2023 European Conference on Computing in Construction
40th International CIB W78 Conference
Heraklion, Crete, Greece
July 10-12, 2023

BARRIERS TO DIGITALIZATION IN THE NIGERIAN CONSTRUCTION INDUSTRY

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Abstract

Digitalization around the world is gaining much popularity and the Nigerian construction is not an exception. Digitalization has been faced with a lot of challenges over the years. This study seeks to identify the barriers to digitalization in Nigerian construction industry and assess the benefits of digitalization with a view of improving productivity. The result revealed that the major barriers to digitalization are resistance to technology by stakeholders, high cost of digital technology, inadequate power supply, difficulties in adapting to change, inadequate digital facilities. There is need to improve the awareness of stakeholders on the benefit of digitalization.

Introduction

Digitalization has been popular around the world due to its capacity to increase project efficiency, effectiveness, and bring new opportunities. In order to fulfill societal needs, the construction industry has always taken on significant and challenging projects (Aghimien et al., 2018). The performance of projects falls far too often short of stakeholder expectations, which can sometimes tarnish the sector's reputation and trustworthiness. Due to pressures on both the supply and demand sides, the sector has recently begun to question the status quo strategy. Rethinking the construction industry is being greatly aided by digitalization. Because of this, the industry is accelerating its adoption of new technologies, enabling it to advance to business models, value chains, and production methods that are more effective (Ezeokoli et al., 2016)

According to Usman & Said (2014), the construction industry is heterogeneous in nature, requiring many companies, consultants, and individuals to combine, discuss, and exchange information at various levels during the planning, designing, and execution of a major construction project. The construction industry, like every other sector, is experiencing a paradigm shift as new technologies, also known as disruptive technologies, gain traction globally (Osunsanmi, et. al, 2018).

The future of the construction industry is facing a high level of complexity, intense competition, and uncertainty regarding the effects of climate change, the availability of resources, and the disruptive nature of innovation (Ezeokoli et al., 2016). New approaches in both design and construction are necessary due to shifting owner demands and more complex facilities and this calls for an innovative approach which will help improve the industry (Philip & Thompson, 2014). The digital transformation in the construction industry did not begin with the COVID-19 crisis. In fact, digital tools for the industry have been emerging for the past ten years. The crisis, on the other hand, highlighted the importance of using these tools in difficult environments where quick, well-informed decisions are critical to survival - and even growth.

Digitalization simply refers to the process of converting analogue information into digital information and this requires the convergence of new technologies, new capabilities, and improve consumer behavior (Blayse & Manley, 2004). The Nigerian construction industry is at the infant stage of adoption of digitalization due to its nature and high number of unskilled labour. It is pertinent for the Nigerian construction industry to adapt digitalization as it helps to improve efficiency and project delivery. Digital technology has been slow to penetrate the construction industry because of the complexity of the sector (Moshood et al., 2020).

Digitalization promotes the expansion of the construction sector, minimize project delays, lower the likelihood of accidents, and ensure economically sound construction projects (Usman & Said, 2014). Research conducted by Ibem & Laryea (2014) revealed that digital technology adoption is a door opener for the development of green and smart buildings, which would be advantageous for the environment. The process of digital transformation involves the integration of digital tools to optimize processes and make them more efficient. Furthermore, to use digitalization for construction site monitoring to save time and resources as well as to protect the environment from pollution (Osunsanmi et.al, 2018). Although all digitalization methods/tools are beneficial in various ways, several factors influence digitalization including productivity, human behavior, and clearance. This paper seeks to identify the barriers to adoption of digitalization in the construction industry and also the benefits of digitalization to the Nigerian construction industry.

The Nigerian Construction industry and Digitalization

The Nigeria construction industry have been a major contributor to the Nigerian economy as it contributes significantly to the GDP of the nation. Despite its impressive performance, the industry faces several challenges, including a lack of local skilled labor, power shortage, non-availability of materials, and unethical practices which is common in the industry (Usman & Said, 2014). The construction industry engages in a wide range of activities, including the building of commercial buildings, underground structures, private residences, and other essential structures like bridges, dams, flyovers, and roads. In addition to alteration, the industry also deals in repairs for buildings and structures. This makes it very important sector for national development and to Nigeria's economy as a developing nation (Moshood et al., 2020).

The need for the industry to be able to stand with the other construction industry made digitalization very important. Adegoke (2022) stressed the need for the adoption of digitization to enhance project performance and promote efficiency in the construction sector. He described digitization as the use of digital devices, like phones and tablets to enhance project performance and construction. The study conducted by Yusuf et al. (2021) highlighted the challenges of digitalization in Nigeria as technological backwardness, low financial capacity, lack of government support, lack of public private partnership, cyber threat, lack of top management support and fear of unemployment. Also, Ezeokoli et al. (2016) identified aligning and managing resources and teams to focus on digital services, limited availability of the right digital skills and capabilities, lack of collaborative and sharing culture and managing change among others.

The Nigerian construction industry needs to harness the benefits of digitalization to improve performance and productivity. Digitalization seeks to adapt ways of making work easier and more sustainable.

Categories of Digital Technologies

Ibem et al. (2018) categorized digital technologies into five main groups: Software for cost estimation, word processing, and architectural and engineering design is included in the first category. technologies and tools for digitally capturing project data fall under the second category. The third category is the processing, storing, and displaying of data and information using hard infrastructure and communication technologies. Databases and repositories are also available for the display of structured data pertaining to building supplies, machinery, and equipment. The final group of digital technologies is made up of intelligent systems which make it easier to communicate, collaborate, coordinate, and integrate information, people, processes, and project activities.

Simulation

The research employed the use of survey research design in which structured close ended questionnaires were used for data collection. These questionnaires were administered to selected professionals in the Nigerian construction industry in Lagos state. Lagos state is a major hub of construction activities in Nigeria and it is believed that the result could be generalized in Nigeria. These professionals include Architects, Builders, Engineers, Quantity surveyors and Project managers who are knowledgeable in the subject area. The research instrument consists of two sections which addresses the background of respondents and the aim of the research respectively. The respondents were asked to respond to each question based on five-point Likert scale where 1 = strongly disagree/ not at all and 5 = strongly agree/critical. A total of 150 questionnaires were administered using a stratified random sampling while 125 were retrieved and considered fit for analysis after being checked for correctness. This shows 83.33% response rate and considered viable. The data were further analyzed using mean score and percentile and the result were presented.

No of Questionnaires administered	No of Questionnaires received	Percentage response rate
150	125	83.33%

Discussion and result analysis

Background of Respondent

A summary of the demographic information obtained from the survey respondents is showed that 25 % of the respondents are Quantity Surveyors, 15% Architects, 34 % Engineers, 16 % Builders and 10% Project managers. 35 % of respondents work in construction firm, 25 % consultancy firm and 40 % works in government establishment. Larger percentage of the respondents have at least 10 years' experience. On professional qualification of respondents, 71.43% of the respondents are corporate member of their respective profession while 28.57% of the respondents are probationer member. On years of post-professional qualification, (1 to 5 years, 50.48%; 6 to 10 years, 25.71% and 11 to 15years, 23.81%) while in summary the respondents had 6.67 years in average. Larger numbers of respondents have more years of experience making the information from them viable for the research.

Barriers to Digitalization of Construction Industry

Table 1: Barriers to Digitalization of the construction industry

Identified barriers	Mean Score	Rank
Resistance to technology by stakeholders	4.32	1
High cost of digital technology	4.28	2
Inadequate power supply	4.21	3
Difficulties in adapting to change	4.12	4
Inadequate digital facilities	4.08	5
Fear of employees losing job	4.06	6
Culture/structure of the organisation	4.02	7
Data insecurity	3.98	8
Limited availability of the right digital skills and capabilities	3.86	9
Complexity of the construction industry	3.82	10
Lack of awareness on digitalization	3.56	11
Shortage of trained personnel	3.56	12
Lack of collaboration	3.52	13
Lack of support from government	3.46	14
Technology challenges	3.44	15
Lack of strategy and competing priorities	3.42	16

Table 1 showed the identified barriers to digitalization in the Nigerian construction industry. It was observed from the analysis that resistance to technology by stakeholders ranked 1st with a mean score of 4.32, followed by high cost of digital technology with a mean score of 4.28, inadequate power supply with a mean score of 4.21 and difficulties in adapting to change with mean score of 4.12 ranking 2nd, 3rd and 4th respectively. Inadequate digital facilities is ranking 5th with a mean score of 4.08, fear of employees losing job ranking 6th with a mean score of 4.06. Ranking least on barriers is lack of strategy and competing priorities with a mean score of 3.42 followed by technology challenges with a mean score of 3.44 and lack of support from government with a mean score of 3.46.

Benefits of Digitalization

Table 2: Benefits of Digitalization

Identified benefits	Mean Score	Rank
Shorten completion time	4.44	1
Improves collaboration	4.32	2
Increases Productivity at low cost	4.28	3
Increases speed of work	4.22	4
Reduces burden of data storage	4.12	5
Improves budget management	4.08	6
Reduces construction error	4.02	7
Better workflow	3.92	8
Improves communication	3.82	9
Simpler working methods	3.65	10
Increases document quality	3.58	11
Speed of response time	3.56	12
Better safety	3.52	13

Table 2 showed the benefits of digitalization of the construction industry. As shown in the table, shorten completion time ranked first with a mean score of 4.44, followed by improves collaboration with mean score of 4.32, increases productivity at low cost with score of 4.28 and increases speed of work with mean score of 4.22. Ranking least is better safety, speed of response time and increases document quality with mean score of 3.52, 3.56 and 3.58 respectively.

Discussion

The study revealed that the adaptation of the Nigerian construction to digitalization is still very low as there are more of paper documentation. Barriers to digitalization were identified as resistance to technology by stakeholders, high cost of digital technology, inadequate power supply, difficulties in adapting to change, inadequate digital facilities, fear of employees losing job

Culture/structure of the organization, data insecurity, limited availability of the right digital skills and capabilities, complexity of the construction industry, lack of awareness on digitalization, shortage of trained personnel, lack of collaboration, lack of support from government, technology challenges and lack of strategy and competing priorities. This is also in agreement with research conducted by (Ikuabe et al., 2020) which also identified increased complexity of data, fear of digital technologies, high cost of digital technology and

resistance to new technology, power supply shortage among others. Also, it aligns with research conducted by (Ezeokoli et al., 2016) on digital transformation un the Nigerian construction industry where it identified lack of awareness, limited availability of digital skills and shortage of trained personnel.

The benefits of digitalization were identified as shorten completion time, improves collaboration, increases productivity at low cost, increases speed of work, reduces burden of data storage, improves budget management, reduces construction error, better workflow, improves communication, simpler working methods, increases document quality, speed of response time and better safety. This is also also corroborated by the research conducted by (Aghimien et al., 2018) where saving time, increasing productivity and increasing speed of work were major benefits of digitalization. There is need to improve the awareness of professionals on digitalization so as harness the benefits of digitalization.

Conclusions

This paper identified the barriers of digitalization in Nigerian construction industry and assessed the benefits of adapting digital technology in the construction industry. Digitalization has become an indispensable part of modern life, bringing numerous advantages such as increased efficiency, accessibility, and connectivity. Various barriers were identified ranging from lack of awareness, high cost of digitalization to inadequate power supply which is major challenge to all sectors in Nigeria. Due to the nature of Nigerian construction industry, there is need to adapt the various digital technology in order to improve efficiency and reduce time. There is need for government and private sector collaboration in the Nigerian construction industry as this will help reduce the high cost associated with digitalization. To create a more inclusive, equitable, and secure digital future, all stakeholders, including policymakers, the private sector, civil society, and individuals must work together to overcome these barriers. By overcoming these obstacles, we can fully realize the potential of digitalization in the Nigerian construction industry to drive long-term economic growth and development. Also, the government should help improve on the issue of power supply as it is very crucial to digitalization adoption.

Acknowledgments

We appreciate the contributions of all authors to this research work and University of Johannesburg for providing financial support for this research.

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