

Problem Caused by COVID-19 Pandemic on the Construction Industry of Akwa Ibom State, Nigeria

Asuquo Henry Okpo^{1*}, Jima Offiong²

¹Department of Building Technology, Akwa Ibom State Polytechnic, Ikot Osurua, Nigeria

²Department of Quantity Surveying, Akwa Ibom State Polytechnic, Ikot Osurua, Nigeria

*Corresponding author's email: henryokpo24@gmail.com

Article history: Received: 8 February 2023 Received in revised form: 24 April 2023

Accepted: 23 May 2023 Published online: 31 December 2023

Abstract

The chances to remedy the construction industry from its diverse problems have weakened due to the breakout of the COVID-19 pandemic in 2020. Although the pandemic is almost reduced to history, its impacts linger with acute effects on the industry's performance. This study investigated the impact of the COVID-19 pandemic on the construction sector of Akwa Ibom State, Nigeria with a specific focus on problems caused by the COVID-19 pandemic. Using survey research design, structured questionnaires were administered to 213 respondents (61 Architects, 32 builders, 46 quantity surveyors, and 74 Civil Engineers). Data analysis involved mean item scores, Chi-Square and Kruskal Wallis tests. The findings revealed that COVID-19 has severed the movement of people and interpersonal relationships, delayed project timelines, escalated transportation problems, and induced high costs of construction resources and project costs. The implication shows that stakeholders in the construction industry are still glued to work ethics during the COVID-19 period or are yet to modify behaviours into the industry norms in terms of human relations and movement. A change in perception is needed to restore the stakeholders to the traditional way of life through an awareness campaign, while the government needs to strengthen economic recovery policies and institute pro-construction industry parameters to reduce the cost of construction resources and overall project costs to accelerate the recovery path of the sector.

Keywords: COVID-19 pandemic, construction industry, Nigeria

© 2023 Penerbit UTM Press. All rights reserved

1.0 INTRODUCTION

The construction sector contributes more than 10% of the global GDP (6-9% in wealthy nations) and employs roughly 7% of the world's population or more than 273 million people (Jwasshaka & Amin, 2019). In 2018, the net worth of the industry was \$10.8 trillion and is anticipated to reach \$14 trillion in 2035 (World Bank, 2019), this huge investment is not surprising as the sector is strategic to socio-economic development of nations supplying housing, infrastructure, and jobs. Zamani, Rahman, Fauzi, and Yusof (2021) linked the construction industry with economic development through the satisfaction of the basic objectives of development indices. However, the erstwhile vibrant nature of the global construction industry was temporarily punctuated by the outbreak of coronavirus disease in 2019.

COVID-19 is a highly transmittable and pathogenic viral infection caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and emerged in Wuhan, China in late 2019. The intermediate source of origin and transfer to humans is not known but a rapid human-to-human transfer has been confirmed widely (WHO, 2020; Shereen, Khan, Kazmi, Bashir, & Siddique, 2020). It entered Nigeria through an Italian businessman in late February 2020, and since then, it has spread to all 36 of the nation's states. Although vaccinations have recently been developed and given to individuals to stop the spread, it has killed millions of people. This pandemic has led to the closure of many companies (Osuizugbo, 2020; Zamani et al., 2021). Due to the closure of several businesses, especially construction firms, many people have lost their employment as a result of this pandemic. The construction supply chain was also disrupted, while also impacting the prices of construction resources (Alsharaf, Banerjee, Uddin, Albert, & Jaselskis., 2021). In Nigeria, the COVID-19 outbreak caused an unprecedented interruption in construction activities across states including Akwa Ibom state (Nigeria Centre for Disease Control, 2020). In this research, the context of the problems arising due to the COVID-19 pandemic in Akwa Ibom State is examined.

Despite the growing number of studies on COVID-19 in the construction industries in emerging nations (Agyekum, Kukah, & Amudjie, 2021; Sami Ur Rehman, Shafiq, & Afzal, 2022; Sierra, 2022; Chigara & Moyo, 2022; Kukoyi, Simpeh, Adebowale, & Agumba, 2022; Elnaggar & Elhegazy, 2022), the archetypes of prominent problems are limited. In addition, most previous studies were qualitative in nature (e.g., Osuizugbo, 2020; Agyekum et al., 2021). Other studies on COVID-19 in Nigeria were industry-specific (e.g., food, Andam,

Edeh, Oboh, Pauw, & Thurlow, 2020; economy, Akanni & Gabriel, 2020). The growing concern missing in the literature is establishing the significant level of the problems caused by COVID-19 in the Nigerian construction industry. The quantitative survey by Ogunnusi, Hama-Adama, Salman, and Kouider (2020) remains inadequate to closing the pertinent knowledge of the problems caused by COVID-19. Ogunnusi et al. (2020) investigated the impacts of COVID-19 on the procurement of constructed assets and possible prospects for the construction sector using data from 71 construction industry professionals. Problems of difficulties with workflow and supply chain interruption, new policy concerns, and workers' burden were prevalent problems (Ogunnusi et al., 2020). Although the study looked at the problems from Nigeria's perspective, this study stresses the defect of inadequate sample size and calls for further research to establish the level of significance of the particular problems related to the COVID-19 pandemic and how they have affected the completion of construction projects. This study is therefore unique in establishing the post-pandemic impacts on the construction industry in buttressing the prominent issue that the construction industry is yet to recover from COVID-19 problems. The era of COVID-19 could have paddle-down, but the impact is ongoing, and the industry seems not to have recovered fully. The remnants of these problems are ignored by the research community despite their impacts on the outputs of the construction industry. Therefore, investigating the problems caused by COVID-19, and espousing its dimensions would stimulate the development of mitigation policies. The findings of this study will contribute to knowledge and serve as a basis for comparison with similar studies conducted in different regions of the nation. The critical objective of the study is to examine problems caused by COVID-19 in the construction industry.

■2.0 LITERATURE REVIEW

2.1 Construction Industry in Nigeria

In Nigeria, the construction industry has always been a major contributor to the country's gross domestic product [GDP]. The construction industry accounts for 6.17% of the GDP in the first quarter of 2019 (National Bureau of Statistics, 2020). The sector is principally involved in the development and maintenance of the building and civil engineering works. It is also known to have the highest workforce after Agriculture. It has been suggested that Nigeria's early escape from recession in 2020 was due to the government's huge investment in infrastructure at both the federal and state levels, underscoring the sector's significance to the country's economy (Ekung, Lashinde, & Adu, 2021a).

According to Gaith, Khalim, and Ismail (2012), the construction activities of the industry involve the erection, installation, maintenance and construction of a portion or construction of the entire project. These activities are controlled, monitored, inspected, and supervised by the contractor, subcontractor and materials and equipment suppliers. The Nigerian construction sector has had several difficulties, including issues with quality, sourcing, managing finances, low or absent productivity, poor performance, low profitability, project delays, and poor communication (Oladapo, 2016; Ishaq, Omar, & Mohammed, 2018). These difficulties were noted before the COVID-19 pandemic. However, the pandemic itself caused problems for the construction sector. Numerous problems, including supply chain disruptions, traffic jams, project delays, and safety concerns, were noted in the literature. The COVID-19 pandemic is currently a hazard to the construction sector. The spread of COVID-19 has therefore severely impacted the construction industry by delaying and stopping building projects that are in the planning stages as well as by interfering with the supply chain and creating a labour shortage as a result of quarantines (Engineering News-Record - ENR, 2020a) (ENR, 2020b). For instance, according to a poll conducted by the Associated General Contractors of America (AGC), 28% of 43 respondents (i.e., AGC members) claimed that COVID-19 in the United States has suspended or delayed projects (ENR, 2020b). Husien, Borisovich, and Naji (2021) found that the COVID-19 pandemic has had a significant impact on the construction industry, with some engineers fearing they may lose their jobs.

2.2 An Overview of the COVID-19 Infectious Disease

COVID-19 is a novel coronavirus with an outbreak of unusual inflammation of the lungs, considered a pandemic. The first was in the Wuhan province of China and later spread speedily across the globe. COVID-19 was caused by the SARS-CoV-2 virus (Mousavizadeh & Ghasemi, 2021; McKibbin & Fernando, 2021; Wang & Wang, 2020; Akanni & Gabriel, 2020). Alpha, beta, gamma, and delta are the four coronavirus classes (Liu et al., 2020). The Middle East respiratory syndrome (MERS) virus (MERS-CoV), the severe acute respiratory syndrome (SARS) virus (SARS-CoV), and SARS-CoV-2 are all beta coronaviruses (Liu et al., 2020; Mousavizadeh & Ghasemi, 2021). The SARS-CoV-2 virus was responsible for the COVID-19 pandemic (McKibbin & Fernando, 2021; Liu et al. 2020). The (MERS) virus COVID-19 is a spherical or pleomorphic enclosed particle that contains (positive-sense) RNA linked to a nucleoprotein (Liu et al., 2020; Mousavizadeh & Ghasemi, 2021).

Coronavirus, commonly known as COVID-19, is caused by the coronavirus 2 (i.e., SARS-COV-2), a serious acute respiratory disorder. Coronavirus frequently spreads via respiratory droplets. Respiratory droplets can be created by coughing, sneezing, taking regular breaths, or even speaking. When people are close to one another, these respiratory droplets might lead to a viral transmission. Additionally, it could touch garments or other items (Black, 2020). Additionally, a person can catch COVID-19 by touching their mouth, nose, or perhaps their eyes after coming into contact with a surface or object that has the virus on it (Black, 2020). On the other hand, a pandemic's associated mortality is the primary predictor of its severity. The case fatality ratio or excess death rate are two important epidemiological indicators that may be accessible soon after the appearance of a pandemic strain through analyses of the first outbreaks or more routine monitoring data. The COVID-19 epidemic impacted economic activity on a worldwide scale and is still expanding (Warwick McKibbin, 2021). The limited and even prohibited movement of people and products among nations has further slowed down world economic activity. Most crucially, a little amount of fear among businesses and consumers has altered typical consumer behaviour and produced market abnormalities.

The Middle Eastern economy has suffered as a result of the coronavirus disease 2019 (COVID-19), which the World Health Organisation (WHO) has classified as a worldwide pandemic. Every economy has actively adopted work-from-home or remote working techniques and is proposing concepts like social distancing. The epicentre of the pandemic was initially in Wuhan, China, but it has now relocated to New York, USA. The outbreak's fast spread and prolonged incubation time have been its most problematic aspects (Hendrickson & Rilett, 2020). The pandemic has contributed to a major health disaster as well as a global economic downturn. In the United States, the "Recession of COVID-19," as it was named by the National Bureau of Economic Research (NBER), started in February (Chodorow-Reich & Coglianesi, 2021). When compared to the jobless rate of around 3.8% in February 2020, the U.S. had a record-high unemployment rate of 14.7% in April 2020 as a result of the economic downturn, which is terrible.

The changes have caused a decline in global stock indexes, and global financial markets have also reacted (Ezeokoli, Okongwu, & Fadumo, 2020). Important objectives include preventing the spread of the pandemic, sustaining infrastructure, limiting the negative impacts on the economy and society functions, and reducing morbidity and mortality (Ezeokoli et al., 2020). The CDC (2020) states that failing to protect human health will probably prevent us from achieving our goals of keeping society functioning and reducing the social and economic repercussions of a catastrophic pandemic. Furthermore, the health and safety requirements for any construction site cannot be compromised at this time (Ezeokoli et al., 2020).

In addition, this pandemic is a widespread illness that can be brought on by several pathogens, such as viruses and influenza. Transmission at the workplace during a pandemic can be predicted among coworkers, the general public, and employees in other types of workplaces in addition to transmission from patients to healthcare staff (OSHA, 2020). It is crucial to maintain the healthcare system running and provide the finest treatment available to save as many lives as possible.

The main methods for preventing influenza include vaccination, treatment of affected people with antiviral drugs, and prophylaxis for people who have been exposed to the virus (Ezeokoli et al., 2020). Additional methods include infection control practices and social isolation. By concentrating on the single objective of saving lives by decreasing spread (i.e., non-pharmaceutical intervention NPI), it may be possible to complete the last stage from the list above, which focuses on broad mitigation. The first two (2) steps on the list above are all about immunization. By preventing contact between sick and healthy individuals, NPI contributes to a decrease in the spread of the influenza virus and the number of people who become ill. Generally speaking, fewer affected people signify a lower demand for healthcare services and a smaller pandemic's effect on the economy and society (CDC, 2020). Other NPI precautions include concealing sneezes and coughs, keeping good hand hygiene, and cleaning surfaces often, and employers should be sure to train their employees on COVID-19 sanitary standards (OSHA, 2020).

2.3 Problems Caused by COVID-19 Pandemic in Construction Industry

Nearly all worldwide industries have been impacted by COVID-19, which has had a huge effect on the global workforce. The construction industry will be the focus of this study, which will focus on COVID-19 problems that have plagued the sector. Construction firms' performance as well as global business performance across nations have been negatively impacted since the COVID-19 outbreak. Zamani et al. (2021) posited that COVID-19 problems in the construction sector are linked to operational and financial problems. While financial problems mostly revolve around late payments, increased project costs, and a decline in the number of construction projects, operational problems have a detrimental impact on the project timetable, reduced labour, and logistics. Osuizugbo (2020) asserted that the COVID-19 problem includes "transportation challenges (for both employees and materials)," "project abandonment," "delay in building activities," "high cost of construction materials," "decrease in working hours per day," "lack of funds," and "shortage of manpower."

The COVID-19 pandemic has had a significant negative influence on the labour market, material availability, project delivery, major cost factors for construction projects, and other areas. The pandemic has made the labour shortage problem for the construction sector worse (Karimi, Taylor, Dadi, Goodrum, & Srinivasan, 2018; Azeez, Gambatese, & Hernandez, 2019). There have been fewer job prospects since the pandemic started, largely as a result of the work interruptions brought on by adhering to restrictions that were put in place to curb the virus' growth. Due to an interrupted supply chain and employee shortages due to quarantines, many projects have been halted or postponed and a lack of personal protective equipment (PPE) because healthcare workers needed it more immediately (Pamidimukkala & Kermanshachi, 2021). COVID-19 ushered in a complete lockdown that had an impact on construction operations (the transportation of employees and materials to the site) in Nigeria as well as the rest of the world. Implicitly, all construction work was halted in response to a directive from the federal government.

According to Zamani et al. (2021), COVID-19 has delayed building projects. Alenezi (2020) stated that many types of project delays, including concurrent, independent, crucial, non-excusable, and excusable delays, were experienced. The majority of these delays are a result of COVID-19's appearance, which has reduced daily working time. Osuizugbo (2020) observed that the COVID-19 pandemic has disrupted the construction industry because of delays in construction operations. Construction projects are not at all aided by delays in construction operations, which first impair the construction schedule. Costs associated with a project may rise as a result of delays.

There have been several interruptions to the global supply chain. The coronavirus pandemic has influenced the availability of materials and will continue to do so, particularly for imported goods. Future procurements should identify potential alternative/new sources and require a thorough grasp of current sources (Biswas et al., 2021; Husien et al., 2021; Adhikaria & Poudyala, 2021). Delays in the supply chain also had an impact on the completion of the project as a whole (Alsharaf et al., 2021). Furthermore, unemployment, labour shortage, transportation problems and financial problems have been caused by COVID-19. Many construction projects suffered project abandonment due to locked down and restrictions of movement. Abandonment of construction projects can cripple the development of nations. Construction firms were not able to pay their staff and it results in laying off workers (Osuizugbo, 2020; Alsharaf et al., 2021). The transportation problems, Biswas et al. (2021) observed that the lockdown in every area of the nation has disrupted all forms of transportation, because of this, no supplies are getting to the construction industry, and no workers can commute from their homes to the workplace. The work has ceased as a result.

About 2.7 billion workers, equivalent to 81% of the workforce around the world, were affected by COVID-19. By implication, many construction workers are not willing to come to work. Construction workers are unable to reach their workplaces because the transportation system is completely closed. The workforce has also endured significant psychological pressures as a result of concern about the future and potential financial troubles, particularly because the majority of them have families and financial commitments (Biswas et al., 2021; Husien et al., 2021). Problems of reduction in efficiency and productivity rates were witnessed during the pandemic. Much of the loss in productivity and efficiency was attributed to the new safety measures that were necessary to protect the workforce. The pandemic caused widespread economic downturns and uncertainties, and owners, investors, and businesses were increasingly wary about investing in construction projects (Alsharif et al., 2021), lack of PPE and a decrease in the number of workers who followed the social distancing suggestions were also blamed for the decline in productivity rates. Alsharif et al. (2021) posited that delaying the start date of new projects and suspending or slowing current initiatives were common throughout the pandemic. The risk management strategy should offer site security using one of the various strategies, including fences or obstacles, electronic security, and guard services, as the pandemic might delay the work for months.

Local building businesses have been influenced by court cases and claim all around the world. Others believe it is plausible to interpret COVID-19 as coming under the category of Force Majeure (unforeseen occurrences that hinder contractors from performing a contract), while others incline toward the concept of changing legislation to resolve disputes (Biswas et al., 2021; Husien et al., 2021). Psychological illnesses and other mental health issues are typically present in those who have experienced traumatic events. Workers typically suffer increased sentiments of uncertainty, disappointment, concern, anger, resentment, aggravation, burnout, and depression (Ekpanyaskul & Padungtod, 2021). Additionally, they could feel dejected, struggle to sleep or focus, or just be exhausted. Lack of effective stress management might result in alcohol, nicotine, or other substance abuse (Karthick, Kermanshachi, Rouhanizadeh, & Namian, 2021). In addition, COVID-19 has impacted factors that can directly affect a worker's physical and mental health as well as the health of their families and communities, such as pay, work hours, workload, stress levels, relationships with coworkers and employers, and the availability of paid time off (Jahan Nipa, Kermanshachi, & Patel, 2020). Hook (2020) proposed that the consequences of this epidemic would force certain construction enterprises to cut debt, look towards alternate sources of funding, or risk going out of business. The pandemic has had an impact on the supply chain, workforce-related problems, and contractual, legal, and operational concerns (Assaad & El-Adaway, 2021).

Looking ahead, a new age will usher in a change in the market and some "national government" investment in infrastructure to kick-start the recovery of the construction industry. Others, though, could encounter resource limitations. With lead-time delays, restricted access to resources, supply-chain bottlenecks, client losses, legal concerns, and foreign travel restrictions, COVID-19 has had a substantial impact on the construction sector (Ilatova, Abraham, & Celik, 2022). Low morale and increasing absenteeism have resulted from COVID-19's adverse effects on economies, businesses, and communities. Due to the COVID-19 pandemic, construction companies are finding it difficult to get new projects, which has an impact on their ability to make a profit (Rani, Farouk, Anandh, Almutairi, & Rahman, 2022).

During the COVID-19 pandemic, the high cost of building supplies was viewed as a disturbance in the industry. In construction projects, the cost is frequently a crucial consideration. Due to the country's lockdown and fighting, the price of the majority of building supplies has increased (Osuzugbo, 2020). Alsharif et al. (2021) further posited that the main problems brought on by COVID-19 are price increases, increased expenses, revenue losses, and payment delays. Construction firms reported a rise in the price of items made of concrete, cement, and timber. A rise in the cost of conducting business was also noted, along with an increase in the price of materials. Many construction firms anticipate unforeseen revenue and financial shocks at various supply chain nodes (Alsharif et al., 2021). Osuzugbo (2020) added that the COVID-19 pandemic has affected the construction sector due to a shortage of funds. Financial problems affect construction projects negatively. Additionally, the COVID-19 pandemic caused a drop in working hours per day, which is attributable to the virus's spread in various Nigerian states, especially Akwa Ibom State, and efforts to contain it. The pandemic also had an impact on the working hours in the construction sector. The problems caused by COVID-19 are shown in Figure 2.1, and they include "project timetable," "reduced labour," "logistics," "late payment," "increased project cost," and "reduced number of projects" (Zamani et al., 2021).

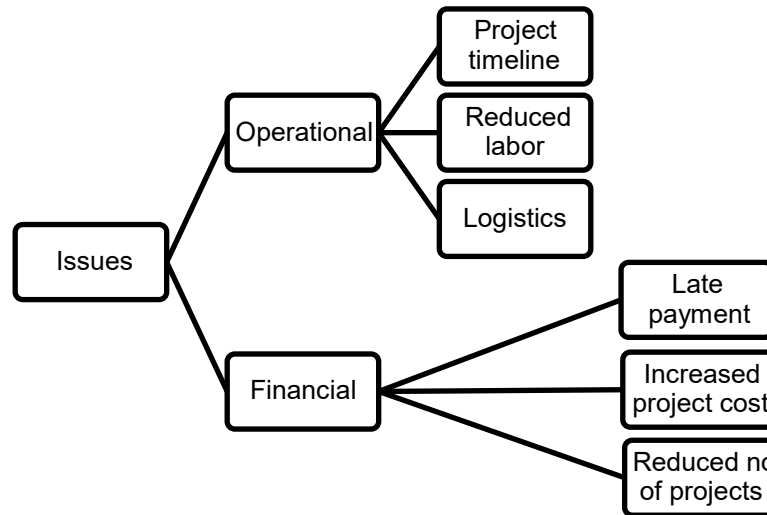


Figure 1 Overview of the problems the construction industry is facing from COVID-19
(Source: Zamani et al., 2021)

There are notable studies around impact COVID-19 on the construction industry around the world (Alenezi, 2020; Alsharif et al., 2021; Zamani et al., 2021; Agyekum et al., 2021; Sami Ur Rehman et al., 2022; Sierra, 2022; Chigara & Moyo, 2022; Kukoyi et al., 2022; Elnaggar & Elhegazy, 2022, just to mention few), but there is limited information in regards to COVID-19 impact on construction project delivery in Nigeria (Ogunnusi et al., 2020; Osuizugbo, 2020). This prompts the need for the study in Nigeria construction industry. The studies reviewed did not take into consideration, COVID-19 impact on construction project delivery in Akwa Ibom State. However, it is crucial to determine the extent to which COVID-19 problems affect the construction sector in Nigeria. None of the reviewed studies evaluated problems caused by COVID-19 in a post-pandemic era in Nigeria. This study seeks to establish the post-pandemic impacts on the construction industry in buttressing the prominent issue that the construction industry is yet to recover from COVID-19 problems.

3.0 METHODOLOGY

3.1 Research Design

A descriptive survey design was implemented to achieve the goals of this study. The survey approach enhances speedy coverage of a wide network since the impact of COVID-19 spread across every region, and understanding of the problem arising from the pandemic is better developed from an extensive population. The study's population consists of registered construction professionals working in Akwa Ibom State, Nigeria. Construction professionals were deemed suitable for the study based on the direct impact of COVID-19 problems on their operations as well as their organisations. Ekung, Odesola, and Oladokun (2022) reported that quantity surveying consultancy outfits in the region have witnessed declined commissions since early 2020; therefore, professionals in this category are a veritable source of data for uncovering the problems caused by the COVID-19 pandemic. Studies have also portrayed the knowledge of construction professionals as a rich repository of experience to analyse the effects of risk on construction operations and sector performance (Ekung et al., 2021a; Ekung, Okonkwo, & Nwosu, 2021b). Akwa Ibom State was therefore the focal region for the study in Nigeria based on its extensive infrastructure development, which progress has been tremendously impeded due to the COVID-19 pandemic.

3.2 Sample Technique

The population frame of the study was the professional bodies' branches in the study area. The sample size for this investigation was selected using a random sampling procedure. Random sampling is the basic form of probability sampling and each construction professional in the population has an equal and known chance of being selected (Saunders, Lewis, & Thornhill, 2009). The Taro Yamane formula was applied to determine the sample size, which consists of 213 construction professionals, comprising 61 architects, 32 builders, 46 quantity surveyors, and 74 civil engineers as shown in Table 1. Taro Yamani sample size method was employed to determine the appropriate sample size for this study (as adopted by Ezeokoli et al., 2020). Taro's formula is represented as:

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

i.e.

Where "n" is the sample size, "N" is the population (105) and "e" is the level of confidence (95%).

Table 1 Sample population of the study

Registered Profession	Population (N)	Sample size (n)
Architects	73	61
Builders	35	32
Quantity Surveyors	53	46
Civil Engineers	92	74
Total	253	213

3.3 Data Collection

The primary way of gathering data for this study was through a questionnaire. The questionnaire survey is a rigorous strategy for obtaining data based on a sample. On a five-point Likert scale, the structured questionnaire's data were gathered. Each item was followed by a five-point Likert scale with the following values: 1 = severely disagree, 2 = disagree, 3 = agree, 4 = slightly agree, and 5 = strongly agree. Furthermore, a total of 253 questionnaires were administered to construction professionals operating in Akwa Ibom State to reduce the effect of non-response bias (Ekung, Opoku, & Okonkwo, 2023). Ekung et al. (2023) validated the related strategy objective to ensure that the response rate of a study is reasonably close to the minimum sample size. The study retrieved 157 questionnaires and only 131 was fit for analysis; this produced a response rate of 64.53%. This level of response is appropriate to produce a valid statistical sample competent to support the findings and conclusion of the study compared to prominent studies in the region.

3.4 Data Analysis

Data from the survey were developed in a database management system and analysed using the Statistical Package for Social Science (SPSS) version 25. Alpha Cronbach reliability test was performed to determine the consistency of respondents' views about the significant problems caused by the COVID-19 pandemic in the construction industry. The Cronbach test is valid at a value greater than 0.70 (Ekung et al., 2022). The measurement constructs and variables in the study showed strong internal coherency with a Cronbach alpha value (0.823 > 0.70); therefore, the inter-item consistency and instrument reliability are deemed significant (0.823 > 0.70). Studies in the research environment involving similar respondents indicate that the reliability of survey data within this range of value is common (Iheme, Effiong, & Ekung, 2015; ADU & EKUNG, 2019; Adu, Ekung, & Toyin, 2020).

The data were analysed descriptively using Mean Item Score (MIS), the study adopted the cut-off point of 3.00 to determine the significance of the problems; the use of this threshold in construction management research is likewise prevalent (Adu et al., 2020; Okonkwo et al., 2022). The test of hypothesis involved Chi-Square and Kruskal Wallis H Test. Both tests were applied to determine the significance of the problems, while Kruskal Wallis determined possible variations in respondents' perceptions about the significance of the problems caused by the COVID-19 pandemic.

4.0 RESULTS

4.1 Respondents Characteristics

The background of the respondents that supplied information used for the study was analyzed for an understanding of the perception of the problem caused by COVID-19 in the construction industry. Four demographic factors related to the gender, education, professional affiliations and experience of the respondents to determine the suitability of the data emanating from this population. From the finding of Table 1., 80.9% represent males while 19.1% represent females. The distribution of gender reveals or affirms that construction is male dominant sector. In education background, 90.8 represents a first degree while 9.2% had a postgraduate qualification. Of the professional affiliation of the respondents, 38.2% were Architects, 29% were Builders, 10.7% were Engineers, and 20.6% were Quantity Surveyors. The results also reveal that 55.7% of the respondents have been in practice between 1-5yrs, 32.8% have practiced for 6-10yrs, 5.3% between 11-15yrss, 1.5% between 16-20yrs, 1.5% between 21-25yrs and 3.1% have been practicing for over 25yrs. The results give a good dependable characteristic of respondents used in the study.

Table 2 Respondent's Characteristics

Variables	Categories	Frequency	Proportion
Gender	Male	106	80.9%
	Female	25	19.1%
Education	First-degrees	119	90.8%
	Postgraduate degrees	12	9.2%
Professional affiliation	National Institute of Architects (NIA)	50	38.2%
	National Institute of Building (NIOB)	38	29.0%
	National Society of Engineers (NSE)	16	12.2%
	Nigerian Institute of Quantity Surveyors (NSE)	27	20.6%

Experience	1-5 years	73	55.7%
	6-10 years	43	32.8%
	11-15 years	7	5.3%
	16-20 years	2	1.5%
	21-25 years	2	1.5%
	Above 25 years	4	3.1%

4.2 Problems Caused by COVID-19 Pandemic in the Construction Industry

The study examined the problems caused by COVID-19 in the construction industry. Problems caused by the COVID-19 pandemic in the construction industry were identified from the view of related literature. Twenty-six (26) variables were extracted from the literature. The results of the field survey are analysed and ranked using the mean item score. The results presented in Table 2 show the descriptive perception of the problems caused by COVID-19.

The result in Table 3 shows that problems caused by COVID-19 such as restriction of the movement were ranked 1st with a mean item score of 4.267, delay of project timeline ranked 2nd with a mean item score of 4.129, transportation/logistics problem ranked 3rd with a mean item score of 3.900, high cost of construction materials ranked 4th with a mean item score of 3.870, and increasing project cost ranked 5th with a mean item score of 3.793. While suspension or slowing of an ongoing project (3.778); reduced construction productivity (3.748); abandonment of some projects (3.717); reduced number of projects (3.694) and reduction of productivity (3.687) were ranked 6th – 10th respectively.

Table 3 also shows the bottom five variables of problems caused by COVID-19 in the construction industry. Contractual implication problems, late payment, shortage of materials, disputes, psychological/mental issues, and shortage of personnel protective equipment were ranked 21st – 26th respectively. However, the table shows that construction professionals agreed that COVID-19 affected the construction industry significantly, with all variables measured having a mean item score above 3.00. This implies that all the identified problems caused by COVID-19 in construction were accepted by the construction professionals in the study area.

Table 3 Problems Caused by COVID-19 Pandemic in the Construction Industry

Problems Caused by COVID-19	1	2	3	4	5	SUM	Mean Item Scores (MIS)	Ranking	Remarks
Restriction of movement	2	2	29	24	74	131	4.267	1 st	Significant
Delay project timeline	8	5	25	17	76	131	4.129	2 nd	Significant
Transportation/logistics problem	3	9	36	33	50	131	3.900	3 rd	Significant
High cost of construction materials	3	9	33	43	43	131	3.870	4th	Significant
Increasing project cost	4	6	48	28	45	131	3.793	5th	Significant
Suspension or slowing of an ongoing project	1	10	40	46	34	131	3.778	6th	Significant
reduced construction productivity	5	11	36	39	40	131	3.748	7th	Significant
Abandonment of some projects	3	12	43	34	39	131	3.717	8th	Significant
Reduced number of projects	3	14	41	35	38	131	3.694	9th	Significant
Reduction of productivity	1	14	43	40	33	131	3.687	10th	Significant
Disruption of the supply chain	3	10	57	25	36	131	3.618	11th	Significant
COVID-19 is also worsening the state of mental health pressure in the construction industry	5	15	47	28	36	131	3.572	12th	Significant
Reduce labour	9	16	36	37	33	131	3.526	13th	Significant
Materials deterioration	6	14	45	37	29	131	3.526	14th	Significant
Lack of funding	4	21	39	38	29	131	3.511	15th	Significant
Government's deficit and debt increase	6	9	50	44	22	131	3.511	16th	Significant
Shortage of skilled construction workers	5	16	43	42	25	131	3.503	17th	Significant
low demand for both private and public projects	3	17	48	39	24	131	3.488	18th	Significant
Loss of profit	6	19	44	34	28	131	3.450	19th	Significant
Unemployment	9	24	34	30	34	131	3.427	20th	Significant
Contractual implication problems	7	22	47	37	37	131	3.282	21st	Significant
Late payment	7	27	43	31	23	131	3.274	22nd	Significant
Shortage of materials	11	18	45	41	16	131	3.251	23rd	Significant

Disputes	12	24	40	35	20	131	3.206	24th	Significant
Psychological/mental health issues (low morale)	12	29	36	35	19	131	3.152	25th	Significant
Shortage of personal protective equipment (PPE)	15	19	54	33	10	131	3.030	26th	Significant

4.3 Test of Variation in Respondents' Perceptions of the Problems Caused by the COVID-19 Pandemic in the Construction Industry

This hypothesis sought to determine whether the perceptions and understanding of respondents about the COVID-19 problems by construction professionals differ or are consistent. The hypothesis states that there is no significant variation in the problems caused by the COVID-19 pandemic in the construction industry among respondents. The study applied the Kruskal Wallis H test to measure variation in perceptions and level of agreement in the rating by the respondents. Both tests were validated using the critical p-value where values greater than 0.05 were accepted and values less than 0.05 were rejected. The results presented in Table 4 show that the perceptions of construction professionals do not vary. The critical p-value p (0.744) is greater than 0.05 and the null hypothesis was accepted. Therefore, the variation in the rating perceptions of respondents about the problems caused by the COVID-19 pandemic is insignificant or shows no variations.

Table 4 Test of variation/agreement in respondents' perceptions of Problems caused by the COVID-19 pandemic

Items compared	The extent of variation in respondents' perceptions
No of variables (N)	26
National Institute of Architects (NIA)	72.23
National Institute of Building (NIOB)	60.23
National Society of Engineers (NSE)	65.17
Nigerian Institute of Quantity Surveyors (NIQS)	68.98
Chi-Square	1.956
p-value	0.744
Significance level	0.050
Decision	Accept

5.0 DISCUSSION

Problems caused by the COVID-19 pandemic in the construction industry have a negative impact on the construction industry. The pandemic has had an impact on the supply chain, workforce-related problems, and contractual, legal, and operational concerns (Assaad & El-Adaway, 2021). Problems caused by COVID-19 can be evaluated on the restriction of movement, delay of the project timeline, transportation/logistics problems, high cost of construction materials and increasing project. These components of the problem caused by COVID-19 are the top five significant problems caused by the COVID-19 pandemic in the construction industry. Overall, construction professionals suffered severely from these problems and ranked top five. Furthermore, the finding of the study emphasized that restriction of movement is the highest problem caused by COVID-19 in construction. This finding is in line with the opinion of Zamani et al. (2021) who observed that the restriction of movements and working from home adopted by governments all over the world has negatively impacted the fortunes of workers and governments. This restriction of movement had a negative impact on the construction industry in Nigeria, as a series of lockdowns were declared by the federal government to stem the tide of infection and deaths. This declaration involved complete restriction of movement across the country. Due to the restriction, all construction sites were closed across Nigeria.

The study's findings also showed that the construction sector experienced delays in project timeframes. Osuizugbo (2020), who highlighted how delays in building operations disrupted the construction business during the COVID-19 epidemic, achieved a similar conclusion. The cost of the project may increase as a result of this delay. The study's findings also demonstrate how the construction sector was impacted by issues with transportation and logistics. This result is consistent with that of Biswas et al. (2021), which explained that transportation disruptions have resulted from travel restrictions inside the nation. This implies no construction materials are arriving in the construction sector and no workers can come to work from their homes. Furthermore, the high cost of construction materials (ranked fourth) and increasing project cost (ranked fifth) have been identified as the problem of the COVID-19 pandemic in the construction industry. This finding supported the opinion of Osuizugbo (2020) that observed the high cost of construction materials was considered to disrupt the construction industry. This high cost is a result of restriction of movement. Alsharif et al. (2021) further agreed that problems caused by COVID-19 are associated with price increases, additional costs, and payment delays. The results also show the variation in the rating perceptions of respondents about the problems caused by the COVID-19 pandemic is insignificant. The inference from the hypothesis test indicated that the responders' perceptions about the severity of the significant problem caused by COVID-19 are consistent.

6.0 CONCLUSION

The impact of COVID-19 across the globe has been significant, leading to deaths and disruption of the global supply chain. Since the outbreak in 2019, the world has witnessed a downturn in productivity, which has contributed to a decrease in the population of workplaces due to unsafe environments. The construction industry is at the centre of the pandemic and has encountered difficulties in delivering construction projects. However, there is limited research on the problems caused by COVID-19 in the construction industry in Nigeria. The findings revealed that COVID-19 has severed the movement of people and interpersonal relationships, delayed project timelines, escalated transportation problems, and induced high costs of construction resources and project costs. The implication shows that stakeholders in the construction industry are still glued to work ethics during the COVID-19 period or are yet to modify behaviours into the industry norms in terms of human relations and movement. In nutshell, construction professionals are expected to produce solutions to these problems encountered. This also implies that if construction professionals do not focus on their compliance with health and safety practices the overall performance of construction projects may be threatened. From a hypothesis viewpoint, the results show, the variation in the rating perceptions of respondents about the problems caused by the COVID-19 pandemic is insignificant. The inference from the hypothesis test indicated that the responders' perceptions about the severity of the significant problem caused by COVID-19 are consistent. This study contributes to the body of knowledge as it revealed the impact of the COVID-19 pandemic on construction project delivery in Nigeria; an area that lacked research attention. The findings of this study are crucial to policymakers to comprehend the unexpected and unrestrained pandemic in the construction industry. The study recommends the provision of health practitioners at the construction site for site training on proper utilisation of the mechanisms for mitigating the spread of the virus and also to develop an effective collaboration template to fight the spread of the virus. Collaborative efforts are needed in curbing the spread of the virus.

The study's findings indicate that health and safety regulations and practices should be improved to be more resilient and ready for further disruptions that might occur. Further research is required to ascertain the true extent of the pandemic's effect on the construction industry and everyday activities on construction sites in Nigeria and around the world as the pandemic recedes or transforms into an endemic. These studies would concentrate on the magnitude of unforeseen interruptions and how the effects vary across different project types and industry sectors in the construction sector. The study's main limitations are its relatively small sample size, which may affect the generalizability of the results and introduce bias because a non-probability sampling method was used, and the possibility that those who opted to participate are not necessarily representative of the entire population of people working in Nigeria's construction industry. This study also uses questionnaire surveys to solicit opinions from building industry specialists. To complement the findings, additional approaches like project-based case studies should be taken into consideration. Finally, further studies may require findings that are based on longitudinal studies that cover several years, this study did not catch the long-term effects of the pandemic on the construction business in Akwa Ibom State and Nigeria at large.

Acknowledgement

The authors wish to thank the Akwa Ibom State Polytechnic for permitting and supporting the research.

References

- Adhikari, K., & Poudyal, L. (2021). Future of construction industry: COVID-19 and its implications on construction projects and risk management—A review. doi:10.20944/preprints202104.0383.v1.
- ADU, E., & EKUNG, S. (2019). MITIGATION MEASURES OF PRICE INCREASE OF BUILDING MATERIAL IN UYO METROPOLIS, NIGERIA. *Ethiopian Journal of Environmental Studies & Management*, 12(1).
- Adu, E. T., Ekung, B., & Toyin, A. (2020). Key causes of variation orders in public construction projects in South-South zone of Nigeria: An explanatory factor analysis. *Civ. Environ. Res*, 12, 47-59.
- Agyekum, K., Kukah, A. S., & Amudjie, J. (2021). The impact of COVID-19 on the construction industry in Ghana: the case of some selected firms. *Journal of Engineering, Design and Technology*, 20(1), 222-244.
- Akanni, L. O., & Gabriel, S. C. (2020). The implication of Covid-19 pandemic on the Nigerian Economy. *Centre for the Study of the Economies of Africa*. <http://cseaafrica.org/the-implication-of-covid19-on-the-nigerian-economy>.
- Alenezi, T. A. N. (2020). The impact of COVID-19 on construction projects in Kuwait. *International Journal of Engineering Research and General Science*, 8(4), 1-4.
- Alsharaf, A., Banerjee, S., Uddin, S. J., Albert, A., & Jaselskis, E. (2021). Early impacts of the COVID-19 pandemic on the United States construction industry. *International journal of environmental research and public health*, 18(4), 1559.
- Andam, K., Edeh, H., Oboh, V., Pauw, K., & Thurlow, J. (2020). Impacts of COVID-19 on food systems and poverty in Nigeria. In *Advances in food security and sustainability* (Vol. 5, pp. 145-173). Elsevier.
- Assaad, R., & El-adaway, I. H. (2021). Guidelines for responding to COVID-19 pandemic: Best practices, impacts, and future research directions. *Journal of management in engineering*, 37(3), 06021001.
- Azeez, M., Gambatese, J., & Hernandez, S. (2019). What do construction workers really want? A study about representation, importance, and perception of US construction occupational rewards. *Journal of Construction Engineering and Management*, 145(7), 04019040.
- Biswas, A., Ghosh, A., Kar, A., Mondal, T., Ghosh, B., & Bardhan, D. P. K. (2021, February). The impact of COVID-19 in the construction sector and its remedial measures. In *Journal of Physics: Conference Series* (Vol. 1797, No. 1, p. 012054). IOP Publishing.
- Black, B. (2020). PANDEMIC PLANNING FOR THE CONSTRUCTION INDUSTRY A GUIDE-Created by: The Calgary Construct.
- Centres for Disease Control and Prevention (CDC). (2020). *Interim Guidance for Businesses and Employers Responding to Coronavirus Disease 2019 (COVID-19)*. Centers for Disease Control and Prevention. Retrieved 07 2020, from <https://www.cdc.gov/coronavirus/2019-ncov/community/guidance-businessresponse.html>.
- Chigara, B., & Moyo, T. (2022). Factors affecting the delivery of optimum health and safety on construction projects during the covid-19 pandemic in Zimbabwe. *Journal of engineering, design and technology*, 20(1), 24-46.
- Chodorow-Reich, G., & Coglianese, J. (2021). Projecting unemployment durations: A factor-flows simulation approach with application to the COVID-19 recession. *Journal of Public Economics*, 197, 104398.

- Ekpanyaskul, C., & Padungtod, C. (2021). Occupational health problems and lifestyle changes among novice working-from-home workers amid the COVID-19 pandemic. *Safety and health at work*, 12(3), 384-389. <https://doi.org/10.1016/j.shaw.2021.01.010>
- Ekung, S., Lashinde, A., & Adu, E. (2021a). Critical Risks to Construction Cost Estimation. *Journal of Engineering, Project & Production Management*, 11(1). DOI 10.2478/jepm-2021-0003.
- Ekung, S., Okonkwo, C., & Nwosu, E. (2021b). CLAIMS CULTURE AND CLIENT-CONTRACTORS' WILLINGNESS TO ENGAGE IN FUTURE PROJECTS: A MULTIVARIATE ANALYSIS. *African Journal of Built Environment Research*, 19. doi.org/10.33796/ajober.5.1.02
- Ekung, S., Odesola, I., & Oladokun, M. (2022). Dimensions of cost misperceptions obstructing the adoption of sustainable buildings. *Smart and Sustainable Built Environment*, 11(4), 852-869. DOI 10.1108/SASBE-10-2020-0160.
- Ekung, S., Opoku, A., & Okonkwo, C. (2023). Organisational learning and sustainability of service-based firms: a canonical correlation analysis. *International Journal of Construction Management*, 23(13), 2160-2170. <https://doi.org/10.1080/15623599.2022.2045863>.
- Elnaggar, S. M., & Elhegazy, H. (2022, January). Study the impact of the COVID-19 pandemic on the construction industry in Egypt. In *Structures* (Vol. 35, pp. 1270-1277). Elsevier.
- ENR. (2020a). COVID-19: Confronting the New Normal. < <https://www.enr.com/articles/49086-COVID-19-confronting-the-new-normal> > (Accessed, July 25, 2020), 387p.
- ENR. (2020b). AGC Survey: 28% of Members Report Halted or Delayed Projects Due to COVID-19.< <https://www.enr.com/articles/48976-agc-survey-28-percent-of-members-report-halted-or-delayed-projects-due-to-COVID-19> > (Accessed, July 25, 2020).
- Ezeokoli, F. O., Okongwu, M. I., & Fadumo, D. O. (2020). Adaptability of COVID-19 safety guidelines in building construction sites in Anambra State, Nigeria. *Archives of Current Research International*, 20(4), 69-77.
- Gaith, F. H., Khalim, A. R., & Ismail, A. (2012). Application and efficacy of information technology in construction industry. *Scientific research and essays*, 7(38), 3223-3242.
- Hendrickson, C., & Rilett, L. R. (2020). The COVID-19 pandemic and transportation engineering. *Journal of Transportation Engineering, Part A: Systems*, 146(7), 01820001.
- Hook, J. (2020). Engineering & construction in a post-COVID world: Weathering the storm. *pwc global*. Retrieved from <https://www.pwc.com/gx/en/issues/crisis-solutions/covid19/engineering-construction-post-covid-world.html>.
- Husien, I. A., Borisovich, Z., & Naji, A. A. (2021). COVID-19: Key global impacts on the construction industry and proposed coping strategies. In *E3S Web of Conferences* (Vol. 263, p. 05056). EDP Sciences.
- Iheme, J. O., Effiong, J. B., & Ekung, S. B. (2015). The effect of government policy on housing delivery in Nigeria: A case study of Port Harcourt low income housing programme. *International Letters of Social and Humanistic Sciences*, 61, 87-98.
- Ilatova, E., Abraham, Y. S., & Celik, B. G. (2022). Exploring the Early Impacts of the COVID-19 Pandemic on the Construction Industry in New York State. *Architecture*, 2(3), 457-475.
- Ishaq, I. M., Omar, R., & Mohammed, M. (2018). Challenges of communication between the client and contractor during construction projects: The Nigerian perspective. *International Journal of Engineering and Modern Technology*, 4(2), 20-29.
- Jahan Nipa, T., Kermanshachi, S., & Patel, R. K. (2020, July). Impact of family income on public's disaster preparedness and adoption of DRR courses. In *Creative Construction e-Conference 2020* (pp. 94-102). Budapest University of Technology and Economics.
- Jwasshaka, S. K., & Amin, N. F. (2019). Gender Discrimination in Building Construction Industry in Nigeria: Threat to Achieving Goal-5 of Vision 2030. *World Journal of Engineering and Technology*, 8(1), 33-41.
- Karimi, H., Taylor, T. R., Dadi, G. B., Goodrum, P. M., & Srinivasan, C. (2018). Impact of skilled labor availability on construction project cost performance. *Journal of Construction Engineering and Management*, 144(7), 04018057.
- Karthick, S., Kermanshachi, S., Rouhanizadeh, B., & Namian, M. (2021). Short-and Long-Term Health Challenges of Transportation Workforce due to Extreme Weather Conditions. In *Tran-SET 2021* (pp. 39-51). Reston, VA: American Society of Civil Engineers.
- Kukoyi, P. O., Simpeh, F., Adebawale, O. J., & Agumba, J. N. (2022). Managing the risk and challenges of COVID-19 on construction sites in Lagos, Nigeria. *Journal of Engineering, Design and Technology*, 20(1), 99-144.
- Liu, C., Zhou, Q., Li, Y., Garner, L. V., Watkins, S. P., Carter, L. J., ... & Albaiu, D. (2020). Research and development on therapeutic agents and vaccines for COVID-19 and related human coronavirus diseases.
- McKibbin, W., & Fernando, R. (2021). The global macroeconomic impacts of COVID-19: Seven scenarios. *Asian Economic Papers*, 20(2), 1-30. Available at: https://www.brookings.edu/wpcontent/uploads/2020/03/202003_02_COVID19.pdf
- Mousavizadeh, L., & Ghasemi, S. (2021). Genotype and phenotype of COVID-19: Their roles in pathogenesis. *Journal of Microbiology, Immunology and Infection*, 54(2), 159-163.
- National Bureau of Statistics (2020). Nigeria Gross Domestic Product Report for 2020. Available at www.nbs.gov.ng.
- Nigeria Centre for Disease Control. (2020, February 28) The first case of coronavirus disease was confirmed in Nigeria. (Accessed on 4th June 2020). Available:<https://ncdc.gov.ng/news/227/first-case-of-corona-virus-disease-confirmed-in-Nigeria>.
- Occupation Safety and Health Administration (OSHA). Protecting Workers during a Pandemic; 2020. (Accessed on 26th May 2020). Available: www.osha.gov/stateplans.
- Ogunusi, M., Hamma-Adama, M., Salman, H., & Kouider, T. (2020). COVID-19 pandemic: the effects and prospects in the construction industry. *International journal of real estate studies*, 14(Special Issue 2).
- Oladapo, I. O. (2016). Problems of the construction industry in Nigeria. Pp140-144. Article Zeitschrift: IABSE reports of the working commissions de travail AIPC = IVBH Berichte der Arbeitskommissionen. <http://dx.doi.org/10.5169/seals-21509>
- OSHA. (2020). *Guidance on Preparing*. U.S. Department of Labor, Occupational Safety and Health Administration. Retrieved 2020, from <https://www.osha.gov/Publications/OSHA3990.pdf>.
- Osuizugbo, I. C. (2020). Disruptions and responses within Nigeria construction industry amid COVID-19 threat. *Covenant journal of research in the built environment*.
- Pamidimukkala, A., & Kermanshachi, S. (2021). Impact of Covid-19 on field and office workforce in construction industry. *Project Leadership and Society*, 2, 100018.
- Rani, H. A., Farouk, A. M., Anandh, K. S., Almutairi, S., & Rahman, R. A. (2022). Impact of COVID-19 on construction projects: the case of India. *Buildings*, 12(6), 762. <https://doi.org/10.3390/buildings12060762>
- Sami Ur Rehman, M., Shafiq, M. T., & Afzal, M. (2022). Impact of COVID-19 on project performance in the UAE construction industry. *Journal of Engineering, Design and Technology*, 20(1), 245-266.
- Shereen, M. A., Khan, S., Kazmi, A., Bashir, N., & Siddique, R. (2020). COVID-19 infection: Emergence, transmission, and characteristics of human coronaviruses. *Journal of advanced research*, 24, 91-98.
- Sierra, F. (2022). COVID-19: main challenges during construction stage. *Engineering, construction and architectural management*, 29(4), 1817-1834.
- Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research methods for business students*. Pearson education.
- Wang, J., & Wang, Z. (2020). Strengths, weaknesses, opportunities and threats (SWOT) analysis of China's prevention and control strategy for the COVID-19 epidemic. *International journal of environmental research and public health*, 17(7), 2235.
- Warwick McKibbin, R. F. (2021). The global macroeconomic impacts of COVID-19: Seven scenarios. *Asian Economic Papers*, 20(2), 1-30.
- WHO. (2020). *Coronavirus disease (COVID-19) pandemic*. (World) Retrieved 10 31, 2020, from <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>
- World Bank (2019). World Bank report on Nigeria's economy. Available at www.worldbank.com
- Zamani, S. H., Rahman, R. A., Fauzi, M. A., & Yusof, L. M. (2021, February). Effect of COVID-19 on building construction projects: Impact and response mechanisms. In *IOP Conference Series: Earth and Environmental Science* (Vol. 682, No. 1, p. 012049). IOP Publishing