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Disruptions and Responses within Nigeria Construction Industry amid COVID-19 Threat

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Abstract: Construction industry is seen as a driver of economic development. Presently, the sector is being confronted by COVID-19 pandemic. COVID-19 is a novel corona virus with an outbreak of unusual inflammation of the lungs, considered as pandemic, first in Wuhan province of China, and later spread speedily across the globe. The COVID-19 pandemic is not only posing threat to the health and lives of people across the globe but also has contributed to social and economic turmoil. The evolution of the virus brought disruptions that affect the construction industry, and its economic impact is highly uncertain. The current study seeks to better understand the disruptions and responses in the construction industry amid COVID-19 threat. A qualitative research approach was used. Fifteen (15) interviews were conducted to gain insights into the underlying disruptions and responses in the construction sector amid the COVID-19 threat in Nigeria. A purposive sampling method was used where the participants (built environmental professionals) are included in the study to serve a particular purpose. The content analysis of the interview transcripts 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 the disruptions in the construction sector of Nigeria during the COVID-19 pandemic. Also, the study findings revealed that temperature checks, hand washing with soap, social distancing, no entry for unauthorised visitors to site, washing of construction equipment and tools with soap and use of personal protective equipment and personal hygiene were the responses in the construction sector during the COVID-19 threat. An understanding of the disruptions and responses in the construction sector amid COVID-19 threat would inform the industry in preparation for future. These information are essential for reshaping the image of the construction industry.

Keywords: Construction industry, COVID-19, Disruptions, Nigeria, Responses, Social distancing

1.0 Introduction

Construction industry is historically related with the process of industrialisation and urbanization (Osuizugbo & Ojelabi, 2020; Lopes, Oliveira & Abreu, 2011) and is a project-specific industry (Kabirifar & Mojtahedi, 2019). The Nigerian construction industry consists of a group of varied and disjointed companies and within the companies, great variety of activities exist (Oladinrin, Ogunsemi & Aje, 2012), organizations, firms or companies that perform construction projects are referred to as contractors (Mafimidiwo & Iyagba, 2015). The Industry is made up of building sector (e.g. industrial, residential and commercial buildings) and civil or heavy engineering sector (e.g. railways, tunnel, bridges, drainage and roads). The construction of these works is usually coordinated or done by a contractor, who takes full responsibility for completion of project or as stated in the contract documents. In both the developed and developing countries, construction industry is viewed as sector of the economy that transforms various resources into constructed facilities through planning, design and construction (Isa, Jimoh & Acheunu, 2013).

Construction industry is a vital area of any national economy. The industry is often seen as a driver of economic development especially in developing countries (Oladinrin et al., 2012), this is mostly because other sectors of the economy depend on its products and services in one way or another to carry

out their operations (Dantata, 2007; Osuizugbo, 2020). The industry improves the overall Gross Domestic Product (GDP) of a country (Dorcas, Elkanah & John, 2019). The construction industry spent about \$10 trillion on construction related goods and services every year, equivalent to 13% of GDP which makes the sector one of the largest in the world economy (McKinsey Global Institute, 2017). According to Essays UK (2018), the construction industry in Nigeria contributes slightly below 16% of its GDP. In the Nigerian construction industry, small sized contractors have become key players to Nigeria's economic growth, employment generation and poverty alleviation (Mafimidiwo & Iyagba, 2015). In as much as the industry plays a significant role in national development, it also faces numerous problems and challenges such as low productivity, high fragmentation, poor quality control, lack of standards and instability (Soewin & Chinda, 2018; Osuizugbo, 2020). Presently, the sector is being confronted by COVID-19 pandemic.

COVID-19 is a novel corona virus with an outbreak of unusual inflammation of the lungs, considered as pandemic, first in Wuhan province of China, and later spread speedily across the globe (Mousavizadeh & Ghasemi, 2020; McKibbin & Fernando, 2020; Wang & Wang, 2020; Akanni & Gabriel, 2020). According to Liu et al. (2020), four classes of corona virus includes alpha, beta, gamma, and delta. The beta corona virus includes severe acute respiratory

syndrome (SARS) virus (SARS-CoV), Middle East respiratory syndrome (MERS) virus (MERS-CoV), and SARS-CoV-2 (Liu et al., 2020; Mousavizadeh & Ghasemi, 2020). The COVID-19 outbreak was caused by the SARS-CoV-2 virus (McKibbin & Fernando, 2020; Liu et al. 2020).

COVID-19 is a spherical or pleomorphic (see fig. 1) enveloped particles containing single-stranded (positive-sense) RNA associated with a nucleoprotein within a capsid comprised of matrix protein (Mousavizadeh & Ghasemi, 2020).

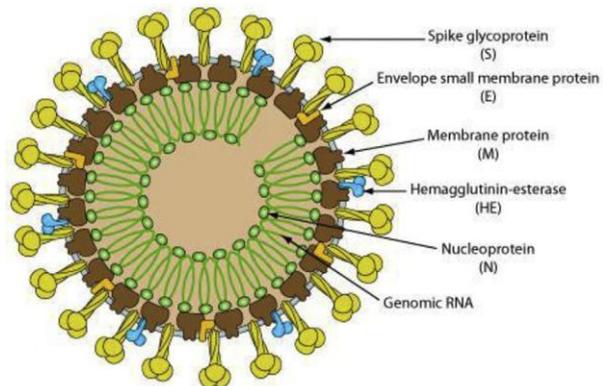


Figure 1: Shape of COVID-19

Similar to SARS-CoV and MERS-CoV, SARS-CoV-2 attacks the lower respiratory system to cause viral pneumonia, but it may also affect the gastrointestinal system, heart, kidney, liver, and central nervous system leading to multiple organ failure (Liu et al., 2020). Studies by Qian et al. (2020) found that fight against COVID-19 is one of the greatest challenges to human beings in the history, because SARS-CoV-2 is different from SARS-CoV and MERS-CoV in terms of biological features and transmissibility. According to Mousavizadeh and Ghasemi (2020), the symptoms of COVID-19 includes coughing, fever, shortness of breath, difficulty breathing, and early symptoms such as chills, body aches,

sore throat, headache, diarrhea, nausea/vomiting, and runny nose. Presently, at the time of this paper, there is no specific treatment for COVID-19. This makes most businesses around the world to close. According to Nadeem (2020), human history is observing a very strange time fighting an invisible enemy, the novel COVID-19 corona virus. The idea that any country can be an island in an integrated global economy is proven wrong by the latest outbreak of COVID-19, thus, global cooperation, especially in the sphere of public health and economic development, is essential (McKibbin & Fernando, 2020).

The COVID-19 pandemic is not only posing threat to the health and lives of millions around the world but also paves the way for universal social and economic turmoil (KPMG, 2020a). Manufacturers/factories are shutting down or cutting down production and output (Akanni & Gabriel, 2020), the crisis has transformed into an economic and labour market shock, impacting not only supply (production of goods and services) but also demand (consumption and investment) (International Labour Organisation (ILO), 2020). Flexible work options such as remote working and skeletal staffing are now the most viable options to ensure business continuity (KPMG, 2020b). The Nigeria Centre for Disease Control (NCDC) has advised that fourteen-day quarantine, social distancing and hand washing with sanitizer is necessary for recovery and to prevent the spreading of the disease. As a result, construction projects are experiencing delays in its operations. According to PwC (2020), the sector is experiencing supply chain bottlenecks of equipment and materials, construction projects have been delayed, and some cancelled, as a result of the impacts of COVID-19 on the companies and governments that commissioned such projects. Beyond the tragic health hazards and human consequences of the COVID-19 pandemic, the economic uncertainties, and disruptions that have resulted come at a significant cost to the global economy (Akanni & Gabriel, 2020), the situation is changing quickly, with widespread impacts (PwC, 2020) and the disruptions are affecting the workforce across sectors (KPMG, 2020a). According to ILO (2020), all

businesses, regardless of size, are facing serious challenges, especially those in the aviation, tourism and hospitality industries, with a real threat of significant declines in revenue, insolvencies and job losses in specific sectors. Furthermore, the movement restrictions and social distancing have unfavourably affect construction activities nationwide with organizations and individuals trying to apply safety measures.

In view of the above discussion, this study seeks to better understand the disruptions and responses in the construction industry amid COVID-19 threat. To address the aim of the study, this research will provide answer to the following questions: (i) what are the disruptions in the construction industry during the COVID-19 outbreak? (ii) what are the responses in the construction industry during the COVID-19 outbreak? An understanding of the disruptions and responses in the construction sector amid COVID-19 threat would inform the industry in preparation for future. The study offers deep insights into the disruptions and responses in the construction sector during the COVID-19 outbreak within the context of a developing country, i.e. Nigeria. The remainder of this manuscript is structured as follows: a description of the research methodology, followed by results presentation and discussion. This was followed by conclusion and recommendations.

2.0 Methodology

This study seeks to better understand the disruptions and responses in the construction industry amid COVID-19 threat. To achieve this aim, a qualitative method was adopted. To gain knowledge of the subject matter, a review of related papers was conducted. Interview questions were designed based on the literature review conducted. This was followed by a one-on-one interview (through telephone calls) so as to obtain the required data for the study. The data provided accurate words of the participants regarding disruptions and responses in the construction industry amid COVID-19 outbreak.

The participants selected for the study were built environmental professionals in construction sector of Nigeria. The purpose for the interview was explained to the participants, and was informed that their responses would be confidential. Survey participants were notified of the interview date by the research team before the interview. A purposive sampling method was used where the participants are included in the study to serve a particular purpose. The basic criteria to include respondent for the research was that the respondents must be an experienced professional in construction industry. The data was collected from a semi-structured interview guide between May and June 2020. A set of 4 interview questions were designed to achieve the aim of the study. And each question had 3 to 5 follow-up questions

to reveal participants opinions on disruptions and responses in the construction industry amid COVID-19 threat. The questions were to reflect the disruptions and responses in the construction industry during COVID-19 outbreak in Nigeria. To start with, participants were asked to talk about their work, position and years of experience in construction sector. This early questions informed the background of the participants. The duration of interview for each respondent varied in length between 20 and 30 minutes. Each interview was recorded with permission, transcribed, and analysed. A total of 15 (R1-R15) interviews were conducted for this study.

3.0 Results and Discussion

In this section, the data analysis and results from the interviews conducted were presented and discussed.

3.1 Characteristics of Interviewees

The interviewees included thirteen (13) males and two (2) females and most of the interviewees are professional builders as shown in Table 1. Majority of the interviewees had more than 8 years working experience in construction sector. This indicates that the participants are eligible for the study. The interviewees are professionals in the Nigerian construction industry. Table 1 summarised the participants’ background information.

Table 1: Background Information of the Participants

S/N	Respondent	Gender	State	Professional Background	Position (Rank)	Years of Working
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						Experience
1	R1	Male	Abuja	Civil engineer	Site manager	6 years
2	R2	Male	Lagos	Builder	Project manager	13
3	R3	Male	Lagos	Civil engineer	Managing director	17
4	R4	Male	Lagos	Civil engineer	Managing director	21
5	R5	Male	Ogun	Architect	Project manager	11
6	R6	Female	Lagos	Quantity surveyor	Project manager	9
7	R7	Male	Lagos	Builder	Project manager	8
8	R8	Male	Lagos	Quantity surveyor	Cost analyst	15
9	R9	Male	Oyo	Civil engineer	Site manager	9
10	R10	Female	Lagos	Civil engineer	Facility manager	12
11	R11	Male	Lagos	Architect	Project design manager	15
12	R12	Male	Oyo	Civil engineer	Site manager	10
13	R13	Male	Lagos	Builder	Project manager	14
14	R14	Male	Lagos	Builder	Managing director	18
15	R15	Male	Lagos	Civil engineer	Project manager	8

3.2 Results Analysis

The key questions of the interview are as follows:

- (i) What are the disruptions in the construction industry during the COVID-19 outbreak?
- (ii) What are the responses in the construction industry during the COVID-19 outbreak?

3.2.1 Disruptions in the Construction Industry amid COVID-19 Threat

The disruptions in the construction industry during COVID-19 pandemic that emerged from the interview transcripts were classified into seven (7) categories. The identified categories are: “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”

3.2.1.1 Transportation Problems (for both material and workers)

Transportation problem (for both materials and workers) was recognised as a disruption in the construction sector during COVID-19 pandemic. Normally workers come to site from home; but due to the lockdown in the country, workers found it difficult to enter transit to workplace. The present lockdown due to COVID-19 pandemic had made movement so difficult for site workers [R14, R6, R2, and R1]. One of the interviewees said: “...because of the lockdown, there is no how we can come down from Ibadan to our site...” [R12]. Some of the interviewees commented that:

“...it has caused me a lot of money, where we use to enter for five hundred Naira transport, they are now collecting one thousand, five hundred Naira (₦1500)...” [R10].

As stated by interviewee R3:

“The issue of lockdown alone within our establishment has impacted a lot of things negatively; in terms of movement of workers to work, movement of materials, movement of everything that has to do with our job, so we could no longer move forward” [R3].

“...presently, as I speak with you, we have a lot of works at hand, but way to access materials to build or execute the jobs is a major problem, we could no longer move forward and this has done a lot of damage to our business...” [R9].

3.2.1.2 Project Abandonment

Project abandonment was considered as a disruption in the construction industry during COVID-19 pandemic. Abandonment of construction projects can cripple the development of nations. One of the interviewees said: “...it crippled the business completely...” [R11].

The COVID-19 pandemic has affected some businesses. For instance, two of the interviewees commented that:

“...a client lamented that his business is no more functioning, that he cannot continue with the project for now...” [R5].

“...the pandemic has reduced work; I have a project ongoing with a bank, for more than four months the client has not communicated on the project...” [R7].

3.2.1.3 Delay in Construction Activities

The study’s interviewees considered delay in construction activities as a disruption in construction sector during COVID-19 pandemic. Delay in construction activities affects first the construction programme and it does not

in any way help construction projects. Delay can bring about increase in the project costs. One of the interviewees said:

“...in construction, time is money...” [R15].

In addition, R13 commented that:

“There is a delay in delivery of project materials to site...” [R13].

“...because of the lockdown in the state, workers are now coming to site only three times in a week (i.e. Monday, Wednesday and Friday)...” [R13].

3.2.1.4 High Cost of Construction Materials

High cost of construction materials was considered as a disruption in construction sector during the COVID-19 pandemic by the study’s interviewees. Cost is often a key factor in construction projects. The costs of most construction materials have gone up due to the lockdown in the country [R3]. Some of the interviewees commented as follows:

“...the rate at which the construction materials are going up is making most clients to stop construction works...” [R8, R1].

“...due to the pandemic, most manufacturing companies have shut down and this had resulted to increase in some of construction materials...” [R2].

One of the interviewees said:

“...importers of construction materials are no longer importing goods and it has affected so many things in terms of costs...” [R14].

3.2.1.5 Reduction in Working Hours per Day

Reduction in working hours per day was recognised as a disruption in the construction sector during COVID-19

pandemic. Due to the outbreak of the COVID-19, some states in the country introduced curfew in order to contain the virus. This initiative also affected the industry in terms of working hours. One of the interviewees said:

“...it has affected a lot, the site that am working now in Banana Island, they only allow us to work for three hours. They brought a rule that we should start by 9am and close by 2pm. And if you enter by 9am, the security personnel will stop you at the entrance gate to check permit card, temperature, and washing of hands, these will take another one hour before you can go in. And once is around 1pm or 2pm, they security people would be pursuing you to leave the premises. Thus, it is a shortage to employers of workers to site...” [R4].

3.2.1.6 Lack of Funding

The study’s interviewees considered lack of funding as a disruption in construction industry during COVID-19 pandemic. Construction projects suffer due to funding problems. One of the interviewees said:

“COVID-19 has crippled most business, especially in construction works as a result of automatic cease of funds ...” [R11]. It is difficult to coordinate a construction project if there is no physical money. Some of the interviewees commented that: “...the lockdown in the country affected the economy and this makes it difficult for clients to release money for works...” [R5].

“...there is no more money coming in as most clients are afraid of the situations on ground...” [R15].

“...the banks are not working as usual and this has made it difficult to pay workers on site...” [R1].

Interviewee **R12** stated that:

“...in terms of payment it has made things difficult. We have a lot of customers abroad, who are ready to make payment on our project, but due to the COVID-19 most of them could not even access their funds and cannot move out to go to the bank; as a result our sales as a real estate developer have been affected...” [R12].

3.2.1.7 Shortage of Workforce

Shortage of workforce was recognised as a disruption in the construction industry during COVID-19 pandemic by the study’s interviewees. Most people have stop going to work due to the COVID-19 pandemic couple with the restrictions in movement. Two of the interviewees commented that:

“...the pandemic has affected the industry as the construction workers are afraid to go to work due to the deadly disease (COVID-19)...” [R8, R11].

One of the interviewees said:

“...there is fear everywhere, site workers are not ready to work, and we the managers also are not able to get to work as well. The pandemic has really reduced work and projects are suffering because of the COVID-19 threat...” [R14].

Another interviewee talked about the shortage of workers on site. The COVID-19 pandemic has made most workers not to go to work coupled with movement restriction. This situation is illustrated by the response of one of the interviewees.

“...there are few construction workers on site, most skilled workers hardly come to site for work because of the fear of the corona virus and movement restrictions by government...” [R10].

3.2.2 Responses in the Construction Industry amid COVID-19 Threat

The responses in the construction industry during COVID-19 threat that emerged from the interview transcripts were classified into six (6) themes. The identified themes are: “temperature checks”, “hand washing with soap”, “social distancing”, “no entry for unauthorised visitors to site”, “washing of construction equipment and tools with soap” and “use of personal protective equipment and personal hygiene”. Contractors, workers and project owners are responsible for ensuring the compliance and implementation of post COVID-19 rules and other applicable requirements issued by the government. These rules are centred mostly on the wellbeing and safety of construction workers. Staff and site workers should strictly adhere to the set out rules in containing the virus when using transit to and from construction site. Some of the interviewees commented that:

“...temperature checks, hand washing and social distancing are duly followed when staff or site workers are in transit to and from site...” [R3, R8, R11, R14].

“...we now conduct site meeting through online Zoom application and sometimes safety meetings by phone...” [R11].

“...you can’t enter into our general office or even allow access to site without at least a face mask...” [R3].

“...unauthorised visitors are not allowed to enter into the construction premises...” [R9].

“...a safety officer is always on ground to ensure compliance for construction workers against the set out COVID-19 safety rules every working day...” [R11]. “Prior to start or end of daily activity, equipment and tools are washed...” [R5].

As stated by R9:

“...in our site no sharing of equipment of tools...” [R9].

Social distancing is necessary in construction sites so as to contain the virus. One of the interviewees said:

“...to reduce site congestion, we now group the activities on site into sections to allow for social distancing...” [R14].

In terms of material management, one of the interviewees said:

“All vehicles with or without materials entering site are disinfected and properly checked right from the entrance gate before it have access to site” [R7].

4.0 Conclusion and Recommendations

The aim of the present study was to explore the disruptions and responses in the construction industry during the COVID-19 pandemic. The study has shown 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” are the disruptions in the construction industry during COVID-19 pandemic. The study also revealed that “temperature checks”, “hand washing with soap”, “social distancing”, “no entry for unauthorised visitors to site”, “washing of construction equipment and tools with soap” and “use of personal protective equipment and

personal hygiene” were the responses in the construction industry during COVID-19 pandemic. The findings of the study provide detailed insights into the disruptions and responses in the construction sector of Nigeria during COVID-19 pandemic. The findings from this study show that, stakeholders in the construction industry have a heavy reliance on manual labour and mechanical technology. Thus the sector needs to rethink in reshaping its image by embracing innovations (digital technologies) that will thrive amid disruptions. These innovations can improve the productivity of the industry. Key stakeholders in the construction sector, such as architects, designers, engineers, builders, building material suppliers, contractors and construction companies need to prepare strategically and make the right moves to thrive amid the disruptions by using technologies such as building information modelling (BIM), prefabrication, wireless sensors, automated and robotic equipment, and 3D-printing. An understanding of the disruptions and responses in the construction sector amid COVID-19 threat would inform the industry in preparation for future. This information is essential for reshaping the image of the construction industry.

References

- Akanni, L. O. & Gabriel, S. C. (2020). The Implication of Covid-19 Pandemic on the Nigerian Economy. Available at: <http://cseaafrica.org/the-implication-of-covid19-on-the-nigerian-economy/> [accessed: 19 May 2020].
- Dantata, S.A. (2007). General Overview of the Nigerian Construction Industry. Project Submitted to the Department of Civil & Environmental Engineering, in Partial Fulfillment of the Requirements for the Degree of Master of Engineering in Civil and Environmental Engineering at the Massachusetts Institute of Technology.
- Dorcias, O. A. B., Elkanah, A. O., & John, O. O. (2019). Most Critical Factors Responsible for Poor Project Quality Performance in Building Construction Industry (A Case Study of Three Major Cities in Nigeria). *European International Journal of Science and Technology*, 8(2), pp. 1-14.
- Essays UK. (2018). Nigerian Construction Industry Performance. Available at: <https://www.ukessays.com/dissertation/examples/construction/nigerian-construction-industry-and-its-performance.php?vref=1> [accessed: 6 April, 2019].
- International Labour Organisation (ILO) (2020). COVID-19 and the World of Work: Impact and Policy Responses (ILO Monitor 1st Edition). Available at: https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/briefingnote/wcms_738753.pdf [accessed: 19 May, 2020].
- Isa, R.B., Jimoh, R.A., & Achuen, E. (2013). An Overview of the Contribution of

- Construction Sector to Sustainable Development in Nigeria. *Net Journal of Business Management*, 1(1), pp. 1-6.
- Kabirifar, K., & Mojtahedi, M. (2019). The impact of Engineering, Procurement and Construction (EPC) Phases on Project Performance: A Case of Large-scale Residential Construction Project. *Buildings*, 9(15), pp. 1–15. DOI:10.3390/buildings9010015
- KPMG (2020a). COVID-19: Skills Sector Impact. Available at: <https://home.kpmg/content/dam/kpmg/in/pdf/2020/04/covid19-skills-sector-impact.pdf> [accessed: 19 June, 2020].
- KPMG (2020b). Workforce, Workplace and HR Reshaping During Covid-19 Pandemic. Available at: <https://home.kpmg/content/dam/kpmg/in/pdf/2020/04/workforce-workplace-and-hr-reshaping-during-19-pandemic.pdf> [accessed: 19 May, 2020].
- Liu, C., Zhou, Q., Li, Y., Garner, L. V., Watkins, S. P., Carter, L. J., Smoot, J., Gregg, A. C., Daniels, A. D., Jervy, S. & Albaiu, D. (2020). Research and Development on Therapeutic Agents and Vaccines for COVID-19 and Related Human Coronavirus Diseases. *ACS Central Science*, 6, pp. 315–331. DOI: 10.1021/acscentsci.0c00272
- Lopes, J. P., Oliveira, R. A., & Abreu, M. I. (2011). The Construction Industry and the Challenges of the Millennium Development Goals. *Management and Innovation for a Sustainable Built Environment*, pp.20-23.
- Mafimidiwo, B., & Iyagba, R. (2015). Comparative Study of Problems Facing Small Building Contractors in Nigeria and South Africa. *Journal of Emerging Trends in Economics and Management Sciences (JETEMS)*, 6(2), pp. 101-109.
- McKibbin, W. & Fernando, R. (2020). The Global Macroeconomic Impacts of COVID-19: Seven Scenarios. Available at: https://www.brookings.edu/wp-content/uploads/2020/03/20200302_COVID19.pdf [accessed: 19 May, 2020].
- McKinsey Global Institute (2017). Reinventing Construction: A Route to Higher Productivity. McKinsey & Company.
- Mousavizadeh, L. & Ghasemi, S. (2020). Genotype and Phenotype of COVID-19: Their Roles in Pathogenesis. *Journal of Microbiology, Immunology and Infection*. DOI: 10.1016/j.jmii.2020.03.022
- Nadeem, S. (2020). Corona virus COVID-19: Available Free Literature Provided by Various Companies, Journals and Organizations around the World. *Journal Of Ongoing Chemical Research*, 5(1), pp. 7-13. DOI: 10.5281/zenodo.3722904
- Oladinrin, T. O., Ogunsemi, D. R., & Aje, I. O. (2012). Role of Construction Sector in

- Economic Growth: Empirical Evidence from Nigeria. *FUTY Journal of the Environment*, 7(1), pp. 50-60. <http://dx.doi.org/10.4314/fje.v7i1.4>
- Osuizugbo, I.C. (2020). Improving the Performance of Building Construction Firms through Addressing the Gap of Building Production Management: A New Production Model Approach. *Journal of Engineering, Project, and Production Management*, Vol. 10 No. 1, pp.50-63.
- Osuizugbo, I. C. & Ojelabi, A.R. (2020). Building Production Management Practice in the Construction Industry in Nigeria. *Engineering Management in Production and Services*, Vol. 12 No. 2, pp.56-73. DOI: 10.2478/emj-2020-0011
- PwC United States (2020). COVID-19: What it Means for Engineering and Construction. Available at: <https://www.pwc.com/us/en/library/covid-19/coronavirus-impacts-engineering-construction.html> [accessed: 19 May 2020].
- Soewin, E., & Chinda, T. (2018). Factors Affecting Construction Performance: Exploratory Factor Analysis. IOP Conference Series: *Earth and Environmental Science*, DOI:10.1088/1755-1315/140/1/012102
- Qian, X., Ren, R., Wang, Y., Guo, Y., Fang, J., Wu, Z. Z., Liu, P. L., Han, T. R. & Members of Steering Committee, Society of Global Health, Chinese Preventive Medicine Association (2020). *Infectious Diseases of Poverty*, 9(34), pp. 1-6. DOI: 10.1186/s40249-020-00650-1
- Wang, J. & Wang, Z. (2020). Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis of China's Prevention and Control Strategy for the COVID-19 Epidemic. *International Journal of Environmental Research and Public Health*, 17, pp. 1-7. DOI:10.3390/ijerph17072235