; checking and prevention of corruption, accountability and financial probity, ensuring that there is efficiency, economic consistency and standard for meeting the quality target, ensuring adherence to practices and procedures, and reduction of cost overrun.

Better ways of managing a construction projects risks, ensuring proper functioning of control measures and procedures, and enabling parties to the contract, to be honest in their dealings are the important function of audit [10]; this is particularly important via contract terms checking and identification of overcharges. Construction audit gives the assurance that the financial aspects of a project are well monitored and managed. This helps to strengthen the relationships of clients and construction organisations. Performing audits help to ensure that the cost structure of projects are verified and reviewed so that closeout time is shortened, and contractors can receive their final payment [10]. In addition, construction companies are better equipped and strengthened to face potential or new projects with the report of audit. This implies that lessons are learnt from the previous project to improve the performance of construction projects and the performing organisations' performances.

Construction audit helps in the recovery of the cost emanating from the default of a party. The parties concerned or responsible for the cost to spiral out of control will have to pay for his/her defaults. An audit also put the project manager into a state of being alert to ensuring that production activities are done correctly and within project scope and requirements [12]. CA help to assess whether a project is progressing well in terms of being ahead or behind schedule and what has been achieved in terms of output. This is important as valuations are based on work done. Furthermore, it ensures that procedures on how to handle dangerous materials, equipment and motions on site are followed. This is important in providing a safe work environment for the artisans and tradespeople and other supervisory management staff. [13] posit that one of the major functions of CA is quality. CA shows what is working and what is not working in terms of quality of work. When the quality of work is to standard, the customers will be satisfied and the project will flow smoothly without any disputes. According to [14], a construction audit when properly applied will ensure that projects resources are kept under control from the inception of a project to the closeout. It particularly ensures that; areas, where risks are likely to be high, are identified, ensure that contracts terms are complied with and the accuracy of charges and billings are verified, project funds are used judiciously, helps in reporting of potential cost savings, recovery or avoidance, helps in eliminating inefficiencies, help to identify areas of improvement in processes, helps in the resolution of identified issues and report status for appropriate remedial action to be taken, and helps in the timely closeout of projects.

[15] posit that Construction projects are audited to ascertain the economy, efficiency, project stakeholders' effectiveness, project compliance with statutory, regulatory and corporate guidelines. Construction audit revolves around finance

and budgeting, procurement processes, project management, technical and legislative issues [5]. However, the fundamental function of auditing centres on finance and budgetary auditing. Auditing the financial aspect of construction activities cover the inspection of all projects' financial records and figures [11]. Therefore, to guarantee value for clients and investors monies, all vital accounting standards and legal requirements must be followed. Failure to carry out an audit means that the real financial situation of the project as well as time and other project resources cannot be assured [16].

The role of auditing the procurement process is to ensure that guidelines for procuring goods and services are followed without deviations. A lot of project resources are wasted, projects have failed to meet their requirements, claims and disputes have evolved; as a result of following the wrong route of procurement. Construction projects have even been abandoned as a result of fraudulent procurement. Therefore, controlling the bidding process is a critical aspect of construction projects that must not be overlooked or ignored [5]. Construction stakeholders rely on construction audits to make a judgement of the quality of publicly procured projects. Project management audit involves auditing the project management and the management of the daily transaction of the projects. Project management audit reveals the actual performance of every stakeholder against the initial project plan prepared at the inception [15].

Technical Auditing of construction projects helps to check that the prescribed engineering procedures and methods are monitored and evaluated at the project construction phase. [11] submitted that technical auditing also ensures that the technical capabilities of the project staff are within the acceptable standard required by professional regulatory institutions. The Technical skills and expertise of the project team are necessary for a better project outcome. Professional technical skills auditing has attracted a lot of attention recently by both researchers and industry practitioners [17, 15], due to the increased spate of building collapse. The legislative function of CA ensures that construction projects are in conformance with the statutes and regulations of the project location [5]. The legislative dimension of auditing is vital for the successful and satisfactory delivery of critical facilities and infrastructure projects in Nigeria.

The critical areas of applications and functions of construction audit are shown on figure 1 below.

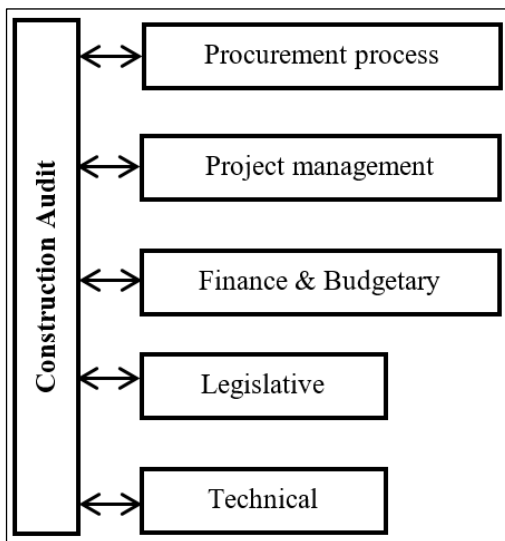


Figure 1: Benefits of Construction Audit.  
Source: Modified from [4].

### III. MATERIALS AND METHODS

This study assessed the benefits of construction audits with a view to establishing that it is a useful tool in controlling projects. The well-structured questionnaire was used in this study to garner relevant data from consultants and contractors involved in the delivery of both public and private projects, especially in Port Harcourt, River State, Nigeria. Port Harcourt is the state capital of rivers state which is one of the states in Nigeria that is very rich in oil and gas and other natural resources. The presence of these natural resources attracts a lot of construction organisations, oil exploration companies as well as other companies. Investors, professionals, construction tradespeople as well as people from all works of life are also attracted to the state because of the many building and infrastructure projects being undertaken by both state and federal government [18, 19].

The questionnaire is simple, easy to use and has the capacity to reach wider audiences in a shorter time and lower cost [20]. The questionnaire used gathered data on the respondents' background information, Frequency of use of auditing to control construction projects, Level of agreement of construction audit as a project control tool and the benefits of construction audit in project control. The questionnaire was designed based on a 5-point Likert scale in which 1 is the lowest scale and 5 is the highest scale.

Five (5) active construction sites and six (6) recently completed projects that are publicly owned were identified during a preliminary survey of the study area. This makes is a total of 11 construction projects that were sampled. The consultants and contractors involved in the projects were identified, contacted and sampled. The lead consultants and main contractors were involved in the study. This was to ensure that quality data are obtained and that experienced experts on the subject of this study participate in it. Three (3) management level personnel from the consultant organisation participated in the study. Five (5) management level personnel of the contracting organisations were sampled. These represent a total sample size of 88 (33 experts from consulting and 55 experts from the contracting organisations). It is the understanding of this study that this sample size is representative enough for the study.

The purposive sampling technique was adopted in the administration of the questionnaire by the researchers. This sampling technique is suitable in a study where the experienced of the participants is very important as well as their availability for the survey. 100% of the administered questionnaires were retrieved and this response rate was achieved due to the several follow-up calls and repeat site visits to remind the participants of the importance of the study.

Data analysed were done through the use of frequencies, percentiles, mean scores and Mann-Whitney U. The mean scores of the assessed variables were used to rank the benefits of construction audit while an independent sample test was used to determine the relationship in the perception of the consultants and contractors. The reliability of the research instrument was tested using Cronbach's alpha test. An alpha value of 0.916 was obtained for data on the benefits of construction audits (See Table 1). This implies that the instrument is reliable and data obtained are of good quality and unbiased. The methodological flow chart is shown in figure 1 below.

Table 1: Reliability Test.

			N	%
Case Processing Summary	Cases	Valid	88	100.0
		Excluded <sup>a</sup>	0	0.0
		Total	88	100.0
Reliability Statistics	Cronbach's Alpha		0.916	
	N of Items		20	

Source: Authors (2021).

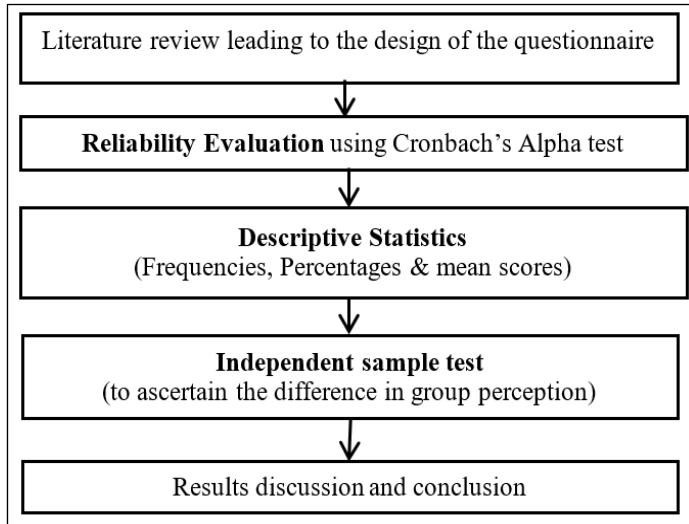


Figure 2: Study Methodological procedure.  
Source: Authors, (2021).

## IV. RESULTS AND DISCUSSIONS

### IV.1 BACKGROUND INFORMATION OF RESPONDENTS

From Table 2 37.50% of the respondents are from consultants and 62.50% are from the contractors' organisations. The profession of the participants showed that Architects are (26.14%), Builders (11.36%), Engineers (36.36%), and Quantity surveyors (26.14%). In terms of their years of experience, it can be seen 32.95% have spent between 5-10 years in the industry, 37.50% have spent 11-15years, 15.19% had spent 16-20years, and those who have spent over 21 years are 13.64%. The educational qualification of the participants indicates that those with HND are (22.73%), PGD (13.64%), BSc/B.Tech (38.64%), M.Sc/M.Tech (22.73%), and PhD holders are 2.27%. Furthermore, the professional qualification of the respondents indicates that the majority of them are corporate members of their various organisations and 11.36% are probationer members of their professional bodies.

It is evident that the respondents are academically and professionally qualified and have the requisite experiences to give information that will aid in meeting the subject of this study.

Table 2: Respondents and organisation profile.

Variables	Classification	Freq.	%	Cum. %
Organisations	Consultants	33	37.50	37.50
	Contractors	55	62.50	100.00
	<b>TOTAL</b>	<b>88</b>	<b>100.00</b>	
Participants professions	Architect	23	26.14	26.14
	Builders	10	11.36	37.50
	Engineers (Civil/structural & Services)	32	36.36	73.86
	Quantity Surveyors	23	26.14	100.00
	<b>TOTAL</b>	<b>88</b>	<b>100.00</b>	
Years of experience	0-4years	0	0.00	0.00
	5-10years	29	32.95	32.95
	11-15 years	33	37.50	70.45
	16-20 years	14	15.91	86.36
	21-above	12	13.64	100.00
<b>TOTAL</b>	<b>88</b>	<b>100.00</b>		
Highest Educational Qualification	Higher National Diploma (HND)	20	22.73	22.73
	Postgraduate Diploma (PGD)	12	13.64	36.36
	Bachelor of Science/Technology (B.Sc./B.Tech)	34	38.64	75.00
	Master's Degree (M.Sc./M.Tech.)	20	22.73	97.73
	Doctorate (PhD)	2	2.27	100.00
<b>TOTAL</b>	<b>88</b>	<b>100.00</b>		
Participants Professional Affiliation	Member Nigerian Institute of Architect (MNIA)	18	20.45	20.45
	Member Nigerian Institute of Builders (MNIQB)	10	11.36	31.82
	Member Nigerian Society of Engineers (MNSE)	29	32.95	64.77
	Member Nigerian Institute of Quantity Surveyors (MNIQS)	21	23.86	88.64
	Probationer	10	11.36	100.00
<b>TOTAL</b>	<b>88</b>	<b>100.00</b>		

Source: Authors, (2021).

#### IV.2 FREQUENCY OF USE OF AUDITING TO CONTROL CONSTRUCTION PROJECTS

Figure 1 shows the result obtained from the analysis of the data gathered on how frequent auditing has been used to control construction projects. It is obvious from fig.1 that the frequency of use of auditing to control projects ranges from moderate to very high. This shows that construction auditing is a recognised practise in the construction industry of Nigeria.

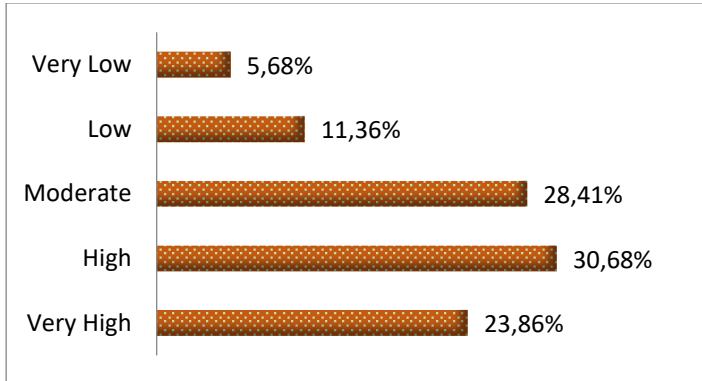


Figure 3: Frequency of use of auditing in projects.  
Source: Authors, (2021).

#### IV.3 CONSTRUCTION AUDITS PLAY SIGNIFICANT ROLE IN PROJECT CONTROL

Figure 4 shows that the participants from the contracting and consulting firms strongly agreed that construction audit plays a significant role in the control of projects. This further shows the consciousness of stakeholders in the construction industry to key project resources under control and proper management. This report supports the finding in figure 3 above.

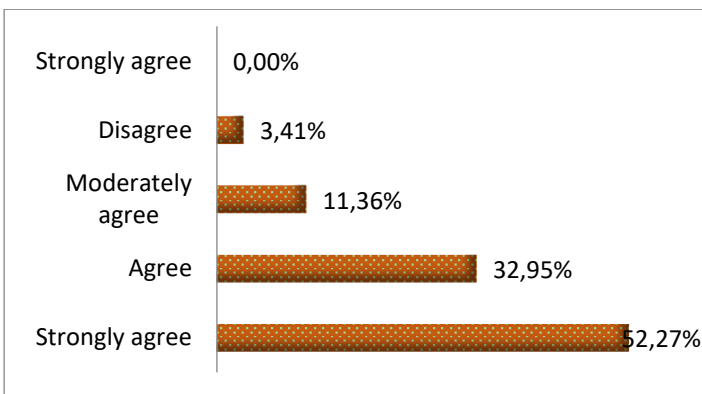


Figure 4: Construction audit a project control tool.  
Source: Authors, (2021).

#### IV.4 BENEFITS OF CONSTRUCTION AUDIT

The result of the analysis of data gathered on the benefits of construction audit is shown in Table 3. The top 5 most important benefits of audit application in construction are; to reduced cost overrun (mean=4.76), Financial probity and accountability (mean=4.59), aid in the recovery of cost to promote cost savings (mean=4.57), to protect the clients from avoidable and unnecessary claims from contractors (mean=4.53),

and ensure that project are delivered in accordance with the project contract provision (mean=4.51). while the least ranked benefits of auditing are; helps to establish actual progress and work done on a project (mean=4.02), Ensure the provision of a safe working environment for workers (mean=4.01), ensure that projects are delivered in accordance with legislative provisions of the location (mean=3.98), to ensure the compliance of all practice and procedures. (Mean=3.90), and help improve return on investment (mean=3.80).

Overall, regardless of the relative ranking of these variables, they still represent the vital benefits obtained from the application of auditing services on construction projects. This is based on the range of the mean scores with a maximum mean of =4.76 and the Minimum=3.80. This study revealed that the major benefits of audit application in construction are; to reduce cost overrun, financial probity and accountability, aid in the recovery of cost to promote cost savings, to protect the clients from avoidable and unnecessary claims from contractors, and ensure that projects are delivered in accordance with the project contract provision. This finding supports that report of [4, 15, 5, 10]. Honesty in dealing with parties in a construction contract is the bedrock for prudent project management and success. Construction audit reveals areas of dishonesty by the contractor as over change, and manipulations of invoices and frauds are detected and sanctions mated. As a major project management function, auditing helps in ensuring that projects are delivered within budget and planned duration. It helps contractors to get their payment faster without undue delays [10]. The quality of the finished building is assured, and the number of accidents on site is reduced where construction audits are frequently performed [16, 5]. Construction audit is a critical project control function as its application ensures that project activities are monitored from inception to completion and facility management stages. There will be savings in cost, fewer claims and disputes, lesser interruption of work progress, and the achievement of good health and safety and quality records and performance on a project that implement auditing.

Mann-Whitney U-Test was carried out to; compare the perceptions of the two groups of participants; especially in determining the variables the respondents' view differs significantly and the percentage of the variables with the same rating pattern by the consultants and contractors. Mann-Whitney U-Test revealed that the participants' views converge in 16(80.0%) of the variables. These variables have a significant p-value of above 0.05; this implies that there is no significant statistical difference in the way the participants rated these variables. A significant statistical difference was observed in the perception of the consultants and contractors on 4(20.0%) of the variables. These variables have a significant p-value of less than 0.05. These variables are; Failures caused by time and cost overrun are prevented through audit of projects (Z=-2.145), help improve return on investment (Z=-4.598), to ensure production efficiency, consistency and standard to meet the quality target of a project (Z=-2.125), Analysis of problem areas of the project to generate data for improving future contract delivery (Z=-2.433), and used to check project management functions of project stakeholders (Z=-0.173).

Table 3: benefits of auditing in construction projects.

S/No	Variables	mean score	S.D	Rank	Mann-Whitney U	
					Z	Sig.
1	To checkmate fraud and corrupt practices	4.42	1.1113	8 <sup>th</sup>	-1.245	0.213
2	to reduce cost overrun	4.76	0.5672	1 <sup>st</sup>	-1.898	0.058
3	Financial probity and accountability	4.59	1.0130	2 <sup>nd</sup>	-0.379	0.705
4	to protect the clients from avoidable and unnecessary claims from contractors	4.53	1.1442	4 <sup>th</sup>	-1.117	0.264
5	To improve understanding of project environment for proper control	4.50	1.0283	6 <sup>th</sup>	-1.732	0.083
6	Failures caused by time and cost overrun are prevented through audit of projects	4.09	1.3615	15 <sup>th</sup>	-2.145	0.032**
7	helps in controlling and mitigating project risks	4.15	1.1894	14 <sup>th</sup>	-0.928	0.354
8	ensure that projects are delivered in accordance with legislative provisions of the location	3.98	1.5461	18 <sup>th</sup>	-1.752	0.080
9	ensure that projects are delivered in accordance with the project contract provision	4.51	0.9942	5 <sup>th</sup>	-1.845	0.065
10	improve the internal control of processes and procedures of organisations	4.23	1.1619	12 <sup>th</sup>	-0.217	0.828
11	aid in the recovery of cost to promote cost savings	4.57	0.8549	3 <sup>rd</sup>	-0.971	0.332
12	Improves understanding of performance opportunities, penalties, incentives, rights and obligations.	4.27	1.3107	11 <sup>th</sup>	-0.352	0.725
13	Ensure the provision of a safe working environment for workers	4.01	1.4739	17 <sup>th</sup>	-0.177	0.859
14	help improve return on investment	3.80	1.6129	20 <sup>th</sup>	-4.598	0.000**
15	to ensure production efficiency, consistency and standard to meet the quality target of the project	4.48	0.9823	7 <sup>th</sup>	-2.125	0.034**
16	Analysis of problem areas of the project to generate data for improving future contract delivery	4.34	1.1733	10 <sup>th</sup>	-2.433	0.015**
17	used to check project management functions of project stakeholders	4.23	1.2292	12 <sup>th</sup>	-0.173	0.862
18	Ensure compliance and adherence to best practices in construction contract procurement and management	4.41	1.0574	9 <sup>th</sup>	-0.878	0.380
19	helps to establish actual progress and work done on a project	4.02	1.3303	16 <sup>th</sup>	-0.237	0.813
20	To ensure the compliance of all practices and procedures.	3.90	1.4145	19 <sup>th</sup>	-0.701	0.483

\*\*P-value&lt;0.05

Source: Authors, (2021).

## V. CONCLUSIONS

This study assessed the benefits of construction audits with a view to establishing that it is a useful tool in controlling projects. The opinion of construction professionals in consulting and contracting organizations was sampled using the well-structured questionnaire and purposive sampling technique in Port Harcourt, River State, Nigeria. The collected data were analyzed, findings made and conclusions drawn.

The study revealed that the frequency of use of auditing to control construction projects is high and it is a significant project control tool. The major benefits of audit application in construction are; to reduce cost overrun, financial probity and accountability, aid in the recovery of cost to promote cost savings, to protect the clients from avoidable and unnecessary claims from contractors, and ensure that projects are delivered in accordance with the project contract provision. Construction audit is a critical project control tool as it focuses on helping clients to achieve value for money. The contractor tries to avoid or reduce unnecessary spending and ensure that works are done are those captured in the contract.

Construction audit helps to instil discipline in the adherence to contract provisions and in the control and management of project resources. Construction project auditing keeps every stakeholder focused on their performance their functions towards meeting the project objectives, reducing wasteful spending, reducing claims and other disputes in the delivery of construction projects, especially of public natures. Finance is the life-blood of every construction and developmental

project. It is the function of auditing that will ensure that projects are delivered within the planned budget.

Construction experts' consultants and contractors are exposed to the benefits of construction audits. This study adds to the few existing bodies of knowledge on construction audit, especially in Nigeria and other African nations. The limitation of this study is in its sample size and geographical location. Care should be taken when generalizing the finding of this study. A similar study with a larger sample size and geographical coverage is recommended in Nigerian or other African countries. This will provide data for the purpose of comparison. An assessment of the relative application of auditing at pre-contract and post-contract stages of construction projects delivery should be assessed.

## VI. AUTHOR'S CONTRIBUTION

**Conceptualization:** Dr. Reuben A. OKEREKE and Usman MUHAMMED.

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**Supervision:** Dr. Reuben A. OKEREKE, Usman MUHAMMED and Emmanuel C. EZE.

**Approval of the final text:** Dr. Reuben A. OKEREKE, Usman MUHAMMED and Emmanuel C. EZE.

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