

## **Leveraging Emerging Technologies during Pandemic: Lessons from Expatriate Construction Firms in Nigeria**

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### **Abstract**

**Purpose:** *This study investigates how expatriate construction firms in Lagos State, Nigeria, leveraged emerging technologies to sustain operations and minimise disruptions caused by the COVID-19 pandemic. The goal is to extract actionable lessons that indigenous firms can adopt to improve future crisis preparedness.*

**Design:** *The study employed a quantitative research design using structured questionnaire administered to 81 construction firms, comprising both expatriate and indigenous organisations. The sample size was considered adequate to represent active firms within the study area and support comparative analysis between both groups. Data were analysed using descriptive and comparative statistical methods to assess pandemic-related challenges, response strategies, and the effectiveness of adopted technologies.*

**Research Limitations and Implications:** *The research is limited to construction firms operating within Lagos State and did not capture conditions in other regions of Nigeria. Nevertheless, the findings provide a foundation for broader national strategies aimed at enhancing construction industry resilience through technological adaptation.*

**Findings:** *The study revealed that expatriate firms demonstrated higher digital adaptability by effectively implementing technologies such as Building Information Modelling (BIM), remote site monitoring, and digital project management tools (higher adoption levels among expatriate firms compared with indigenous firms). These interventions helped maintain project continuity, reduce financial losses, and improve health protocol compliance. The strategies adopted includes collaboration platforms, virtual project coordination, and remote site monitoring, digital project collaboration. Indigenous firms, however, experienced greater operational challenges due to limited digital infrastructure and workforce digital readiness.*

**Practical and Theoretical Implications:** *Practically, the study offers evidence-based recommendations to enhance digital transformation and crisis readiness within the Nigerian construction industry. Theoretically, it contributes to resilience and crisis management literature by highlighting technology's role as a moderating factor between external shocks and operational outcomes.*

**Keywords:** Building Information Modelling, Construction Industry, COVID-19, Crisis Management, Digital Transformation, Pandemic

## **Introduction**

The construction industry is a major contributor to global economic growth, accounting for about 13% of the global GDP (Radzi, Mohd-Rahim, & Adnan, 2022). In Nigeria, the sector plays a critical role in infrastructure development, underscoring its importance to national development objectives. However, the COVID-19 pandemic, which emerged in late 2019, severely disrupted the global economy and had a profound impact on construction activities (Agyekum, Kissi, & Asamoah, 2021). In Nigeria, the pandemic led to widespread project delays, increased costs, workforce shortages, and supply chain interruptions (NIQS, 2020).

While several studies have documented the adverse effects of COVID-19 on construction globally—emphasising project delays, cost overruns, and compliance with health protocols (Chung, Li, & Luo, 2020; Huang, Sun, & Zhang, 2020)—there remains limited empirical research on how construction firms, particularly expatriate firms, have leveraged emerging technologies to mitigate these challenges within the Nigerian context. Existing works have largely concentrated on the constraints and vulnerabilities caused by the pandemic, but less attention has been given to the proactive technological adaptations and crisis strategies deployed during this period (Oladapo & Ojo, 2021; Fapohunda, 2022). This leaves a significant knowledge gap in understanding how foreign firms operating in Nigeria navigated the crisis compared to their indigenous counterparts.

This study addresses this gap by investigating how expatriate construction firms operating in Lagos State, Nigeria, utilised digital tools, remote collaboration systems, and emerging site technologies to maintain operational

continuity during the COVID-19 pandemic. The aim is to evaluate their crisis response strategies, highlight lessons learned, and propose actionable insights for indigenous firms seeking to enhance future resilience.

The practical significance of this research lies in its ability to inform both corporate crisis management practices and policymaking within the Nigerian construction sector. By understanding successful digital adaptation strategies, firms can better prepare for future disruptions, while policymakers can structure industry support frameworks to promote technological transformation (Agyekum et al., 2021). Despite its limitations in scope—focusing on a specific geographic location and timeframe— This study, therefore, investigates how expatriate construction firms in Lagos State applied digital tools, remote collaboration systems, and emerging site technologies to maintain operational continuity during the COVID-19 pandemic, with the aim of identifying effective crisis response strategies and lessons that can guide future resilience planning.

## **Literature Review**

### **Impact of COVID-19 on the Construction Industry**

The COVID-19 pandemic created unprecedented disruptions across all sectors, with construction among the most severely impacted (Chung et al., 2020; Huang et al., 2020). Lockdowns, supply chain interruptions, labour shortages, and compliance with health protocols led to significant project delays and cost escalations (Wang et al., 2020).

In Nigeria, studies conducted by the Nigerian Institute of Quantity Surveyors (NIQS, 2020) and the Nigerian Institute of Architects (NIA, 2020) confirmed similar trends. The majority

of public and private construction projects experienced delays due to shortages of materials, reduced workforce availability, and shifting regulatory requirements. Moreover, additional health and safety expenditures contributed to escalating project costs.

The construction sector's dependence on physical labour and material flows made it highly vulnerable to pandemic-induced disruptions. Unlike sectors that could transition easily to remote operations, construction sites required on-site presence, which created specific challenges such as difficulties in enforcing social distancing, delays in project timelines, and interruptions in material delivery, as noted in studies by Chung et al. (2020) and Huang et al. (2020). These findings highlight gaps in existing pandemic management strategies for construction, including the lack of contingency planning for workforce mobility restrictions and insufficient digital tools for remote monitoring.

#### **Challenges Faced by Construction Firms**

The COVID-19 pandemic posed severe challenges to the global construction industry, and Nigeria was no exception. Bartik et al. (2020) identified several critical areas of disruption, including supply chain interruptions, workforce availability issues, reduced demand for construction services, rising operational costs, financial strain, difficulties in managing projects remotely, and regulatory delays. Within the Nigerian context, these challenges were particularly amplified for indigenous firms. Many such firms experienced liquidity crises and outright project suspensions due to limited cash reserves and restricted access to financing options (Deloitte, 2020; NIQS, 2020).

The pandemic further highlighted the structural weaknesses of local firms, especially their dependence on traditional project delivery methods and physical interactions. Indigenous contractors without robust digital systems found it extremely difficult to maintain project continuity under lockdown conditions (Agyekum et al., 2021). In contrast, expatriate firms were relatively better positioned to withstand the shock. They were able to leverage stronger financial bases, global networks, and established digital infrastructure, which enabled them to adapt quickly through remote collaboration tools, virtual inspections, and digital project tracking systems (Chung et al., 2020; Radzi et al., 2022). This divergence in resilience not only underscored the vulnerabilities of indigenous firms but also emphasised the importance of proactive digital transformation in crisis preparedness.

#### **Adoption of Emerging Technologies in Construction**

Emerging technologies played a pivotal role in sustaining construction operations during the pandemic. Global studies, including McKinsey (2020), revealed that firms adopting digital tools and technology-driven strategies demonstrated significantly better operational performance compared to those that relied solely on conventional methods. The Nigerian construction sector reflected a similar trend, with expatriate firms taking the lead in adopting and scaling such technologies (NIQS, 2020).

Among the most impactful technological adaptations was the use of virtual collaboration platforms such as Zoom and Microsoft Teams, which enabled project teams to maintain regular communication despite restrictions on physical gatherings (Huang et al., 2020). Additionally, the

integration of Building Information Modelling (BIM) facilitated real-time coordination between architects, engineers, and site managers, thereby reducing errors and delays (Chung et al., 2020). Remote site monitoring technologies, including drones and IoT sensors, became invaluable for maintaining project oversight with reduced physical presence on site (McKinsey, 2020). Furthermore, advanced project management software platforms such as Procore and PlanGrid streamlined documentation, scheduling, and task tracking, helping firms remain organised under uncertain conditions (Radzi et al., 2022).

Expatriate firms operating in Nigeria were generally quicker and more effective in deploying these solutions, largely because of their pre-existing investments in digital infrastructure and their international experience in crisis management (Agyekum et al., 2021). Indigenous firms, by contrast, struggled to make such transitions, which limited their ability to mitigate the pandemic's impacts. This contrast highlights the urgent need for Nigerian firms to embrace digital transformation as a strategic imperative, not merely as an optional enhancement.

### **Research Methods**

This study adopted a quantitative research approach, utilising a descriptive survey method to collect data from construction firms operating in Lagos State, Nigeria.

The study population comprised construction firms actively engaged in projects within Lagos State, Nigeria, including both expatriate and indigenous companies. A total of 81 firms were selected for participation based on their availability and willingness to respond. These firms were identified through professional networks and direct contacts

within the industry, ensuring that both expatriate and indigenous organisations were represented. A stratified sampling approach was applied to maintain proportional representation of firm types, allowing for meaningful comparison between expatriate and indigenous firms. The sample size of 81 was considered adequate to capture a comprehensive picture of technological adoption and crisis management practices during the COVID-19 pandemic, based on accessibility and responsiveness of firms within the study period.

A structured questionnaire was the primary instrument for data collection. The questionnaire was designed to capture firm demographics, challenges encountered during the pandemic, types of technologies adopted, and perceived effectiveness of strategies implemented. It consisted mainly of closed-ended questions, measured on a Likert scale for ease of quantitative analysis.

Data were collected through both physical distribution and online dissemination of questionnaire, allowing flexibility for respondent preferences due to movement restrictions during the pandemic. Collected data were coded and analysed using Statistical Package for Social Sciences (SPSS). Descriptive statistics (frequencies, means) and comparative analysis techniques (independent samples t-tests for Likert-scale items, chi-square tests for categorical responses, and cross-tabulations to explore relationships between firm type and technology adoption or crisis response strategies) were employed to interpret the findings.

### **Findings and Discussion**

The respondents comprised construction professionals in Lagos State, Nigeria,

including project managers, engineers, architects, and quantity surveyors. Most respondents (64%) had over five years of industry experience. The majority of participants (79%) held bachelor's and postgraduate degrees, and were members of professional bodies such as the NIOB, NIQS, and NSE. Firm ownership was evenly distributed between expatriate and indigenous firms. These demographics indicate a knowledgeable and credible respondent base for the study.

**TABLE 1.** Demographic of the Respondents

Variable	Category	Frequency	Percent
Gender	Male	62	78.5%
	Female	17	21.5%
Professional Background	Quantity Surveyor	40	50%
	Builder	18	23%
	Civil Engineer	14	18%
	Estate Surveyor	4	5%
	Architect	3	4%
	Professional Bodies	NIQS	41
	NIOB	14	17.7%
	NSE	17	21.5%
	NIA	3	3.8%
Years of Experience	< 5 years	29	36.7%
	6-10 years	36	45.6%
	11-15 years	12	15.2%
	>15 years	2	2.5%
Type of Organisation	Expatriate	32	51%
	Indigenous	47	27%
Years of Operation	< 5 years	21	26.6%
	6-10 years	30	38%
	11-15 years	14	17.7%
	> 20 years	14	17.7%

Note. NIQS = Nigerian Institute of Quantity Surveyors; NIOB = Nigerian Institute of Building; NSE = Nigerian Society of Engineers; NIA = Nigerian Institute of Architects.

The demographic profile reveals a predominantly male workforce (78.5%), reflecting industry-wide gender trends. A substantial number of respondents (50%) had backgrounds in quantity surveying, and a majority were affiliated with leading professional bodies such as NIQS and NSE.

Most participants had between 6 to 10 years of experience, suggesting a reasonably seasoned sample. The balance between expatriate (51%) and indigenous (49%) firms provided a strong basis for comparative analysis. The diverse range of professional affiliations and years of firm operation further

strengthens the validity of the findings derived from this study.

It was evident from the project status analysis that over 90% of the respondents stated that their construction projects were adversely affected during the COVID-19 pandemic. About 51% of the participants indicated that their projects experienced moderate to severe disruptions, while approximately 39% reported project suspensions or complete shutdowns at various stages. Only a small fraction of respondents, less than 10%, indicated minimal or no impact on their ongoing projects.

The high incidence of project disruptions highlights the vulnerability of the construction sector to external global shocks. These findings are consistent with previous

studies by Abdulrahman et al. (2020) and McKinsey (2020), which identified the construction industry as one of the most significantly disrupted sectors globally during the pandemic. The subsequent subsections discuss in detail the specific challenges encountered by firms, the extent of emerging technology adoption, and the comparative resilience exhibited by expatriate and indigenous firms.

**Challenges Encountered by Construction Firms During COVID-19**

The pandemic introduced significant disruptions to construction projects in Lagos State, affecting both expatriate and indigenous firms. The major challenges experienced included project delays, cost overruns, supply chain disruptions, and health protocol compliance difficulties.

**TABLE 2:** Challenges Encountered by Firms During the Pandemic

Impact Parameter	Rank
Delay in Project Timelines	1
Increased Project Costs	2
Disruption of Supply Chain	3
Workforce Shortages	4
Compliance with new safety protocols	5

The findings align with studies by Chung et al. (2020) and Radzi et al. (2022), which reported similar patterns of disruptions globally. Delays and cost escalations were the most prominent impacts, affirming the construction sector’s high vulnerability to pandemic-induced restrictions. These outcomes can be attributed to several contextual factors in Lagos State: supply chain interruptions caused by border closures and limited availability of construction materials; workforce shortages resulting from

movement restrictions and health concerns; and additional expenditures required to implement health and safety protocols on-site. The Nigerian Institute of Quantity Surveyors (2020) also reported increased operational costs related to health and safety measures, confirming the present findings. Therefore, the combination of disrupted logistics, limited labour availability, and heightened safety requirements provides a plausible basis for the observed project delays and cost escalations.

**Adoption of Emerging Technologies**

Expatriate firms showed higher levels of emerging technology adoption compared to indigenous firms. These technologies

included virtual collaboration tools, Building Information Modelling (BIM), remote site monitoring, and digital project management systems.

**TABLE 3.** Adoption of Technologies by Firm Type

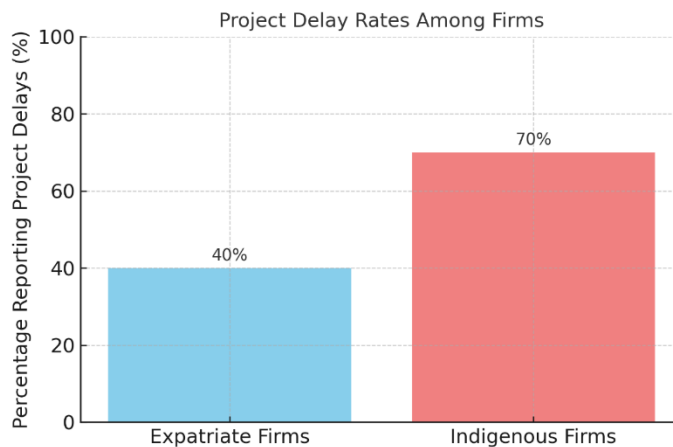
Technology	Expatriate Firm (%)	Indigenous Firms (%)
Virtual collaboration platforms (Zoom, Teams)	95	60
Building Information Modelling (BIM)	88	35
Remote site monitoring (Drones, CCTV)	82	40
Digital project management tools	90	45

The results reveal a technological gap between expatriate and indigenous firms. Expatriate firms' readiness can be attributed to prior investments in digital infrastructure and greater exposure to global best practices (McKinsey, 2020; Wendy et al., 2021). Indigenous firms, on the other hand, appeared to adopt technologies at lower levels, which may reflect constraints observed in the data, such as limited access to digital tools, lower workforce digital readiness, and smaller operational budgets. These contextual factors suggest that financial and technical capacity

challenges could have influenced the slower uptake of emerging technologies among indigenous firms, consistent with patterns reported in developing economies (Abdulrahman et al., 2020).

**Impact of Technology Adoption on Project Continuity**

Firms that deployed digital tools reported fewer delays, reduced costs, and higher compliance with health protocols compared to firms that did not.



**Figure 1:** Project Delay Rates Among Expatriate and Indigenous Firms.

The data demonstrates that technology adoption directly contributed to better project continuity, validating the theoretical framework proposed earlier. These findings are consistent with Radzi et al. (2022), who concluded that technological readiness strongly predicts firm resilience during pandemics.

### **Lessons Learned from Expatriate Firms**

The experiences of expatriate construction firms during the COVID-19 pandemic provide several important lessons for the Nigerian construction sector. First, they highlight the critical importance of proactive investment in digital tools, which allowed projects to continue seamlessly under mobility restrictions. Second, they emphasise the need for continuous workforce digital skills development, ensuring that staff at all levels could effectively utilise emerging technologies. Third, they illustrate the value of integrating crisis management frameworks into organisational operations, enabling firms to respond swiftly and systematically to unexpected disruptions (Deloitte, 2020).

Taken together, these findings reinforce the application of digital transformation theories within real-world crisis contexts. As McKinsey (2020) suggests, organisations that embed agility, resilience, and technology-driven strategies into their core operations are better positioned to withstand shocks. For indigenous firms in Nigeria, this underscores the urgent need to prioritise technology investment and institutionalise adaptive strategies to bridge existing performance gaps and remain competitive in a rapidly changing industry landscape.

### **Conclusion and Recommendations**

This study examined the strategies adopted by expatriate construction firms in Lagos

State, Nigeria, during the COVID-19 pandemic, focusing on how emerging technologies helped mitigate project disruptions. The findings indicate that firms that invested early in digital technologies and implemented structured crisis management were better able to maintain operations and enhance resilience during periods of systemic disruption.

Findings revealed that expatriate firms, with greater digital readiness, were able to adapt faster, maintain project continuity, and minimise financial losses compared to indigenous firms. Core technologies leveraged included Building Information Modelling (BIM), virtual collaboration platforms, remote site monitoring, and digital project management tools.

Based on these propositions, the following recommendations are made:

- a) Indigenous construction firms should prioritise proactive investment in digital technologies to enhance project management and communication efficiency.
- b) Regular digital skills training programs should be institutionalised for construction professionals to improve their adaptability during future disruptions.
- c) Firms should develop comprehensive crisis response plans that integrate digital solutions as essential tools for operational continuity.
- d) Policymakers and industry regulators should provide incentives and frameworks that promote digital transformation within the construction sector, particularly among indigenous firms.

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