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ASSESSMENT OF THE IMPACT OF COVID-19 PANDEMIC ON CONSTRUCTION WORKS IN OSUN STATE

[1]Oyelami, Kehinde Olufemi, [2]Ajiferuke, Olabisi O
[3]Oyedele, Adebola, Jumoke,[4]Dosumu Babatunde
[1,3]Department of Quantity Surveying, Osun State College of Technology, Esa Oke, Osun State
[2] Department of quantity surveying, Niger Delta University, Wilberforce Island, Ammasoma, Bayelsa State
[4] Department of Quantity Surveying, The Polytechnic, Ibadan
Email: distinct.ok@gmail.com

ABSTRACT

The study assessed the impact of COVID-19 on construction works in Osun State. The study was conducted through literature review, a well-structured questionnaire and interview. The study was conducted in Osun State, Nigeria. The thematic content analysis method was used to analyze the data received from the interview. The study revealed that cost overrun is the mostly rated impact of the pandemic on construction projects in Osun State with an importance index of 0.99.The second is finance with an importance index of 0.98 and the third mostly rated impact is time overrun with an importance index of 0.99. Interruption of contractual terms (legal issues), Suspension of projects and Socioeconomics impacts are the three least rated impacts with importance indices of 0.60, 0.58, 0.55 respectively.The study concluded that Covid-19 has impacted the construction works in Osun State.

Keywords: *Impact, Covid-19, Pandemic, Construction works, Osun State*

INTRODUCTION

The COVID-19 outbreak started in December 2019 in Wuhan city in Hubei province of China and was caused by the SARS-CoV-2 virus. It spreads immediately across the world. Initially the epicenter of the outbreak was Wuhan in China but has since moved to every part of the world. The first case of corona virus (COVID-19) disease in Nigeria was recorded in Lagos State, on the 27th of February 2020 since the outbreak in December 2019 in China. According to the World Health Organization (WHO, 2020), corona virus spreads through respiratory droplets. Respiratory droplets may be produced through cough, sneeze, normal breath or conversation. These respiratory droplets may cause viral transmission from person to person when individuals are near one another. Also, it may land on clothing or other objects. It is possible for

an individual to contract COVID-19 by first touching a surface or object that has the virus on it and then touching their own mouth, nose or possibly their eyes. Conversely, the main determinant of a pandemic's severity is its associated mortality. This may be defined by case fatality ratio or excess mortality rate—key epidemiological parameters that may be available shortly after the emergence of a pandemic strain from investigations of initial outbreaks or from more routine surveillance data.
Amid COVID-19, the construction industry has been hit hard and is been challenged by many obstacles regarding contractual obligations, availability of resources, deliverables, health and safety measures, and project delays, or cancellations. Helm (2020) says the outbreak of COVID-19 disrupted economic activities globally and keep spreading on global scale. Transportation of people and goods are been limited and even restricted among countries which further slowed down global economic activities. Most importantly, some panic among consumers and firms has distorted usual consumption patterns and created market anomalies. Global financial markets have also been responsive to the changes and global stock indices have plunged. Furthermore, the fear or anxiety (i.e. psychological effects) associated with this deadly virus is similar in with the reaction to biological and other terrorism threats and causes a high level of stress, often with longer-term consequences. Consequently, a large number of people would feel at risk at the onset of a pandemic, even if their actual risk of dying from the disease is low. From a logical perspective, many may assume that COVID-19 can be classified as a force-majeure event. ''Force-majeure'' refers to a contractual clause regarding an extra-ordinary event beyond the party's control that prevents it from accomplishing the contractual obligations on time.

Ivanov 2020 says the United States imports about 30% of its building materials from China, with a further 20% each coming in from Canada and Mexico. That means 70% of their imports are dependent on these three countries. Other major suppliers, such as Japan, Korea, Vietnam, Germany, Spain and Italy have also been hit severely by COVID-19. Ultimately, despite the dependency on a limited set of countries, the global impact of the corona virus pandemic makes it evident that the building materials supply chain is undergoing a difficult time. This supply chain disruption is also evident from a 20% drop in cargo volumes at American ports in the 1st quarter of 2020.Plumbing materials, elevator components, hardware, fire protection, electrical materials — all of these

building materials supplies mostly depend on China. In addition, flooring, windows and curtain materials are primarily sourced from Italy, whereas glass and aluminum products are sourced from across Italy, Lithuania and Spain. Currently, Italy, Spain and other European nations have halted production and industry experts foresee a considerable passage of time before revamped production can help businesses regain normalcy. Shipping constraints and the unavailability of various materials required may require an additional 6 to 8 weeks of lead time, rather than the current 10 to 12 weeks.

Failures in containing the spread of the corona virus may cause a rise in domestic building materials supplies due to the inability of suppliers to export to desired locations. At the same time, imports will also face similar issues; hence one can expect an unpredictable mix of price fluctuations. However, in the long term, building materials prices could go up due to supply chain bottlenecks. As building construction firms will try to normalize their activities in a bid to return to normal business, it is estimated that there will be supply chain bottleneck created by a surge in demand across the world.

Impacts of Covid-19 on Construction Projects in Osun State

According to Yasal and Abdulsalam (2020), the COVID-19 pandemic has by far-reaching very severe consequences since it has spread to all the countries. The economy, in general, faces a direct impact in the mid of COVID-19 outbreak. Many countries face recession and economic downturn. All the business activities have been shut down unless it falls under the essential categories as necessary supplies and medical sectors, in addition to a few vital projects which are necessary to support the health system and safety of the people. Relatively, it has limited the businesses around the world and companies have shifted to work Work-From-Home (WFH) concept remotely to accommodate and run the business and services. However, in the construction industry, all the workers and technical engineers need to nearly work on-site either to perform activities or to monitor the work done correctly (Harari, 2020).

In the midst of the current Corona virus crisis, the priorities for most construction companies are (1) the health and well-being of its employees, and (2) addressing delays on projects caused by the inability to obtain labor or materials. Once the crisis subsides, the priority for construction companies will be dealing with the spillover financial impacts of the crisis. Our economy, and particularly the construction industry, depends on

people venturing out, people interacting, moving things around, and engaging in millions of transactions each day that require us to interact. Thus, the "cure" for the Corona virus ceases or severely diminishes the activities that drive our economy. In 2008, the financial crisis and Great Recession created many issues that are likely to occur once the Corona virus crisis subsides. Some projects will fail and be taken over by a lender, at which point the contractor and subcontractors will engage in a fight over who recovers what if anything.

Studies have shown that Force majeure provisions in contracts are ultimately designed to excuse non-performance for various reasons. Typically, one associates the force majeure provisions with acts of God, to include natural disasters. There are no known force majeure provisions in standard construction contracts that include pandemics, although you must look at the precise language to determine whether the pandemic would qualify for inclusion as a force majeure event. Naturally, contractors that are working behind schedule will have an incentive to attribute their delay to corona virus-related issues. Determinations will need to be made as to whether the pace of performance preceding the corona virus pandemic was consistent with the pace of performance throughout the period of the pandemic.

Harari (2020) says the construction industry is far different from other industries which typically require on-site involvement of all the project members. Hence, it is crucial to appreciate how the construction industry addresses this unforeseen situation. During the pandemic, the situation drastically deteriorated by firstly shortage of construction material supply, which then impacted the construction industry. Following the spread of the virus, many countries, including Nigeria started implementing several measures to reduce movement of people, and that has mainly obstructed the construction because it requires on-site work and every project member must be available to work, check, and monitor all the work activities.

Nicola, Alsafi, Sohrabi, Kerwan, Al-Jabir, Iosifidis, and Agha, (2020)reported that the restrictions imposed by the authorities had reduced the mobility causing many industries to shut down the business and resulted in job loss and the essential supplies like food and medical supplies which led to a socio-economic impact on each individual. Job loses is also a major disaster during the escalating situation of the

pandemic. Globally, millions of employees have lost their jobs amid the COVID-19 crisis. In the construction industry, all the on-site employees lost their jobs and most of the small enterprises are not able to pay salaries during lockdowns. Literatures in the subject of the pandemic is still scarce, especially in the construction industry sector. Hence, it is crucial to investigate the impact of the pandemic in the construction industry.

Ivanov, D. (2020) studied the effect of the outbreak on the supply chain and found that the construction industry has been impacted negatively and it may take a longer time to recover. Harari (2020) also expressed thatCOVID-19 pandemic is the biggest crisis of the generation and it may take years to recover and action must be taken decisively to subsidize and plan new strategies to avoid the travail of humankind. Another study by Venkitachalam, J. (2020) found that the Indian real estate sector has been severely affected and declination has been considerably recorded. Helm, D. (2020) also pointed out that the total lockdown caused by COVID-19 has severely curtailed economic activities. The construction industry with no exception has been severely affected by the COVID-19 pandemic and there is no study exclusively reported focusing on the impact of the pandemic on the construction industry hence this study is aimed to discover the effects of COVID-19 on construction projects in Osun State.

METHODOLOGY

This study adopted two methods to collect the data. The first method was by conducting an exploratory interview with 5 selected experts from the construction industry sectors to share and express their insights and opinions on the current state of the construction industry in the mid of pandemic in Osun State. Additionally, the experts were asked to share the impact of the pandemic on the construction industry. The second method is quantitative data by associating construction practitioners to assess the level of impact using a five Likert type scale. A total of 120respondents participated in answering the questionnaire survey. The respondents were asked to rank the level of effect using 5 Likert type scale. The data collected were then statistically analyzed using SPSS software. Descriptive analysis was used to rank the factor by the importance index. The thematic content analysis method was used to analyse the data received from the interview. Thematic analysis is a standard method used to analyse qualitative data of unknown phenomenon. It is a descriptive and interpretive method that uses themes

and frequency of occurrence. Moreover, it is a method used to organize and scrutinize the collected data to draw understandable conclusions and findings (Turunen,Vaismoradi, and Bondas2013).The selection of sample size for a questionnaire survey was based on random sampling technique. The random sampling technique is widely used in construction research where the sample is randomly selected from the population-based on non-zero probability. This technique is considered adequate because it produces a sampling representative of the population by avoiding any voluntary response bias (Sandelowski, 2000). All population has the probability of equal chance of being selected as the sample and provides accurate representation for the broader population(Sharma, 2017). Therefore, this technique is adopted to select the participants for this study. The method to determine the sample size of an unlimited population is adopted from Enshassi & AlSwaity (2015) to calculate the sample size.

$$SS = \frac{z^2 \times p(1-P)}{C^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where,

SS = Sample Size

Z = Z value (1.96 for 95% confidence level)

P = percentage picking a choice expressed as a decimal (0.5 used for sample size needed)

C = margin of error (9 %), maximum error of estimation which can be 9 or 8% (Memon &Ismail, 2013)

$$SS = \frac{1.96^2 \times 0.5(1-0.5)}{0.09^2} = 118.57 \cong 119 \text{ (As the minimum SS)}$$

To check the marginal error value, the following formula is being used (Enshassi& Al Swaity,

2015): The maximum margin of error for a 95% confidence level $\approx \mathbf{1.96} = \frac{1.96}{\sqrt{SS}} = \frac{1.96}{\sqrt{119}} = 0.18 > 0.09$

Hence, the margin is acceptable. In this study, the final sample size used is 120 respondents. Before the start of analyzing the data, the consistency and scale reliability is measured using Cronbach's Alpha which was calculated using SPSS and the outcome is 0.83 which is considered good internal consistency for the data.

Respondents Profile

This section presents the demographics of participants for the study. Table 1 shows the demographic data of organizations, which includes the type of organization, the category of organization, role of participant, qualification, and years of experience.

Table 1: Participant's demography for the study

Category	Items	Frequency	Percentage (%)
Type of Organization	Consultant	35	29
	Contractor	55	46
	Client	30	25
Category of organization	Government	75	62.5
	Private	45	37.5
Role of a participant in the organization	Company Director	26	22
	Project Manager	32	27
	Architect	15	12
	Project engineer	24	20
	Quantity Surveyor	23	19
	Other roles	0	0
Highest level of education	Diploma	26	22
	Degree	61	51
	Master	28	23
	PhD	5	4
Years of experience	0-10 Years	33	27.5
	11-20 Years	65	54.2
	21-30 Years	20	16.7
	above 31 Years	2	1.6

Table 1 presents the demographical data of the respondents who participated in the study. In respect to their roles in the organization, most participants work as architects. However, for the qualification, the data shows that most of the respondents obtained a bachelor's degree and have been working in construction for more than ten years; therefore, their responses and opinions regarding the evaluation of the relevancy for cause and effect factors are used for further analysis.

RESULTS AND ANALYSIS

After analyzing the interview transcription, a few points are extracted from the transcription, which includes the following:

i. The pandemic has entirely suspended construction projects in Osun State, and workers and technical engineers are aware of the infectious disease and need to work with full consciousness and scrutiny on resumption to sites.

ii. For project participants who work off-site, they are required to maintain constant communication with all sub-contractors, establish daily video meetings, manage all the orders, constantly reviewing workshop drawings, coordinate with all the stakeholders for updates, and maintain proper communication with people onsite.

iii. The way the construction industry was managed has to be modified to suit the contingency so as to accommodate all the needs and excesses to deal with the entire sudden crisis.

iv. Construction planning and scheduling will significantly be affected because of the crisis. Hence, planners and schedulers should have backup plans.

DESCRIPTIVE ANALYSIS

This part introduces the analysis of the data collected through a questionnaire survey. Descriptive analysis was used to evaluate the degree of impact by calculating the importance index.

Importance index was used in analysing the level of importance for the identified impacts from literatures and interviews. A rating value from 5 to 1 was attached to the level of importance since the scale of measurement is ordinal. The importance index was derived for the strategies using the following formular by El-Haram and Homer (2002) as follows:

$$\text{Importance index} = \frac{\sum (wi \times fxi)}{AN} = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1}{5N} \quad \ldots\ldots\ldots\ldots\ldots\ldots 2$$

Where:

wi is the weight given to *i*th response and *i* = 1, 2, 3, 4, or 5 is response frequency

*fx*5 = very important and *fx*1 = not important

n = total number of responses

Table 2: Assessment of the Impacts of COVID-19 Pandemic on construction Projects in Osun State.

Impacts	Importance Index (II)	Rank
Cost overrun	0.99	1
Financial impact	0.98	2
Time overrun	0.97	3
Workforce shortage	0.95	4
Sudden fluctuation of material price	0.93	5
Supply shortage	0.82	6
Restriction of movement on the work and travel bans	0.82	6
Shortage of materials to support running projects	0.77	7
Interruption of Planning and scheduling	0.64	8
Interruption of contractual terms (legal issues)	0.60	9
Suspension of projects	0.58	10
Socioeconomics impact	0.55	11
Uncertainty of survival	0.52	12
Impact on the existing accomplished activities	0.50	13
Impact on Research and technology	0.49	14

Table 2 shows the findings of the assessment of the impacts based on the level of effect using Likert's type scale. The frequency of the impacts was counted and the importance index was calculated using the formular given above. The importance index shows the degree of the impact according to the number of scales. The study revealed that cost overrun is the mostly rated impact of pandemic occurrence on construction projects in Osun State with an importance index of 0.99.The second mostly rated impact is finance which is caused by the economic deterioration of the state and also due to the suspension of projects. Subcontractors' needs to pay machine tariffs and materials on-site may also be deteriorated and that is associated with additional cost. Moreso, contractors are obliged to pay salaries in which the work is not progressing. The third mostly rated impact is time overrun which is associated with the movement and measure control period. The longer the time required to fight the pandemic will undoubtedly require more time for the project to complete. Labour impact and job losing is due to the suspension of the projects and the fear of gathering due to the spike spread of the contagious virus among workers. The decision comes to an end to avoid assemblies and upkeep social distancing. It has therefore affected the workers in terms of finance and safety. The least rated impact is Socioeconomics impact with an importance index of 0.55.

CONCLUSION

This study has investigated and assessed the effects of COVID-19 pandemic on the construction projects in Osun State. It is statistically proven that the most impacting factors are cost overrun, finance, time overrun, workforce shortage, and sudden fluctuation in prices of materials. From the interviews, it was highlighted that the economic impact is significant to all the project stakeholders and the workforce. Legal issues are also inevitable due to the non-conformity to contractual terms which is caused by the suspension of the project and sudden fluctuation of material prices. These unplanned impacts are indisputably important to consider broadly in order to maintain the project progress.

In conclusion, as revealed from the study, Covid-19 has impacted the construction works in Osun State.

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