

Challenges and strategies for sustainable project performance in the post-Covid era in Nigeria: a thematic analysis approach

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Abstract

Purpose – Covid-19 pandemic have raised serious health concerns, work disruptions and job loss. Thus, Nigeria's Covid-19 challenges can hinder project performance in the construction sector. By integrating the principle of sustainable construction, it can minimise the environmental and socio-economic impact of Covid-19. This research therefore aims at developing strategies to achieve sustainable project performance in the post-Covid era in Nigeria.

Design/methodology/approach – A qualitative research method was used. Data was collected from 13 stakeholders in the built environment. Percentages and thematic analysis were used to analyse data from the interviews.

Findings – The study reveals that stakeholders are encountering operational and financial challenges: Increased price of materials, labour and material shortage and project delays were key operational challenges. The financial challenges were related to increased construction cost, reduced profit and payment delays. To address these challenges, the study developed managerial, contractual and governmental strategies: Market survey and bulk purchase, remote working and adherence to Covid-19 protocols were among the key managerial strategies. For the contractual strategies: contracts reviews, smart contracts, working overtime and night shift were developed, while governmental strategies included provision of funds, loans and incentives for workers.

Originality/value – The study deduced that while environmental sustainability was employed to address the Covid-19 challenges, the economic and social aspects were found to be under-utilized. Therefore, the study concluded that a holistic application of environmental, economic and social sustainability themes while incorporating managerial, contractual and governmental strategies is significant for achieving sustainable project performance in the post-Covid era in Nigeria.

Keywords Covid-19 pandemic, Challenges and strategies, Sustainable project performance, Sustainable construction, Thematic analysis, Post-covid era

Paper type Research paper



1. Introduction

The construction industry have been among the industrial sectors mostly affected by the Corona Virus disease (Covid-19) pandemic, therefore efforts are geared towards managing the impact and piloting projects through this post-Covid period. The construction sector, have been affected in a number of ways. Since the pandemic began, there have been fewer employment opportunities partially due to work disruptions and shortage of personal protective equipment (Rouhanizadeh *et al.*, 2019). As a result, the global economy deteriorated to its worst level in decades and the construction sector in Russia, America, Europe and other countries suffered various consequences such as suspending and cancelling activities, lack of suppliers' ability to deliver essential construction materials, uncertainty regarding future projects, workforce problems, increased costs, in addition to a set of legal issues (Husien *et al.*, 2021).

During the past year, various researchers have discussed the effects of Covid-19 on the construction industry. Yadeta and Pandey (2020) emphasized that the Covid-19 pandemic has left an enormous amount of uncertainty regarding contractual implications for those involved in the construction industry. Permesly *et al.* (2021) revealed that the impacts on construction projects includes, delays in the as-built schedule, changes in productivity, escalating labour and material costs, increased overhead, the time for project completion and each party bearing its own costs during force majeure event.

In Nigeria, Kabiru and Yahaya (2020) concluded that Covid-19 harmed the construction industry as it has obstructed site work, affected the bill of quantities, project completion and the law of contract. Osuizugbo (2020) attributed project abandonment, delay in construction activities, high cost of construction materials and shortage of workforce among the disruptions in the Nigerian construction sector. Yusuf *et al.* (2021) observed that the Covid-19 pandemic has led significantly to project cost overrun, project time overrun and litigation arising from construction disputes. For this reason, Yadeta and Pandey (2020) identified collaboration and good communication between government and contractors to be an essential solution. Ozili (2020) suggested adequate social welfare packages to swiftly cushion the effect of the pandemic. Similarly, Husien *et al.* (2021) suggested safe work site conditions, creative and innovative solutions and fair legislation as possible strategies to address these challenges. According to Baniya *et al.* (2021), the pandemic has challenged the developing world to meet sustainable development goals (SDGs) affecting construction. Thus, Nigeria's Covid-19 scenario may hinder SDGs connected with the construction sector (Ebekoziem *et al.*, 2021).

Therefore, although the above studies have helped in providing meaningful insight into the impacts of Covid-19, however, key aspects of sustainable construction and how its application can address Covid-19's impact were not taken into consideration. A sustainable driven strategy can help in minimising the negative impact of Covid-19 in the Nigerian construction industry by creating a safer working environment, while taking cognizance of labour impact, project cost and time related issues. This attests to the need for stakeholders to employ sustainability in their projects during this post-Covid era. This study therefore aims at developing strategies to address the challenges encountered by stakeholders as a result of the Covid-19 pandemic so as to achieve sustainable project performance in Nigeria. Thus, the objectives of the study are to:

- (1) Examine the challenges encountered by stakeholders in Nigeria as a result of the Covid-19 pandemic on construction projects
- (2) Develop strategies to address these challenges to achieve sustainable project performance in the post-Covid era.

As the built environment is currently striving to adjust to the Covid-19 pandemic, the findings of this study sheds light on current challenges in construction, while presenting applicable strategies to address them. The study further expands the field of scientific research that focuses on proffering post-Covid solution to the Nigerian construction industry. Regarding

sustainability, this paper contributes to existing knowledge by developing strategies to achieve sustainable project performance, thereby drawing a roadmap to face similar pandemic crises in the foreseeable future.

2. Summary of Covid-19 and its origin

Covid-19 is a novel corona virus with an outbreak of unusual inflammation of the lungs (Osuizugbo, 2020). The current Covid-19 pandemic is caused by a virus named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), with the first human case reported from Wuhan City, China, in December 2019. Ever since then, the confirmed cases have grown at an alarming rate and spread globally leaving the World Health Organisation (WHO) to declare Covid-19 a pandemic in March 2020 (WHO, 2020). In response to serious health concerns, governments around the world implemented social distancing, banned travelling, restricted movement of persons and finally a total lockdown. Though these restrictions have currently been eased, according to WHO, as of 2022, 593 million confirmed cases and 6.4 million deaths have been reported globally. Presently, WHO continues to offer advice on prevention and control measures. However, as different countries are struggling to keep the outbreak in check, several industries have paid heavily.

2.1 Impact of Covid-19 pandemic on the global construction industry

Many research (Ogunnusi *et al.*, 2020; Gamil and Alhagar, 2020; Baniya *et al.*, 2021; Alsharif *et al.*, 2021; Umar, 2021; Timilsina *et al.*, 2021) have been devoted to the impact of Covid-19 on the global construction industry, with insightful developments. Baniya *et al.* (2021) reviewed impacts of Covid-19 on the world economy and practices in Nepal and showed that the global gross domestic product (GDP) has declined causing economic recession on international and national scales, community instability and violence increase due to unemployment.

Alsharif *et al.* (2021) conducted a series of structured interviews with 34 construction professionals and found the following impacts of Covid-19 on the construction sector in the United States of America (USA): Material delivery delays and shortage; delays in inspections and securing permits; reduction in efficiency and production rate; slowing of on-going projects and delay in the start of new projects; price escalations, additional costs, loss of revenue, payment delays; safety concerns, workforce shortages; expected increase in disputes, litigation, and claims. In yet another study, Umar (2021) observed that the critical aspect of the impacts arising from Covid-19 are related to delays of the construction projects, effective management of workforce, health and safety issues and legal aspects. Timilsina *et al.* (2021) acquiesced that Covid-19 have also caused delays in construction projects in Malaysia, with the most common reason being that the daily working period has been shortened. Similarly, Gamil and Alhagar (2020) found suspension of projects, labour impact and job loss, time overrun, cost overrun and financial impact as the most impacting factor caused by Covid-19. Remarkably, Ogunnusi *et al.* (2020) opined that construction companies that are adopting and implementing technology are gaining the rewards (especially in this Covid-19) with better collaboration, increased productivity and project completion under budget and on time leading to increased profit margin.

2.2 Covid-19's impact on the Nigerian construction industry

The contribution of construction activities and the significant role it plays to the nation's economic, environmental and social development cannot be over-emphasized (Isang, 2016). The industry represents 13% of global GDP, its output worth more than \$100bn a year, providing work for millions of people (Dania *et al.*, 2013). This, unfortunately, became impossible under the new normal due to the pandemic. According to Yusuf *et al.* (2021) the construction industry like other economic sectors was not spared and as such, suffered its

share of the adverse effects of the pandemic. [Ogunnusi et al. \(2020\)](#) considered the negative side of Covid-19 as delays in the completion of projects, hardship encountered by daily paid labourers, budget delays, properly scheduled project disruption, real estate sector revenue slowdown.

[Osuizugbo \(2020\)](#) revealed that transportation problem (for both materials and workers), project abandonment, delay in construction activities, high cost of construction materials, reduction in working hours per day, lack of funding and shortage of workforce were among the disruptions in the Nigerian construction sector during the Covid-19 pandemic. [Ozili \(2020\)](#) attributed the severity of the pandemic in Nigeria to weak institutions, and a lack of adequate social welfare packages to swiftly cushion the effect of the pandemic. [Yusuf et al. \(2021\)](#) found that the Covid-19 pandemic has led significantly to project cost overrun, project time overrun and litigation arising from construction disputes. Interestingly, [Ebekozi et al. \(2020\)](#) suggested that the Fourth Industrial Revolution (4IR) technologies can stir up attaining SDG associated with the sector in the post-Covid-19 recovery era. A summary of some of the impact of COVID-19 pandemic in the construction industry identified from relevant literature is shown in [Table 1](#).

2.3 Challenges faced by construction professionals due to the impact of Covid-19

As a result of Covid-19 having a tremendous negative impact on project performance, relevant literature ([Bailey et al., 2020](#); [Gamil and Alhagar, 2020](#); [Kabiru and Yahaya, 2020](#); [Pamidimukkala and Kermanshachi, 2021](#)) have identified some of the challenges faced by construction professionals. [Pamidimukkala and Kermanshachi \(2021\)](#) identified categories of Covid-19 challenges, with the result revealing that; lack of a safe environment in the workplace, heavy workloads, home situations and concerns about job stability are contributing factors that management encounter with their construction workers. [Bailey et al. \(2020\)](#) observed that where work continues on construction sites, health and safety risk assessments needs to be provided for a safe working environment.

On the contractual side, [Gamil and Alhagar \(2020\)](#) noted that contractors in Malaysia are inevitably faced with legal issues due to the nonconformity of contractual terms, which is caused by the suspension of the project and sudden fluctuation of material price. [Kabiru and Yahaya \(2020\)](#) revealed that contractors and employers in the construction industry are affected with site work activities, the bill of quantities, project completion, law of contract, causing Force Majeure events in the Nigerian construction industry. This poses a difficult challenge to stakeholders. A summary of some of the identified challenges from relevant literature faced by construction professionals due to Covid-19 is shown in [Table 2](#).

2.4 Possible measures for addressing the impact of Covid-19 in the construction industry

As different sectors are struggling to keep the outbreak in check, the construction industry is among them. In identifying measures to address Covid-19 in the construction industry, there have been recent related studies. [Simpeh and Amoah \(2021\)](#) identified three categories of

Key impacts	Source
Community instability; unemployment	Baniya et al. (2021)
Material delays and shortage; efficiency and production rate reduction; additional costs; loss of revenue	Alsharif et al. (2021) , Umar (2021) , Ogunnusi et al. (2020) , Gamil and Alhagar (2020) , Yusuf et al. (2021)
Project abandonment; delays; high cost of construction materials; shortage of workforce	Osuizugbo (2020)

Table 1.
Impact of Covid-19 in
the construction
industry from relevant
literature

measures to curb the spread of Covid-19 among construction site workers, which are: screening, site access and handling of material and equipment deliveries on-site. [Salami et al. \(2021\)](#) stated that companies have devised some means like working weekends only when the site is usually empty, while some other have used other strategy like working from home. [Pamidimukkala and Kermanshachi \(2021\)](#) demonstrated that: redefining workforce site safety by placing signs, ensuring a safe distance between workers, providing sanitizers and washing stations in the fields, and also using effective technologies are strategies to enhance project productivity were the strategies to combat them. In addition, [Permesly et al. \(2021\)](#) opined that: installing hand sanitizer stations; mounting center for disease control (CDC) posters emphasizing the importance of washing hands and covering faces with masks; mandating thermal screening for everyone entering and leaving the facility are health and safety preventive measures that can be made.

[Husien et al. \(2021\)](#) suggested possible and effective strategies to include: safe work site conditions; creative and innovative solutions; and cooperative and fair legislation. To that point, [Kabiru and Yahaya \(2020\)](#) suggested that there is a need for global pandemics, such as Covid-19 to be included as a force majeure event. [Umar \(2021\)](#) noted that the government should support businesses to sustain themselves during this period. In Nigeria, [Osuzugbo \(2020\)](#) revealed that temperature checks, social distancing, no entry for unauthorised visitors to site, use of personal protective equipment and personal hygiene were the responses in the construction sector during the Covid-19 threat. Indeed, the pandemic has challenged developing country, like Nigeria to meet SDGs affecting construction.

The goal of sustainability, as established by [Isang \(2016\)](#) and [Oladokun et al. \(2020\)](#) is to assess the environmental, economic and social impact of construction activities on the society. To that end, stakeholders can incorporate the principle of sustainable construction by creating a safe working environment to complete their building projects on time while achieving project cost with minimum impact post-Covid. As evident in the literature review, these studies were focused on different purpose. Although [Ogunnusi et al. \(2020\)](#) conducted an in-depth study on Covid-19; however their investigation was generalized to a global audience, and not tailored to the Nigerian context. On the other hand, [Yusuf et al. \(2021\)](#) study in Nigeria focused on Covid-19 pandemic through digitalization of operations and processes, while the work of [Osuzugbo \(2020\)](#) focused on disruptions and responses to Covid-19's threat within the Nigeria construction industry. However, these studies did not focus on integrating sustainable construction as a strategy to address post-Covid challenges. This research intends to fill the gap by developing strategies for sustainable project performance post-Covid, while taking environmental, social and economic challenges encountered by stakeholders into consideration. A summary of some possible measures identified from relevant literature for addressing the impact of Covid-19 in the construction industry is shown in [Table 3](#).

3. Research methodology

This study adopted a qualitative research design with the use of face to face oral interviews and phone calls. The qualitative approach was used to gain deeper insight, through a series of

Table 2.
Identified challenges from literature faced by construction professionals due to Covid-19

Key challenges	Source
Health and safety risk; heavy workloads	Bailey et al. (2020) , Pamidimukkala and Kermanshachi (2021)
Legal issues; project suspension; fluctuation of material price	Gamil and Alhagar (2020)
Effects on bill of quantities and law of contracts	Kabiru and Yahaya (2020)

interaction, into the challenges stakeholders experienced as a result of Covid-19 and the strategies they employed to achieve sustainable project performance post-Covid. The source of empirical data was collected with the help of 50 interviewees' using convenience sampling technique. The 50 interviewees were selected based on their knowledge and expertise in executing construction projects. Convenience sampling technique was adopted due to the availability of the sample population. 13 respondents gave the required information this was as a result of accessibility criteria.

The in-depth interviews were conducted with stakeholders in the construction sector in Nigeria comprising of Contractors, Consultants and Clients in Akwa Ibom, Bayelsa, rivers and Abuja between the period of January to March 2022. The respondents were selected due to their experience in sustainability practices and direct involvement in on-going construction projects. Two questions were asked based on the research objectives: 1. What challenges did you encounter on construction projects as a result of the Covid-19 pandemic? 2. What post-pandemic strategies have you employed to address these challenges to achieve sustainable project performance? The study used thematic analysis to examine the responses provided by participants in the research field. In using thematic analysis, themes and sub-themes were thus generated to analyse the field data (Braun and Clarke, 2006). Thus, an inductive analysis of participants' experiences by a qualitative research approach (Shank, 2006) was used. The thematic analysis was conducted by transcribing the audio recordings manually, through intelligent verbal transcription of the interviews and phone calls into written form. Thorough and repeated listening was applied to achieve this. Coding was then carried out by highlighting the notes on Microsoft word application. Themes and sub-theme were thereafter generated by searching, reviewing and defining the coded thematic text. The extracted data was finally analysed and the findings were reported. This method assisted in making sense of the qualitative data. Descriptive statistics of percentages were also used to present the data and complement the thematic analysis. Figure 1. shows a flow chart of the methodology employed for the study.

4. Research findings

4.1 Respondents demographics and reliability of data

Table 4 presents the demographics of the respondents in terms of their profession, academic qualification, affiliation and years of work experience. An in-depth look at the table indicates that 7.70% of the respondents were Engineers, 38.46% Quantity Surveyors, Builders, Construction Managers and Consultants were 15.38% and Clients 7.70%. This result implies that stakeholders in the built environment were the respondents in the study with Quantity Surveying Contractors representing the major figure head on construction projects. Moreover, the table also shows that majority of the respondents have adequate educational qualification to participate in the study with 46.15% possessing a B.Sc degree. Also, 72.50% of the stakeholders were registered professionals in their field of study. This

Key measures	Source
Working weekends	Salami <i>et al.</i> (2021)
Social distancing; provision of sanitizers and washing stations; temperature checks; use of personal protective equipment	Pamidimukkala and Kermanshachi (2021), Osuizugbo (2020), Permesly <i>et al.</i> (2021)
Safe work site conditions; creative and innovative solutions; cooperative and fair legislation	Husien <i>et al.</i> (2021)
Remote working	Ogunnusi <i>et al.</i> (2020)

Table 3.
Possible measures
from relevant literature
for addressing
Covid-19

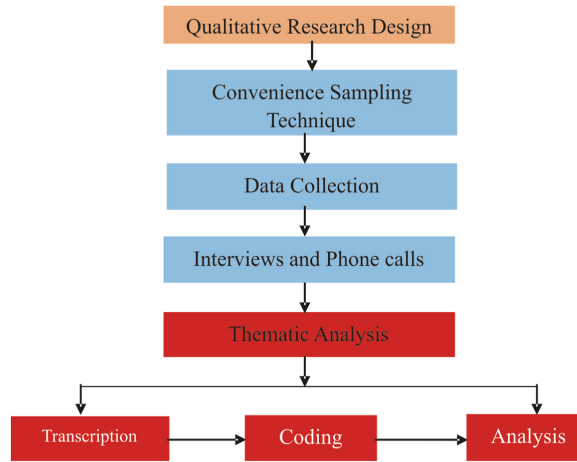


Figure 1.
A flow chart of the methodology employed for the study

Respondent's characteristics	No	Percentage %
<i>Profession</i>		
Construction manager	2	15.38
Builder	2	15.38
Engineer	1	7.70
Quantity surveyor	5	38.46
Consultant	2	15.38
Client	1	7.70
Total	13	100
<i>Qualification</i>		
PhD	2	15.38
M.Sc	2	15.39
B.Sc	6	46.15
HND	3	23.08
Total	13	100
<i>Affiliation</i>		
CORBON	2	25.00
COREN	1	12.50
QSRBN	5	62.50
Total	8	100
<i>Years of experience</i>		
Contractors	107	82.95
Consultants	7	5.42
Clients	15	11.63
Total	129	100

Table 4.
Demographics of the respondents

Source(s): Authors' Survey

implies that most of the respondents have adequate qualification and knowledge to make useful input in the research. Further analysis in Table 4 also reveals that the combined working experience of the Contractors, Consultants and Clients in the built environment were 129 years. This generally implies that the interviewees had adequate experience to make

meaningful contribution to the research. Details of the respondents' demographics are presented in [Table 4](#).

4.2 Challenges encountered on project construction as a result of the covid-19 pandemic

Covid-19 has had devastating effects on construction projects. To achieve the objective of examining the challenges encountered by stakeholders in Nigeria as a result of the Covid-19 pandemic, the interviewees' were asked the challenges they encountered. Their responses were thematically categorized into two themes, which are operational and financial.

4.2.1 Operational challenges encountered on project construction during Covid-19 pandemic. Certain operational challenges such as shortage in labour supply, inadequate supply of materials, health and safety issues, project delay and low patronage and management difficulties were encountered. According to a Quantity Surveying Contractor interviewee, it was difficult for contractors to recruit skilled and unskilled labours to work on site during the Covid-19 pandemic. A consultant interviewee further added that workers who relocated, withdrew or lost their lives during this time and could not be replaced resulting in low workforce. It was also mentioned that they lacked occupational safety health (OSH) staff during this period. Issues of health and safety of workers also posed challenges to the building construction workers during the pandemic. A Mechanical Engineer interviewee alluded to the difficulties in protecting the workers from exposure to Covid-19 infections, because construction work entails interpersonal contact, thereby making it difficult to maintain physical distancing on construction site. Further to this, there was also the challenge of project delay and low patronage. A Construction Manager voiced out that project delays were caused by setbacks in delivering materials to construction site due to the restriction of movement. He also added that the difficulty in recruiting workers during the pandemic led to shortage of workers and temporary closure of the construction site, as well as reduction in the operational time. This also caused delay in project execution.

Speaking on low patronage, one of the Contractor, A Quantity Surveyor, revealed that there was reduction in the number of project they were awarded during this period compared to the pre-Covid era. Contractors also faced challenges in project management during the Covid-19 pandemic. A Quantity Surveyor articulated that it was difficult to manage and supervise project remotely because construction project management requires the physical presence of the contractor/supervisor on site. Another Construction Manager interviewee noted that the inability of contractors to move about freely because of the restriction in movement, reduced the efficiency of the workers on the worksite making project supervision difficult. A Client also lamented that his inability to supervise his project during the pandemic gave room to the contractors to use sub-standard materials to gain undue profit.

There was also the challenge of inadequate supply of materials during the pandemic. A Building Contractor interviewee alluded to the restriction in movement affecting the supply of materials into the worksite which affected project construction during this period. Apart from the operational challenges, stakeholders also faced financial challenges in building construction project during the Covid-19 pandemic. These are highlighted in the next sub-theme.

4.2.2 Financial challenges encountered on project construction during Covid-19 pandemic.

The Covid-19 pandemic was also accompanied by financial challenges such as increase in materials and construction cost, reduction in profit and payment delay. Speaking further on the hike in the prices of materials and the resultant high construction cost, a Construction Manager and a Quantity Surveyor interviewee lamented that there was an increase in the cost of both human and material resources in the construction site which caused delays and increase in construction cost. In addition, the contractors explained that their profit on building construction projects reduced drastically compared to the pre-Covid era. Another

Construction Manager added that it is now extremely difficult to claim their compensation; this has resulted in reduction in their investment. As told by a Quantity Surveyor interviewee, they now experienced budget deficit which have led to abandoning of project. Finally, delays in paying the contractors which invariably led to delay in paying the workers on the site is another challenge confronting building construction as a result of the Covid-19 pandemic. The Contractors as well as a Client alluded that insufficient cash flow has resulted in delay in the payment of remuneration to the construction workers.

Despite these challenges, the study shows that Contractors and Clients are still managing to execute building construction projects. Therefore, the next theme focuses on the strategies employed by stakeholders for sustainable project performance in the post-Covid-19 era.

4.3 Strategies employed for sustainable project performance in the post-Covid-19 era

For the purpose of developing strategies to address the Covid-19 challenges, the interviewees' were also asked the strategies they employed to achieve sustainable project performance. Insights from their response were thematically categorized into three themes which are managerial, contractual and governmental strategies.

4.3.1 Managerial strategies employed for sustainable project performance. Applicable managerial strategies were put in place by the interviewees to overcome the challenges associated with Covid-19 pandemic and ensure sustainable project performance. These strategies includes: promotion of health and safety, taking market survey and bulky purchase, adequate supervision, working remotely, application of technological innovation, strategic procurement, joint risk management and adherence to Covid-19 protocol. While talking about promotion of health and safety, a Contracting Quantity Surveyor interviewee articulated that they created safety consciousness in their workers and ensured adherence to safety protocols such as cleanliness. One of the interviewee, a Consultant, added that safety personnel had been trained to educate the site workers. In order to address the increase in the price of building materials, the Contractors undertook market survey to ascertain the current price of materials needed before carrying out their quotations and the actual purchase. They also noted that they bought in bulk to save cost. Another unique strategy employed by the interviewees was working remotely and making use of technology. According to a Mechanical Engineer, they currently engage in online contact than physically by using zoom application and other online platforms to hold virtual meetings. Furthermore, they used the pandemic period to strategize how to use technology to augment the activities of workers for better productivity.

Also, Building Contractors asserted that they normally employ strategic procurement method such as collaborative procurement, in which the concerned contractor collaborates with other contractor(s) to receive procurement at an affordable rate. Joint risk management and adequate supervision were other strategies highlighted by another Construction Manager interviewee. According to a Quantity Surveyor, they provided hand sanitizer and nose mask for their workers on the worksite and they ensured compliance. Also, a Client voiced that they ensured the activities of the workers were closely monitored and supervised in the construction worksite. In addition to the managerial strategies put in place by the interviewees, stakeholders also employed contractual strategies to address the Covid-19 challenges. This is highlighted below.

4.3.2 Contractual strategies employed for sustainable project performance. In order to ensure sustainable project performance, the contractors employed certain strategies such as: reviewing of project budget, overtime and night shift, procurement of quality materials and smart contract. A Quantity Surveyor interviewee revealed that, as a result of the pandemic, the price hike compelled them to review the budget of their construction projects. He added that they revisited the budget of projects they had prior to Covid-19 and reviewed it upwards

to accommodate the current market price and their workers' remunerations. A Building Contractor also explained that they resorted to doing overtime and night shift as a strategy to cope with the challenges of shortage in their operation time. This was as a result of the lockdown and restriction of movement during Covid-19 pandemic. They also encouraged procurement of quality materials, as some clients tend to opt for sub-standard material because of the hike in price. One of the Construction Manager declared that he employs smart contract strategy to ensure sustainable project performance in the post-Covid-19 era. A client interviewed explained that due to the increase in the price of materials used in the project worksite, they provided additional funds to assist the contractors in executing the project. The interviewees further employed governmental strategies to address the challenges they experienced as a result of Covid-19. This are highlighted below.

4.3.3 Governmental strategies employed for sustainable project performance. Financial aids and provision of incentives were the two key governmental strategies the interviewees noted would ensure sustainable project performance. As told by the interviewees, relief funds should be provided to the contractors by the government to relief them of the resulting financial burden of the pandemic. A Quantity Surveyor further articulated that the government should give them the opportunity to access grants and loans, so as to keep their operation running in the worksite, pay their workers' salaries and support the project cost. Further to this, other interviewees' noted that incentives should be provided to the workers on site to motivate them and ease the burden of the pandemic.

5. Discussion of findings

Based on the thematic analysis, the findings were categorized into themes and sub-themes which are all discussed below. For the challenges encountered by Stakeholders, this category revealed two (2) major themes and (7) seven sub-themes with the result showing that Stakeholders encountered two-level challenges: operational and financial as a result of the Covid-19 pandemic. The study details four specific sub-themes under the operational challenges on construction projects:

- (1) Increased price of materials
- (2) Health and safety issues
- (3) Shortage of labour and material supply
- (4) Delay in project delivery

The operational site work challenges encountered in construction projects as a result of Covid-19 were attributed to inflation in the Nigerian economy which escalated the price of building material, notably cement from 2,500 naira to 4,000 naira per bag. This contributed to price increment and resource scarcity experienced by stakeholders. Concerns over health and safety, labour issues such as relocation or withdrawal of personnel were also operational related challenges. This result echoes the assertion of [Gamil and Alhagar \(2020\)](#) that projects that are still running will face challenges such as shortage of workers, the rise of materials price and shortage of material and supply chains. More insights drawn from the findings reveals that, the inability of contractors to move freely due to restriction in movement reduced the efficiency of the workers on the worksite, making labour and material supply along with project supervision difficult. This result agrees with previous work by [Alsharef et al. \(2021\)](#) that Covid-19 impacted material delivery delays, workforce shortages, reduction in efficiency and production rate, slowing on-going and new projects.

Another illuminating finding from the study shows that the issue of low patronage, difficulties in recruiting skilled and unskilled labour, low workforce due to relocation and

withdrawal of construction workers are social sustainability themes established in this study. This finding lends credence to [Pamidimukkala and Kermanshachi \(2021\)](#) that labour impact, concerns about job stability and job loss are factors caused by Covid-19. By implication, this proves that the social aspect of sustainability was adversely impacted during the Covid-19 pandemic in the Nigerian construction sector.

Furthermore, three sub-themes under financial challenges encountered by stakeholders due to Covid-19 were revealed as:

- (1) Increase in materials and construction cost
- (2) Reduction in profit
- (3) Payment delays

Undoubtedly, financial difficulty is a major economic challenge experienced as a result of the pandemic. As such, findings from the study prove that stakeholders experienced little or no profit. Delayed payments further affected the contractor's cash flow in the project. Also, the study reveals that increase in the cost of human and material resources on the site, along with increase in construction cost, were challenges experienced by stakeholders. This finding is consistent with [Osuizugbo \(2020\)](#) and [Yusuf *et al.* \(2021\)](#) that high cost of construction materials and additional cost are among the effects of Covid-19 in the Nigerian construction sector. This infers that during the Covid-19 pandemic, the economic aspect of sustainability in Nigeria was seriously affected. [Figure 2](#) presents a flow chart of the challenges encountered in construction projects during Covid-19 pandemic.

The study further developed strategies to address these challenges. As a result of the thematically analysed findings, three (3) themes and fourteen (14) sub-themes were derived. Managerial, contractual and governmental strategies were developed to achieve sustainable project performance in the post-Covid era. Under managerial strategies, the eight sub-themes were:

- (1) Continuous health and safety improvement
- (2) Application of technological innovation
- (3) Joint risk management
- (4) Strategic management
- (5) Adequate supervision
- (6) Taking market survey and bulky purchase
- (7) Remote working
- (8) Adherence to Covid-19 protocol

The result of this study reveals that training construction workers on being health and safety conscious, provision of hand sanitizers and nose mask are among the health and safety strategy employed in construction projects. This shows that stakeholders promoted continuous health and safety improvement and adhered to Covid-19 protocols at construction sites. This finding is in agreement with previous studies by [Permesly *et al.* \(2021\)](#) that safe work site conditions, provision for hand washing and sanitizers, and the use of face masks are measures to address Covid-19 challenges. This can be deduced as an environmental aspect of sustainable construction, indicating that stakeholders are applying sustainability goals to achieve sustainable project performance post-Covid. Another profound finding from this study reveals that monitoring material cost through market survey and bulk purchase is a key strategy employed by Contractors to address the increase in material cost. This strategy

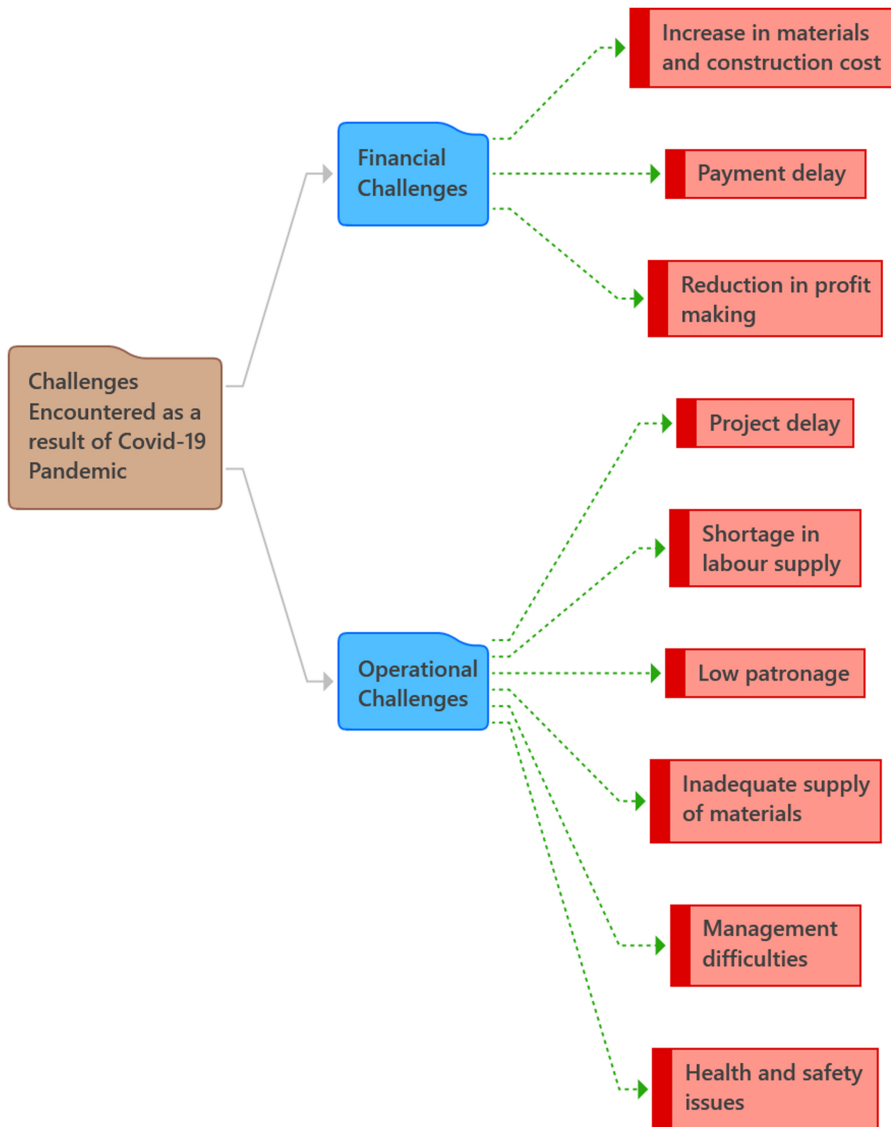


Figure 2. Flow chart of the specific challenges encountered by stakeholders in Nigeria as a result of the Covid-19 pandemic on construction projects

assists in improving project cost overrun in stakeholder's quest for sustainable project performance post-Covid. Also, management's strategy in exploring remote working technologies such as Microsoft office and Zoom video conferencing have been revealed as a strategy to achieve sustainable project performance in a non-Covid world. This finding conforms to the observation of [Ogunnusi et al. \(2020\)](#) that, construction companies that are adopting and implementing technology, especially in this Covid-19, will have better collaboration and increased productivity. This shows the benefits to be had in applying technological innovation for sustainable project performance in Nigeria.

Four sub-themes under contractual strategies to address Covid-19 were also revealed to include:

- (1) Review of project budget
- (2) Smart contract
- (3) Working overtime and night shift
- (4) Procurement of quality materials

The result reveals that complete change to procurement operations, use of fluctuating fees contract, integrated design practice, joint risk management and reviewing contract rates to accommodate price increase are contractual strategies stakeholders are employing to address post-Covid challenges. This harmonizes with the work of [Yadeta and Pandey \(2020\)](#) and [Kabiru and Yahaya \(2020\)](#) that collaboration between government and contractors, as well as negotiation of contract amendments are essential solution.

Two sub-themes under governmental strategies were also revealed:

- (1) Government relief funds and loans
- (2) Provision of incentives for worker

The role of the government in providing relief funds and loans can go a long way in sustaining stakeholders during the post-Covid period. Therefore, findings from this study support the call for the provision of financial aid by the government and clients in the form of relief funds and loans. This can take the form of introducing incentive and overtime for workers to assist contractors in operation, paying staff salaries and supporting the project cost. This is in tandem with [Osuizugbo \(2020\)](#) and [Ozili \(2020\)](#) that adequate funding and social welfare packages can swiftly cushion the effect of the pandemic in Nigeria. This implies that going forward; the Nigerian construction sector must fully utilize the economic aspect of sustainability in the post-Covid era for sustainable project performance. [Figure 3](#) presents a flowchart of the strategies developed for sustainable project performance in the post-Covid era.

6. Conclusion

The impact of the Covid-19 pandemic has challenged developing countries like Nigeria, to meet sustainability goals affecting project performance in the construction sector. Based on this premise, this research examined the challenges encountered by stakeholders during Covid-19 and developed strategies to achieve sustainable project performance in the post-Covid era. Findings from the study reveal that stakeholders are encountering operational and financial challenges due to Covid-19. The study showed that construction project are affected by increase in the price of materials, health and safety issues, shortage of labour and material supply, reduced profit and delays in project. This emphasizes the need to carry out market survey and bulk purchase for cost savings. The introduction of overtime work, night shift and worker's remuneration have also been shown to assist stakeholders in addressing labour impact to achieve sustainable project performance post-Covid.

The study also reveals that, to address Covid-19 challenges, stakeholders are employing managerial, contractual and governmental strategies. At management level, more attention is now focused on improving the health and safety of construction workers as a result of Covid-19. Findings from this research further shows that despite the initial challenge of managing project remotely, stakeholders in Nigeria are applying innovative technologies like Microsoft office and Zoom video conferencing for better productivity. The need to review contract rates to reflect force majeure events and fluctuating material prices have also been explored in this research. Going forward, this calls for a shift towards smart contract considering the

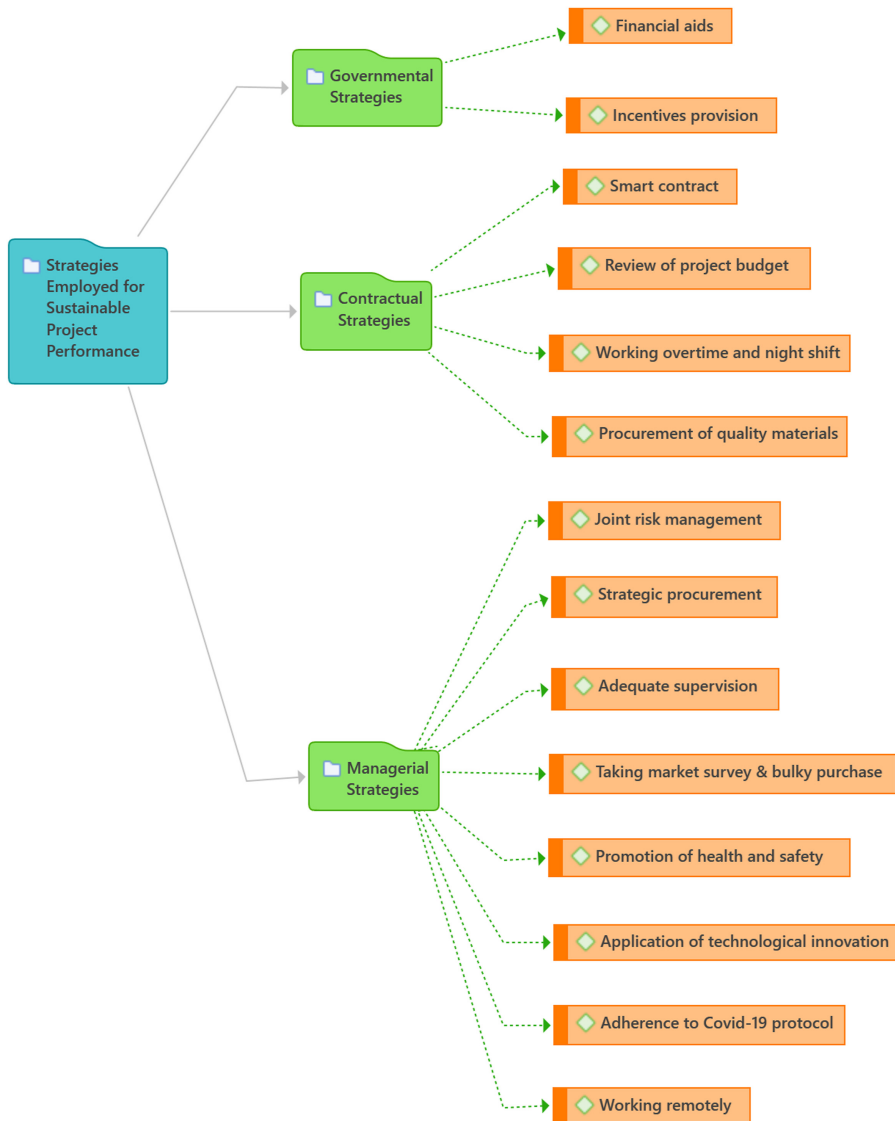


Figure 3. Flow chart of the applicable strategies developed to be employed by stakeholders for sustainable project performance on the post-Covid era in Nigeria

post-Covid situation in Nigeria. The study further reiterates the need for government and clients to provide loan, funding and incentives to assist contractors and consultants in supporting staff payment and exceeding cost towards project completion. Key ways to achieve this is by introducing incentives programmes, overtime and grants.

Based on this findings, the study thematically drew the conclusion that Covid-19 have caused operational and financial challenges, therefore it is recommended employing managerial, contractual and governmental strategies to achieve sustainable project performance post-Covid in Nigeria. One of the most significant finding to emerge from this study is that, the economic and social aspects of sustainability was under-utilized to address

the Covid-19 pandemic in construction projects. Therefore, the theoretical implication for building professionals holds that, to achieve sustainable project performance, the environmental, economic and social themes of sustainability must be holistically employed. All of this strategies developed are crucial for sustainable project performance in the post-Covid era in Nigeria and should serve as a basis for future post-Covid studies. Also, the study has practical implication for researchers in the field of sustainable construction in Nigeria. More effort should be geared towards promoting the benefits of sustainability practices through scientific research. Professional bodies and academicians can generate interest among clients and the Nigerian Government about sustainable construction as a panacea for project performance in the post-Covid recovery era, this is hereby canvassed in this paper. As with all studies, this research has limitations with the major one being the number of respondents interviewed. Further studies can consider using a larger sample size with a multi-method approach to better generalize the findings and gain a more comprehensive outcome.

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