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UTILISATION OF BUILDING INFORMATION MODELLING CAPABILITIES IN SMALL BUILDING PROJECTS

ISHAQ Ziyadul Hassan[1], LAWAL Yarima Sallau[1], CHARLES Sunday Edidiong[1], ISAH Ibrahim[1], ABDULRAZAQ Abdullahi Taiwo[2]

[1] Department of Building, Ahmadu Bello University Zaria, Nigeria.
[2] Building Department, Ladoke Akintola University of Technology, Ogbomosho, Nigeria.

Correspondence: ziyadishaq2@gmail.com

ABSTRACT

Building Information Modelling (BIM) has emerged as a transformative force in the construction industry, promising improved project efficiency, cost savings, and enhanced collaboration. However, empirical studies to assess the utilisation of BIM capabilities are still lacking. This study assesses utilisation of BIM capabilities in small building projects. Quantitative research method comprising questionnaire survey was used for this study. Data was obtained using close ended structured questionnaires distributed to 53 professionals in built environment. Descriptive statistic (frequency, mean and standard deviations) and Inferential statistics (Kruskal-Wallis test) were used to analyse the data. Findings revealed a high level of awareness of construction professionals regarding the benefits of BIM, with 'accurate visualisation of design' (MS=4.68), 'project quality enhancement' (4.54) and 'faster project delivery' (4.52) being the most recognised benefits. the findings of the study further revealed that, the utilisation of BIM capabilities in small projects varies, with capabilities like 'design visualisation' (3.68), finding widespread use, while others, such as 'achieving energy efficiency and sustainability' (1.76), lags behind. Moreover, the findings also revealed that lack of government support or incentives (4.80), high cost of BIM implementation (4.76), and limited digital education and training (4.50) to be the significant barriers to utilisation of BIM capabilities. The study concludes that there is a moderate utilisation of BIM capabilities in small building projects. The study recommends that public and private organisations in the construction sector should provide support to train and upskill construction professionals on BIM tools to drive its successful utilisation in construction projects.

KEYWORDS: *Barriers, BIM capabilities, Building Information Modelling (BIM), Small building projects, Utilisation,*

INTRODUCTION

In the rapidly evolving construction industry, the adoption of Building Information Modelling (BIM) has emerged as a transformative approach to project management and collaboration. BIM represents a digital representation of a building's physical and functional characteristics, integrating design, construction, and operation, offering stakeholders improved project efficiency and reduced errors (Eastman, 2011). BIM is also seen as a means to consolidate building information into a single, collaborative platform, addressing the limitations of previous CAD technologies. The adoption of BIM has been recognised as a key factor in managing project information, complexity, and risk within supply chains, improving decision-making, and facilitating effective information sharing among project partners (Vidalakis *et al.*, 2020). This approach provides a single repository for multidisciplinary construction and design documents, streamlining data administration throughout the entire project lifecycle.

The adoption rate and utilisation of BIM is not rapid, and so many countries and firms are still struggling with its adoption and utilisation in construction projects. The adoption rate of developed countries is faster than that of developing countries (Jung and Lee, 2015). In surveys by McGraw Hill (Construction, 2015), there has been an increase in BIM adoption in the United Kingdom, France and Germany, and North America. Similarly, the National BIM report (NBS, 2017) has advocated that the adoption and of BIM in the United Kingdom has increased from 13% in 2011 to 60% in 2017. BIM adoption in developed countries such as the United Kingdom, United States, Hong Kong, China, Australia, Norway, Finland, Denmark, and Malaysia enjoys strong government support (Wong *et al*. 2011); but this is not the case in developing countries such as Nigeria and Ghana where there is often a lack of government support and guidance for technologies such as BIM (Abubakar *et al*., 2014)

In Nigeria, Abubakar *et al*, (2013) investigated the readiness of Building Design firms and contracting organisations to adopt BIM and have reported them to be appreciably ready. Abubakar *et al*, (2014) also identified the barriers and drivers of BIM adoption in Nigerian construction industry. However, despite some readiness assessments, there's a lack of empirical study that explored the extent of utilisation of BIM capabilities in small building projects in Nigeria. Small building projects are projects generally characterised by a combination of factors related to having low budget, short duration, minimal complexity, small project team and repetitive or standardised tasks. The implementation of BIM starts from small projects, which if successful, then can be extended to large building projects. Therefore, exploring the utilisation of BIM capabilities in these small projects becomes crucial for successful BIM implementation in the Nigerian Construction Industry. Thus, the objectives of this study are therefore, to:

1. assess professionals' awareness of BIM capabilities and
2. assess the utilisation of BIM capabilities in small Building projects

RESEARCH METHODOLOGY

This study adopted a quantitative research approach. A closed ended structured questionnaire was used to collect data for the study. The questionnaire was designed in four sections. Section A solicited information regarding the demography of the respondents, Section B assessed the level of awareness of construction professionals on the benefits of BIM using a 5-point Likert scale where 1 represents very low level of awareness and 5 represents very high level of awareness. Section C determined the extent of utilisation of BIM capabilities in small building projects on a 5-point Likert scale where 1= to very low extent on one end and 5= to very high extent on the other end. Section D assessed the barriers to BIM utilisation in small building projects, also using a 5-point Likert scale where 1= strongly disagree on one end and 5= strongly agree on the other end.

The population of the study includes construction professionals that handled small building projects in FCT Abuja. The choice of professionals is for the fact that, they are directly involved in project implementation, from planning and design to execution and delivery. Furthermore, Abuja was selected as the study area because it is one of the fastest-growing cities in the country and has a very high concentration of construction professionals. This can be attributed to the large quantity of construction works in the area (Ameh & Odusami, 2010).

Due to unavailability of a single database to obtain a list of construction professionals that have handled small building projects in the study area from which accurate sample size could be drawn, the sample size for the research was then obtained using a sample size Table for non-finite population developed by Louangrath (2014) which says that the minimum sample size for an unknown population at 95% confidence interval with 5% error level is approximately 34 counts. However, 40% of the estimated sample size was added to account for non-responses. Therefore, a total of 53 questionnaires were administered to construction professionals (Architects, Builders, Quantity surveyors, Structural and Services Engineers) in Abuja, Nigeria. 50 properly filled and returned questionnaires (94.3%) were analysed.

Descriptive statistics (Frequency, Mean, standard deviations and percentages) and inferential statistics (Kruskal-Wallis H test) were used to analyse data. Section A of the questionnaire was analysed using frequency and percentages while section B, C and D were analysed using mean values and standard deviation. Furthermore, Kruskal-Wallis test was used to determine the significance of difference in ratings across the respondents' groups. Consequently, the following hypothesis were postulated in this study.

$H_0$1: There is no significant difference in the respondents' ratings of the awareness of benefits of BIM

H1: There is significant difference in the respondents' ratings of the awareness of benefits of BIM

$H_0$2: There is no significant difference in the respondents' ratings of the Utilisation of BIM capabilities in small building projects

H2: There is significant difference in the respondents' ratings of the Utilisation of BIM capabilities in small building projects

$H_0$3: There is no significant difference in the respondents' ratings of the barriers to Utilisation of BIM capabilities in small building projects

H3: There is significant difference in the respondents' ratings of the barriers to Utilisation of BIM capabilities in small building projects

The reliability of the questionnaire was also tested using internal consistency test (Cronbach's alpha Coefficient) as seen in Table 1.

Table 1: Internal consistency test (Cronbach Alpha Coefficient) for the measurement of items

Test	No. of variables	Cronbach Alpha Coefficient
Level of awareness of construction professional on benefits of BIM	15	0.935
Level of BIM utilization in small building projects	15	0.960

The result in Table 1 shows that all the Cronbach Alpha coefficients are above 0.70, which indicates that the instrument for data is reliable as suggested by Nunnally and Bernstein (1994).

RESULTS AND DISCUSSION

The introductory part of the questionnaire focused on acquiring information about the respondents' profile which include their profession, educational qualification, years of experience and sector of organization. The summarized profile of respondents is presented in Table 2.

Table 2: Demography of the respondents

Profession of the Respondents	Frequency	Percent
Architects	17	34.0
Structural Engineers	6	12.0
Quantity Surveyors	9	18.0
Builders	8	16.0
Services Engineer	10	20.0
Total	50	100.0
Highest Educational Qualification		
ND	6	12.0
HND/BSC	37	74.0
M.sc/PhD	7	14.0
Total	50	100.0
Years of Experience		
0-5 Years	2	4.0
5-10 Years	20	40.0
10-15 Years	19	38.0
15 Years and Above	7	14.0
Total	50	100.0
Sector of Organization		
Public	19	38.0
Private	31	62.0
Total	50	100.0

Results from Table 2 indicate that 34% of the respondents are architects, 12% are Structural Engineers, Quantity Surveyors represent 18%, Builders 8% and services engineers (20%). More so, on the highest educational qualifications of the respondents, 6% of the respondents hold National Diploma. 37 % have Higher National Diploma or first degree and 14% of the respondents hold either M.sc or

PhD. This demonstrates high level of education of the respondents. In addition, on the respondents' years of experience more than 50% of the respondents have more than 10 years of working experience in construction sector. Lastly, on the respondents' organisation, 38% of the respondents were drawn from public sector while 62% from private sector. This shows a coverage of respondents from both public and private sector organisations.

Awareness of benefits of BIM

Respondents were asked to rate their level of awareness of the benefits of Building Information Modelling (BIM) in construction. Results are presented in Table 3.

Table 3: Level of Awareness of construction professionals on BIM Benefits

S/N	Benefits of BIM	Mean	SD	Rank
1	Accurate visualisation of design	4.68	.551	1st
2	Better project quality & performance	4.54	.646	2nd
3	Faster project delivery	4.52	.580	3rd
4	Enhance design, planning and construction of projects	4.42	.731	4th
5	Reduce construction cost	4.34	.658	5th
6	Improve productivity (less rework, conflict & changes)	4.32	.819	6th
7	Discover errors and omission (clash detection)	4.32	.819	7th
8	Synchronization of design and construction planning	4.30	.580	8th
9	Project scheduling	4.26	.751	9th
10	Cost estimating	4.08	1.007	10th
11	Enhance project collaboration among stakeholders	3.98	.958	11th
12	Risk reduction	3.74	1.121	12th
13	Checking design intent	3.68	.913	13th
14	Reduce wastages	3.54	1.092	14th
15	Achieve Energy efficiency & sustainability	3.24	1.098	15th
	Average	**4.13**		

Table 3 shows the results for the level of awareness of construction professionals regarding the benefits of Building Information Modelling (BIM) in construction. The top five benefits, with the highest mean values, include accurate design visualization (4.68), better project quality and performance (4.54), faster project delivery (4.52), enhance design and planning (4.42) and reduce construction costs (4.34) Accurate visualization of design is a crucial benefit of Building Information Modelling (BIM) that plays a significant role in small construction projects (Hergunsel, 2011). BIM technology enhances the design and planning phase by providing professionals in the built environment, such as architects, builders, quantity surveyors, services and structural engineers, with a comprehensive and realistic representation of the project (Azhar *et al*., 2009). In traditional construction practices, visualising the final outcome of a project from 2D drawings can be challenging. However, with BIM, professionals can create 3D models that offer a lifelike portrayal of the building's components, spaces, and overall structure (Sharafutdinova, 2015). This three-dimensional visualization goes beyond flat drawing and allow stakeholders to understand the project's intricacies more effectively. One of the main advantages of accurate visualisation through BIM is the reduction of design errors and conflicts (Azhar, 2011). Being able to see the project in three dimensions aids in identifying potential clashes between different building elements, systems, and disciplines early in the design phase. This proactive approach minimizes costly changes and rework during construction, ultimately leading to time and cost savings. Accurate visualisation of design also aids in client engagement and satisfaction. Clients, who might not be well-versed in technical drawings, can better comprehend the project's design intent through interactive 3D models. This transparency improves client feedback and reduces the likelihood of miscommunication, ensuring that the final project aligns closely with their expectations.

Conversely, the bottom five benefits, with lower mean values, include enhanced collaboration (3.98), risk reduction (3.74), checking design intent (3.68), reduce wastages (3.54), and Achieving energy efficiency and sustainability (3.64). These BIM benefits, although having high mean values were ranked the least. The overall average mean scores for the level of awareness of BIM capabilities is 4.13 which implies high level of awareness of the professionals on the benefits of BIM.

Difference in respondents' ratings of awareness of BIM benefits

This section, demonstrates the outcomes of the Kruskal-Wallis test, utilised to assess the variation in level of awareness of BIM benefits among various professional groups in the construction sector. The purpose of the test is to determine the variation in respondents' ratings of their level of awareness of benefits of BIM. The results are detailed in Table 4

Table 4: Variation in ratings of awareness of BIM benefits amongst construction professionals

S/N	Benefits of BIM	Kruskal-Wallis H	Asymp.Sig.
1	Enhance design, planning and construction of projects	11.295	.023
2	Cost estimating	5.793	.215
3	Enhance project collaboration among stakeholders	5.061	.281
4	Improve productivity (less rework, conflicts and changes)	5.561	.243
5	Discovering design errors and omission (clash detection)	5.157	.272
6	Project scheduling	3.237	.519
7	Faster project delivery	4.175	.383
8	Better project quality and performance	3.663	.454
9	Risk reduction	6.330	.176
10	Reduce wastages	3.710	.447
11	Reduced construction cost	.909	.923
12	Accurate visualization of design	3.780	.437
13	Checking design intent	9.775	.044
14	Achieving Energy efficiency and sustainability	15.046	.005
15	Synchronization of design and construction planning	5.019	.285
	Average		**0.314**

Test Statistics [a,b]

a. Kruskal-Wallis Test

b. Grouping variable: Profession of Respondents

The Kruskal-Wallis test results indicate varying levels of significance in level of awareness of BIM benefits among different professional groups. Notably, professionals'/respondents' rating of benefits such as 'Achieving Energy efficiency and sustainability', 'Enhance design, planning and construction of projects' and 'Checking design intent' showed statistically significant differences (p values obtained ≤0.05), suggesting that the professionals perceive these benefits differently, likely due to their unique professionals' priorities and expertise. On the other hand, BIM benefits with p values > 0.05 demonstrated no statistically significant differences which implies similarity in awareness of the benefits across professionals' groups. These BIM benefits include 'Reduce construction cost', 'Project scheduling', 'Better project quality and performance', 'Enhance design, planning, and construction projects', 'Cost estimating', 'Enhanced project collaboration among stakeholders', 'Improved productivity (less rework, conflicts, and changes)', 'Discovering design errors and omissions (clash detection)', 'Faster project delivery', 'Risk reduction', Reduce wastages', 'Accurate visualization of design', and 'Synchronization of design and construction planning'. The overall average p values is recorded as 0.314 which is > 0.05. This implies that, the professionals have a similar level of awareness of the benefits. Overall, no significant difference is found regarding the professional responses on their level of awareness on the BIM benefits.

Utilisation of BIM capabilities in small building projects

Respondents were given the option to indicate the extent to which they utilise BIM capabilities in small building projects. Results are presented in Table 5

Table 5: Utilisation of BIM capabilities in small building projects

S/N	BIM Capabilities	Mean	SD	Rank
1	Visualise design	3.68	1.400	1st
2	Ensure project quality and performance	3.52	1.282	2nd
3	Discover errors and omission (clash detection)	3.44	1.327	3rd
4	Achieve faster project delivery	3.40	1.245	4th
5	Synchronize design and construction planning	3.34	1.319	5th
6	Improve productivity (less rework, conflicts and changes)	3.28	1.386	6th
7	Reduce construction cost	3.38	1.400	7th
8	Enhance design, planning and construction	3.10	1.298	8th
9	Schedule projects	3.08	1.322	9th
10	Estimate cost	2.70	1.313	10th
11	Check design intent	2.60	1.309	11th
12	Reduce risk	2.38	1.210	12th
13	Reduce waste	2.32	1.285	13th
14	Enhance project collaboration among stakeholders	2.22	1.148	14th
15	Achieve energy efficiency and sustainability	1.76	1.061	15th
	Average	**2.95**		

Table 5 present the utilisation of BIM capabilities in small building projects. Result indicates that, professionals mostly utilised BIM capabilities to visualize designs (3.68), ensure project quality and performance (3.52), discover errors and omission (clash detection) (3.44), Achieve faster project delivery (3.40) and to synchronize design and construction planning (3.34). BIM's Accurate Visualisation of design transcends traditional two-dimensional drawings by enabling the creation of highly detailed and interactive three-dimensional models (Liu, 2010). This means that instead of relying solely on flat blueprints, professionals now construct a virtual representation of the entire project. Every aspect of the construction, from the tiniest detail to the grandest scheme, can be visualised in three-dimension. This is particularly advantageous for small building projects, where even minor design discrepancies can have a disproportionate impact. One of the primary advantages of this capability is the enhanced clarity it provides. Architect are being able to showcase their design to clients, fellow professionals, and stakeholders in an immersive 3D environment. This not only facilitates a better understanding of the design intent but also allows for more effective communication. Stakeholders can 'walk through' the virtual building, experiencing its spatial arrangement and design elements first hand. Such vivid visualisation aids in pre-emptively identifying potential clashes, discrepancies, or shortcomings early in the design phase, leading to efficient problem-solving and reduced construction errors. In small building projects, resource optimization is paramount. Accurate visualisation of design via BIM aids in this regard by enabling professionals to fine-tune their plans without the need for physical iterations (Bhonde, 2023). Spatial arrangements, material choices, and other critical decisions can be simulated and adjusted virtually, contributing to optimal resource allocation and cost-effectiveness. Furthermore, accurate visualisation also plays a crucial role in project presentation and stakeholder engagement (Clason, 2007). Presenting a lifelike 3D model to clients and investors helps them grasp the project's potential better than static drawings ever could. This leads to more informed decision-making, quicker approvals, and potentially greater project support. However, the bottom five utilised capabilities, include 'checking design intent', 'risk reduction', 'waste reduction', 'enhancing project collaboration', and 'achieving energy efficiency and sustainability', have lower mean values and are considered less utilised. The low utilisation of BIM capability for enhancing energy efficiency and sustainability is supported by the work of Pereira *et al*. (2021) who also found that, there is a lack of interoperability between BIM and energy analysis tools, a high potential for integrating BIM with other technologies, such as thermography, Geographic Information Systems (GIS) and monitoring to optimise construction solutions which allow energy savings. This could influence the low utilisation of BIM capability to enhance energy efficiency. More so, study by Eze *et al.* (2022) revealed five major groups of factors causing construction waste at the design and pre-contract stages that can be avoided or minimised through BIM implementation. These are errors in design and documentation, specification and quality factors, estimating and site condition factors, planning of work factors and procurement related factors. Eze *et al.* (2022) offered practical insight for industry participants on the need utilise BIM capabilities to reduce construction waste by identifying the diverse areas responsible for these waste generation. The average mean value for the overall utilisation of BIM capabilities in small building projects is 2.95 which implies a moderate utilisation of the BIM capabilities in small building projects.

Differences in respondents' ratings of utilisation of BIM capabilities in small building projects.

This section, provides the results of the Kruskal-Wallis test performed to examine how the utilisation of BIM varies among different professional groups. This test evaluates whether professionals in the construction industry differ in their usage of various BIM capabilities. The results are presented in Table 6

Table 6: Variation in respondents' ratings of utilisation of BIM capabilities in small building projects

S/N	BIM capabilities	Kruskal-Wallis H	Asymp.Sig.
1	Enhance design, planning and construction of projects	16.031	.003
2	Estimate cost	15.934	.003
3	Enhance project collaboration among stakeholders	2.474	.649
4	Improve productivity (less rework, conflicts and changes)	8.881	.064
5	Discover design errors and omission (clash detection)	13.847	.008
6	Schedule project	4.451	.348
7	Achieve Faster project delivery	8.414	.078
8	Ensure project quality and performance	10.003	.040
9	Reduce risk	6.552	.163
10	Reduce waste	8.572	.073
11	Reduce construction cost	6.079	.193
12	Design visualization	20.168	.000
13	Check design intent	8.436	.077
14	Achieve Energy efficiency and sustainability	2.101	.717
15	Synchronize design and construction planning	17.023	.002
	Average		**0.161**

Test Statistics [a,b]

a. Kruskal-Wallis Test

b. Grouping variable: Profession of Respondents

The Kruskal-Wallis test results indicate differences in BIM utilisation across professional groups. Notably, 'Accurate visualization of design', 'Cost estimating', 'Enhancing design, planning and construction projects', and 'Synchronization of design and construction planning' exhibit statistically significant differences having p values of ≤ 0.05, suggesting varied utilisation of these capabilities. This could be due to the difference or peculiarities in respondents' professional tasks. Conversely, BIM capabilities such as 'Enhancing project collaboration among stakeholders', 'Improving productivity', 'Discovering design errors and omissions', and many more with p values > 0.05 show no significant difference in utilisation. This implies similarity in utilisation of these capabilities among the professionals. Overall, the average p values obtained is 0.161, which is > 0.05, implying that overall, there is no significant difference in the respondents' ratings of the utilisation of BIM capabilities in small building projects

Barriers to Utilisation of BIM capabilities in small building projects

Respondents were given the option to rate some barriers to BIM utilisation. Results are presented in Table 7.

Table 7: Barriers to utilisation of BIM capabilities in small building projects

S/N	Barriers to BIM utilisation	Mean	SD	Rank
1	Lack of government support or incentive for BIM adoption	4.80	0.495	1st
2	High cost of BIM implementation	4.76	0.431	2nd
3	Limited digital education and training	4.50	0.505	3rd
4	Absence of a structured methodology that is supportive	4.26	0.723	4th
5	In adequate facilitation and training centre for BIM	4.24	0.687	5th
6	Resistance to change and reluctance to adopt new technology	3.86	0.926	6th
7	The construction industry's lacklustre adoption of technology	3.76	0.894	7th
8	Insufficient team work from upper management	3.72	0.882	8th
9	In the work place, resistance to BIM adoption remains strong	3.70	0.909	9th
10	The lack of demand for or insistence on BIM from customers	3.60	0.969	10th
11	To many complexities in design produced by BIM	3.56	0.907	11th
12	Limited awareness about the benefits of BIM	2.34	0.443	12th

Table 7 present the barriers to utilisation Building Information Modelling (BIM) capabilities in small building projects. The top barriers are a lack of government support and incentives, the high cost of implementation, limited digital education and training, inadequate digital education and training, and the absence of a supportive methodology. The absence of government support or incentives for BIM adoption poses a notable barrier to the utilisation of BIM capabilities in the construction industry, particularly in small project (Andrew & Roine, 2017). BIM has the potential to revolutionize the construction process by improving collaboration, reducing errors, and enhancing project outcomes. However, without government encouragement and backing, the adoption of BIM can face significant challenges (Olanrewaju & Chileshe, 2020). Government support and incentives play a pivotal role in driving the adoption of new technologies and practices within industries. In the case of BIM, government involvement can create a conducive environment for its implementation by offering various benefits to stakeholders (Alreshidi *et al*., 2017). These benefits can include financial incentives, policy frameworks, standardized guidelines, and even mandates for BIM usage in public projects. When these incentives are absent, small construction projects may struggle to justify the investment and effort required for BIM adoption (Olanrewaju & Chileshe, 2020).. Conversely, the bottom five barriers involve the construction industry's slow adoption of technology, insufficient teamwork from upper management, resistance to BIM adoption, a lack of customer demand, and complexities in design generated by BIM. These obstacles, especially the lack of government support and resistance to BIM, can hinder BIM's progress, particularly in smaller construction projects.

Difference in Professional Ratings of Barriers to utilisation of BIM capabilities in small building projects

This section presents the findings of Kruskal-Wallis test that examined differences in perceived barriers to BIM utilisation among various professional groups in the construction industry. The aim was to assess whether distinct professional groups face unique challenges when it comes to implementing Building Information modelling (BIM). The results are detailed in Table 8, shedding light on potential variations in perceived barriers across these professional groups.

Table 8: Variation in respondents' ratings of the awareness of Barriers to BIM Utilisation in small building projects

S/N	Barriers to BIM utilisation	Kruskal-Wallis H	Asymp. Sig.
1	Limited awareness about the benefits of BIM	4.366	.359
2	High cost of BIM implementation	4.203	.379
3	Lack of demand for or insistence on BIM from customers	3.235	.519
4	Resistance to change and reluctance to adopt new technology	3.546	.471
5	Lack of digital education and training	1.920	.751
6	Insufficient teamwork from upper management	7.050	.133
7	The construction industry's lacklustre adoption of technology	5.032	.284
8	Lack of government support or incentives for BIM adoption	5.563	.234
9	Too many complexities in design produced by BIM	4.369	.358
10	In the workplace, resistance to BIM adoption remains strong	5.385	.250
11	inadequate facilitation and training centre for BIM	5.298	.258
12	Absence of a structured methodology that is supportive	3.099	.541
	Average		**.378**

Test Statistics [a,b]
a. Kruskal-Wallis Test
b. Grouping variable: Profession of Respondents

The Kruskal-Wallis test results indicate that there is no statistically significant difference in how various professional groups within the construction industry perceive barriers to BIM utilisation. All p-values exceeded 0.05, suggesting that these professional groups generally share similar perceptions regarding the barriers to utilisation of BIM capabilities in small building projects. Overall, the average P values obtained for the barriers to utilisation of BIM capabilities in small building projects is recorded as 0.378, which is greater than 0.05. This implies that, overall, there is no significant difference on the respondents' ratings of the barriers to utilisation of BIM capabilities in small building projects

CONCLUSIONS AND RECOMMENDATION

Conclusion

This study aims to assess the utilisation of Building Information Modelling capabilities in small building projects. Furthermore, the study sought to determine variation in responses among different professional groups. Based on the findings of the study, it is concluded that Professionals in the construction industry possess a high level of awareness regarding the benefits provided by BIM. Furthermore, BIM capabilities are moderately utilised in small construction project. The study also concludes that, there are variations regarding the professionals' utilisation of BIM capabilities in small construction projects, more so, the professional/respondents' groups generally share similar views regarding the benefits and barriers hindering utilisation of BIM capabilities in small building projects.

Recommendations

The study recommends that public and private organisations in the construction sector should provide support to train and upskill construction professionals on BIM tools to drive successful utilisation of BIM in construction projects. Additionally, the study also recommends providing incentives that would encourage the utilisation of BIM capabilities in building projects.

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