

Chapter **11**

Effect of COVID-19 Pandemic on the Delivery of Building Construction Projects in Abuja

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Abstract

Studies have established that the problem of the COVID-19 pandemic has resulted in a halt in construction activities leading to poor cost and timely delivery of building construction projects. The study evaluated the effect of the COVID-19 pandemic on the delivery of building construction projects in Abuja with a view to identifying strategies for minimising the effects on project delivery. A quantitative research approach was adopted with the use of questionnaire survey to collect data from thirty (30) construction firms registered with Federal Capital Development Authority (FCDA), Abuja. Analysis of data was undertaken with the use of frequency counts, percentage and Mean Item Score (MIS). It was found that the most important factors hindering the success of construction project delivery as a result of COVID-19 are Restrictions of movement and lockdown (MIS = 5.00); Delays in material delivery (MIS = 4.97); and Price escalations (MIS = 4.97). The study shows that the most significant effects of COVID-19 on the cost delivery of building construction projects are Price escalation of material (MIS = 5.00); High cost of construction materials (MIS = 5.00); and Disruptions (MIS = 4.87). It was also shown that the most

significant effects of COVID-19 on the time delivery of building construction projects are Workforce availability due to illness (MIS = 4.63) and Shortage of equipment and labour (MIS = 4.57). It was also discovered that the most effective strategies for reducing the negative effects of COVID-19 on the delivery of building construction projects are Communication of information (MIS = 4.63); Design optimization (MIS = 4.53); and more effective actions by the government to generate faster healing in the construction sector (MIS = 4.53). The study concluded that the effect of the COVID-19 pandemic on the delivery of building construction projects in Abuja is significant. It was therefore recommended that construction firms should set up implementable mechanism that will accommodate all the effective strategies for reducing the negative effects of COVID-19 on the delivery of building construction projects with more focus on communication of information; design optimization; and effective actions by the government to generate faster healing in the construction sector.

Keywords: *Construction, COVID-19, Delivery, Pandemic, Projects.*

Background of the Study

The construction industry plays a significant role in the nation's economic, societal, and political development. Global and dramatic spread of COVID-19 has traveled much faster than our response plan, and the risks such as this pandemic has been underestimated by governments, industries, and all others (Ozguler, 2020). The COVID-19 has already brought unprecedented economic and social impacts to many parts of the world and several sectors including, but not limited to business, schools, universities, travel, tourism, hospitality, aviation, agriculture, petroleum and oil, manufacturing industry and construction industries (Gamil and Alhagar, 2020). Due to this pandemic, all construction and engineering projects activities have stopped following the movement control order by the Federal Government of Nigeria. The safety measures such as travel restrictions, social distancing and quarantines have resulted in unprecedented delays, disruptions, increased construction cost, and uncertainty on construction projects with increasingly disrupting supply chains, contractor workforces and the availability of governmental personnel for project inspections (Robert *et al.*, 2020) and it is not yet clear how the construction industry will adopt once the recovery and rebuilding phase begins (Ozguler, 2020). Moreover, work from home may not be practical, as the physical activity must be conducted on-site. There would be a high impact on Nigeria's economic growth if any major construction projects get

delays (Zamani *et al.*, 2021). Therefore, finding approaches to reduce the adverse effects of COVID-19 is crucial to avoid negative economic growth in the nation that can eventually result in an economic recession. The “Roadmap to Recovery” prepared by Construction Leadership Council requires the construction industry to 'reinvent' by safeguarding construction businesses and work collaboratively. The Nigerian economy was negatively impacted especially in the country's capital (Abuja) and financial centre (Lagos). The challenging situation created insufficient revenues for some States to meet their immediate spending. Ogunnusi *et al.* (2020) reported that the prognosis for the growth of the construction industry has been reviewed downward with possibility of further cut if actions in the short-term are severely disrupted more than envisaged by the COVID-19.

Furthermore, past studies have reported that the construction industry became a victim of COVID-19 to the extent that it has brought its projects to a halt and significantly eroded the market of its beneficiaries (CIRT, 2020; Gamil and Alhagar, 2020; Ogunnusi *et al.*, 2020; Ozguler, 2020; Adhikaria *et al.*, 2021; Zamani *et al.*, 2021). For instance, CIRT (2020) reported that amid COVID-19, the construction industry has been hit hard and is being challenged by many obstacles regarding contractual obligations, availability of resources, deliverables, health and safety measures, and project delays or cancellations. In addition, Gamil and Alhagar (2020) found that the COVID-19 pandemic has posed serious threat to the economy of the construction industry. This is because the lockdown of many States in Nigeria has resulted in the long-term suspension of construction projects. This could result into cost overrun, time overrun, job loss and bankruptcy of some construction firms among other challenges. Unlike other industries, construction projects cannot accommodate distance working but facing challenges making on-time delivery impossible and therefore construction industry is at risk (Ghandour, 2020). Therefore, the construction industry has been faced with a lot of challenges as a result of the COVID-19 pandemic which could result into the poor delivery of construction projects which can result into economic downfall around the globe and cause increased inflation and these impacts could be prolonged. In view of the above background, it has been discovered that the COVID-19 pandemic has resulted into a halt in construction activities which has led to a multiplying effect on construction projects in the form of poor cost and time delivery. This effect can be felt both in the short-term and long-term.

Aim and Objectives

In the light of the study's background and the research problem identified, this study set out to evaluate the effect of COVID-19 pandemic on the delivery of building construction projects in Abuja with a view to identifying strategies for minimising the effects on project delivery. In order to achieve this aim, the following objectives were pursued:

- i. To identify and examine the factors hindering the success of construction project delivery as a result of COVID-19 in Abuja.
- ii. To determine the underlying effects of COVID-19 on the cost and time delivery of building construction projects in Abuja.
- iii. To propose strategies for reducing the negative effects of COVID-19 on the delivery of building construction projects in Abuja.

Literature Review

In order to solve the research problem and achieve the objectives set for the study, an extant review of literature related to the theme of the study was undertaken. The following sub-sections address this.

Factors Hindering the Success of Construction Project Delivery as a Result of COVID-19 in Abuja

Several studies, among which are Gamil and Alhagar (2020); Ghandour (2020); and Bala (2021), have been carried out to determine the effects of COVID-19 pandemic hindering the construction projects delivery in Nigeria. Such studies also reported that the negative effects of COVID-19 pandemic on construction sectors caused delays in material delivery, delays in inspections and securing permits, reduction in efficiency and production rate, slowing of ongoing 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, claims, among others. Summarizing the outcome of these studies, Table 1 presents a breakdown of these factors and the sources of the studies where the information was obtained.

Table 1: Factors Hindering the Success of Construction Project Delivery as a Result of COVID-19 in Abuja

S/No.	Factors Hindering the Success of Construction Project Delivery as a Result of COVID-19	Source(s)
1	Delays in material delivery	Gamil and Alhagar (2020); Ghandour (2020); Bala (2021); Ogunnusi <i>et al.</i> (2021); Zamani <i>et al.</i> (2021); Umar (2021)
2	Delays in inspections and securing permits	Gamil and Alhagar (2020); Ghandour (2020); Bala (2021); Ogunnusi <i>et al.</i> (2021); Zamani <i>et al.</i> (2021); Umar (2021)
3	Reduction in efficiency and production rate	Gamil and Alhagar (2020); Ghandour (2020); Bala (2021); Ogunnusi <i>et al.</i> (2021); Zamani <i>et al.</i> (2021); Umar (2021)
4	Slowing of ongoing projects and delay in the start of new projects	Gamil and Alhagar (2020); Ghandour (2020); Bala (2021); Ogunnusi <i>et al.</i> (2021); Zamani <i>et al.</i> (2021); Umar (2021)
5	Price escalations	Gamil and Alhagar (2020); Ghandour (2020); Bala (2021); Ogunnusi <i>et al.</i> (2021); Zamani <i>et al.</i> (2021); Umar (2021)
6	Additional costs	Gamil and Alhagar (2020); Ghandour (2020); Bala (2021); Ogunnusi <i>et al.</i> (2021); Zamani <i>et al.</i> (2021); Umar (2021)
7	Loss of revenue	Gamil and Alhagar (2020); Ghandour (2020); Bala (2021); Ogunnusi <i>et al.</i> (2021); Zamani <i>et al.</i> (2021); Umar (2021)
8	Payment delays	Gamil and Alhagar (2020); Ghandour (2020); Bala (2021); Ogunnusi <i>et al.</i> (2021); Zamani <i>et al.</i> (2021); Umar (2021)
9	Health and Safety Concerns	Gamil and Alhagar (2020); Ghandour (2020); Bala (2021); Ogunnusi <i>et al.</i> (2021); Zamani <i>et al.</i> (2021); Umar (2021)
10	Workforce shortages	Gamil and Alhagar (2020); Ghandour (2020); Bala (2021); Ogunnusi <i>et al.</i> (2021); Zamani <i>et al.</i> (2021); Umar (2021)
11	Expected increase in disputes	Gamil and Alhagar (2020); Ghandour (2020); Bala (2021); Ogunnusi <i>et al.</i> (2021); Zamani <i>et al.</i> (2021); Umar (2021)
12	Litigation	Gamil and Alhagar (2020); Ghandour (2020); Bala (2021); Ogunnusi <i>et al.</i> (2021); Zamani <i>et al.</i> (2021); Umar (2021)
13	Claims	Gamil and Alhagar (2020); Ghandour (2020); Bala (2021); Ogunnusi <i>et al.</i> (2021); Zamani <i>et al.</i> (2021); Umar (2021)
14	Shortening construction activities	Gamil and Alhagar (2020); Ghandour (2020); Bala (2021); Ogunnusi <i>et al.</i> (2021); Zamani <i>et al.</i> (2021); Umar (2021)
15	Effective management of workforce	Gamil and Alhagar (2020); Ghandour (2020); Bala (2021); Ogunnusi <i>et al.</i> (2021); Zamani <i>et al.</i> (2021); Umar (2021)
16	Reduction in the number of workers at construction sites	Gamil and Alhagar (2020); Ghandour (2020); Bala (2021); Ogunnusi <i>et al.</i> (2021); Zamani <i>et al.</i> (2021); Umar (2021)
17	Distruption of the supply chain management	Gamil and Alhagar (2020); Ghandour (2020); Bala (2021); Ogunnusi <i>et al.</i> (2021); Zamani <i>et al.</i> (2021); Umar (2021)
18	Time and cost overrun	Gamil and Alhagar (2020); Ghandour (2020); Bala (2021); Ogunnusi <i>et al.</i> (2021); Zamani <i>et al.</i> (2021); Umar (2021)
19	Restrictions of movement and lockdown	Gamil and Alhagar (2020); Ghandour (2020); Bala (2021); Ogunnusi <i>et al.</i> (2021); Zamani <i>et al.</i> (2021); Umar (2021)

Effects of COVID-19 on the Cost and Time Delivery of Building Construction Projects in Nigeria

It has been discovered from past studies that the effects of COVID-19 have adversely affected all segments in the construction industry, both operationally and financially (Sodipe *et al.*, 2021). The delays, disruptions, suspension and termination of contracts, limited resources and therefore price escalation of material, equipment and labour, additional cost on maintaining site security and safety, and impacts on workforce availability due to illness and retention of key skilled employees have affected operational process of the industry. Additionally, such operational implications leading to cancellation of contracts has added financial difficulties in construction projects. In addition to this, it is observed that these effects can be categorized in terms of cost and time delivery of building construction projects. Table 2 gives a breakdown of these effects of COVID-19 on the cost and time delivery of building construction projects.

Table 2: Effects of COVID-19 on the Cost and Time Delivery of Building Construction Projects in Abuja

S/No.	Effects of COVID-19 on the Cost and Time Delivery of Building Construction Projects	Source(s)
1	Ddisruptions	Ghandour (2020); Kabiru and Yahaya (2020); Olanrewaju (2020); OSHA (2020); Osuizugbo (2020); PWC (2020); Adhikari and Poudyal (2021); Bala (2021); Husien <i>et al.</i> (2021); Sodipe <i>et al.</i> (2021); Zamani (2021)
2	Time and cost overrun	Ghandour (2020); Kabiru and Yahaya (2020); Olanrewaju (2020); OSHA (2020); Osuizugbo (2020); PWC (2020); Adhikari and Poudyal (2021); Bala (2021); Husien <i>et al.</i> (2021); Sodipe <i>et al.</i> (2021); Zamani (2021)
3	Suspension and termination of contracts	Ghandour (2020); Kabiru and Yahaya (2020); Olanrewaju (2020); OSHA (2020); Osuizugbo (2020); PWC (2020); Adhikari and Poudyal (2021); Bala (2021); Husien <i>et al.</i> (2021); Sodipe <i>et al.</i> (2021); Zamani (2021)
4	Limited resources	Ghandour (2020); Kabiru and Yahaya (2020); Olanrewaju (2020); OSHA (2020); Osuizugbo (2020); PWC (2020); Adhikari and Poudyal (2021); Bala (2021); Husien <i>et al.</i> (2021); Sodipe <i>et al.</i> (2021); Zamani (2021)
5	Price escalation of material	Ghandour (2020); Kabiru and Yahaya (2020); Olanrewaju (2020); OSHA (2020); Osuizugbo (2020); PWC (2020); Adhikari and Poudyal (2021); Bala (2021); Husien <i>et al.</i> (2021); Sodipe <i>et al.</i> (2021); Zamani (2021)
6	Additional cost on maintaining site security and safety	Ghandour (2020); Kabiru and Yahaya (2020); Olanrewaju (2020); OSHA (2020); Osuizugbo (2020); PWC (2020); Adhikari and Poudyal (2021); Bala (2021); Husien <i>et al.</i> (2021); Sodipe <i>et al.</i> (2021); Zamani (2021)
7	Workforce availability due to illness	Ghandour (2020); Kabiru and Yahaya (2020); Olanrewaju (2020); OSHA (2020); Osuizugbo (2020); PWC (2020); Adhikari and Poudyal (2021); Bala (2021); Husien <i>et al.</i> (2021); Sodipe <i>et al.</i> (2021); Zamani (2021)
8	Shortage of equipment and labour	Ghandour (2020); Kabiru and Yahaya (2020); Olanrewaju (2020); OSHA (2020); Osuizugbo (2020); PWC (2020); Adhikari and Poudyal (2021); Bala (2021); Husien <i>et al.</i> (2021); Sodipe <i>et al.</i> (2021); Zamani (2021)
9	High cost of construction materials	Ghandour (2020); Kabiru and Yahaya (2020); Olanrewaju (2020); OSHA (2020); Osuizugbo (2020); PWC (2020); Adhikari and Poudyal (2021); Bala (2021); Husien <i>et al.</i> (2021); Sodipe <i>et al.</i> (2021); Zamani (2021)

Strategies for Reducing the Negative Effects of COVID-19 on the Delivery of Building Construction Projects

Since it has been established that there exists a potential negative effect of COVID-19 on the delivery of building construction projects, it is very important to plan out a mechanism for reducing the negative effects of COVID-19 on the delivery of building construction projects. In order to achieve this, studies have identified the three strategies facing the design and construction during COVID-19, which are project delivery, design optimization, and communicating information among project stakeholders (Kabiru and Yahaya, 2020; Zamani *et al.*, 2021). Table 3 gives a comprehensive breakdown of the strategies for reducing the negative effects of COVID-19 on the delivery of building construction projects as identified from extant review of literature.

Table 3: Strategies for Reducing the Negative Effects of COVID-19 on the Delivery of Building Construction Projects in Abuja

S/No.	Strategies for Reducing the Negative Effects of COVID-19 on The Delivery of Building Construction Projects	Source(s)
1	Design optimization	Djalantea <i>et al.</i> (2020); Kabiru and Yahaya (2020); Ogunnusi <i>et al.</i> (2020); Rahman and Fauzi (2021); Zamani <i>et al.</i> (2021)
2	Communication of information	Djalantea <i>et al.</i> (2020); Kabiru and Yahaya (2020); Ogunnusi <i>et al.</i> (2020); Rahman and Fauzi (2021); Zamani <i>et al.</i> (2021)
3	The extension of disaster risk governance	Djalantea <i>et al.</i> (2020); Kabiru and Yahaya (2020); Ogunnusi <i>et al.</i> (2020); Rahman and Fauzi (2021); Zamani <i>et al.</i> (2021)
4	Strengthening community-level preparedness and response.	Djalantea <i>et al.</i> (2020); Kabiru and Yahaya (2020); Ogunnusi <i>et al.</i> (2020); Rahman and Fauzi (2021); Zamani <i>et al.</i> (2021)
5	More effective actions by the government to generate faster healing in the construction sector	Djalantea <i>et al.</i> (2020); Kabiru and Yahaya (2020); Ogunnusi <i>et al.</i> (2020); Rahman and Fauzi (2021); Zamani <i>et al.</i> (2021)
6	Effective communication with industry players	Djalantea <i>et al.</i> (2020); Kabiru and Yahaya (2020); Ogunnusi <i>et al.</i> (2020); Rahman and Fauzi (2021); Zamani <i>et al.</i> (2021)

Research Methodology

This study undertook a quantitative research approach with the use of questionnaire survey. The study covered the effect of COVID-19 on the cost and time delivery of building construction projects. The area of study is Abuja. The analysis of data was undertaken with the use of descriptive statistical tools. The population for the study was made up of thirty (30) construction firms registered to execute projects for Federal Capital Development Authority (FCDA) in Abuja. The reason for this is that FCDA is saddled with the responsibility of awarding construction projects to different construction firms within Federal Capital Territory. Aside that, there are considerable construction activities that take place in Abuja, which is also a significant source of employment for a considerable number of Abuja residents. Unfortunately, there were restrictions and lockdown due to high cases of COVID-19 pandemic in Abuja. This limited the number of construction firms that were active at that period to thirty (30).

The study used questionnaire survey to collect data from various construction companies. The questionnaire was established based on a five-scale known as Likert Scale Format. The questionnaire was developed based on the research objectives to generate relevant information that would help in answering the research questions. The research questionnaire was divided into four parts. Part (a) addressed the general information of respondents. Part (b) addressed the factors hindering the success of construction project delivery as a result of COVID-19 in Abuja. Part (c) addressed the underlying effects of COVID-19 on the cost and time delivery of building construction projects in Abuja. Part (d) addressed the strategies for reducing the negative effects of COVID-19 on the delivery of building construction projects in Abuja. The structured questionnaires were self-administered with the respondents required to fill them within few days. The collected data were cross-checked to ensure that the respondents responded to all the questions in the questionnaire. Analysis of data was carried out using descriptive methods of analysis which include Frequency count and Mean Item Score (MIS). Frequency counts and percentages were employed to analyse data on the profile of respondents while MIS was used to analyse data related to the objectives of the study. Table 4 gives a summary of the decision rule to be used for the MIS analysis.

Table 4: Decision Rule for Data Analysis

Scale	MIS	Interpretation		
		Level of Importance	Level of Significance	Level Effectiveness
5	4.51 - 5.00	Very Important	Very Significant	Very Effective
4	3.51 - 4.50	Important	Significant	Effective
3	2.51 - 3.50	Fairly Important	Fairly Significant	Fairly Effective
2	1.51 - 2.50	Less Important	Less Significant	Less Effective
1	1.00 - 1.50	Least Important	Least Significant	Least Effective

Source: Adapted and Modified from Shittu *et al.* (2015)

Results and Discussion

Presentation of Respondents' Profile

The profile of the respondents is presented in Table 5. The profile of respondents is on respondent's designation in the organisation; respondent's profession; respondent's highest academic qualification; respondent's professional qualification; and years of experience of respondent. This profile indicates that the respondents are educated, experienced and qualified to provide reliable information that be used for the study to draw conclusion and inferences.

Table 5: Respondents' Profile

Respondent's Designation in the Organisation	Frequency	Proportion (%)
Managing Director / CEO	8	26.67
Project Architect	3	10.00
Project Builder	1	3.33
Project Building Engineer	2	6.67
Project Civil Engineer	1	3.33
Project Manager	4	13.33
Project Quantity Surveyor	2	6.67
Site Architect	2	6.67
Site Engineer	5	16.67
Site Quantity Surveyor	2	6.67
Respondent's Profession	Frequency	Proportion (%)
Architect	7	23.33
Builder	8	26.67
Engineer	9	30.00
Quantity Surveyor	6	20.00
Respondent's Highest Academic Qualification	Frequency	Proportion (%)
ND	0	0.00
HND	9	30.00
BSc/BTech	9	30.00
MSc/MTech	12	40.00
PhD	0	0.00
Respondent's Professional Qualification	Frequency	Proportion (%)
MNIA/ARCON	7	23.33
MNIOB/CORBON	8	26.67
MNSE/COREN	9	30.00
MNIQS/QSRBN	6	20.00
Years of Experience of Respondent	Frequency	Proportion (%)
1 – 5 years	0	0.00
6 – 10 years	0	0.00
11 – 15 years	7	23.33
16 – 20 years	13	43.33
Above 20 years	10	33.33
TOTAL	30	100.00

Results of Factors Hindering the Success of Construction Project Delivery as a Result of COVID-19 in Abuja

The result of the MIS analysis used to rank the opinions of respondents on the of factors hindering the success of construction project delivery as a result of COVID-19 in Abuja is presented in Table 6.

Table 6: Factors Hindering the Success of Construction Project Delivery as a Result of COVID-19 in Abuja

CODE NO.	Factors Hindering the Success of Construction Project Delivery	MIS	RANK	DECISION
B19	Restrictions of movement and lockdown	5.00	1st	Very Important
B1	Delays in material delivery	4.97	2nd	Very Important
B5	Price escalations	4.97	2nd	
B17	Disruption of the supply chain management	4.90	4th	Very Important
B6	Additional costs	4.87	5th	Very Important
B9	Health and Safety Concerns	4.87	5th	Very Important
B18	Time and cost overrun	4.80	7th	Very Important
B4	Slowing of ongoing projects and delay in the start of new projects	4.60	8th	Very Important
B16	Reduction in the number of workers at construction sites	4.60	8th	Very Important
B10	Workforce shortages	4.57	10th	Very Important
B15	Effective management of workforce	4.47	11th	Important
B14	Shortening construction activities	4.33	12th	Important
B8	Payment delays	4.30	13th	Important
B7	Loss of revenue	4.23	14th	Important
B3	Reduction in efficiency and production rate	4.07	15th	Important
B2	Delays in inspections and securing permits	3.07	16th	Fairly Important
B11	Expected increase in disputes	3.03	17th	Fairly Important
B12	Litigation	2.90	18th	Fairly Important
B13	Claims	2.87	19th	Fairly Important
Group MIS		4.28		Important

It can be seen from Table 6 that nineteen (19) factors were identified to be hindering the success of construction project delivery as a result of COVID-19 in Abuja. Of these factors, the most important are Restrictions of movement and lockdown (MIS = 5.00); Delays in material delivery (MIS = 4.97); and Price escalations (MIS = 4.97). The least important factors hindering the success of construction project delivery as a result of COVID-19 in Abuja are Expected increase in disputes (MIS = 3.03); Litigation (MIS = 3.90); and Claims (MIS = 2.87). On the average, all the factors hindering the success of construction project delivery as a result of COVID-19 in Abuja are important (Group MIS = 4.28). The studies of Ogunnusi *et al.* (2021) and Zamani *et al.* (2021) agree with this study because these past studies reported that the negative effects of COVID-19 pandemic on construction sectors caused delays in material delivery, delays in inspections and securing permits, and project timelines due to shortening

construction activities and late approvals by related authorities among others. It is therefore necessary to mitigate the effect of these factors hindering the success of construction project delivery as a result of COVID-19 through well evaluated strategies.

Results of Effects of COVID-19 on the Delivery of Building Construction Projects in Abuja

The study identified nine (9) effects of COVID-19 on the delivery of building construction projects in Abuja. These effects were ranked separately in terms of cost and time delivery as presented in Tables 7 and 8 respectively.

Table 7: Effects of COVID-19 on the Cost Delivery of Building Construction Projects in Abuja

CODE NO.	Effects of COVID-19 on the Cost Delivery of Projects	MIS	RANK	DECISION
C1.5	Price escalation of material	5.00	1st	Very Significant
C1.9	High cost of construction materials	5.00	1st	Very Significant
C1.1	Disruptions	4.87	3rd	Very Significant
C1.6	Additional cost on maintaining site security and safety	4.87	3rd	Very Significant
C1.2	Time and cost overrun	4.83	5th	Very Significant
C1.3	Suspension and termination of contracts	4.47	6th	Significant
C1.4	Limited resources	4.40	7th	Significant
C1.8	Shortage of equipment and labour	4.20	8th	Significant
C1.7	Workforce availability due to illness	1.70	9th	Less Significant
<i>Group MIS</i>		<i>4.37</i>		<i>Significant</i>

Table 7 shows that the most significant effects of COVID-19 on the cost delivery of building construction projects in Abuja are Price escalation of material (MIS = 5.00); High cost of construction materials (MIS = 5.00); Disruptions (MIS = 4.87); and Additional cost on maintaining site security and safety (MIS = 4.87). The least significant effect of COVID-19 on the cost delivery of building construction projects in Abuja is Workforce availability due to illness (MIS = 1.70). On the average, all the effects of COVID-19 on the cost delivery of building construction projects in Abuja are significant (Group MIS = 4.37). This finding is in line with findings from previous studies. Osuizugbo (2020) discovered that the costs of most construction materials have gone up due to the lockdown in the country, and the rate at which the construction materials are going up is making

most clients to stop construction works due to the pandemic. Sodipe *et al.* (2021) found that the effects of COVID-19 have adversely affected all segments in the construction industry, both operationally and financially. Therefore, it is essential to work out strategies for reducing the effects of COVID-19 on the cost delivery of building construction projects.

Table 8: Effects of COVID-19 on the Time Delivery of Building Construction Projects in Abuja

CODE NO.	Effects of COVID-19 on the Time Delivery of Projects	MIS	RANK	DECISION
C2.7	Workforce availability due to illness	4.63	1st	Very Significant
C2.8	Shortage of equipment and labour	4.57	2nd	Very Significant
C2.6	Additional cost on maintaining site security and safety	4.43	3rd	Significant
C2.1	Disruptions	4.17	4th	Significant
C2.4	Limited resources	4.10	5th	Significant
C2.9	High cost of construction materials	4.07	6th	Significant
C2.3	Suspension and termination of contracts	3.97	7th	Significant
C2.2	Time and cost overrun	2.87	8th	Fairly Significant
C2.5	Price escalation of material	2.67	9th	Fairly Significant
<i>Group MIS</i>		<i>3.94</i>		<i>Significant</i>

Table 8 revealed that the most significant effects of COVID-19 on the time delivery of building construction projects in Abuja are Workforce availability due to illness (MIS = 4.63); Shortage of equipment and labour (MIS = 4.57); and Additional cost on maintaining site security and safety (MIS = 4.43). The least significant effects of COVID-19 on the time delivery of building construction projects in Abuja are Suspension and termination of contracts (MIS = 3.97); Time and cost overrun (MIS = 2.87); and Price escalation of material (MIS = 2.67). On the average, all the effects of COVID-19 on the time delivery of building construction projects in Abuja are significant (Group MIS = 3.94). This finding also agrees with findings from previous studies. Ghandour (2020) discovered that the COVID-19 lockdown has negative implications on building construction projects,

considering that the deliverables would not be realized within the set timeframes. Bala (2021) reported that the social distancing directive provides that all persons should avoid social gatherings. This leads to a reduction in the project management team. This had impacted the progress of the construction works considering that the fewer the number of workers, the longer it takes to realize each of the stated deliverables. In the light of this it is imperative to work out strategies for reducing the effects of COVID-19 on the time delivery of building construction projects.

Results of Strategies for Reducing the Negative Effects of COVID-19 on the Delivery of Building Construction Projects in Abuja

The result of the MIS analysis used to rank the opinion of respondents on the strategies for reducing the negative effects of COVID-19 on the delivery of building construction projects in Abuja is presented in Table 9.

Table 9: Strategies for Reducing the Negative Effects of COVID-19 on the Delivery of Building Construction Projects in Abuja

CODE NO.	Strategies for Reducing the Negative Effects of COVID-19	MIS	RANK	DECISION
D2	Communication of information	4.63	1st	Very Effective
D1	Design optimization	4.53	2nd	Very Effective
D5	More effective actions by the government to generate faster healing in the construction sector	4.53	2nd	Very Effective
D3	The extension of disaster risk governance	4.50	4th	Effective
D4	Strengthening community-level preparedness and response.	4.47	5th	Effective
D6	Effective communication with industry players	4.37	6th	Effective
Group MIS		4.51		Very Effective

It was revealed from Table 9 that six (6) strategies for reducing the negative effects of COVID-19 on the delivery of building construction projects in Abuja were identified from this study. The most effective strategies for reducing the negative effects of COVID-19 on the delivery of building construction projects in Abuja are Communication of information (MIS = 4.63); Design optimization (MIS = 4.53); and more effective actions by the government to generate faster healing in the construction sector (MIS = 4.53). the least effective strategy for reducing the

negative effects of COVID-19 on the delivery of building construction projects in Abuja is Effective communication with industry players (MIS = 4.37). On the average, all the strategies for reducing the negative effects of COVID-19 on the delivery of building construction projects in Abuja are very effective (Group MIS = 4.51). The finding of this study in this area agrees with the findings of the studies of Ogunnusi *et al.* (2020); Djalantea *et al.* (2020); Rahman and Fauzi (2021); and Zamani *et al.* (2021). All these studies agree that effective mechanism to reduce the negative effect of COVID-19 pandemic on the delivery of building construction projects should be developed through effective communication with industry players. In addition, these studies emphasized that an effective responding plan can be developed to reduce the damages caused by the pandemic to the barest minimum. It is therefore very necessary to implement effective strategies to reduce the negative effects of COVID-19 pandemic on the delivery of construction projects.

Conclusion and Recommendations

The study revealed that the most important factors hindering the success of construction project delivery as a result of COVID-19 are Restrictions of movement and lockdown; Delays in material delivery; and Price escalations. It was found that the most significant effects of COVID-19 on the cost delivery of building construction projects are Price escalation of material; High cost of construction materials; and Disruptions. The most significant effects of COVID-19 on the time delivery of building construction projects in Abuja are Workforce availability due to illness; Shortage of equipment and labour; and Additional cost on maintaining site security and safety. On the average, all the effects of COVID-19 on the time delivery of building construction projects in Abuja are significant. It was also found that the most effective strategies for reducing the negative effects of COVID-19 on the delivery of building construction projects are Communication of information; Design optimization; and More effective actions by the government to generate faster healing in the construction sector. It can therefore be concluded that the effect of the COVID-19 pandemic on the delivery of building construction projects in Abuja is significant. It is therefore imperative to work out a mechanism for mitigating the negative effect of COVID-19 pandemic on the delivery of building construction projects in Abuja.

In view of the findings and conclusion of this study, the following recommendations have been suggested:

- i. In order to address the factors hindering the success of construction project delivery as a result of COVID-19, construction firms should focus more attention on strategies that will make construction activities cost and time effective in the event of restrictions of movement and lockdown; delays in material delivery; and price escalations.
- ii. Construction firms should focus their policies more towards strategies for addressing the issue of price escalation of material; high cost of construction materials; and disruptions. This will help in mitigating the effects of COVID-19 on the cost delivery of building construction projects.
- iii. In order to mitigate the effects of COVID-19 on the time delivery of building construction projects, construction firms should focus their strategies more on the ways for addressing issues of workforce availability due to illness; shortage of equipment and labour; and additional cost on maintaining site security and safety.
- iv. Construction firms should set up implementable mechanism that will accommodate all the effective strategies for reducing the negative effects of COVID-19 on the delivery of building construction projects with more focus on communication of information; design optimization; and effective actions by the government to generate faster healing in the construction sector. This will assist in the reduction of the negative effects of COVID-19 on the delivery of building construction projects in Abuja.

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