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INFRASTRUCTURE DEVELOPMENT AND ABANDONMENT

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The Nigerian Government is developing infrastructure guided by the United Nations (UN) call for sustainable development. However, uncompleted government infrastructure (roads, bridges, buildings, dams and others) projects litter the entire landscape of the country. This research investigates the causes of infrastructure abandonment in Nigeria through literature review and distribution of questionnaire. It also posits possible solutions to the menace of abandoned infrastructure. Findings from the literature review revealed inefficient procurement processes, defective design, cost overrun, and changes in government (election). From 129 questionnaire distributed to Architects, Engineers, Project Managers, Surveyors, Builders and Construction Procurement Personnel in the built environment both in the public and private sectors in Nigeria, 80 responses were received and analysed with SPSS Pearson Correlation Analysis. The findings from the survey showed that inadequate planning, change in government, faulty procurement, corruption and politics are some of the causes of abandonment. "Changing procurement method" ranked highest in the recommendation for addressing the abandoned infrastructure projects followed by designing with deconstructability in mind. Amongst other recommendations are using innovative management tools and refurbishment of abandoned projects. This research is imperative for the revitalisation of abandoned infrastructure environmentally, economically, and socially and the integration of innovative management tools for the future sustainable procurement of infrastructure.

Keywords: Procurement, Sustainability, Projects, Abandoned, Building, Construction, Refurbishment.

1 INTRODUCTION

The Federal Government of Nigeria is propelling infrastructure as the focal point of their "administration and policy enactment" for social and economic stability (Ogunnusi 2015). The Nigerian landscape is cluttered with abandoned rail roads, buildings, roads, ports and other infrastructural projects initiated by the government at Federal, state and local government levels (Olalusi and Otunola 2012). Project abandonment creates social problems such as health threats, marring the environmental aesthetics, social menace in form of armed robberies, accidents and hideout for miscreants (Amade *et al.* 2015, Ezenekwe and Uzonwanne 2017).

In the opening statement of the President of the Federal Republic of Nigeria on the implementation of the Sustainable Development Goals (SDG): A National voluntary Review (report), the Federal government recognised the importance of the 17 sustainable development goals to their progress as at 2017 (Federal Republic of Nigeria 2017). Meanwhile with critical reflection on SDG goals 9 (Industry Innovation and Infrastructure) and 11 (Sustainable Cities and Communities), abandonment of infrastructure projects continues to be recorded:

- Okereke (2017) – a failed renewable energy project;
- Odutola and Adeniran (2017); Abdul *et al.* (2018) - road and bridge constructions
- Nwannekanma and Gbonegun (2019) - National Art Theatre.

It is one thing to "accelerate investments in infrastructure" as included in the Federal Government statement, while it is another thing to ensure the sustainability of the infrastructure to evade abandonment (Federal Republic of Nigeria, 2017). While there is no country without some examples of abandoned infrastructures - United States, Saudi Arabia, Spain, Russia and Malaysia have their stories to tell (Hoe 2013) -, Nigeria's situation requires further attention. Based on the findings of Ayodele and Alabi (2011), Amade *et al.* (2015) and Okafor *et al.* (2018), a total of 4000 uncompleted, deserted public projects with a total value around N300 billion (about £6.3 Million) are identifiable throughout Nigeria. Despite attempts to curb the occurrences of abandoned and incomplete infrastructure projects, the problem persists (Philip *et al.* 2012, Hoe 2013).

In a bid to make Nigeria on par with the global community in seeking to meet its infrastructure deficit, this research evaluates the causes of abandonment of infrastructure in Nigeria from the perspective of an aim of exploring the role infrastructure procurement plays, if any, in the mitigating future project abandonment.

2 LITERATURE REVIEW

A tenet of economic development is generally accepted as being the position that a country cannot be affluent in the absence of state-of-the-art infrastructure. Most Nigerian infrastructure, even that which is not currently abandoned, is in a parlous state, to which the deserted and incomplete structures strewing Nigeria add by not only contradicting the claim of "sustainable development" but also by raising questions regarding the methods of procurement deployed in delivering such projects (Oyewobi *et al.* 2017).

Table 1 reveals factors considered to be the causes of abandoned infrastructure projects as captured by some authors.

Table 1. Causes of project abandonment deduced from literatures.

Authors	Factors
(Ubani and Ononuju 2013)	Misappropriation of projects finances, means of financings completed projects, recurrent changes in government
(Olalusi and Otunola 2012)	Inefficient payment plan, Corruption and Politics, Method of procurement, Prequalification processes
(Ayodele and Alabi 2011)	Ineffective planning, Project scope variation and defective design
(Amade *et al.* 2015)	Political risk, inefficient information and communication management, Inefficient procurement process
(Oyewobi *et al.* 2017)	Procurement systems
(Adetola *et al.* 2011)	Traditional forms of projects procurement,
(Ezenekwe and Uzonwanne 2017)	Uncertainty of meeting projects deadlines, Cost overruns and low quality
(Dim and Ezeabasili 2015)	Ignorance to adopting and implementing modern procurement strategy

Table 1 listed design issues, government politics and policies, monitoring, communication and information management, insufficient funding, and procurement (appearing five times) as factors considered to be the causes of abandoned infrastructure in Nigeria. A possible strategy of addressing abandonment is the BIM-based Deconstructability Assessment Score (BIM-DAS) platform. This is an innovative way to enable 'building-in' of deconstructability during the design stage (Akinade *et al.* 2015), although, the underlying factors are the usage of demountable

connections and prefabricated assemblies (Pantini and Rigamonti 2020). Araszkiewicz (2016) on the other hands addresses the refurbishment of an abandoned cotton mill in Puuvilla into a shopping and services center through the use of Green BIM with the aid of Laser Scanning. However, the comprehensive details of how Green BIM as a tool was effective in the refurbishment of abandoned infrastructure was not expressed, and Green BIM may need to evolve a capability to address the abandonment/non-completion problem. This returns the focus to the research question of in what ways do current infrastructure procurement practices in Nigeria contribute to/result in project abandonment.

3 METHODOLOGY

Having reviewed literature on the related subjects, with reference to the aims and objectives of this research, a quantitative method was adopted to ascertain the views of relevant professionals in the industry regarding abandoned infrastructure and how this can be addressed. To obtain information to aid the research analysis, a multiple choice, open and close ended question option questionnaire (distributed through a survey method) was collected from professionals in the built environment, with their demographic information indicated in Table 2:

Table 2. Demographic information of industry professionals.

	Description	Number	Percentage
Profession	Architect	33	41.25
	Project Manager	18	22.50
	Engineer	11	13.75
	Others	9	11.25
	Surveyor	4	5.00
	Builder	4	5.00
	Construction Procurement Personnel	1	1.25
	Others	9	11.25
Years of experience	Very Experienced (More than 15years)	49	61.25
	Experienced (5-10years)	21	26.25
	Somewhat Experienced (1-5years)	9	11.25
	Not Experienced(>1year)	1	1.25
Which part of Nigeria are you located (Sub - geographical zone)	South – West	60	75.00
	South – South	9	11.25
	North – Central	4	5.00
	South – East	3	3.75
	North – East	3	3.75
	North - West	1	1.25

To overcome sampling problem in research, Dawson (2011) stated that selecting a small manageable number is better option. In this case, the research area was related to built environment and random sampling was adopted to enable targeting of professionals familiar with the area, to provide adequate information for efficient analysis and findings. The questionnaire was administered to 129 professionals of which 80 (62%) responded. Although there was homogeneity in the sampling, a larger percentage of participants were from the South West region of Nigeria. This could result from the prominence of the level of education, knowledge and the extent of development activities in that region.

4 PRELIMINARY FINDINGS

A suitable qualitative approach must entail a collection of a range of perspectives about the research topic while data analysis in the quantitative research are expected to be adequately reported (Creswell and Creswell 2018). Change in government, poor funding, political influence, corruption and faulty procurement process was commonly given as reason for abandonment. The response on impact of abandoned infrastructure in Nigeria (Table 3) are non-eco-friendly (NE), uneconomical (UE), constitutes social menace (CSM), waste of useful resources (WUR) and All of the above (ATA). From Table 3, ATA ranked highest which signifies that approx. 88% respondents agreed that abandonment in Nigeria is NE, UE, CSM and WUR and significant as mentioned by Amade *et al.* (2015).

Table 3. Impact of abandoned building and possible solutions.

	Description	Number	Percentage
In your opinion, what do you think is the impact of abandoned Infrastructure in Nigeria? (tick as many)	Non eco-friendly (NE)	1	1.25
	Uneconomical (UE)	4	5.00
	Constitute Social Menace (CSM)	6	7.50
	Waste of useful resources (WUR)	16	20.00
	All of the above (ATA)	70	87.50
As a professional, what do you think is the remedy for abandoned projects in Nigeria (tick as many)	Designing with deconstructability in mind (DDM)	30	37.50
	Refurbishment of abandoned projects (RAP)	44	55.00
	Using an innovative management tool (UIMT)	51	63.75
	Changing procurement methods (CPM)	53	66.25

From the SPSS Pearson multivariate correlation Two- tailed significance among the four variables DDM, UIMT, RAP and CPM with repeated correlation for each pair in Table 4, there was correlation between RAP and DDM with statistical significance of 0.027 which is less than the asymptotic significance benchmark of 0.05. Although weak pearson correlation of 0.247 also indicates a weak relationship between the variables, the significance of the relationship is vital. With the level of significance of RAP and DDM, it can be deduced that the Nigerian government should consider refurbishing abandoned infrastructure and also integrate deconstructability in the design concept relaying to Akinade *et al.* (2015).

Table 4. SPSS Correlation for statistical significance among variable factors.

		DDM	UIMT	RAP	CPM
DDM	Pearson Correlation	1	0.202	0.247*	0.022
	Sig. (2-tailed)		0.072	0.027	0.847
	N	80	80	80	80
UIMT	Pearson Correlation	0.202	1	0.104	0-.026
	Sig. (2-tailed)	0.072		0.359	0.817
	N	80	80	80	80
RAP	Pearson Correlation	0.247*	0.104	1	-0.170
	Sig. (2-tailed)	0.027	0.359		0.131
	N	80	80	80	80
CPM	Pearson Correlation	0.022	-0.026	-0.170	1
	Sig. (2-tailed)	.0847	0.817	.0131	
	N	80	80	80	80

*. Correlation is significant at the 0.05 level (2-tailed).

One of the causes of abandoned infrastructure from one of the participants in the open ended question was the non-adherence to traditional/cultural norms and values of a particular community where the infrastructure is situated. Hence, community engagement is crucial in infrastructure delivery, as supported by Hanachor (2012).

5 CONCLUSION

This research, through a literature review, identified the possible causes of abandoned infrastructure projects in Nigeria as political factors, and defective designs and procurement process. A survey distributed among construction professionals across the country also revealed the causes of abandoned infrastructure as poor funding, change in government, political influence and inefficient procurement process. "Changing Procurement Method" ranked highest in the recommendations for addressing the abandoned infrastructure projects, followed by "Using an Innovative Management Tool". However, the significant relationship between the variable factors of "Refurbishment of Abandoned Projects" and "Designing with Deconstructability in Mind" indicates a green light for government to consider the environmental, social and economic impact of revitalizing abandoned infrastructure in the country. Coupled with this is the need for the integration of Innovative Management tools to enhance sustainability in the procurement procedures in Nigeria.

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