

## Quality control tool for enhancing effective building project delivery in Bayelsa state, Nigeria

Julius Atose <sup>1,\*</sup>, Gift Nkeoma Onyinye Okafor <sup>2</sup>, Nimi Adoki Diepiri <sup>1</sup> and Barine Henry Dum-Joseph <sup>1</sup>

<sup>1</sup> Department of Building Technology School of Secondary Education (Technical), Federal College of Education (Technical), Omuoku, Rivers State, Nigeria.

<sup>2</sup> Department of Vocational and Technology Education, Faculty of Education Niger Delta University, Wilberforce Island, Bayelsa state, Nigeria.

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### Abstract

This study is on quality control tools for enhancing effective building project delivery in Bayelsa State with the aim of determining whether the use of check sheet as a quality control tool enhances effective building projects delivery in Bayelsa State. The population for the study was 188, consisting of 83 building professional lecturers in tertiary institutions and 105 building professionals in ministries, departments and authorities in Bayelsa State. The study adopted descriptive survey design. Questionnaire was used to collect needed data from the respondents. Mean and standard deviation were used to analyze the collected data, while t-test statistics was used to test the hypothesis. Findings revealed that check sheet as a quality control tool enhances effective building project delivery in Bayelsa State. Result also showed that there was no significant difference in the mean response scores of building construction professional lecturers in tertiary institutions and building construction professionals in ministries, departments and authorities on check sheet as quality control tool for enhancing effective building project delivery in Bayelsa State. Therefore, it was concluded that check sheet is a quality control tool for effective building project delivery. Based on the findings, it was recommended that building professionals be encouraged to adopt and implement the use of check sheets as quality control tools for enhancing effective building project delivery in Bayelsa State.

**Keywords:** Building; Professional; Quality; Quality Control; Check Sheet

### 1. Introduction

The construction industry is as old as when man needed shelter to protect him against the effect of climatic elements and to protect his belongings. The industry is saddled with the responsibility of providing quality building projects for its citizenry. According to [2], the construction industry is a crucial sector for the development of a country's economy system. The construction industry provides construction related services and construction related products and materials. The industry is a very vital sector that constructs buildings and roads that connect communities, provide jobs, and improve the society [16]. The industry comprises a wide range of activities involving designs, planning, repairs, maintenance, construction, demolishing of buildings, civil engineering works, mechanical and electrical engineering works. The construction industry is made of various professionals ranging from the Builders, Architects, Town Planners, Quantity Surveyors, Land Surveyors, Estate Valuers, Electrical Engineers, Mechanical Engineers, Civil Engineers etc. Construction as a concept refers to the art, manner and process of designing, maintaining and developing the natural and physical built environment. It entails the designing of a structure as well as bringing together of necessary requirement for the building of that structure. Construction work involves the installation and assembling of various project activities on site in accordance with approved designs, methods and specifications. According to [17],

\* Corresponding author: Julius Atose

construction is the art and science to form object, system or organization and it covers the processes involved in delivering building, infrastructure, industrial facilities and associated activities. These processes start with planning, financing and designing; and continue until the asset is built and ready for use. Since construction projects are very complex in nature, it makes the industry susceptible to disputes, delays and lost. That is why; it is paramount to put in place measures to control the construction process.

Building plays critical role in the well-being of mankind. Every rational human being looks for a place to live in other to carry out their day-to-day activities. Thus, building projects are very important in the economic development of any country. [3] opined that 10 20% of the overall economic activities in a nation is carried out in a building and it is the biggest fixed asset. The quest to own a building is not only the basic need of humanity but also show the standard of living in a society. A building is a commodity that is seen as a tangible asset with potential returns. It can be built as a residential, commercial and industrial structure that provides shelter, safety and warmth as well as providing a place of rest for man. The provision of quality building for human is a clarion call and a necessity for all and sundry. Since most of man's activities cannot be undertaken outdoor, then it became very necessary for mankind to have a place called house to enable him carry out his day-to-day activities. From the foregoing, a building according to [4], is an environmental envelope that modifies the natural or external environment to produce a satisfactory internal environment.

However, the incessant building collapse in the country and across the globe is an eye opener on the need for durable building construction projects and this is nonnegotiable demand that professionals in the building construction industry must make available to their citizens. Thus, durability in building construction is one aspect in the construction industry that is very important. According to [8], quality is among the critical factors in the fortune of building projects. It is the degree or extent to which a project work may match with set out standards and requirements. Quality can also be seen as the degree to which an object or entity in terms of prices, products, or services satisfy a specified set of attributes or requirements [16]. The quality of a construction project means the ability of the project to maintain standard in terms of performance, grade, durability, appearance and the intended purpose. Quality in building construction project ensures safety of workers, occupants and the general public. Building construction work that lack quality, can lead to accidents, injuries or even death. Quality building project reduces the need for frequent maintenance and repair activities whereby saving time and cost in the long run. Customer satisfaction is also one key thing that quality of building projects provides and which also increases its value. In an attempt to achieved quality of building projects in the construction industry, it is pertinent that quality control mechanisms need to be put in place in other to achieve quality building projects in order to reduce substandard projects in the built environments.

Quality control as a concept involves activities that help to provide objectives during project construction. Quality control is the process of monitoring project activities in other to ensure compliance with specifications and standard of regulatory bodies and also reducing poor performance and cost requirement during project construction. According to [15], quality control measures are increasingly needed for effective project delivery in the construction industry. [5] also reported that quality control is the main activity and method used in the construction process to satisfy quality requirements. It is the process through which construction firms seek to ensure that the quality of project work is maintained or improved. Quality control system is aimed at ensuring that final product of the project work meet standard and guidelines laid down by regulatory bodies. The system is to fast track the quality improvement of products and services in the building construction sector [10]. Quality control procedures in the construction industry involves the inspection of building materials and equipment, testing of construction materials and techniques, and monitoring the workmanship of workers working on construction sites in order to ensure that defects are identified and rectified during construction process. The goal of quality control during project work is to provide good quality products, safe and durable products that satisfied client's requirements and also complies with the construction industry standard. It is imperative to adopt quality control measures or tools for effective project delivery [1], since the tools are beneficial for improving production, eliminating errors and making information available about the various stages to satisfy clients. They are also very crucial in ensuring safety, cost saving, durability, client satisfaction and compliance with regulatory bodies. Quality control tools used in the building construction industry include check sheets, fishbone diagrams, flow charts, scatter diagrams, control charts, histograms and Pareto charts.

Check sheet or check list is a very effective and easy quality control tool commonly used in the building construction industry to ensure that the activities in the construction process are in compliance with specification and standard. It is a well-structured and prepared measure for collecting and analyzing data in building construction project. It is a generic form of data collection and analysis that can be used in the construction industry. This quality control tool is also called a tally sheet. It is a specifically arranged data that enables the user to record data easily. While using this quality control tool, data are assembled and integrated on the check sheet to record the frequency of a given situation during the data collection process [11]. They are easy to understand and apply, give a clear picture of the situation and condition of any

building project. They are useful tools for the identification of challenges in the building sector. Check sheets incorporate various data to improve the project quality control process [14]. This tool is also very useful when planning maintenance jobs; auditing a maintenance system, work sampling, foreman job description etc. They are very useful in measuring faults of difference types, location of the fault and the cause of the fault [9]. Quality inspection activities are easily undertaken by the use of check sheet. They are design to check and verify compliance with building codes, regulations and project specification. Monitoring the quality of materials and equipment used in a given project becomes easy with aid of check sheet. Safety during building construction work is paramount and check sheets can be used to guarantee safety protocols. In the implementation of safety procedures and the maintenance of safe working environment during construction process, the check sheet is very important in controlling quality during building project construction. They also help in providing structured method in documenting quality control activities that can be used for project inspection, test and other verifications carried out during the project work. Check sheets are very versatile quality control tool in the building construction industry that can be tailored to achieving different objective during the construction process.

The building construction industry in Nigeria is a very vast industry and also very complex in nature. The industry is saddled with the responsibility of providing habitable buildings for all and sundry but there are numerous challenges confronting the sector. The task of making available durable buildings for all the citizenry of Nigeria has not come into fruition owing to the overwhelming issues in the sector. In the building construction industry, reducing or eliminating defects during the construction process in order to produce and deliver quality building projects is critical. According to [6], the key to being competitive lies in the quest to exceed clients' needs and desires and also making available customers requirement, a quality product at low cost on time and every time. Quality control is a key factor for the success and growth of any industry and the fact that the life span of a building project passed through different stages, starting from the conceptual stage to the completion stage and to maintenance and repairs stages, called for the need to employed quality control measures. The quality of the building project is linked with good quality control process in all the phases of the building life span [7]. Quality control as a matter of fact is a critical area of building project delivery by ensuring that construction processes and final project works are in compliance with laid down standards and requirements. However, effective implementation of quality control measures in building project delivery process is saddled with various obstacles, for instance, lack of standardization, integration of technology, training and education, communication and collaboration, cost and resource constrain and regulatory compliance. The inability to effectively implement quality control measures during project works in the building construction industry has occasioned in the loss of customers, loss of quality of project, loss of compliance with standards, loss of innovation, increase in construction cost, delay in project delivery date, poor resource allocation, poor material selection, improper planning, schedule and activity definition, improper record keeping and documentation, ineffective leadership and control and as such, quality control measures become essentials tools for effective building project delivery. This therefore, predisposes a study to investigate quality control tools for enhancing effective building project delivery in Bayelsa State, with the objective to determine whether the use of check sheet as a quality control tool enhances effective building projects delivery in Bayelsa State.

The null hypothesis formulated to guide the study states that: there is no significance difference in the mean response scores of building construction professional lecturers in tertiary institutions and building construction professionals in ministries, departments and authorities respectively on check sheets as a quality control tool for enhancing effective building project delivery in Bayelsa State.

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## 2. Methodology

### 2.1. The study adopted analytical descriptive survey design.

The population of the study comprised 188 building construction professional lecturers in tertiary institutions of learning and building construction professionals in ministries, department, and authorities. The population of the study comprised 105 building construction professionals in Bayelsa State ministries, department and authorities and 83 building construction professional lecturers in tertiary institutions in Bayelsa State respectively. The study therefore adopted census survey. Structured questionnaires were used to obtain data from the respondents. The response options on a 4-points Likert rating scale were strongly agree (SA), agree (A); disagree (D), and strongly disagree (SD). A total of 188 copies of questionnaires were administered to the respondents in Niger Delta University, Federal University, Otuoke, Bayelsa State Ministry of Land, Housing and Urban Development, Bayelsa State Ministry of Works and Infrastructure and Bayelsa State Physical Planning and Development Board. Mean and standard deviation were used to analyze the collected data. A mean response score of 2.50 was used as the criteria score on a 4-point rating scale for decision making. Thus, a questionnaire item with a mean response score equal to and above 2.50 was considered high perception and a questionnaire item with a mean perception score below 2.50 was considered low perception. The null

Hypothesis was tested using t-test of two independent variables at 0.05 level of significance. Thus; if t- calculated value was greater than t-critical value, the null hypothesis of no significant was rejected but if the t- calculated value was less than t- critical value, the null hypothesis of no significant was accepted.

### 3. Results and Discussion

#### 3.1. Mean Response

The results in Table 1 revealed that the mean response scores for each item statements of building construction professional lecturers in tertiary institutions on check sheet as a quality tool for enhancing effective building project delivery in Bayelsa State, were 3.40, 3.29, 3.40, 3.42, 3.41, and 3.51, while the mean response scores for each item statements of building construction professionals in ministries, departments and authorities respectively in Bayelsa State were 3.46, 3.43, 3.54, 3.40, 3.37 and 3.38

**Table 1** Mean response scores on check sheet as a quality control tool for effective building project delivery in Bayelsa state

S/N	Items statement	Building Professional Lecturers (BPL)				Building Professional in MDA			
		N	X1	SD1	Remark	N	X2	SD2	Remark
	<b>Check-sheet as a quality control tool enhances effective build delivery by helping in;</b>								
1	The regular Quality Inspections at Various Stages of Construction	83	3.40	0.65	Agreed	105	3.46	0.81	Agreed
2	The verification of compliance with Building codes, Regulations and Project specification.	83	3.29	0.76	Agreed	105	3.43	0.68	Agreed
3	The monitoring of quality conditions of construction materials.	83	3.40	0.65	Agreed	105	3.54	0.56	Agreed
4	Ensuring safety protocols during construction works	83	3.42	0.64	Agreed	105	3.40	0.66	Agreed
5	The documentation of quality control activities.	83	3.41	0.63	Agreed	105	3.37	0.70	Agreed
6	Tracking the activities of quality control	83	3.51	0.64	Agreed	105	3.38	0.76	Agreed
Grand Mean response scores and Standard Deviation			3.41	0.66	Agreed		3.43	0.70	Agreed

X= mean, SD = Standard Deviation, N= (Total number of respondents) BPL = Building Professional Lecturer, MDA=Ministries, Departments and Authorities, criterion score = 2.50

The mean response scores of the two groups of building construction professionals were above the mean criterion response score of 2.50, which indicated that, the two groups of building construction professionals agreed that all the item statements for check sheet were quality control tool for enhancing effective building project delivery in Bayelsa State. Also, the grand mean response scores of 3.41 and 3.43 for building constructing professional lecturers in tertiary institution and building construction professionals in ministries, departments and authorities respectively was also above the criterion score of 2.50. This means that, check sheet as a quality control tool enhances effective building project delivery in Bayelsa State. This finding is in line with [14], who maintained that check sheet quality control tool incorporates various data to improve the quality control process of building construction activities for effective project delivery.

In addition, the standard deviation result of 0.66 and 0.70 for both building construction professional lecturers in tertiary institutions and building construction professionals in ministries, departments and authorities were close, indicating homogeneity in the results.

### 3.2 Hypothesis Test

HO1: There is no significant difference in the mean response scores of building construction professional lecturers in tertiary institutions and building construction professionals in ministry department and authorities respectively on the use of check sheet as quality control tool for enhancing effective building project delivery in Bayelsa State.

**Table 2** T-test of significant difference between the mean response scores of building construction professional lecturers in tertiary institutions and building construction professionals in ministries, departments and authorities on check sheet as quality control tool enhances effective building project delivery in Bayelsa State

Respondents	N	X	SD	DF	Level of Significance	t-cal	t-critical	Decision
Building Professional Lecturer	83	3.41	0.66	186	0.05	0.20	2.00	HO <sub>1</sub> Accepted
Building Professional in Ministry, Department and Authorities	105	3.43	0.70	Significant Difference				

The result in Table 2 revealed that the calculated t-value of 0.20 was less than the critical t-value of 2.00 at 0.05 probability level with 186 degrees of freedom. Thus, the null-hypothesis was therefore accepted. This implied that there was no significant difference in the mean response scores of building construction professional lecturers in tertiary institutions and building construction professionals in ministries, departments and authorities respectively on check sheet as quality control tool for enhancing effective building project delivery in Bayelsa State. That is, it was accepted by the two groups of building construction professionals that check sheet as a quality control tool enhances effective building project delivery in Bayelsa State.

This finding is consistent with the work of [13], who explained that check sheet quality control method was very effective for the inspection of quality of product on site during execution phases and also improving the quality of building project. The findings were also in agreement with [12], who reported that check sheet quality control helps in the assembling and integration of data for better projects inspection.

### 4. Conclusion

Findings from the study showed that building construction professional lecturers in tertiary institutions and building construction professionals in ministries, department and authority responded that check sheet is a quality control tool for enhancing effective building project delivery in Bayelsa State.

#### *Recommendations*

Based on the findings, the following recommendations were made

- Government and Stakeholders should encourage building construction professionals to adopt and implement check sheet as an effective quality control tool for building project delivery.
- Government and non-governmental organizations should train and develop building construction professionals to enhance their skills and knowledge on the use of check sheet as quality control tool for effective building project delivery.

### Compliance with ethical standards

#### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

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