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Contractors in the state of Akwa Ibom Use Building Information Modeling (BIM) to Coordinate Their Projects

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Abstract
Project managers in the building construction industry in Akwa Ibom State were the focus of this research on the use of Building Information Modelling (BIM). The study was driven by eight research questions and eight hypotheses, all in accordance with the particular aims of the research. The research strategy used in the study was a descriptive survey. A total of 114 participants were selected from a pool of 401 building construction practitioners in Akwa Ibom State by a combination of cluster and simple random selection methods. With 76 items organized into 8 clusters to cover the study issues, the "Application of Building Information Modelling for Project Management Questionnaire (ABIMPMQ)" served as the data collecting tool. Three specialists from the University of Uyo, Uyo's Departments of Industrial Technology Education (Building Technology option) and Measurement and Evaluation verified the instrument. Twenty (20) non-study participants in the construction business in Akwa Ibom State served as trial subjects to establish the instrument's dependability. The instrument's reliability coefficient was 0.85, which was calculated using the Cronbach Alpha technique, which is a measure of internal consistency. With the assistance of three research assistants, some surveys were collected immediately after administration, while others were collected the next day. Descriptive and inferential statistics were used to analyze the acquired data. The study issues were addressed using the Mean and Standard Deviation. To evaluate the hypotheses at a significance level of 0.05, a one-sample t-test was used. The results showed that building construction practitioners in Akwa Ibom State only use building information modeling (BIM) to a high degree in risk control and facility management, but not at all in designing, scheduling, quantity take-off, visualizing, clash detection, or constructability analysis of building construction projects. Researchers in Akwa Ibom State came to the conclusion that building information modeling (BIM) is not widely used in the construction industry. In order to keep up with global standards, the researcher suggests that the state government in Akwa Ibom State should create and pass rules that are acceptable to the public and would promote the mandatory use of building information modeling (BIM) by building experts in the construction industry.

Key Words: Application, Building Construction, Building Information Modelling, Project Management

Introduction:

Humans have been constructing buildings for a very long time. The need for a climate-controlled setting to mitigate its impacts was the initial impetus. Humans were able to adapt to a broad range of climates in part because they built houses. Buildings have been around from the time of the first people. Caves were man-made structures that provided refuge from the elements, including cold, rain, and heat. There was a transition from living in caves to constructing homes out of sticks and leaves. Building construction has developed and will continue to evolve in response to future concerns in areas such as security, business, industries, education, and the economy, all in the name of improving comfort. Many different types of buildings, including homes, schools, government offices, and factories, have sprung up across the world as a result of the necessity to address these issues. Building construction professionals' management practices have a significant impact on whether or not these structures are able to fulfill their intended purpose (Zhao et al., 2016).

Construction project management is the practice of guiding and managing a project's people and material resources to meet its defined goals in terms of scope, budget, time, quality, and satisfaction of all parties involved. From inception to closeout, Anastasios (2019) defines construction project management as the process of guiding, regulating, and supervising a project. It include creating a plan for the project's execution, outlining everyone's duties, deciding on a scope and baselines, creating a schedule, creating a procedure for making changes, creating and executing a strategy for quality control, creating a strategy for communicating with stakeholders, and building the structure itself. According to Anastasios (2019), the four main components of a well-managed building construction project are the following: project inception and planning; project execution and launch; and project performance. The end objective of construction project management, according to researchers like Kushwaha (2016), Nerija and Audrius (2012), and Sebastine (2011), is to fulfill the client's need for a functioning and financially feasible project. Applying Building Information Modelling (BIM) to building construction management is crucial for achieving efficiency and effectiveness in the project and satisfying the customer. Modeling is a method of explaining the inner workings of a real-world system via the use of a simplified, structurally planned representation. Its purpose is to depict and illustrate the ideal state of a system or project. From the very beginning of a project's planning stages all the way through to its final demolition, Building Information Modeling (BIM) keeps track of the building's physical and functional details digitally. A building information modeling (BIM) model provides a digital, 3D depiction of the planned project. A building information model (BIM) is a computer program that can accurately depict the digital construction of a building. Eastman et al. (2011) states that building information modeling (BIM) provides precise dimensions and comprehensive data needed for design, procurement, material manufacture, and construction processes. After building is complete, the model may be used for facility maintenance and operational management.

Using a combination of geographic data, spatial correlations, cost schedules, material estimates, quantities, and component specifications, BIM shows how everything fits together in a structure, as pointed out by Bazjanac (2016). All the way from the planning stages all the way to the finished product, the BIM model can show you every little detail. Hence, it is easy to get quantities and associated material attributes. Dissecting and outlining the scope of the task is a simple process. All of the facility's sequences, assemblies, and systems may be virtually scaled up and shown. Building information modeling (BIM) allows for the unambiguous connection of construction-related documents, such as contracts, drawings, procurement and tender papers, and more (Khemlani et al., 2016).

By providing all specialists with the ability to collaborate effectively and accurately, building information modeling (BIM) allows for a simulated process that integrates all areas, specializations, and approaches to a single facility inside a digital model, rather than relying on conventional techniques. Before a project is launched, the model is reviewed and adjusted often to match the design specifications and model changes, according to Carmona and Irwin (2007). This is done to make sure the model is as accurate as feasible. Importantly, building information modeling (BIM) is both a methodology and a piece of software. Building Information Modeling (BIM) is a way to make major changes to the project delivery procedures, in addition to employing tools for 3D models. The building information modeling (BIM) approach is novel in the AEC sector and encourages all parties involved in a project to work together. According to Bynum et al. (2013), project team members who have historically seen each other as competitors may actually benefit from BIM's capacity to promote more efficiency and cooperation. Building information modeling (BIM) is an innovative approach to project delivery that collaboratively combines technologies, people, and business processes to reduce inefficiencies and increase efficiency all through a project's lifespan. From the beginning to the end of a project, there are many steps that make up its lifetime. Raw material extraction, building material manufacturing, on-site material assembly, facility use, facility management, repair and maintenance, demolition, disposal, and recycling are all steps in the process.

BIM integrates artificial technology with social aspects and establishes the relevance of its application in the organization. It is seen as a multidimensional interrelatedness of technical and social aspects. According to McGraw (2013), the ability to handle data and do 3D modeling is the most crucial technological feature of building information modeling software. Vendors create BIM software with the intention of using it inside the BIM framework; this allows for both short-term fixes and more extensive changes down the road. Autodesk Revit is one of several commercially accessible building information modeling (BIM) programs; it lets the operator create 3D or 4D models of a facility, structure, and all of its parts. Building Information Modeling (BIM) software creates a model using cutting-edge digital technologies. A building information model (BIM) is a digital representation of an item or idea, often with a high level of abstraction, as stated by Buyle (2013).

Building information modeling (BIM) creates a trustworthy foundation for choices made

throughout a project's life cycle by acting as a common knowledge repository for a facility's information. The building sector has been greatly impacted by BIM, an innovative design tool, as stated by Xiao and Noble (2014). Building information modeling (BIM) is an appropriate tool for managing many aspects of building projects, including procurement, execution, and facility management (Bryde et al., 2013). From its creation until its eventual retirement, the asset must be carefully monitored. For construction managers to fully use BIM data, they must be able to comprehend, question, contribute, and verify it. A number of new construction methods, scheduling, costs, quality, coordination, fabrication, sequencing, and facilities management may be better supported with data if they use model information and adopt new ways of working. The construction manager must think about the additional procedures, tools, and skill sets that BIM offers if he is to take on this increased position. According to Nasila and Cloete (2018), building information modeling (BIM) is used throughout the lifecycle of a building project, from planning to construction to post-construction. Building information modeling (BIM) helps in planning, scheduling, quantity take-off, and visualizing building construction projects throughout the pre-construction stage. They claim that building information modeling (BIM) helps with conflict identification, constructability analysis, and risk control during construction, and that it's also valuable for facility management after the fact. Sarkar and Modi (2015) found that building information modeling (BIM) may be used for conceptual design, space planning, site inventory, and ensuring program consistency with regard to site-related factors during the pre-construction phase. According to Yamazaki et al. (2014), when it comes to using BIM effectively during construction, the following are the most important factors: fundamental investigation throughout the process, automated crash checking technology, continuous construction simulation, and 3D estimating technology. Using building information modeling (BIM), facilities may be proactively managed, planned maintenance can be enabled, and maintenance history can be reviewed once construction is complete (Latiffi et al., 2013). Sarkar and Modi (2015) go on to say that at this point, building information modeling (BIM) enables the implementation of facility management in connection with operations, maintenance, renovations, cost estimates via investigation of material amounts, and construction sequencing for more consistent scheduling.

Application refers to the use or act of directing or referring something to a particular case. Application of BIM in this study refers to the use of BIM for project management by building construction practitioners. Cao *et al* (2014) listed the applications of BIM in construction projects to include design coordination, energy performance simulation, scheduling and quantity take-off, clash detection and 3D visualization. The forgoing implies that BIM finds applications in designing, scheduling, quantity take – off, visualization, clash detection, constructability analysis, risk control, and facility management of building construction projects. Each of these shall be discussed beginning with applications of BIM in designing of building construction projects.

Applications of BIM in designing of building construction projects involves the use of BIM authoring tools by architects to create a digital 3D model of the building which allows them to see a representation of what it will look like and how it will operate. According to Tahir et al (2017), it is the process of taking a client's requirements for a new building or changes to an existing building and translating them into an agreed design using BIM. It involves the use of BIM by construction workers to translate the ideas and rough sketches of engineers, architects and scientists into detailed drawings. The drawings provide visual guidelines, showing the technical details of the structures, specifying dimensions, materials to be used, and procedures and processes to be followed. A building design is a detailed blueprint of the construction work from inception to completion. It specifies the space available for the construction work, what needs to be done, and how it should be done. This is chiefly the business of architects. In designing building construction projects, BIM finds application in site planning and analyses, hosting of 3D modelling, generation of accurate and consistent 2D drawings, scheduling, and collaboration among others Kjartansdóttir, and Snæbjörnsson (2015). As noted earlier, BIM can also be used in scheduling of building construction projects.

Scheduling is described as the process of a 4D model used to plan the phased occupancy in renovation, addition, retrofit, or to show the construction sequence, and space requirements on a building site. A 4D modelling is a very powerful visualization and communication tool that can give project stakeholders a much better understanding of the project. According to Dim et al (2015), application of BIM in Scheduling involves the use of BIM to communicate how the job would-be run-in terms of time and sequence. It involves the linking of objects from the 3D model to a task in the construction schedule, using a 4D scheduling tool like Vico Office, Synchro, or Navisworks. This approach as affirmed by Azhar *et al* (2012) is changing how complex projects are planned, making it possible to visualize the whole construction project or just some phases of it, and see how timing of tasks affect the workflow. This includes comparison of planned versus actual schedules; time-based clashes, such as verifying the planned sequence towards constrained activities (i.e. demolition, permanent construction and temporary construction), site utilization planning and more. A 4D model can be used at all

stages of the project. During the conceptual design, it can be used to discuss site logistics. During the construction phase it can be used to validate costs of completed work, demonstrate work to owners, provide health and safety instructions and justify subcontractor billings to the owner for completed work. As applicable in scheduling, BIM is also used in quantity take – off and estimation of building construction projects.

Application of BIM in quantity take – off and estimation of building construction projects involves the use of Information models to generate accurate cost estimates at a faster rate of modelled materials. Here the model is linked to a cost database, which then computes a cost estimate. Kjartansdóttir, and Snæbjörnsson (2015) avers that BIM can be used to provide more accurate cost information to the owner during the early decision-making phase of building design and throughout the lifecycle of the building, including changes during construction. It allows estimators to focus on more value adding activities in estimating such as: identifying construction assemblies, generating pricing and factoring risks, which are essential for high quality estimates. According to Kjartansdóttir and Snæbjörnsson (2015), added to a construction schedule (such as a 4D Model), a BIM developed cost estimate can help track budgets throughout construction and help reduce time on quantity take-offs and cost estimations.

There is a very limited awareness and knowledge of BIM technology in Nigeria (Onungwa *et al*., 2017); and this is generally associated with lack of awareness of the concept, or lack of trained staff on the BIM tools or both (Abubakar et al., 2013; Onungwa *et al.,* 2017). Kori and Kiviniem (2015) reveals that large and medium firms were found to be leading the BIM application in the Nigerian Architectural Engineering and Construction (AEC) industry while the small firms are less advanced regarding policy and process adherence therefore has less adoption. Primarily, the Nigerian construction industry is fragmented as all the professionals are generating information and managing them separately (Onungwa *et al*., 2017). Structural and services designs are still on conventional CAD (2D) system with few (mostly Architects) utilising 3D CAD system for visualisation purpose (mostly) or as a presentation drawing (Hamma-adama *et al* 2017; Kori, 2015).

Ultimately, the culture of the industry is very conventional, hence require behavioural change which is the most difficult move amongst the successful BIM adoption and application (Hardin and McCool, 2015). Change is possible only when people are aware of BIM application in Nigeria. In view of the varied benefits and usefulness of BIM to the construction industry and the challenges to its adoption and application in Nigeria, it becomes imperative to determine the extent of application of BIM in building construction project management by building construction practitioners in Akwa Ibom State.

Statement of the Problem

The need for the application of the Building Information Modelling (BIM) technology in the construction industry especially in developing countries like Nigeria has become very pertinent. Building Information Model (BIM) in construction design is regarded as an alternative approach for design which makes it easy to present digital designs which contains all the necessary information about the proposed project before it is constructed. BIM is an innovative design tool which has changed a lot in the construction industry such as project procurement, execution, and facility management. Without any doubt, the level of integration available in the application of the BIM technique has resulted in it being regarded as the next cutting edge in construction technology.

Developed countries have adopted the use of Building Information Modelling (BIM) technologies in both small- and large-scale capacities. BIM is an intelligent 3D model-based process that equips architecture, engineering and construction professionals with the insight and tools to more efficiently plan, design, manage and construct buildings and infrastructure. Using a BIM methodology improves collaboration and ensures a new level of control over projects of all sizes. Better project outcomes are achieved through a complete flow of information among applications and across distributed project teams for greater accuracy. The adoption and application of BIM does not only enhance profit and productivity in the built industry but also increase efficiency and effectiveness.

It is no longer news that relationships in the construction industry in Nigeria over the years have been poor. Not only has this situation resulted in haphazard implementation and uncontrolled quality of projects, the frequent break-downs in communication have also led to increased costs, prolonged project execution time and most times, abandoned projects. The alarming cases of collapsed buildings in Nigeria only point to the sub-optimal constructions which fall short of global standards. In the past few years, there has been several cases of collapsed buildings in Nigeria resulting in the loss of lives and properties. A case in point is the recent collapse of storey buildings in Akwa Ibom State and in Lagos State which claimed many lives. Building collapse in Nigeria has been attributed to a number of factors including sub – standard or poor-quality building materials, design issues, construction issues, weak foundation, structural overloads, and incompetence of construction workers. BIM addresses these issues and its application for building construction project management by building contractors in Nigeria is expected to reduce the menace of building collapse and its associated problems. The heavy dependence of many construction firms on traditional ways of communication, such as exchange of drawings and associated paper documents underscores the need for an adoption of the BIM system in modern-day projects.

In a bid to embrace the global construction trend, the Nigeria Institute of Quality Surveyors (NIQS) has called upon the government to support the development of BIM technologies through funding and implementation of laws for the construction industry. The institute urged all the stakeholders and professional bodies of the construction industry to create awareness on the application of BIM for projects, to assume the new roles defined by BIM in their service delivery, and the Bureau of Public Procurement to encourage and subsequently make the use of BIM mandatory on projects of certain magnitude as a starting point.

Literature has also revealed that the BIM concept seems relatively new in Akwa Ibom State. This suggests that the construction industry in Akwa Ibom State may still be struggling to adopt and fully maximize the potentials and gains of BIM to develop the sector. This study therefore seeks to determine the application of BIM for building construction project management by building construction practitioners in Akwa Ibom State.

Purpose of the Study

The general purpose of this study was to determine the extent of application of Building Information Modelling (BIM) for project management by building construction practitioners in Akwa Ibom State. Specifically, the study sought to:

1. determine the extent of application of BIM for designing of building construction projects by building construction practitioners in Akwa Ibom State.
2. determine the extent of application of BIM for scheduling of building construction projects by building construction practitioners in Akwa Ibom State.
3. determine the extent of application of BIM for quantity take – off of building construction projects by building construction practitioners in Akwa Ibom State.

Methodology

This study employed a descriptive survey design. The use of this design is considered appropriate because it will establish the opinions of building construction practitioners on the extent of application of BIM for building construction project management in Akwa Ibom State. The study was conducted in Akwa Ibom State. Akwa Ibom is one of the 36 states in Nigeria, located in the coastal southern part of the country. It lies between latitudes $4^{0}32^{'}$N and $5^{0}33$'N, and longitudes $7^{0}25^{'}$E and $8^{0}25^{'}$E. The state is located in the South – South geopolitical zone, and is bordered on the east by Cross River State. The population of this study was 401 building construction practitioners. This consisted of registered professionals in the building construction industry in Akwa Ibom State, obtained from the directories of professional bodies in Nigeria. (https://www.vconnect.com › Akwa Ibom).

The sample size for this study was One Hundred and fourteen (114). A cluster and

simple random sampling techniques was adopted in selecting the sample. The population was grouped into three clusters to represent three senatorial districts of Akwa Ibom State namely: Uyo, Ikot Ekpene, and Eket. A Simple random sampling technique was adopted to select the sample size of 38 from each cluster. (See Appendix II for sample distribution by cluster). This was to ensure that each member of the population has equal chances of being selected for the study. Questionnaire titled Extent of Application of Building Information Modelling for Project Management Questionnaire (EABIMPMQ) was used for data collection. The questionnaire was developed by the researcher and structured based on the research questions. The questionnaire contained a total of 30 items built in three clusters: A, B and C with 10 questions in each cluster to address the research questions. The three clusters therefore consisted of items structured to address the three research questions that guided the study. A five-point rating scale was provided in each of the clusters for the respondents to make their responses as follows: Very High extent (VHE), High Extent (HE), Moderate (M), Low Extent (LE), and Very Low Extent (VLE). The scale was weighed 5, 4, 3, 2, and 1 respectively.

The face validation of the instrument was done by three experts, two in the Department of Industrial Technology Education (Building technology option) and one in the Department of Measurement and Evaluation, all from the University of Uyo, Uyo. The experts were asked to assess the suitability of the language, adequacy and relevance of the items in addressing the research questions, bearing in mind the purpose of the study. Their corrections and comments were used to modify the questionnaire before producing the final copy. The reliability of the instrument was determined by trial testing the instrument on twenty (20) practitioners in the building industry in Akwa Ibom State who were not part of the sample of the Study. The Cronbach Alpha procedure was used to compute the estimate of internal consistency of the instrument so as to determine the reliability coefficient. The instrument yielded the reliability coefficient of 0.85. This showed that the instrument was reliable to be used for the study.

The researcher with three research assistants administered and collected the questionnaire. The research assistants were instructed on how to administer the questionnaire to ensure high return rate. Some questionnaires administered were retrieved on the spot while some were retrieved a day after.

The data collected were analysed using descriptive and inferential statistics. The Mean and Standard Deviation were used to answer the research questions, while one sample t – test was used in testing the hypotheses at 0.05 level of significance. The mean value of 3.0 was used as a decision rule in answering the research questions. Any item with the mean value below 3.0 was considered as low, while the mean value of 3.0 and above was considered as high. As for the hypotheses, in a situation where calculated p value is greater than the critical value of 0.05, the null hypothesis was retained. If the calculated p value is less than or equal to the critical value of 0.05, the null hypothesis was rejected for the alternative.

Results

Research Question 1: What is the extent of application of BIM for designing of building construction projects by building construction practitioners in Akwa Ibom State?

Table 1: Extent of application of BIM for designing of building construction projects by building construction practitioners in Akwa Ibom State

Variables	n	$\bar{X}$	SD	Weighted mean	Remark
Building construction practitioners	114	22.27	2.20	2.22	Low extent

In Table 1, the result revealed that the mean rating of building construction practitioners on application of BIM for designing of building construction projects is 22.27 and the weighted mean of items is 2.22. Since the weighted mean of items is less than the benchmark of 3.0, it is regarded as low extent. This implies that the extent of application of BIM for designing of building construction projects by building construction practitioners in Akwa Ibom State is low.

Research Question 2: What is the extent of application of BIM for scheduling of building construction projects by building construction practitioners in Akwa Ibom State?

Table 2: Extent of application of BIM for scheduling of building construction projects by building construction practitioners in Akwa Ibom State

Variables	n	$\bar{X}$	SD	Weighted mean	Remark
Building construction practitioners	114	24.64	3.28	2.46	Low extent

In Table 2, the result revealed that the mean rating of building construction practitioners on application of BIM for scheduling of building construction projects is 24.64 and the weighted mean of items is 2.46. Since the weighted mean of items is less than the benchmark of 3.0, it is regarded as low extent. This implies that the extent of application of BIM for scheduling of building construction projects by building construction practitioners in Akwa

Ibom State is low.

Research Question 3: What is the extent of application of BIM for quantity take–off of building construction projects by building construction practitioners in Akwa Ibom State.?

Table 3: Extent of application of BIM for quantity take–off of building construction projects by building construction practitioners in Akwa Ibom State

Variables	n	$\bar{X}$	SD	Weighted mean	Remark
Building construction practitioners	114	25.362	2.89	2.53	Low extent

In Table 3, the result revealed that the mean rating of building construction practitioners on application of BIM for quantity take–off of building construction projects is 25.36 and the weighted mean of items is 2.53. Since the weighted mean of items is less than the benchmark of 3.0, it is regarded as low extent. This implies that the extent of application of BIM for quantity take–off of building construction projects by building construction practitioners in Akwa Ibom State is low.

Null Hypothesis 1: Extent to which building construction practitioners do apply BIM for designing of building construction projects in Akwa Ibom State is not significant.

Table 4: Summary of one sampled t-test on extent to which building construction practitioners do apply BIM for designing of building construction projects in Akwa Ibom State

Variable	$\bar{X}$	SD	df	t	P=0.05	Decision
designing	22.27	2.20	113	108.045	.671	**

*note ** = p is not significant*

The result in Table 4 revealed that the calculated t = 108. 045, and p = .671 at 113 degree of freedom. Since the p value is greater than 0.05 level of significance the null hypothesis which stated that the extent to which building construction practitioners do apply BIM for designing of building construction projects in Akwa Ibom State is not significant is retained. This implies that the extent to which building construction practitioners do apply BIM for designing of building construction projects in Akwa Ibom State is not significant.

Null Hypothesis 2: Extent to which building construction practitioners do apply BIM for scheduling of building construction projects in Akwa Ibom State is not significant.

Table 5: Summary of one sampled t-test on extent to which building construction practitioners do apply BIM for scheduling of building construction projects in Akwa Ibom State

Variable	$\bar{X}$	SD	df	t	P=0.05	Decision
scheduling	24.64	3.28	113	79.97	.439	**

*note ** = p is not significant*

The result in Table 5 revealed that the calculated t = 79.97 and p = .439 at 113 degree of freedom. Since the p value is greater than 0.05 level of significance the null hypothesis which stated that the extent to which building construction practitioners do apply BIM for scheduling of building construction projects in Akwa Ibom State is not significant is retained. This implies that the extent to which building construction practitioners do apply BIM for scheduling of building construction projects in Akwa Ibom State is not significant

Null Hypothesis 3: Extent to which building construction practitioners do apply BIM for quantity take–off of building construction projects in Akwa Ibom State is not significant.

Table 6: Summary of one sampled t-test on Extent to which building construction practitioners do apply BIM for quantity take–off of building construction projects in Akwa Ibom State

Variable	$\bar{X}$	SD	df	t	P=0.05	Decision
quantity take–off	25.36	2.89	113	93.58	.560	**

*note ** = p is not significant*

The result in Table 6 revealed that the calculated t = 93.58 and p =. 560 at 113 degree of freedom. Since the p value is greater than 0.05 level of significance the null hypothesis which stated that the extent to which building construction practitioners do apply BIM for quantity take–off of building construction projects in Akwa Ibom State is not significant is retained. This implies that the extent to which building construction practitioners do apply BIM for quantity take–off of building construction projects in Akwa Ibom State is not significant.

Discussion of Findings

Application of BIM for designing of building construction projects by building construction practitioners in Akwa Ibom State

Table 1 shows the results showing how many building construction practitioners in Akwa Ibom State used BIM for building construction project design. Building construction practitioners in Akwa Ibom State do not use BIM to a great degree when planning building construction projects,

according to the results. Building construction practitioners in Akwa Ibom State do not significantly use building information modeling (BIM) for project design, according to the relevant hypothesis (Table 4). The fact that construction professionals often make mistakes on the job and don't manage to significantly cut down on mistakes and confrontations in buildings might explain the outcome. The construction specialist can find and fix the conflicts when the building's components are built on a computer. The final design will have all the details worked out so that the building budget is perfect. This confirms the results of Tahir et al. (2017), who investigated the use of building information modeling in the Malay construction sector. Findings indicated that "design and visualisation," "integration and collaboration of stakeholders," "quantity take-off and estimation," and "clash detection and coordination" were the most common uses of building information modeling (BIM) in Malaysia. The paper explains how a building information model may be used for all stages of a project, from initial concept to final inspection and beyond. In order to prevent structures from colliding with one another, its application allows builders to see the finished product in a virtual setting, which helps them spot any design, construction, or operating problems. This confirms what Salman (2021) found: that using BIM enhances profitability, reduces costs, improves time management, and increases economic benefits for builders by speeding up collaboration within project teams, which in turn improves building performance and operation. The current research shows that building information modeling (BIM) applications typically account for building performance, and that builders should use BIM in their projects.

Conclusion

The research found that building construction practitioners in Akwa Ibom State do not use building information modeling (BIM) for project management to a large extent. The fact that the majority of builders are unfamiliar with building information modeling (BIM) and its applications in project scheduling, quantity take-off, and design is another common reason for construction delays.

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