1 INTRODUCTION

The construction industry is dynamic in nature due to unforeseen activities arisen during construction project [1]. It is also been described as complex, highly fragmented with adversarial business environment [2]. [3] Asserted that, any organizations failing to adapt and respond to the complexity of the new environment tend to experience survival problems. The construction sector faced so many criticisms across the globe for its inefficiency and lack of productivity [4]. According to [5] the success of the industry depends on a number of factors, such as project complexity, contractual arrangements, relationships between project participants, and the competency of project managers.

[6] Affirm that, organized building practice in Nigeria which began in the 1930s is still saddled with a lot of inherent challenges. [7] Further clarifies that Nigerian building project is still grappling with a deep-rooted challenges, ranging from inadequate technical and managerial know-how to insufficient financial, material, modern tools and equipments. [8) Describe that the Nigerian construction sector as "hesitant" to IT adoption. Although, present-day literatures showed that the IT adoptions are significantly improving at construction consultancy firms in Nigeria.

It is very vital to understand construction consultant's services, during construction project, the owner usually employs consultants' services and engaged them to oversee and control the construction process from inception to completion [9] in the same vein [10] emphasizes that, the construction consultants have a wider variety of roles to play during the construction process. Construction consultants are specialist, skilled and expertise with various roles and categorizations of responsibilities to handle and satisfy the construction processes performance and quality to attain construction project goal. It is also part of their role to ensure that they administered the contract as described in the contract document. [11] Outlined the roles necessary for consultant to be involve-in during construction project such as the standard form consultant contracts, the role of the consultant during the design stage, the role of the consultant during bidding & negotiations, Construction contract administration and Post-completion inspection.

With the advent of the current global construction technology, [10] reported that, Nigerian construction consultants are utilizing BIM packages in their in-house at individual level without collaborations with other disciplines in the production process. The global construction revolution have set new challenges for the collaborative activity of different parties in construction projects and enhances the construction process, to obtain buildings of better quality, minimize project cost and time and improve productivity.

With the growth of information technologies in the construction sector over the years, numerical building information modeling and process simulation has been accepted and widely used tool for project [2]. Building Information Modelling (BIM) is a collaborative way of working, underpinned by the digital technologies which unlock more efficient methods of the construction processes [13]. Building Information Modeling (BIM) is a combination of different technologies and ways to organise construction projects to develop and increase the work capacity amongst different actors in a construction project [14].

BIM is a digital construction technology but its adoption is much slower than anticipated in Nigerian construction sector. Several research works have been executed by the construction practitioners on BIM uptake in Nigeria but the adoption and implementation were very insignificant compare to current global challenges. Construction consultants are the early adopters of BIM in Nigerian construction sector and their adoption level mostly managed three dimensional (3D), times scheduling (4D), and project cost (5D) but does not support collaboration. For a successful adoption of BIM, an organization needs to be multidisciplinary model-based collaborative project [4]. [15] Concluded that the adoption of BIM in Nigeria is not rapid as expected compare to advanced economic countries where the strength of adoption is high. [16] Claimed that, BIM has been renowned as construction industry transformer many construction firms are still cautious about adoption but substantiated the fewer adopters in Nigeria to be consultant Architects, Engineers and project managers. Therefore, this study aimed at assessing the drivers affecting the adoption of Building Information Modelling (BIM) by construction consultants with a view to sensitizing the consultants in Abuja, Nigeria. [17] found out that BIM adoption rates have increased in the last decade, between 2007 and 2012 the adoption has gone from 28% in 2007 to 71% in 2012. It was also found that in 2009; only 27% of those who adopted BIM were heavy users, however, the number of heavy users is forecasted to approach 60% of users by 2014.

[18] gave the preferential order of whom of the construction actor to drive the adoption of BIM after the researched ways are developed. The benefits with BIM are ultimately most benefitted by the owner of the project while the consultants and contractors benefits from more efficient information sharing, their improvements in efficiency is ultimately benefitted. [19], identified the following factors as the drivers that could increase the pace of BIM adoption in Malaysian construction industry: establishment of national BIM roadmap, standard and common practice, awareness, training and education, product information & BIM libraries, BIM guidelines, information exchange, changing procurements process, special interest groups, research & development, forming BIM committee, registration with international bodies, mandate BIM for public sector, collaboration of BIM activities among government

agencies & professional bodies, use government procurements to drive the adoption and BIM reference center. Similarly [20] identified government support through legislation, clients' interest, software availability, cooperation and commitment of professional bodies, and collaborative procurement methods as the drivers to BIM adoption. He further clarifies that, all these have to be in place to enable successful transition of the industry to BIM adoption. [21] Identified drivers for BIM adoption and ranked them in order of importance. The paper highlights the importance of the UK Governments BIM adoption Strategy It also suggests that other Governments, nationally and internationally would benefit from adopting this strategy. However, once BIM is implemented the importance of operational drivers becomes evident. government pressure, client/competitive pressure, desire for innovation to remain competitive, improving the capacity to provide whole life value to client, streamlining design activities and improving design quality, designing health and safety into the construction process, improving communication to operatives, cost savings and monitoring, time savings, accurate construction sequencing and clash detection, automation of schedule/register generation, facilitating increased prefabrication, facilitating facilities management activities. [1] Rated the following as the driving forces to accelerate technological (BIM) adoption. Innovation cash for knowledge, long term cost benefit, competitive advantage, time savings, quality improvement and education. This result clearly reflects competitive nature of the industry and saying that "time is money". Less important drivers comprise cash for knowledge, education and the sake of innovation itself.

[22] Identified factors for successful BIM adoption across disciplines, such as data management and information exchange, including standards, security, and responsibility issues. [23] asserted that, factors that have top management priority for successful accomplishment of a task are termed positive factors. [24] stated that, Some of the driving factors of BIM adoption in Architectural, Engineering, and Construction industry (AEC) are collaboration, communication, and analysis instead of drafting, best practices setup, training of staff, raising the understanding of BIM, and resolving how to operate in this global change. [3] showed that nontechnical issues, including inter organizational issues such as willingness to share information, master BIM model team/ managers, effective collaboration between project participants, and organizational structure to support BIM, were regarded as positive drivers to BIM adoption, although several technical factors, such as abundant BIM libraries, and collaboration management tools were also considered important but relatively lower in priority

2 METHOD

The overall strategy used to answer the research problems in this study was quantitative method approach through field survey; structured questionnaires were used in collecting descriptive information in the construction consultancy firms in Abuja. The study adopted the five point Likert scale rating comprising a range of one (1) = strongly disagree to five (5) = strongly agree with a neutral phrase in the middle.

The target populations of this study were construction consultants offering design and construction services. Sixty six (66) structured questionnaires were administered through purposive non-probabilistic sampling techniques. Fifty four out of sixty six questionnaires were retrieved and represent 81.8%, with 4 questionnaires being rejected due to incomplete filling out and it represents 6%. Therefore a total of 50 properly filled questionnaires were used for analysis which represents 75.8% response rate. The questions asked for this study were relevant and straight forward and the alpha test was run to determine the reliability of the scales and the value obtained was > 0.7. Therefore, comparing this result (> 0.7) with the work of [24] (2011) indicates acceptable and reliable testing instrument.

The data generated for this study were subjected to analyses using mean score and standard deviation, SPSS version 21 was used as tool for the analysis. The data were further subjected to ranking analysis to determine the firm's perception of the significant drivers affecting the adoption of BIM in the construction consultancy firms. Relative Importance Index Method (RII) was used in this research and the formula was computed as

Relative importance index (RII) = Σ w / (A x N) - - - , (0 ≤ index ≤ 1)

Where: *w = weighting given to each factor by the respondents,*

A = highest weight (i.e. 5 in this case), and

N = total number of respondents (i.e. in this case 50).

The rating of all the factors for degree of significance will be based on the value of their respective relative importance index (RII). The item with the highest RII is ranked first followed by the next and so on. Therefore, this research adopted the method of RII ranking used by [10] where he rank RII above 0.85 to be very significant and RII of 0.54 to be not significant at all

3 RESULT

Table 1 shows responses of respondents on strategies capable of driving BIM adoption. From the table, it can be seen that the most significant initiatives capable of driving BIM adoption by consultants are introducing BIM in tertiary (RII =0.900), increase awareness of the benefit of using BIM (RII=0.892),establishment of national BIM road map (RII=0.872), establishment of BIM promotion agency and forming special interest group both with RII of 0.830 were considered the most significant drivers, while research and development fund (RII=0.822), establishment of BIM reference center (RII=0.782), forming BIM committee (0.772), mandate BIM for public sector (RII = 0.764) were considered to be fairly significant factors. Also, registration with international bodies (RII = 0.748) was considered not significant initiatives capable of driving BIM adoption.

The findings suggest that government has a pivotal role to play in BIM adoption in the construction sector by implementing

BIM in the tertiary curriculum. Increase awareness of the benefit of using BIM to all construction practitioners and establishment of national BIM road map were considered most acceptable strategy to promote BIM adoption by consultants. This is also obtainable in countries such as Malaysia and Singapore where a timeline has been set to establish BIM road map.

Table 1: Perception of Consultants on Strategies Capable of driving BIM Adoption

S/n	Factors	Mean	RII	Rank
1.	Introducing BIM in tertiary edu. Curriculum	4.50	0.90	1st
2.	Increase awareness of BIM benefit	4.46	0.89	2nd
3.	Establishment of National Road Map	4.36	0.87	3rd
4.	Establishment of BIM Promotion Agency	4.16	0.83	4th
5.	Forming Special Interest Group	4.16	0.83	5th
6.	Research and Dev. Found	4.10	0.82	6th
7.	Establishment of BIM reference centre	3.92	0.78	7th
8.	Forming BIM Committee	3.86	0.77	8th
9.	Mandate BIM for Public Sector	3.17	0.54	9th
10.	Registration with Intr. Bodies	3.11	0.51	10th

4 CONCLUSION

The study aimed at assessing factors affecting the adoption of BIM by construction consultants in Abuja, Nigeria. The study information was collected from both the primary and secondary sources. The BIM drivers affecting BIM adoption were tested using mean score, standard deviation (SD) and the relative importance index (RII).The study found out that, introducing BIM in tertiary education curriculum, increased awareness of the benefits of using BIM and establishment of national BIM road map are the most significant factors capable of driving BIM adoption by the consultants. This is in accordance with the conclusion reached by Haron (2013) in studying barriers to BIM adoption and the work of [25] in studying status advantages, barriers and strategies to enhance BIM implementation in Malaysian construction industry and [26] in studying business drivers For BIM, in Australia. All of them identified incorporating BIM in tertiary institutions as the major driver to accelerate BIM adoption. It also contradicted the work of [27] who identified the research and development Found as the greatest drivers to promote BIM adoption. The findings suggest that government has a pivotal role to play in BIM adoption by mandating BIM in some tertiary institutions who offered construction related programs and this was considered the most acceptable strategy to promote BIM adoption. [15] in his study on barriers to BIM adoption in Nigeria highlighted the role of government as the major catalyst in promoting BIM adoption in the construction industry.

The research revealed that incorporating BIM in tertiary education Curriculum, increased awareness of the benefit of using BIM and establishment of national BIM road map are the most significant drivers required to accelerate the BIM adoption, as such government has a crucial role to play in promoting BIM adoption in the construction sector in general by implementing BIM as a course of its self in the tertiary institutions across the country. There by, establishing a clear standards and guide on the use of BIM and to provide more tailored training to future students and practitioners

REFERENCES

[1] Khalfan, M. A. and Anumba, C. J. (2000). Development of a Readiness Assessment Model for Concurrent Engineering in Construction, Benchmarking: An International Journal 8(3), 223 - 239.

[2] Pales, E. (2013). An Analysis of BIM Adoption Holdback Assuming a Sharp Change in Process and Culture. Unpublished Master" s Thesis in Architectural Technology and Construction Management University College, Horsens, Denmark

[3] Lee, G., Sacks, R., and Eastman, C. M. (2006). Specifying parametric building object behavior (BOB) for a building information modeling system. *Automation in Construction, 15,* 758- 776

[4] Nuruddeen, U. and Usman, S. A. (2018). Barriers Affecting the Adoption of Building Information Modelling in Construction Consultancy Firms in Abuja, Nigeria: *International Journal of Innovative Research and Advanced Studies (IJIRAS) Volume (5) 13-17*

[5] B.N. Baker, D.C. Murphy, D. Fisher,(1983). Factors affecting project success, Project Management Handbook, Van Nostrand Reinhold, New York

[6] Mbamali, I. Okotie, A.J. (2012) An Assessment of the Threats and Opportunities of lobalization on Building Practice in Nigeria *American International Journal of Contemporary Research (2) 4*

[7] Oluwakiyesi, T. (2011). Construction Industry Report: A Haven of Opportunities *Vitiva Research* [online]. Avalable from t.oluwakiyesi@vetiva.com [Accessed 3rd January, 2012].

[8] Umar, A. (2015). *an assessment of critical success factors for building information modelling adoption by clients in the construction industry.* Unpublished Master's Thesis, Ahmadu Bello University, Zaria

[9] Muhammad A. (2015). Factors affecting the adoption of information and communication technology in Nigerian construction firms in abuja, nigeria. Unpublished Master" s Thesis, Abubakar Tafawa University, Bauchi

[10] Usman, S. A. (2017). *Factors affecting the adoption of Building Information Technology in construction consultancy firms in Abuja*. Master's Thesis, Abubakar Tafawa University, Bauchi

[11] Wilson, C. *The role of the consultant in construction.* Retrieve from BC's Law Firm for Business website, http://cwilson.com

[12] Ford, S., Aouad, G., Brandon, P., Brown, F., Child,T., Cooper, G., Kirkham, J., Oxman, R., Young, B. (1994) The object oriented modelling of building design concepts, Building and Environment, 29(4), 411-419

[13] Stanley, R and Thurnell, D (2014) 'The benefits of, and barriers to, implementation of 5D BIM for quantity surveying in New Zealand', *Australasian Journal of Construction Economics and Building,* **14** (1) 105-117

[14] Birging E. and Lindfors, N. (2014). *Integration of BIM in the construction phase* Unpublished Master's thesis, Chalmers University of Technology Göteborg, Sweden

[15] Abubakar, M., Ibrahim, Y., Kado, D., & Bala, K. (2014). Contractors' Perception of the Factors Affecting Building Information Modelling Adoption in the Nigerian Construction Industry: *Paper presented at the Computing in Civil and Building Engineering (2014),* Orlando, Florida, United States

[16] Shuaibu, I. and Malumfashi, B. I. (2012), Review of Using Building Information Modeling in Nigerian Construction Industry. *Journal of Environmental Sciences and Policy Evaluation 2*(2)

[17] Lewis, A. M. (2014). *The perceived value of using bim for energy simulation* Unpublished master's thesis Colorado state university

[18] Lindblad, (2013) *Study of the implementation process of BIM in construction projects.* Unpublished Master's thesis

[19] Harris, M., Che Ani, A. I., Haron, A. T., Preece, C. & Husain, A. H. (2014).Engaging the challenges, enhancing the relevance: *Prioritizing building information modeling initiatives for malaysia construction industry.* Congress conducted at Kuala Lumpur Malaysia

[20] Pales, E. (2013). *An Analysis of BIM Adoption Holdback Assuming a Sharp Change in Process and Culture.* Unpublished Master's Thesis in Architectural Technology and Construction Management University College, Horsens, Denmark

[21] Gu, N., & London, K. 2010. Understanding and facilitating BIM adoption in the AEC industry. *Automation in Construction, 19*(8), 988-999

[22] Jonsung, W., Ghang, L. Carrie, D. & John, M. (2013), Where to Focus for Successful Adoption of BIM Within Organisation. *Journal of construction engineering and management 5*(7), 223-239

[23] Nevena, Z. (2009). *Building Information Modeling Uses for Design in the Architecture, Engineering, and Construction (AEC) Industry.* Unpublished Master's Thesis, Graduate School, Pennsylvania State

[24] Tavakol M. & Dennick R. (2011) Making Sense of Cronbach's Alpha. International Journal of Medical Education (2)1

[25] Haron, A. T. (2013). Organisational Readiness to Implement Building Information Modelling: A Framework for Design Consultants in Malaysia. (Doctoral Dissertation, University of Salford Manchester, Salford)

[26] Aftab, H. M., Isma'il, A. Irfana, M. & Nur Iffah, A. A. (2014). BIM in Malaysian Construction Industry: Status, Advantages, Barriers and Strategies to Enhance the Implementation, *Research Journal of Applied Sciences, Engineering and Technology, 8*(5), 606-61

[27] Saqib, M. (2008). Assessment of Critical Success Factors for Construction Projects in Pakistan: Advancing and Integrating Construction Education, Research & Practice. First *International Conference on Construction in Developing Countries held on 4-5 August* at Karachi, Pakistan