

ASSESSMENT OF DESIGN SPECIFICATION AND ITS' IMPACT ON BUILDING
SUSTAINABILITY IN AKWA IBOM STATE

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ABSTRACT

The study aims to assess design specification and its' impact on building sustainability in Akwa Ibom State. The study used Ex-Post-Facto design. The targeted population for the study comprised of all Architects in Akwa Ibom State. A stratified random sampling technique was used to select 30 Architects from Uyo senatorial district and 25 architects each from Ikot Ekpene and Eket Senatorial Districts. which gave a total of 80 respondent used for the study. The instrument used for data collection was a structured questionnaire titled: Design Specification and building sustainability Questionnaire (DSBSQ). Face and content validation of the instrument was carried out by an expert in test, measurement, and evaluation in order to ensure that the instrument has the accuracy, appropriateness, and completeness for the study. The reliability coefficient obtained was 0.91, and this was high enough to justify the use of the instrument. The researcher subjected the data generated for this study to appropriate statistical techniques such descriptive statistics. The study revealed that design specification is essential to ensure building sustainability in Nigeria. The researcher concluded that design specifications plays a crucial role in architectural planning and construction practices as it provides a roadmap for projects, detailing materials and methods for implementation. It was also concluded that prioritizing sustainability in construction processes can build a resilient, environmentally conscious future for Nigeria which is essential in improving the economic and social well-being of the nation. Also, the extent of design specification adoption in building construction in Akwa Ibom State is very low especially in the case of building construction undertaken by non-professionals. Finally, there are many roles of design specification in mitigating building collapse and promoting building sustainability in Akwa Ibom State, including "choosing the right building assembly to utilise in various building parts". One of the recommendations was that architects, engineers, and other stakeholders involved in construction projects should ensure strict adherence to design specifications throughout the building process.

KEYWORDS: Design Specification, Impact, Building Sustainability and Akwa Ibom State.

INTRODUCTION

In Nigeria, the construction industry plays a crucial role in economic development and societal progress. However, amidst growing concerns for environmental sustainability and the need to mitigate risks such as building collapses, the significance of meticulous design specifications cannot be overstated. Design specifications serve as the blueprint for building projects, outlining the materials, techniques, and standards necessary for construction. This paper aims to assess the impact of design specifications on building sustainability in Nigeria.

According to NBS (2020), architectural specifications, often prepared by architects, engineers, or designers, serve as comprehensive accounts of the dimensions, construction, workmanship, and materials of work completed or to be completed on a project. These specifications are crucial components of the building process, facilitating timely, cost-effective, and high-quality project completion.

Building sustainability, or appropriate construction, involves living in harmony with the environment, considering social, environmental, and economic factors, and minimizing environmental impact by adopting resource-efficient practices. Sustainable buildings are designed to use fewer resources during planning, construction, refurbishment, and maintenance, making them essential for sustainable development. (Chris, 2021)

In Nigeria, where traditional architectural design concepts coexist with modern sustainability practices, the implementation of design specifications linked to sustainability has significantly impacted building sustainability (Anyanwu, 2022). Design specifications contribute to the selection of environmentally friendly materials and passive design components, essential for creating productive and healthful environments. However, challenges such as building collapses due to poor planning, construction, or unstable foundations underscore the importance of adhering to stringent design specifications and monitoring by certified professionals (Williams, 2020).

This work will explore the connection between design specifications and building sustainability in Nigeria, examining the roles of architects, engineers, and other stakeholders in ensuring compliance with sustainable practices and mitigating risks associated with inadequate design and construction processes. Through a comprehensive assessment, this work aims to elucidate the critical role of design specifications in fostering sustainable development and resilience in Nigeria's built environment.

STATEMENT OF PROBLEM

In Nigeria and of course in Akwa Ibom State, a concerning trend of structural weakness and compromised integrity plagues numerous buildings, putting them at risk of collapse. This deficiency in integrity often stems from a disregard for crucial aspects of construction, including the oversight of design specifications, which architects typically recommend. These specifications are pivotal, serving as a detailed blueprint for construction projects by delineating the materials, techniques, and standards necessary for building construction. Recognizing the significance of design specifications in construction, this research endeavors to assess the profound impact on building sustainability within Nigeria. It aims to scrutinize the relationship between adherence to design specifications and the sustainability of buildings. By investigating how closely design specifications are followed and the resultant effects on building sustainability, this research seeks to shed light on critical factors influencing the resilience,

longevity, and environmental footprint of structures in not only in Akwa Ibom State but Nigeria as a whole.

PURPOSE OF THE STUDY

- To find out the extent of design specification adoption in building construction by non-professionals in Akwa Ibom State.
- To examine the roles of design specification in mitigating building collapse and promoting building sustainability in Akwa Ibom State.

RESEARCH QUESTIONS

- What is the extent of design specification adoption in building construction by non-professionals in Akwa Ibom State?
- What are the roles of design specification in mitigating building collapse and promoting building sustainability in Akwa Ibom State?

LITERATURE REVIEW

CONCEPT OF ARCHITECTURAL DESIGN SPECIFICATION

The phrase "written document describing in detail the scope of work, materials to be used, methods of installation, and quality of workmanship for a parcel of work to be placed under contract" refers to an architectural design specification. The process of creating architectural specifications starts with careful planning and preliminary study. Architects examine project specifications, customer preferences, and financial limitations. They take into account the particular kind of building, its intended purpose, and local building laws and ordinances.

Architectural specifications, prepared by architects, engineers, or designers—often referred to as specifiers—are a comprehensive account of the dimensions, construction, workmanship, materials, etc., of work completed or to be completed on a project, according to NBS (2020). Architectural specs provide a thorough rundown of the tasks involved in a project. Architectural specifications must be studied in conjunction with documents that define quantities, timetables, and drawings because they do not include information on cost, product availability, quantity, or drawn or visualised information.

Architectural design requirements, which offer comprehensive details on the goods, materials, and techniques that will be utilised to construct a project, are crucial components of the building process. The timely, cost-effective, and high-quality completion of the project is made possible in part by these specification designs. Written documents known as architectural specification designs lay out the specifications needed to complete a construction job. Including the tools, supplies, and techniques that will be applied. The specifier, the project's architect, or the project engineer drafts the specifications. Additionally, they are meant to give the construction team a thorough road plan to follow (Zerodocs, 2024).

Architectural requirements also specify how a building is to be built, demolished, changed, or removed. When architectural specifications are brief, they effectively communicate design choices and integrate them into the building timeline. The goods that are used and the design guidelines for a project are specified in the specification. Architectural specifications, when carried out concurrently with design and drawing work, aid in striking a balance between

the needs of the customer, the law, technology, and aesthetics. The most prevalent writers of architectural specification designs are designers, architects, and engineers. The author is typically referred to by the industry as a "specifier" (Master spec, 2022).

Likewise, according to Grace (2023), an architectural design specification, or spec, outlines the labour and materials required to finish a building project. as necessary records for the design phase, which are a component of an official procedure. The design of the architectural specification is essential to the completion of the project. At any reputable architecture firm, a project's successful completion is largely dependent on an effective architectural specification design.

A building project's quality, standards, materials, and completion of work are all described in depth in the architectural specification design. Typically, specifications are released as a part of the handover information once they are included in the contractual documents for building contractors. It makes information sharing between the client, designer, and contractor easier. Accurate and current building information throughout the course of a project shields stakeholders from risk (Bcicentral, 2023).

Furthermore, Paul (2022) proposed that an architectural design specification is an organized, comprehensive account of the caliber, requirements, materials, craftsmanship, and finalization of work that develops over the course of a project. Typically, specifiers, designers, engineers, and architects prepare specifications. They could be released as a part of the building contractors' contract documents, to be perused alongside schedules, drawings, and occasionally models, and then included in the handover materials. An architectural specification design is typically organized "with requirements" or "scope of work" at the outset, and then pertinent laws or contractor concerns come next.

CONCEPT OF DESIGN SPECIFICATION

All the information that is required to describe an expected product, including its structure, materials, purpose, lifespan, and essential characteristics, is outlined in the design specification. A design specification, according to Obloo (2023), is a document that contains the specifications, expectations, and constraints of a system or product. A design specification is meant to make sure that, prior to work commencing, all parties involved are aware of exactly what is needed, anticipated, and feasible. It is best to draft a design specification early on in the product development process, ideally in the ideation stage. As the product develops, it should be often examined and modified. All parties involved in the project should have access to the design specification, as should everyone who works on it.

Furthermore, a design specification, also known as a product design specification, is a written document that specifies the requirements that a process or product must meet. The specification should include the needs of the client or customer if the product or its design is being developed on their behalf. For instance, necessary dimensions, environmental considerations, ergonomic considerations, aesthetic considerations, maintenance requirements, etc., could all be included in a design specification. Additionally, it could provide precise illustrations of how the design ought to be implemented, assisting others in working correctly by serving as a manual for actions (Wikipedia 2024).

Moreover, a design specification encompasses all or any portion of a description, whether in machine-readable, human-readable, or another format, of a product's physical, functional, or

technical elements, attributes, requirements, or performance that are connected to or used in its design, manufacture, testing, operation, and repair. Bills of materials, schematic diagrams, approved vendor lists, parts, general and special fabrication and assembly drawings and procedures, computer-aided design and manufacturing files, unique material specification control drawings, manufacturing materials and chemistry, test procedures, software and equipment, component and other source control drawings, are just a few examples of what can be included in a "design specification" (Law Insider, 2023).

A design specification is a comprehensive document that lists every need for a product's design, including size, composition, and features. It acts as a blueprint, assisting artists from the beginning to the conclusion and guaranteeing that the final product is in line with the planned vision and purpose (Mary McMahan, 2024). As the name implies, a design specification is a document that details the design specifications for a certain project. The client has conducted thorough study before preparing this document, which includes extremely specific and detailed specifications for the design that must be strictly followed through to completion. Design specifications are a crucial component of the construction documentation because trenchless building is done underground. To create a final product that satisfies the client's objectives, a contractor must follow accepted best practices and design specifications (Trenchlesspedia 2023).

CONCEPT OF BUILDING SUSTAINABILITY

Building sustainability, also known as appropriate construction, is the practice of living in balance with the environment, taking the social, environmental, and economic elements of decisions into account, and minimizing environmental impact by leading a lifestyle that uses less energy, water, and materials. It can also relate to a building's structure as well as the implementation of resource- and environmentally-conscious procedures at every stage of the building's life cycle, including planning, design, construction, operation, maintenance, refurbishment, and demolition. Sustainable buildings use fewer resources when they are planned, constructed, refurbished, and maintained. It has been observed that the construction of buildings is crucial to sustainable development.

According to Chris (2021), constructing sustainably entails limiting energy use and trash creation while utilizing recyclable and renewable resources in construction projects. Minimizing the sustainable construction method's negative environmental effects is its main objective. After a building project is over, sustainable construction doesn't stop; the building's design should have as little of an environmental impact as possible during the building's lifetime.

Furthermore, the term "building suitability" encompasses not just the actual construction but also the process of constructing environmentally conscious buildings that lessen carbon footprints. When creating an appropriate construction, material selection is a major consideration. Reusable, non-toxic, renewable, and recyclable materials are generally favoured above other types. A cost-effective, energy-efficient, hygienic, and environmentally friendly living and working environment is designed and constructed with consideration for building appropriateness (Black bridge, 2022).

Nonetheless, Group 6 (2023) defines building appropriateness as using recyclable and renewable resources in construction to cut waste and energy usage. The main goal of building appropriateness is to reduce the environmental impact of construction. Ensuring that the final building has the least possible impact on the environment is the goal of building appropriateness, which includes both the building project and design. Furthermore,

environmentally friendly materials and components must be selected in order for a structure to be considered suitable. Solar panels, energy-efficient roof hatches, and energy-efficient insulation are examples of sustainable building practices.

Building appropriateness refers to the use of recyclable and renewable resources and materials in construction. It is important to take precautions during construction projects to preserve the surrounding natural environment and minimize waste and energy usage. An environmentally friendly structure or setting is the ultimate goal of every sustainable construction project (Go construct, 2020). Building appropriateness, according to Alicia (2021), is a construction style that aims to lessen the detrimental effects that buildings have on the environment, society, and economy. Building appropriateness techniques are made to achieve a number of goals. These goals include cutting back on the use of non-renewable natural resources, boosting the use of renewable resources, decreasing the quantity of waste that people make, lowering the need for and expense of maintenance, and enhancing social interactions within our communities.

The goal of building sustainability is to create dwellings that are more hygienic, accessible, and comfortable while also reducing operating expenses and their negative environmental effects. It covers building resilience against natural disasters including earthquakes, storms, and flooding, as well as energy efficiency and the transition to a net zero carbon economy. Throughout its whole life cycle, a sustainable building avoids irreparable environmental damage, ensures that resources are distributed equally, and satisfies social and cultural demands (Branz, 2024).

TYPES OF BUILDING DESIGN SPECIFICATION

The following are the types of building specifications:

- **Propriety**

Proprietary specs are usually used by contractors to specify the exact materials and resources needed for the project. This kind of specification is most frequently used by contractors when finishing projects on already-existing structures, such home renovations. The proprietary specification may include a description of the current structural materials as well as a list of comparable or matched materials that are required to finish the project (Indeed 2023).

- **Performance and Construction Specifications**

These are the project's operational needs after it is completed. It is not a detailed description of every task, as the prescriptive construction requirements do. Rather, the contractor is in charge of the specifics of how the task is completed. The only requirement is that the project be delivered in a way that satisfies the client's goals. Malsam, William (2023).

- **Prescriptive Specifications**

Prescriptive specifications explain in great detail the materials and installation methods that the contractor must employ in order to complete the job. Typically, this kind of specification will have a format like the sections below (ARCH Tool Box, 2024).

ROLES OF DESIGN SPECIFICATION IN MITIGATING BUILDING COLLAPSE AND PROMOTING BUILDING SUSTAINABILITY

In Nigeria, it is imperative that the issue of building collapse be addressed. In Nigeria, there are numerous factors that might lead to a structure collapsing, including poor planning, carelessness, incapacity, poor construction, unstable foundations, excessive weight, and corruption. It is important to consider and address these factors. It is wise to implement measures to lessen the likelihood of building collapses in Nigeria.

Building collapse, according to Williams (2020), is likely the most significant topic that has been highlighted in the Nigerian construction sector because of the rise in building collapses that are occurring in numerous urban locations. The main reasons of building collapse are earthquakes, flooding, abrupt geotechnical changes, and poor construction details. Building design specifications and monitoring should be managed by certified professionals, and if a professional is proven to be at fault for a building's collapse, they should be suitably sanctioned. We will be able to lessen building collapse in Nigeria by using these techniques.

According to Dorcas (2015), an architect is a key player in the building industry and has a responsibility to coordinate all activities of the allied professions, ensuring that all specifications are followed and in line with the design and client satisfaction in order to mitigate building collapse in Nigeria. As the master planner, the architect has the responsibility to make sure the client is sent to qualified specialists. Buildings must meet strict functional, safety, and cost requirements in addition to being aesthetically pleasing in order to fulfil its intended use and purpose.

According to Tim (2024), building collapses are a serious risk to people's lives and property, thus preventing them requires a thorough grasp of the roles that construction experts play in putting mitigation techniques in place. Institutional theory can direct initiatives for institutional transformation to effectively minimize building collapses. It can evaluate the obstacles to change inside the current institutions, including professionals' hesitation to adopt safer methods in Nigeria or their opposition to new legislation.

Architects make sure they design the building to meet safety requirements and structural integrity during the Calebella (2023) design specification phase, which is crucial to the construction process. Professional architects should prepare the design and construction papers, such as architectural drawings, specifications, and details, which are utilized by contractors for construction. This is one of the main strategies for reducing building collapse in Nigeria. The National Building Code, which establishes the minimal requirements for building design and construction, must be adhered to by architects working in Nigeria.

Reducing the energy consumption of buildings and, consequently, the detrimental effects of urbanization and inadequate energy infrastructure on people's well-being, is the primary goal of Nigeria's building sustainability sector. One of the main tactics being used to significantly lower the amount of energy required for constructing energy. Nigeria has been tremendously impacted by design specifications because they make it possible to utilise sustainable materials and passive design components to create settings that are productive and healthful.

In order to support our growth and progress, Abbagana (2016) cited industries that deplete non-renewable resources and harm the atmosphere. This has made it essential for all significant resource consumers, including the building. At first, Nigeria lacked an action plan for

sustainable development that contained tactics for achieving sustainability in the built environment. However, Nigeria will benefit if they can implement these five principles of sustainable site design, water conservation and quality, energy and environment, indoor environmental quality, and conservation of materials and resources. These benefits would include bettering operational and maintenance procedures, safeguarding and conserving water, and improving indoor air quality.

According to Anyanwu (2022), Nigeria is a nation that exhibits a wide variety of traditional architectural design concepts in various locations according to socioeconomic background, cultural background, and climatic conditions. The use of design specifications is encouraged by Nigeria's potential for renewable energy. The restoration and new building sectors have seen a rise in interest in the topic of green and sustainable design. In light of these existing conditions, it is clear that sustainable development principles, when applied to the planning, designing, constructing, and using of buildings, can improve and have an impact on the environmental health and economic well-being of communities in Nigeria and other third-world nations.

According to Inimbom (2023), the idea of building appropriateness in Nigeria has greatly benefited from design standards linked to sustainability. Nigeria's sustainability has, in many respects, achieved an all-time high. In Nigeria and around the world, sustainable construction (SC) has played a significant role in preserving natural resources and raising standards of living. A sustainable building seeks to create design-specified structures that financially and efficiently improve people's quality of life while protecting the environment. Due to these demands, sustainability has grown in significance as a field of study for Nigerian construction researchers.

According to Peter (2018), choosing the right building assembly to utilize in the various building parts is one of the most crucial responsibilities in the design specification stage of building design. Traditionally, architects have been responsible for this duty. Although building appropriateness has a major influence on the environment, it is essential to the economic success of many nations. Architects working in Nigeria's construction business have found that design specifications might aid in their decision-making when choosing building materials.

METHODOLOGY

In carrying out the study, Ex Post-facto design was adopted for this study. The study was carried out in Akwa Ibom State. The targeted population for the study comprised all Architects in Akwa Ibom State. A stratified random sampling technique was used to select 30 Architects from Uyo Senatorial District, 25 each from Ikot Ekpene and Eket Senatorial district which gave a total of 80 respondent used for the study. The instrument used for data collection was a structured questionnaire titled "Design Specification and Building Sustainability Questionnaire (DSBSQ)". Face and content validation of the instrument was carried out by an expert in test, measurement, and evaluation in order to ensure that the instrument has the accuracy, appropriateness, and completeness for the study under consideration. The reliability coefficient obtained was 0.91, and this was high enough to justify the use of the instrument.

RESULTS AND DISCUSSIONS

Research Questions 1: The research question sought to find out the extent of design specification adoption in building construction by non-professionals in Akwa Ibom State. To answer the research question percentage analysis was performed on the data, (see table 1).

Table 1: Percentage analysis of the extent of design specification adoption in building construction by non-professionals in Akwa Ibom State

EXTENTS	FREQUENCY	PERCENTAGE
HIGH EXTENT	12	15*
LOW EXTENT	27	33.75
VERY LOW EXTENT	41	51.25**
TOTAL	80	100%

** The highest percentage frequency

* The least percentage frequency

SOURCE: Field survey

The above table 1 presents the percentage analysis of the extent of design specification adoption in building construction by non-professionals in Akwa Ibom State. From the result of the data analysis, it was observed that the highest percentage (51.25%) of the respondents affirmed that the extent of design specification adoption in building construction by non-professionals in Akwa Ibom State is of “very low”, while the least percentage (15%) of the respondents stated that the extent of design specification adoption in building construction by non-professionals in Akwa Ibom State is of “high”.

Research Questions 2: The research question sought to find out the roles of design specification in mitigating building collapse and promoting building sustainability in Akwa Ibom State. To answer the research question percentage analysis was performed on the data, (see table 2).

Table 2: Percentage analysis of the roles of design specification in mitigating building collapse and promoting building sustainability in Akwa Ibom State

	FREQUENCY	PERCENTAGE
Choosing the right building assembly to utilize in various building parts	56	30.43**
Lessening the likelihood of building collapses aids in the decision-making when	43	23.36
Choosing building materials Promotes Environmental health and economic	41	22.28
well-being of communities	24	13.04
Enhances renewable energy	20	10.86*
TOTAL	81	100%

**The highest percentage frequency

* The lowest frequency

The above table 2 presents the percentage analysis of the roles of design specification in mitigating building collapse and promoting building sustainability in Akwa Ibom State. From the result of the data analysis, it was observed that the highest percentage (30.43%) of the respondents affirmed that “Choosing the right building assembly to utilize in various building parts” played a crucial role in mitigating building collapse and promoting building sustainability in Nigeria, while the least respondents (10.86%) of the respondents stated that “Enhancing renewable energy” in design specification was essential in mitigating building collapse and promoting building sustainability in Akwa Ibom State.

CONCLUSION

Design specifications plays a crucial role in architectural planning and construction practices. It provides a roadmap for projects, detailing materials and methods for implementation. By integrating sustainable principles like renewable resources and energy efficiency, specifications contribute significantly to building sustainability. This approach addresses environmental challenges, enhances resilience against disasters, and fosters economic growth.

It is also concluded that the extent of design specification adoption in building construction in Akwa Ibom State is very low especially in the case of building construction undertaken by non-professionals. Also there are many roles of design specification in mitigating building collapse and promoting building sustainability in Akwa Ibom State. They are “choosing the right building assembly to utilise in various building parts”, “lessening the likelihood of building collapses”, “aids in the decision-making when”, “choosing building materials”, “promotes Environmental health and economic”. “well-being of communities” and “enhances renewable energy”.

Collaboration among stakeholders is essential for fully realizing the potential of design specifications in promoting sustainability. Ultimately, prioritizing sustainability in construction processes can build a resilient, environmentally conscious future for Nigeria hence, improving the economic and social well-being of the nation.

RECOMMENDATIONS

- Architects, engineers, and other stakeholders involved in construction projects should ensure strict adherence to design specifications throughout the building process. Regular audits and inspections should be conducted to verify compliance with specified materials, techniques, and standards.
- There should be incorporation of sustainable design principles into architectural specifications. This includes specifying the use of eco-friendly materials, energy-efficient systems, and passive design strategies aimed at minimizing environmental impact.
- There should be continuous training and capacity building programmes for construction professionals, including architects, engineers, and contractors to enhance their knowledge and understanding of sustainable construction practices.

REFERENCES

- Abbagana, M. (2016). Strategies for achieving sustainability in the Nigerian building design and construction industry. Available at: https://www.researchgate.net/publication/311994239_strategies_for_achieving_sustainability_in_the_nigerian_building_design_and_construction_industry.
- Alicia, B. (2021). The 7 principle of sustainable construction. Available at: <https://www.acbconsultingservices.com/sustainable-construction-project-management/the-7-principles-of-sustainable-construction>.
- Anyanwu, I. (2022). Issues on green building design in Nigeria and its effect. Available at: https://www.cambridgenigeriapub.com/wp-content/uploads/2022/05/cjeres_vol24_no4_march_2022-21.pdf.
- ARCH tool box (2024). Types of Construction Specifications available at: <https://www.archtoolbox.com/types-of-construction-specification/>
- Bcicentral (2023). Specification in Construction: Everything You Need to Know. Available at: <https://www.bcicentral.com/blog/specification-in-construction-and-its-importance>.
- Blackbridge (2022). What is green building concept and how does it help to achieve sustainability. Available at: <https://www.blackridgeresearch.com/blog/what-is-green-building-and-what-is-the-role-of-green-building-council>.
- Branz (2024). Sustainable building. Available at: <https://www.branz.co.nz/sustainable-building>.
- Calebella (2023). The Roles of Architects in Preventing Building Collapse in Nigeria. Available at: <https://calebella.com/the-roles-of-architects-in-preventing-building-collapse-in-nigeria>.
- Chris, J. (2021). What Is Sustainable Construction? Available at: <https://www.construction21.org/articles/h/what-is-sustainable-construction.html>.
- Dorcas, A. (2015). Strategies for Mitigating Building Collapse in Nigeria: Roles of Architects and Other Stakeholders in the Building Industry. Available at: https://www.researchgate.net/publication/319551481_Strategies_for_Mitigating_Building_Collapse_in_Nigeria_Roles_of_Architects_and_Other_Stakeholders_in_the_Building_Industry.
- Go construct (2020). Sustainability in construction. Available at: <https://www.goconstruct.org/why-choose-construction/whats-happening-in-construction/sustainability-in-construction-1>.
- Grace, E. (2023). What Are Construction Specifications? Available at: <https://constructionblog.autodesk.com/what-are-construction-specifications>.
- Group 6 (2023). What is sustainable construction? Available at: <https://proest.com/construction/what-is-sustainable-construction>.
- Indeed (2023). Types of specifications available at: <https://www.indeed.com/career-advice/career-development/specification-in-construction>

- Inimbom, W. I. (2023). A historical review of sustainable construction in Nigeria: a decade of development and progression. Available at: <https://www.emerald.com/insight/content/doi/10.1108/FEBE-02-2023-0010/full/html>.
- Law Insider (2023). Design Specification definition available at <https://www.lawinsider.com/dictionary/design-specification>
- Mary McMahan (2024). What Is a Design Specification? Available at: <https://www.smartcapitalmind.com/what-is-a-design-specification.htm>
- Masterspec, (2022). What is a Construction Specification? Available at: <https://masterspec.co.nz/What-is-a-Construction-Specification/7085-2b23d547-15f6-42e1-b5c3-687ff2923655-p1>.
- Nbs (2020). What are architectural specifications? Available at: <https://www.thenbs.com/knowledge/what-are-architectural-specifications>.
- Obloo (2023). Design Specification Definition available at: <https://oboloo.com/glossary/design-specification/objectmanager.com/blog/types-of-construction-specifications>
- Paul, S. (2022). Construction specifications: Everything you need to know. Available at: <https://www.thenbs.com.au/resources/articles/construction-specification>.
- Peter, O. A. (2018). Investigating Factors Influencing Building Materials Selection in Nigerian Construction Industry. Available at: <https://pubs.sciepub.com/ajcea/6/4/4/index.html>.
- Tim, O. E. (2024). Roles of building professionals in promoting building collapse mitigation strategies in south-south Nigeria. Available at: http://www.globalscientificjournal.com/researchpaper/roles_of_building_professionals_in_promoting_building_collapse_mitigation_strategies_in_south_south_nigeria.pdf.
- Trenchlesspedia (2023). What Does Design Specification Mean? Available at: <https://trenchlesspedia.com/definition/2494/design-specification>
- Wikipedia (2024). Design specification available at: https://en.wikipedia.org/wiki/Design_specification
- William, M. (2023). Types of Construction Specifications available at: <https://www.pr>
- Williams, B. Q. (2020). Mitigating building collapse in Nigeria. Available at: https://www.researchgate.net/publication/346876550_Mitigating_building_collapse_in_Nigeria.
- Zerodocs, (2024). Architectural Specifications: A Guide for Construction Projects. Available at: <https://zerodocs.com/architectural-specifications-a-guide-for-construction-projects>