

# Assessment of the Impact on the Use of in-house Professionals in Building Projects Delivery in Tertiary Institutions in Anambra State: a Case of Nnamdi Azikiwe University

**Ndubuisi Michael Odoanyanwu\*<sup>1</sup>; Calistus Chibuzor Okafor\*\*<sup>2</sup>,  
Aniakor Ugochi Chizorom\*\*<sup>3</sup>**

<sup>123</sup>*Department of Architecture, Nnamdi Azikiwe University, Awka, Anambra State*

## **Abstract:**

*The study focused on the assessment of the impact of in-house professionals in building projects delivery for tertiary institutions with a case of Nnamdi Azikiwe University, Awka, Anambra state, Nigeria. The review shows that no research work has being carried out on the in-house professionals in building projects delivery for the used case study. The method of research work adopted is research design which helps the researcher to solve the research problem. The tools used to analyze the study are the percentages, frequency accumulations and mean scale likert. The result shows that the male are dominant of the field study. Professionals with Masters Degrees, master of philosophy and doctor of philosophy are dominant for the respondents used in the research work. The study also shows that the null hypothesis will be rejected, while the alternative will be accepted which says that there is the in-house professionals plays a significance role in building projects delivery for tertiary institutions in Anambra State which Nnamdi Azikiwe University was used as a study area. In conclusion, the study recommends the high impact of the in-house professionals to project building delivery and encourage the appropriate authorities to ensure continuity of the adequate system in projects delivery.*

**Key words:** *Building; professional; project; in-house; delivery; institutions*

---

## **Article Citations:**

Ndubuisi Michael Odoanyanwu, Calistus Chibuzor Okafor, Aniakor Ugochi Chizorom, " Assessment of the Impact on the Use of in-house Professionals in Building Projects Delivery in Tertiary Institutions in Anambra State: a Case of Nnamdi Azikiwe University ", International Journal of Geography, Earth and Environment Science, Volume 1, Issue 1, 2021, 15-28.

## 1. Background of the Study

Construction is the process of building things such as houses, bridges, roads, structures and designs (Idoceanline.com, 2021). Construction projects are the organized effort to construct a building or structure.

In the fields of civil engineering and architecture, construction projects involve the process that consists of tangibly assembling an infrastructure or building (Construction.law.com, 2021; Ogunoh, 2018). Construction projects incorporate numerous mini-projects; a construction project is not a single activity. Larger scale construction projects require human multitasking; in most instances, these construction projects are managed by a project manager and supervised by a construction manager. In addition, these types of larger construction projects are supervised by a design engineer, a construction engineer or a certified project architect. In order for construction projects to be executed in a cost-efficient manner, effective planning is required. Any construction management team involved with the design and execution of the infrastructure must implement various safety measures and analyze the overall cost of the project to ensure that work-related injuries or financial troubles are not met. Stringent planning is required in all construction projects because of the invariable environmental and financial impact the job will possess. As a result of these inherent traits, all construction projects, to be successful, require exhaustive planning revolving around the following elements: the availability of building materials, logistics, scheduling a budget, construction site safety, bidding and the inconvenience the project will impose on the general public.

### Types of Construction Projects:

In general, there are three types of construction projects: building construction projects, heavy or civil construction projects and industrial construction projects (Designingbuildings.co.uk, 2021; Hassan & Bakar, 2011). Each type of construction project will require a unique team to design, plan, construct and maintain the construction endeavor (Kwak & Randall, 2017). Building construction projects involves the process of adding a structure to real property. The majority of building construction projects is small renovations, such as simple additions to rooms or the renovation of a bathroom. In these cases, the owner of the underlying property will act as the project manager. That being said, all building construction projects will include some elements in common, such as financial, legal and design considerations. Residential construction is grouped into this type of construction project; the most common type of residential construction project in the United States is wood framed construction (Bharil, 2017; Child & Scoones, 2017; Hamilton et al., 2015; Wikipedia, 2021). Industrial construction is a small part of the construction industry, but arguably the most important. Owners of these construction projects are typically for-profit, industrial corporation that can be found in various industries, including: petroleum, medicine, chemical, manufacturing, generation (Ezeliora & Nwufo, 2021; Ogunoh, 2018).

A **project delivery method** is a system used by an agency or owner for organizing and financing design, construction, operations, and maintenance services for a structure or facility by entering into legal agreements with one or more entities or parties (Delivery Integrated Project, 2009; Gajurel, 2021; Gordian, 2021; Killough, 2021; Kwak, Z.H. & Randall, 2017; Pekka, 2002; Wikipedia, 2021; Zimmermann, 2021).

**a) Objectives of the Study**

The main objective of this study is to assess the impact on the use of in-house professionals in building projects delivery for tertiary institutions in Anambra State.

**The specific objectives are:**

- i. To examine the impact of the use of in-house influence in building project delivery for tertiary institutions.
- ii. To examine how the risk prevalent in adopting in-house professionals in building projects delivery for tertiary institutions
- iii. To ascertain the effect of fund investment in building projects delivery for tertiary institutions
- iv. To determine the level of in-house professional skills in building projects delivery for tertiary institutions

**b) Research Questions**

- i. How does the impact of the use of in-house professionals influence in building project delivery for tertiary institutions?
- ii. Can there be any risk that can prevail in adopting in-house professionals in building projects delivery for tertiary institutions
- iii. What is the effect of fund investment in building projects delivery for tertiary institutions?
- v. To what the level of in-house professional skills in project buildings for tertiary institutions?

**c) Research Hypothesis**

**i. Hypothesis I -**

$H_0$ : There is no significant impact on the use of in-house professionals in building project delivery for tertiary institutions.

**ii. Hypothesis II-**

$H_0$ : The level of risks does not significantly prevail in adopting in-house professionals in building projects delivery for tertiary institutions.

**iii. Hypothesis III-**

$H_0$ : The fund investment has no significant effect in building projects delivery for tertiary institutions

**iv. Hypothesis IV-**

$H_0$ : The level of in-house professional skills has no significant effect in building projects delivery for tertiary institutions.

## 2. Literature Review

### Project development, delivery, and execution

The project delivery method, whether it is a conventional design-bid-build, design-build (DB), engineer-procure-construct (EPC), PPP, or construction at risk, can have an impact on the bridge planning process, but this decision is often deferred. In the past, the amount of project funding precluded certain type of project delivery methods. Another method, known as construction at risk or general contractor construction manager (GCCM) is where a contractor is retained earlier in the design process, which helps to sync both the design and construction together so that the cost of the project is more certain. An early determination of probable project delivery methods can be very helpful in the planning process and very cost effective for the bridge owners as well (Bharil, 2017; Killough, 2021;

Kos et al., 2004; Pekka, 2002; Zimmermann, 2021).

### **Delivery Methods for Construction Projects**

The most widely used project delivery methods in the construction industry: Design-Bid-Build, Design-Build, Construction Manager at Risk, Job Order Contracting and Multiple Award Task Order Contract (Bharil, 2017; Gordian, 2021; Hamilton et al., 2015; Kaijun & Wang Yuxia, 2010; Killough, 2021; Kwak, Z.H. & Randall, 2017; Pekka, 2002; Wikipedia, 2021).

#### **1. Design-Bid-Build (Traditional Building)**

Design-Bid-Build is the most commonly used method for completing construction projects and is probably what comes to mind when most people think about the construction process. As its name suggests, this delivery method consists of three distinct phases: the design phase, the bid phase and the build phase. Design-Bid-Build is a good option for new commercial construction. Although it's a lengthy process, it allows owners to work in tandem with architects and engineers to get the best price for their project (Construction.law.com, 2021; Ezeliora et al., 2020; Igwegbe et al., 2021; Ogunoh et al., 2014). The design phase begins with an owner hiring a designer, either an architect or an engineer, to design a new facility. While designing the new building, the architect or engineer will prepare any necessary drawings and specifications that the contractor's team will need to complete the construction work. Once the design work is finished, the project is opened for bids. During the bid phase, general contractors will review construction documents, confer with any needed subcontractors and ask the architect or engineer clarifying questions in order to prepare their bid. Each bid represents a general contractor's best price for a project, and multiple bids for the same project can vary greatly. After all of the general contractors have submitted their respective bids, the designer will review each bid, ask the contractors for any additional information and, ultimately, choose the bid they think best fits the owner's needs. Once the winning bid has been selected, the build phase begins, and the general contractor's team can get to work constructing the new facility. A unique feature of the Design-Bid-Build method is that the designer will oversee the work of the general contractor and subcontractors. This helps ensure that the owner receives a quality end product (Executive Summary, 2021; Hamilton et al., 2015).

#### **2. Design-Build (D-B)**

The Design-Build method was created to reduce the lengthy timeline that often accompanies Design-Bid-Build. It does so by replacing the designer and the contractor with a single party who fills both of these roles, called a design-builder. The design-builder, who is usually an architect, engineer or contractor, serves as the owner's single contact for the entirety of the project. And while this allows for efficient communication, it also means that the design-builder is singularly accountable for the outcome of the project. The D-B process begins with an owner drafting an initial project design and asking for project proposals from various design-builders. These proposals, like bids in the Design-Bid-Build method, generally represent a design-builder's best price for the project. The key difference between a bid and a proposal is that proposals include notes on the project design, whereas bids don't alter the project design. Owners typically select the proposal that provides the best value for the project without sacrificing design elements (Executive Summary, 2021; Hamilton et al., 2015; Schwartz

et al., 2016). After the owner has chosen a specific proposal, the design-builder's team can get to work securing permits and beginning construction immediately. The project can also be completed in phases, where the first phase is designed and construction begins while the second phase is designed, again allowing for a faster start to construction. This makes Design-Build ideal for large projects that require an accelerated timeline. But the benefits of D-B also add some risk to the owner. Owners who choose the D-B delivery method for their projects lose the advantage of having a separate party oversee the quality of construction. Instead, the design-builder has complete autonomy in the construction phase. So choosing a trustworthy design-builder is integral to success in Design-Build (Bharil, 2017).

### **3. Construction Manager at Risk (CMAR)**

Construction Manager at Risk is also a derivative of the Design-Bid-Build process. But instead of the designer overseeing the design process and construction quality, a construction manager is hired by the owner to oversee the entire project. In fact, once hired, the Construction Manager stands in as the owner's representative and advocate in every step of the construction process from preconstruction, to design and bidding, through construction. This makes CMAR ideal for project owners who want an expert's help managing their project or communicating between parties, and sometimes CMAR allows owners to remove themselves from the majority of the construction process altogether (Bharil, 2017; Chinwuko et al., 2014; Construction.law.com, 2021; Dajadian & Koch, 2014; Hamilton et al., 2015; Merriam-webster.com, 2021; Ogunoh, 2018; Pekuri et al., 2011). When an owner decides to use the CMAR delivery method for their project, they'll bring an initial design to a Construction Manager, who will then begin consulting with designers to draw up plans. During the design phase, the Construction Manager will work on the owner's behalf to value engineer and find cost-saving opportunities where possible. About halfway through the design phase, the Construction Manager will present the owner with their Guaranteed Maximum Price (GMP). With their GMP, the Construction Manager sets a price threshold that they promise the owner's project will not exceed. If the project comes in under this threshold, the Construction Manager will likely be rewarded by the owner through a cost-sharing agreement. But if the project exceeds the GMP, then the Construction Manager takes on the risk of making up the difference. Once the design phase is finished, the Construction Manager will take bids from contractors for the project and select the bid they believe best meets the owner's needs without crossing the GMP threshold. Once construction begins, the Construction Manager will work with the contractor to schedule construction phases, oversee the quality of the contractor's work and coordinate any needed change orders (Dajadian & Koch, 2014; Pekuri et al., 2011).

### **4. Job Order Contracting (JOC)**

Job Order Contracting is an indefinite-delivery, indefinite-quantity (IDIQ) project delivery method. This means that multiple projects can be completed over the life of one long-term contract, as opposed to the single-project contracts used in the three previous methods. The long-term contract makes JOC an ideal choice for owners who complete a high volume of construction projects over the course of each year. Rather than needing to take each project to bid, owners take bids from contractors at the beginning of the contract, then can access their services without having to re-bid throughout the entire life of the contract. The JOC project delivery method is predicated on a catalog of construction

Tasks with preset prices, which we call the Construction Task Catalog (CTC) that lives for the entirety of the contract. Having the CTC set at the beginning of the JOC contract allows owners to access contractor services at any point during the agreed time span without having to renegotiate prices for each project. Rather than bidding on individual projects, contractors will place bids by adding an adjustment factor to the CTC to account for their overhead, profit and other operating costs. Owners will typically award the contract to the lowest responsive, responsible bidder (Koch & Wüstemann, 2014). After the contract is awarded, the winning contractor can perform work for the owner at any point needed. Each project will be preceded by a Joint Scope Meeting to make sure all parties agree on what work needs to be completed and to set a Detailed Scope of Work for the project. Once the scope is set, the contractor will submit a Price Proposal for the total project cost, the owner will review the Price Proposal and work will get started. Procurement for traditional projects can take six months or more. JOC cuts that down to a few weeks. That time savings also brings significant cost savings by reducing administrative work. And the preset pricing makes sure that cost overruns are minimized. Because the JOC method is designed to complete a succession of pre-defined construction tasks, it's perfect for a variety of small to medium construction projects including repairs, renovations and maintenance work, especially when short timelines or fixed budgets are involved. JOC, however, isn't typically an ideal choice for new construction. Building a catalog of Pre-Priced Tasks for constructing an entire building would be burdensome, and the length of the project would negate the timesaving benefits of completing smaller projects in quick succession. There's a lot more we could say about JOC and why we think it's an incredible innovation. If you'd like to hear more about JOC from us, you can find information here. But for now, we'll move onto other project delivery methods (Bharil, 2017; Gordian, 2021; Killough, 2021; Kwak & Randall, 2017; Pekka, 2002; Wikipedia, 2021).

### **5. Multiple Award Task Order Contract (MATOC)**

Like Job Order Contracting, MATOC is an IDIQ method that's commonly used by the military and the Federal government. It sets a long-standing contract under which multiple projects can be completed. MATOC is distinct, though, as it houses multiple contractors under a single master contract. While JOC doesn't prohibit the use of multiple contractors under one JOC program, it doesn't necessitate it. Because of this, the terms JOC and MATOC can be used interchangeably for certain projects. The MATOC delivery method begins with a master contract sometimes called an umbrella contract, which defines the parameters of work that can be completed under the program. The owner will select a pool of contractors they want to participate in bids for projects. When the owner is ready to start a project, they'll take bids from only the contractors pre-selected to participate in the MATOC program. When a winner is selected for a project, a smaller, project-specific contract will be written between the owner and the contractor who will complete the project. Although a separate contract is written for each project, the details in the master contract reduce the number of details that need to be re-negotiated for the project contract. The benefits of MATOC largely mirror those of JOC reducing the procurement timeline and controlling costs. However, because MATOC is used most often by the Federal government, which generally prefers to set contracts with longer timeframes than just a year or two, it can be hard for smaller, local contractors to enter into MATOC contracts. In contrast, JOC, which is used in a variety of industries, normally encourages the participation of local contractors (Gajurel, 2021; Killough, 2021; Merriam-webster.com, 2021; Pekka, 2002).

### 3. Research Method

#### a) Introduction

The study examines the usefulness of the impact of in-house professionals in building projects delivery for tertiary institutions. The research methodology would further explain the research design, the study area, population size of the study, sample size and sampling technique, validity and reliability of the research instruments, source of data collection and method of data analysis.

#### b) Research Design

Research design is the guideline which directs the researcher towards solving the research problem. In the course of this study the researcher will adopt survey method of data collection. That means, data will be gathered from both primary and secondary data using questionnaire method of data collection (C. D. Ezeliora & Ejikeme, 2015).

#### c) Area of the study

The study area covers Nnamdi Azikiwe University and their branches all over Anambra State of Nigeria. Nnamdi Azikiwe University is located at south eastern region of the country. It is bounded on the north by Kogi State, on the west by Delta State, on the east and south-east by Imo and Abia State and on the north-west by Benue State, on the west and south-west by Ebonyi, Enugu and Abia State. And overall effect of this is that Anambra has rich soil for Agriculture and enjoys equitable climate that is neither hot nor too cold all year round.

#### d) Population size of the study

Population refers to the entire members or elements in which the researcher is interested. Then population of this study covers the 1200 staff who are professionals in the building projects within the institution and beyond. Also 200 (two hundred) registered building project professionals who are contractors in the institution were also used in this case study.

#### e) Sample size and sampling technique

The tertiary institution includes in the sample will be selected using purposive sampling method after considering all these factors. Thus, the sampled tertiary institution will be filtered as follows; data from respondent questionnaires, works unit and physical units of the tertiary institution and financial reports of the building projects delivery over twenty years in the institution. They are subject to some unique regulations and the accruals behavior is different compared to other companies. Building financial and project delivery will be left out as such buildings generally do not generate any building project delivery in the institutions. This indicates that their accruals generating process differ significantly and they require specific building project rules and requirements, including, the minimum capital requirements and specific regulations governing building finance and building project services. Finally, buildings without projects delivery of which their existence and undelivery of the buildings cannot be determined will be left out. Therefore, after all these filtration processes, we will apply statistical formula to arrive at our sample size. Statistically, our sample size was chosen using Yaro Yameni Formula stated as follows (Ogunoh, 2018; Okpala et al., 2021):

$$n = \frac{N}{1+N(e)^2}$$

Where n= Sample size; N= Total population; e= error term or significant level (10%)

$$n = \frac{1400}{1 + 1400(0.05)^2} = \frac{1400}{1 + 3.5}$$

$$n = 311.11 = 311 \text{ buildings}$$

Note that 5% level of significance level was utilized as the bench mark acceptable in research work. In addition, the sample also excluded newly undelivered buildings under construction that did not exist as at beginning of 2010; that is newly buildings with missing data points were left out as this will result in missing data for the period being studied. Also, newly listed buildings are excluded due to inadequate data to estimate expected core building projects. Based on consideration of sampling, the size of sample in this study is three hundred and eleven (311) buildings but there are buildings that do not have the completeness of the data and they were filtered.

**f) Source of data collection**

The researcher used both primary and secondary methods of data collection in obtaining data for the work,

**i. Primary Data**

Primary data refers to data that contains direct accounts that are obtainable observations, direct participation and questionnaires (Ezeliora et al., 2014; Martínez-Jurado et al., 2013; Ogunoh, 2018). The primary data used for this research work is personal interview and questionnaires.

**ii. Secondary Data**

The secondary sources of information used are journals, magazines, seminar-papers, works unit and physical unit of the tertiary institution under study.

**g) Method of data analysis**

The analytical tools used in analyzing the data collected for the study is the descriptive statistics. In the same vein, the study used Pearson correlation coefficient and the student t-test to test the formulated hypothesis. The correlation coefficient in testing the hypothesis is to determine the extent of correlation between the coefficient of correlation, while the t-test is used for ascertain the significance of the univariate variables within the system.

## 4. Data Presentation and Data Analysis

**a) Data Presentation**

Based on the research question and hypothesis that guide this study, the data collected are presented, analyzed and discussed in this chapter. The researcher had earlier defined a sample size of (1200) staffs and (200) registered building contractors for the study. Questionnaires were prepared and administered based on gender, age, professionalism and educational qualification. In this section, the researcher presented and analyzed the personal data of the respondents. This analysis is based on percentages as shown below:

Table 1: Sex Distribution of the Respondents

Responses	Frequency	Percentages (%)
<b>Male</b>	189	61
<b>Female</b>	122	39
<b>Total</b>	311	100

Source: Field Survey 2021

The above table revealed that 189 respondents representing 61% were male while 122 respondents representing 39% were female.



Table 2: Age Distribution of the Respondents

Responses	Frequency	Percentages (%)
<b>21-30years</b>	53	17
<b>31-45years</b>	157	50
<b>46-60years</b>	101	33
<b>Total</b>	<b>311</b>	<b>100</b>

Source: Field Survey 2021

The above table shows that fifty three (53) respondents representing seventeen percent (17%) fall within age bracket of 21-30years while one hundred and fifty seven (157) respondents representing fifty percent (50%) were within 31- 45years and 46-60years were one hundred and one respondents (101) representing thirty three percent (33%).

Table 3: Educational Qualification

Responses	Frequency	Percentage (%)
<b>OND/NCE</b>	52	17
<b>HND/DEGREE</b>	61	20
<b>MSC AND M Phil.</b>	92	30
<b>PhD</b>	71	23
<b>Professors</b>	35	11
<b>Total</b>	<b>311</b>	<b>100</b>

Source: Field Survey, 2021

The above table revealed that fifty two (52) respondent’s represent seventeen percent (17%) had educational qualification of OND/NCE while sixty one (61) respondents represent twenty percent (20%) were HND/DEGREE holder. Ninety two (92) respondents represent thirty percent (30%) are MSC and M.Phil holder. seventy one (71) respondents represent twenty three percent (23%) are PhD holder. Thirty five (35) respondents represent eleven (11%) are professors.

**b) Data Analysis**

In this section, the researcher presents and analyzed all data collected in the course of the study. Here, the researcher used frequency table, percentage and mean scale likert to present, interpret and analyzed the data.

**Table 4:** To determine whether the in-house professionals has no significance impact on building projects delivery for tertiary institutions in Anambra State

S/N	Respondent Questionnaires	Strongly Agree	Agree	Strongly Disagree	Disagree	Undecided	Mean Score	Rank
1	The percentage of the professionals used are no significant on the building project delivery for Nnamdi Azikiwe University	11	13	156	131	0	2.691	1

2	The level of risks does not significantly prevail in adopting in-house professionals in building projects delivery for tertiary institution	1	21	171	117	1	2.691	1
3	The fund investment has no significant effect in building projects delivery for tertiary institutions	3	6	181	121	0	2.650	4
4	The level of in-house professional skills has no significant effect in building projects delivery for tertiary institution	6	2	157	146	0	2.576	6
5	The professional contractors used have no significance effect on building project and project delivery	12	19	131	148	1	2.656	3
6	The housing funds for projects delivery are not significance to building projects in reality	6	31	121	151	2	2.640	5
7	The in-house professionals does not have the ability to significantly evaluate the building project delivery for Nnamdi Azikiwe University	2	14	142	153	0	2.566	7
8	The building project delivery records shows that there's no significance influence on the use of the in-house professionals	7	4	137	163	0	2.534	8

Source: Field Survey, 2021

The table above shows the mean score scale of the hypothesis test for the variables. The results show that the percentage of the professionals used are significant on the building project delivery for Nnamdi Azikiwe University ranked first with mean score of 2.691. Also, the level of risks does significantly prevail in adopting in-house professionals in building projects delivery for tertiary institution ranked also equally first with the same mean score scale of 2.691. The third ranked mean score of 2.656 shows that the fund investment has significant effect in building projects delivery for Nnamdi Azikiwe University. The fourth ranked mean score scale of 2.650 shows that the level of in-house professional skills has significant effect in building projects delivery for tertiary institution. The fifth ranked mean score scale value of 2.640 shows that the professional contractors used has significance effect on building project and project delivery. The sixth ranked mean score scale of 2.576 shows that the housing funds for projects delivery are significance to building projects in reality. The seventh ranked mean score scale value of 2.596 shows that the in-house professionals do has the ability to significantly evaluate the building project delivery for

Nnamdi Azikiwe University. The eighth ranked mean score scale of 2.534 shows that the building project delivery records shows that there's no significance influence on the use of the in-house professionals.

## **5. Decision Rule**

The decision rule is based on the scale of the mean from strongly disagree to undecided on the scale of five (5) to one (1). The scale of 5 to 4 shows that the null hypothesis will be accepted, while the alternative will be rejected. The scale of 3 to 1 shows the alternative hypothesis will be accepted, while the null hypothesis will be rejected. Based on the decision rule, the null hypothesis will be rejected while the alternative will be accepted which says that the in-house professionals has no significance impact on building projects delivery for Nnamdi Azikiwe University in Anambra State.

### **5.1 Summary of Findings**

The summary of the findings are based on the results and analysis of the hypothesis as shown below;

- (1) There is more male the field of professionals and contractors than the female genders.
- (2) Professionals within the age limits of 31-45years are more on the professional field.
- (3) Professionals with Masters Degree, master of philosophy and doctor of philosophy are more within the practicing professionals.
- (4) There is significant impact on the use of in-house professionals in building project delivery for Nnamdi Azikiwe University.
- (5) The level of risks does significantly prevail in adopting in-house professionals in building projects delivery for tertiary institutions.
- (6) The fund investment has significant effect in building projects delivery for Nnamdi Azikiwe University
- (7) The level of in-house professional skills has significant effect in building projects delivery for Nnamdi Azikiwe University
- (8) The building project delivery records shows that there's significance influence on the use of the in-house professionals in Nnamdi Azikiwe University
- (9) The percentage of the professionals used are significant on the building project delivery for Nnamdi Azikiwe University
- (10) The professional contractors used have significance effect on building project and project delivery
- (11) The housing funds for projects delivery are significance to building projects in reality.
- (12) The in-house professionals does not have the ability to significantly evaluate the building project delivery for Nnamdi Azikiwe University

### **5.2 Conclusions**

This research assessed the impact of in-house professionals in building projects delivery in Nnamdi Azikiwe University. The research was carried out in Anambra state, south east Nigeria. The study revealed that in-house professionals' practices have an appropriate impact in building projects delivery in Nnamdi Azikiwe University, Awka. The results show that the use of in-house professionals is the role model and the appropriate technique in building, structural and construction projects delivery. The study is therefore recommended to the case study, to other tertiary institutions within the country under the study area and to construction companies for their wider use and applicability

in appropriate decision making in building projects delivery.

## 6. References

1. Bharil, R. K. (2017). Project development, delivery and execution. *Handbook of Green Building Design and Construction (Second Edition)*. <https://www.sciencedirect.com/topics/engineering/project-delivery-method>.
2. Child, T. B., & Scoones, D. (2017). Community preferences, insurgency, and the success of reconstruction spending. *Defence and Peace Economics*, 28(1), 34–52. <https://doi.org/10.1080/10242694.2015.1050802>
3. Chinwuko, C. E., Ugochukwu, N. C., Ezeliora, C. D., & Nwadike, C. E. (2014). *Design and construction of a powered toggle jack system*. 1(6), 66–71.
4. Construction.law.com. (2021). *Construction Projects*. <https://Construction.Laws.Com/Construction-Projects>. <https://construction.laws.com>
5. Dajadian, S. A., & Koch, D. C. (2014). Waste management models and their applications on construction sites. *International Journal of Construction Engineering and Management*, 3(3), 91–98. <https://doi.org/10.5923/j.ijcem.20140303.02>
6. Delivery Integrated Project. (2009). A Working Definition. *American Institute of Architects California Council*.
7. Designingbuildings.co.uk. (2021). *construction*. <https://www.designingbuildings.co.uk/wiki/Construction>
8. Executive Summary, D.-B. E. S. (2021). Final Report. In *US Department of Transportation, Federal Highway Administration*. [www.fhwa.dot.gov/reports/designbuild/designbuild.htm](http://www.fhwa.dot.gov/reports/designbuild/designbuild.htm)
9. Ezeliora, C. D., Arinze Victor, O., Maryrose Ngozi, U., & Njide, M. N. (2014). Analysis Of Queuing System Using Single-Line Multiple Servers System: (A Case Study Of Shoprite Plaza Enugu State, Nigeria). *International Journal of Scientific & Technology Research*, 3(3), 364–374. [www.ijstr.org](http://www.ijstr.org)
10. Ezeliora, C. D., & Ejikeme, I. (2015). Available online [www.jsaer.com](http://www.jsaer.com) *Research Article Treatment of Vegetable Oil Effluent Using Factorial Design Experiment for Pleurotus Tuberregium Sclerotium Coagulant*. 2(3), 22–35.
11. Ezeliora, C. D., & Nwifo, A. M. (2021). *Solutions to Nigerian problems of industrialization and manufacturing*.
12. Ezeliora, C. D., Umeh, M. N., & Dilinna, A. M. (2020). *Investigation and Optimization of Production Variables: A Case of Plastic Manufacturing Industry*. 15(1), 1–16. <https://doi.org/10.9734/JERR/2020/v15i117134>
13. Gajurel, A. (2021). Project Delivery Systems (PDS). *Performance-Based Contracts for Road Projects*, pp 7-28. [https://doi.org/https://doi.org/10.1007/978-81-322-1302-4\\_2](https://doi.org/https://doi.org/10.1007/978-81-322-1302-4_2)
14. Gordian. (2021). *Comparing 5 Delivery Methods for Construction Projects*. <https://www.gordian.com/resources/comparing-5-project-delivery-methods/>
15. Hamilton, A., Griffith, A., King, A., & Hallam, S. (2015). *CONSTRUCTION PROCESS AND PROJECT MANAGEMENT Handbook of Project Management Procedures Handbook of Project Management Procedures Best Practice Tendering for Design and Build Projects Strategic Management Applied to International Construction Buildability*.
16. Hassan, A., & Bakar, A. (2011). *Implementation of Strategic Management Practices*. 5(1), 140–154.

17. Igwegbe, A., Ezeliora, C. D., Osagie, C., Khan, N. A., & Guilherme, L. (2021). Journal of Environmental Chemical Engineering, 105320. <https://doi.org/10.1016/j.jece.2021.105320>
18. Kaijun, L., & Wang Yuxia, W. x. (2010). Research on inventory control policies for nonstationary demand based on TOC. *International Journal of Computational Intelligence Systems*, 3(8), 114–128. <https://doi.org/10.1080/18756891.2010.9727757>
19. Killough, D. (2021). *Common Construction Project Delivery Methods: A Breakdown*. <https://www.levelset.com>. <https://www.levelset.com/blog/construction-project-delivery-methods/>
20. Koch, C., & Wüstemann, J. (2014). Experimental Analysis. In *Oxford Handbook of Public Accountability* (Issue July 2016, pp. 1–23). <https://doi.org/10.1093/oxfordhb/9780199641253.013.0003>
21. Kos, I., Belušić, D., Jeričević, A., Horvath, K., Koračin, D., & Telišman, P. M. (2004). Education and research: Initial development of the Atmospheric Lagrangian Particle Stochastic (ALPS) Dispersion Model. *Geofizika*, 21, 37–52.
22. Kwak, Z.H. & Randall, B. (2017). Construction management at risk: an innovative project delivery method at stormwater treatment area in the Everglades. *Florida*. [http://home.gwu.edu/~kwak/asce\\_congress\\_6.pdf](http://home.gwu.edu/~kwak/asce_congress_6.pdf)
23. Ldoceonline.com. (2021). *Construction*. <https://www.ldoceonline.com/dictionary/construction>.
24. Martínez-Jurado, P. J., Chang, H.-M., Huang, C., Torng, C.-C., Curtindale, K., Ba, C., Hoppes, C., Parry, G., Graves, a., James-Moore, M., Ayeni, P., Baines, T. S., Lightfoot, H., & Ball, P. D. (2013). Lean new product introduction: a UK aerospace perspective. *International Journal of Innovation, Management and Technology*, 4(11), 1–146. <https://doi.org/10.1177/0954405411407122>
25. Merriam-webster.com. (2021). *No Title*. <https://www.merriam-webster.com/dictionary/construction>
26. Of, M., Rod, C., Rsm, M., Dao, M., Raghunandan, K., Rama, D. V., Olotuah, A. O., Kelimeler, A., Omajene, J. E., Martikainen, J., Kah, P., Igwegbe, A., Ezeliora, C. D., Osagie, C., Khan, N. A., Guilherme, L., Palani, P. K., & Murugan, N. (2014). AN EVALUATION OF ACCESSIBILITY OF LOW-INCOME EARNERS TO HOUSING AN EVALUATION OF ACCESSIBILITY OF LOW-INCOME EARNERS TO HOUSING FINANCE IN NIGERIA. *Journal of Environmental Chemical Engineering*, 4(6), 2020. <https://doi.org/10.11648/j.ijmea.20140206.17>
27. Ogunoh, C. C., Ogunoh, P. E., Ogunoh, A. V., & Ezeliora, C. D. (2014). Evaluation and modelling of energy consumption in a selected residential building. *Journal of South American Earth Sciences*, 7(4), 57–68.
28. Ogunoh, P. E. (2018). *Building Maintenance Practices & their Implications in an Institution* (D. C. Ezeliora (ed.); 1st Editio). Lambert Academic Publishing.
29. Okpala, C. D., Nwuba, E. I. U., Nwajinka, C. O., Ezeliora, C. D., & Okonkwo, C. C. (2021). *Geospatial Mapping , Modelling and Optimization of Modular Rice Aggregation Centers in Anambra Zone*. 18(1), 297–305.
30. Pekka, P. (2002). Innovative Project Delivery Methods for Infrastructure. *Finnish Road Enterprise*, 120.
31. Pekuri, A., Haapasalo, H., & Herrala, M. (2011). *Productivity and Performance Management – Managerial Practices in the Construction Industry*. 1, 39–58.
32. Schwartz, Y., Raslan, R., & Mumovic, D. (2016). Implementing multi objective genetic algorithm for life cycle carbon footprint and life cycle cost minimisation: A building refurbishment case study.

*Energy*, 97, 58–68. <https://doi.org/10.1016/j.energy.2015.11.056>

33. Wikipedia. (2021). [https://en.wikipedia.org/wiki/Project\\_delivery\\_methodle](https://en.wikipedia.org/wiki/Project_delivery_methodle). [www.wikipedia.org](http://www.wikipedia.org)

34. Zimmermann, J. (2021). Project delivery systems. *Lecture Note in Lehrstuhl Für Bauprozessmanagement Und Immobilienentwicklung an Der Technischen Universität München*.