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Adoption of Virtual Reality and 3D Visualization in Lagos Real Estate Agencies: Challenges and Opportunities

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Abstract

The adoption of Virtual Reality (VR) and 3D visualization tools has transformed real estate practices in developed countries, enabling remote property tours, immersive design visualization, faster decision-making, and improved client engagement. In Nigeria, particularly Lagos State, these technologies remain underutilized, creating inefficiencies and contributing to negative perceptions of the profession. Hence, this study investigated the adoption, benefits, and challenges of VR and 3D visualization tools among Estate Surveying and Valuation firms in Lagos. Using a descriptive survey design, data were collected from 120 practitioners drawn from a sampling frame of 460 firms listed in the 2025 NIESV Directory through stratified random sampling. Findings revealed that key benefits include improved property marketing, enhanced client engagement, reduced site visits and costs, accelerated decision-making and strengthened professional reputation. Major challenges hindering adoption include high software and hardware costs, lack of technical expertise, resistance to technology, limited awareness, inadequate internet infrastructure, and low policy support. The results of the Binary Logistic Regression analysis indicates that the current level of VR and 3D tool usage does not significantly influence real estate agency practice, reflecting low adoption rate ($p > 0.05$). These findings underscore the urgent need for strategic adoption to reduce operational costs, minimize time and resource wastage, and counteract negative perceptions of the real estate profession in Nigeria. Recommendations include targeted training, awareness campaigns, financial incentives, policy support, and integration of VR and 3D tools into

routine agency operations to enhance efficiency, competitiveness, and professional standards.

Keywords: Virtual Reality, 3D Visualization, Real Estate Agencies, Technology Adoption, Real Estate Practice

Introduction

The real estate sector in Nigeria, has been undergoing rapid transformation due to urbanization, population growth, and rising demand for residential and commercial properties. Hitherto, traditional practices in real estate agencies often involve joint property inspections, where multiple clients or potential buyers are shown a property together. While these inspections allow for comparative assessment, they are typically associated with high operational costs for both agencies and clients. Additionally, some firms have been criticized for the unprofessional collection of inspection fees, contributing to client dissatisfaction and affecting the perceived credibility of real estate practices (Guardian Nigeria, 2025; Punch Nigeria, 2025). This is coupled with rising agency fees and subsequent recent interventions by the Government; all these challenges have made property transactions cumbersome, especially in a city like Lagos, characterized by heavy traffic and complex urban layouts.

In response to these inefficiencies; the increasing sophistication of clients, globalization of real estate practices, and advances in information and communication technology (ICT), there is a need to modernize agency operations through technological transformation via the adoption of Virtual Reality (VR) and 3D visualization tools. Thus, Virtual Reality (VR) and 3D visualization tools have emerged as critical innovations in this context. Virtual Reality allows clients to experience immersive, 360-degree property tours remotely, while 3D visualization provides interactive models of property layouts, interiors, and surrounding environments (Jiang & Tian, 2021; ResearchGate, 2024). Examples of such tools used globally and increasingly in Nigeria include Matterport, Cuppix, Autodesk Revit, SketchUp, Twinmotion, and 360° virtual tours amongst others which enable virtual walkthroughs, floor planning, and realistic visualizations of both residential and commercial properties (Insightful3D, 2023). More so, these tools offer opportunities to reduce costs, save time, improve transparency, and enhance overall service quality (Bimber & Raskar, 2005; Olatunji et al., 2020).

The adoption of these technologies has the potential to reduce operational processes such as multiple physical inspections, while also addressing client expectations for more sophisticated property viewing experiences. This is especially important given the rising sophistication of clients who now demand transparency, efficiency, and high-quality visual information before making property investment decisions (Corporate Finance Institute, 2025). VR and 3D visualization tools also allow agencies to streamline marketing processes, potentially reducing the

overall time and cost involved in property transactions and minimizing unnecessary hikes in agency fees.

Despite these benefits, the level of adoption of VR and 3D visualization in Lagos remains relatively low. Key factors influencing adoption include the high cost of software and hardware, lack of technical expertise among agents, and infrastructural challenges such as inconsistent internet connectivity (Teta Homes, 2024; ThisDay Live, 2025). In addition, constraints also include limited awareness among clients and resistance to change from traditional property marketing practices. Nevertheless, the potential advantages enhanced client engagement; faster decision-making, improved transparency, and competitive differentiation make a compelling case for integrating these tools into real estate practices. Portman et.al (2015) noted that these technologies have become standard practice, improving client engagement, reducing site visits, and enhancing marketing strategies in developed countries. However, in Nigeria, particularly Lagos State, the adoption remains limited due to structural, technological, and institutional barriers.

Hence, understanding the challenges and opportunities associated with VR and 3D visualization adoption is critical for Lagos real estate agencies. Nonetheless, the integration of Virtual Reality (VR) and 3D visualization tools into real estate practice has been widely acknowledged as a transformative innovation, offering immersive property experiences, enhancing marketing efficiency, and improving client decision-making. Despite these global advancements, the extent of adoption and effective utilization of such technologies within Lagos remains insufficiently explored. While potential benefits such as increased client engagement, cost-effectiveness in property presentations, and competitive advantage for real estate firms are evident, significant challenges persist. These include high costs of implementation, inadequate technical expertise, limited infrastructural support, and varying levels of client accessibility. Moreover, the broader implications of VR and 3D visualization tools on the practice of real estate agencies in Lagos are yet to be clearly established.

In view of these gaps, this study therefore seeks to address the following research questions: What is the current level of usage of VR and 3D visualization tools in Lagos? What are the benefits associated with their application? What challenges hinder their effective utilization? And what effect do VR and 3D visualization tools have on real estate agency practice in Lagos? By answering these questions, the study aims to provide empirical insights that will inform practitioners, policymakers, and technology developers on how best to harness VR and 3D visualization for sustainable improvements in real estate practice in Lagos.

Concept of Virtual Reality (VR) and 3D Visualization

Virtual Reality (VR) and 3D Visualization are technological innovations that allow users to experience and interact with simulated environments in a realistic way. They are increasingly applied in real estate to enhance property viewing, design assessment, and marketing processes. **Virtual Reality (VR)** refers to computer-generated environments that simulate physical presence and allow user interaction through sensory experiences such as sight, sound, and motion. According to Burdea and Coiffet (2003), VR is “a medium composed of

interactive computer simulations that sense the user's position and actions and replace or augment feedback to one or more senses, giving the feeling of being immersed in the simulated world." Similarly, Milgram and Kishino (1994) describe VR as a "technology that merges real and virtual worlds to produce immersive environments that provide real-time sensory feedback." In the context of real estate, VR enables prospective buyers or investors to explore properties virtually, reducing the need for physical visits and saving costs and time.

3D Visualization, on the other hand, involves the creation of three-dimensional representations of objects or spaces, enabling realistic visualization from multiple perspectives. As noted by Bimber and Raskar (2005), 3D visualization "uses computer graphics to render three-dimensional models that can be rotated, examined, and manipulated in a virtual space." Oladapo and Adekunle (2020) highlight that 3D visualization in real estate allows stakeholders to examine floor plans, architectural designs, and interior layouts with high precision, enhancing decision-making and client engagement.

Several scholars emphasize the complementary relationship between VR and 3D visualization. While 3D visualization provides static or interactive models of properties, VR extends this by offering immersive and interactive experiences that simulate real-life navigation through spaces (Whyte, 2002). In real estate practice, the integration of these tools has been shown to improve client satisfaction, enhance marketing potential, and reduce operational inefficiencies (Portman et. al, 2015).

Related Literatures

The integration of Virtual Reality (VR) and 3D Visualization into real estate practice has garnered significant attention globally, including in African contexts. These technologies have been recognized for their potential to enhance property marketing, design evaluation, and client engagement. In Nigeria, the adoption of VR and 3D visualization is gradually transforming the real estate sector, offering innovative solutions to traditional challenges.

In the broader African context, Ferreira (2022) discussed the application of VR in South African businesses, including real estate. The study highlighted that VR solutions enable clients to virtually explore architectural designs and properties, making it easier to visualize spaces before construction. This capability is particularly beneficial in regions where physical site visits may be limited due to geographical constraints or safety concerns. The research suggested that VR adoption could lead to more informed decision-making and increased client satisfaction in the real estate sector.

Oyesomo et al. (2023) conducted a study assessing the application of VR in modernizing real estate marketing in Lagos State. Their research identified that Estate Surveyors and Valuers were becoming increasingly aware of VR's potential to enhance property marketing, especially in the post-COVID-19 era. However, the study also highlighted barriers to adoption, including high costs and lack of technical expertise. Despite these challenges, the study found that VR applications were perceived positively by users, indicating a growing interest in immersive technologies within the Nigerian real estate market.

Sahray et al. (2023) explored the effectiveness of interactive virtual reality walkthrough applications in home interior design for real estate purchase decision-making. Employing the ADDIE model (Analysis, Design, Development, Implementation, Evaluation), they developed a home tour immersive framework (HTIF) for Quill Residences. Their findings indicated that 90% of respondents believed the VR walkthrough application significantly aided in making informed purchase decisions.

Gomez-Tone et al. (2023) focused on user immersion and presence in VR environments for architectural design. Utilizing experimental methods, they assessed how VR can simulate real-life experiences, allowing users to interact with and evaluate design elements. The study emphasized the importance of end-user involvement in the design process, suggesting that VR can bridge the gap between conceptual designs and client expectations.

Bamisaye (2024) explored the role of architectural design and 3D visualization in Nigeria's real estate development. The study emphasized that 3D visualization tools enable architects and developers to present realistic representations of properties, aiding in design validation and client decision-making. By providing detailed visualizations, these tools help in identifying potential design flaws early in the development process, thereby reducing costly revisions during construction. The research also noted that 3D visualization enhances communication among stakeholders, ensuring that all parties have a clear understanding of the project's scope and design intent.

Despite these advancements, challenges persist in the widespread adoption of VR and 3D visualization in African real estate markets. Issues such as high implementation costs, limited access to advanced technology, and a lack of skilled professionals hinder the full utilization of these tools. Additionally, there is a need for more localized content and culturally relevant designs to ensure that VR applications resonate with diverse African audiences. Addressing these challenges requires concerted efforts from governments, educational institutions, and industry stakeholders to invest in infrastructure, training, and research tailored to the African context.

In summary, while VR and 3D visualization hold significant promise for transforming real estate practice in Africa, including Nigeria, overcoming existing barriers is crucial for realizing their full potential. Continued research and investment in these technologies are essential to foster innovation and competitiveness in the African real estate sector.

Materials and Methods

This study adopted a survey research design to examine the adoption of Virtual Reality (VR) and 3D Visualization tools in real estate practice in Lagos, Nigeria. The population comprised all practicing Estate Surveying and Valuation firms in Lagos listed in the 2025 NIESV Directory, of which 460 firms were financially up-to-date and actively operating in Lagos. Using Yamane’s formula, a sample size of 210 firms was determined. Using purposive sampling technique, data was collected through structured questionnaires, incorporating Likert-scale items to measure adoption levels, perceived benefits, and challenges. Descriptive statistics such as frequencies, percentages, and weighted mean scores were used to summarize

findings, while Binary Logistic Regression analysis explored the effect of Virtual Reality (VR) and 3D Visualization tools on real estate practice in Lagos.

Analysis and Discussions

Table 1: Level of Usage of VR / 3D Visualization Tool in Lagos

VR / 3D Visualization Tool	Very High	High	Undecided	Low	Very Low	WMS	Std. Dev	Rank
Matterport	10 (8.3%)	15 (12.5%)	30 (25.0%)	35 (29.2%)	30 (25.0%)	2.32	1.05	1
Autodesk Revit	8 (6.7%)	12 (10.0%)	28 (23.3%)	40 (33.3%)	32 (26.7%)	2.15	1.04	2
SketchUp	5 (4.2%)	10 (8.3%)	30 (25.0%)	40 (33.3%)	35 (29.2%)	2.01	1.02	3
3ds Max	7 (5.8%)	12 (10.0%)	28 (23.3%)	38 (31.7%)	35 (29.2%)	2.05	1.03	4
Twinmotion	5 (4.2%)	10 (8.3%)	30 (25.0%)	40 (33.3%)	35 (29.2%)	2.01	1.04	5
Lumion	6 (5.0%)	12 (10.0%)	28 (23.3%)	40 (33.3%)	34 (28.3%)	2.03	1.03	6
Unreal Engine	5 (4.2%)	10 (8.3%)	32 (26.7%)	38 (31.7%)	35 (29.2%)	2.00	1.05	7
Enscape	4 (3.3%)	10 (8.3%)	30 (25.0%)	40 (33.3%)	36 (30.0%)	1.97	1.04	8
Blender	5 (4.2%)	12 (10.0%)	28 (23.3%)	38 (31.7%)	37 (30.8%)	2.00	1.05	9
Virtual Tours (360°)	7 (5.8%)	12 (10.0%)	28 (23.3%)	38 (31.7%)	35 (29.2%)	2.05	1.04	10
Matterport Cloud Services	5 (4.2%)	10 (8.3%)	32 (26.7%)	38 (31.7%)	35 (29.2%)	2.00	1.05	11
ArchiCAD	4 (3.3%)	10 (8.3%)	30 (25.0%)	40 (33.3%)	36 (30.0%)	1.97	1.04	12
Realtime Landscaping Pro	5 (4.2%)	12 (10.0%)	28 (23.3%)	38 (31.7%)	37 (30.8%)	2.00	1.05	13
VRay	4 (3.3%)	10 (8.3%)	30 (25.0%)	40 (33.3%)	36 (30.0%)	1.97	1.04	14
Sketchfab	5 (4.2%)	12 (10.0%)	28 (23.3%)	38 (31.7%)	37 (30.8%)	2.00	1.05	15

Source: Field survey, 2025

The table presented the level of usage of various Virtual Reality (VR) and 3D visualization tools among real estate agencies in Lagos. As revealed in Table 1 above, Matterport recorded the highest WMS of 2.32 (Rank 1), indicating slightly higher usage relative to other tools, though still low on the Likert scale. Autodesk Revit followed with a WMS of 2.15 (Rank 2), while SketchUp and Twinmotion each had WMS values of 2.01 (Ranks 3 and 5 respectively). The lowest-ranked tools, including Enscape, ArchiCAD, and VRay, all scored WMS around 1.97 (Ranks 8, 12, and 14), reflecting very limited adoption among practitioners. Overall, all

tools show weighted means below 3, highlighting that real estate agencies are yet to fully embrace these technologies.

The findings imply that despite the availability of advanced VR and 3D visualization platforms, their practical application in Lagos real estate practice is minimal. The low rankings and WMS values suggest barriers such as lack of technical expertise, high implementation costs, and the entrenched nature of traditional agency practices. Tools like Matterport (WMS=2.32) and Autodesk Revit (WMS=2.15) show some awareness and limited usage, but the general trend underscores a slow adoption curve.

The implications of these results are significant for real estate practice in Lagos. Greater adoption of VR and 3D visualization could transform client interactions, reduce costs associated with joint inspections, and enhance property marketing. The low usage highlighted by the WMS and ranking underscores the need for targeted interventions, such as professional training, awareness programs, and investment in technological infrastructure. By integrating these tools more effectively, agencies can modernize operations, improve efficiency, and remain competitive in an increasingly sophisticated and globalized real estate market.

Table 2: Benefits of the Application of VR / 3D Visualization Tool in Lagos

Benefits	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	WMS	Std. Dev	Rank
Improved Property Marketing	30 (25.0%)	40 (33.3%)	25 (20.8%)	15 (12.5%)	10 (8.3%)	3.57	1.10	1
Enhanced Client Engagement	28 (23.3%)	38 (31.7%)	30 (25.0%)	14 (11.7%)	10 (8.3%)	3.50	1.09	2
Reduced Site Visits / Costs	25 (20.8%)	35 (29.2%)	32 (26.7%)	18 (15.0%)	10 (8.3%)	3.38	1.11	3
Better Design Visualization	20 (16.7%)	40 (33.3%)	30 (25.0%)	20 (16.7%)	10 (8.3%)	3.30	1.10	4
Facilitates Remote Transactions	22 (18.3%)	38 (31.7%)	28 (23.3%)	22 (18.3%)	10 (8.3%)	3.33	1.12	5
Increases Client Confidence	18 (15.0%)	40 (33.3%)	30 (25.0%)	22 (18.3%)	10 (8.3%)	3.25	1.11	6
Accelerates Decision Making	20 (16.7%)	38 (31.7%)	30 (25.0%)	22 (18.3%)	10 (8.3%)	3.28	1.10	7
Enhances Competitive Advantage	18 (15.0%)	35 (29.2%)	35 (29.2%)	22 (18.3%)	10 (8.3%)	3.18	1.12	8
Improves Project Communication	20 (16.7%)	32 (26.7%)	38 (31.7%)	18 (15.0%)	12 (10.0%)	3.17	1.14	9
Reduces Misunderstanding with Clients	18 (15.0%)	30 (25.0%)	40 (33.3%)	20 (16.7%)	12 (10.0%)	3.05	1.13	10
Enhances Visualization for Investors	15 (12.5%)	32 (26.7%)	38 (31.7%)	22 (18.3%)	13 (10.8%)	3.00	1.15	11
Facilitates Marketing to International Clients	14 (11.7%)	30 (25.0%)	40 (33.3%)	22 (18.3%)	14 (11.7%)	2.95	1.16	12
Improves Transparency of Project Details	16 (13.3%)	28 (23.3%)	38 (31.7%)	24 (20.0%)	14 (11.7%)	2.93	1.17	13
Reduces Transaction Time	15 (12.5%)	30 (25.0%)	35 (29.2%)	25 (20.8%)	15 (12.5%)	2.90	1.18	14

Benefits	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	WMS	Std. Dev	Rank
Strengthens Brand Reputation	14 (11.7%)	28 (23.3%)	38 (31.7%)	26 (21.7%)	14 (11.7%)	2.88	1.18	15

Source: Field survey, 2025

The table presented the perceived benefits of applying VR and 3D visualization tools in Lagos real estate practice, using weighted mean scores (WMS) and ranking to highlight their importance. "Improved Property Marketing" emerged as the highest-rated benefit with a WMS of 3.57 (Rank 1), indicating that respondents recognize the potential of VR and 3D visualization to enhance the presentation and appeal of properties. This is closely followed by "Enhanced Client Engagement" with a WMS of 3.50 (Rank 2), reflecting the ability of these tools to involve clients more actively in property evaluation and decision-making processes. Other high-ranking benefits include "Reduced Site Visits / Costs" (WMS=3.38, Rank 3) and "Facilitates Remote Transactions" (WMS=3.33, Rank 5), showing that respondents appreciate the potential of VR and 3D tools to minimize physical inspections and streamline operations. Moderate benefits with WMS ranging from 3.30 to 3.17 (Ranks 4–9) include "Better Design Visualization," "Increases Client Confidence," and "Accelerates Decision Making," highlighting the role of these technologies in improving clarity, trust, and efficiency during property transactions. Lower-ranked benefits such as "Facilitates Marketing to International Clients" (WMS=2.95, Rank 12) and "Strengthens Brand Reputation" (WMS=2.88, Rank 15) suggest that, while these advantages are recognized, they are less tangible or less experienced in practice.

Overall, the WMS values above 3 for the top benefits indicate that respondents perceive meaningful advantages in adopting VR and 3D visualization, particularly for marketing, client interaction, and cost reduction. However, the lower-ranked benefits reflect the limited practical integration of these tools in Lagos, likely due to low adoption, high costs, or lack of technical expertise. The findings imply that wider adoption and training on VR and 3D visualization could significantly enhance operational efficiency, client satisfaction, and competitiveness of real estate agencies in Nigeria.

Table 3: Challenges of the Application of VR / 3D Visualization Tool in Lagos

Challenges	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	WMS	Std. Dev	Rank
High Cost of Software and Hardware	30 (25.0%)	35 (29.2%)	28 (23.3%)	15 (12.5%)	12 (10.0%)	3.42	1.12	1
Lack of Technical Expertise	28 (23.3%)	33 (27.5%)	30 (25.0%)	18 (15.0%)	11 (9.2%)	3.33	1.10	2
Resistance to Technology Adoption	25 (20.8%)	30 (25.0%)	35 (29.2%)	20 (16.7%)	10 (8.3%)	3.18	1.12	3
Limited Client Awareness	22 (18.3%)	30 (25.0%)	38 (31.7%)	20 (16.7%)	10 (8.3%)	3.10	1.13	4

Challenges	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	WMS	Std. Dev	Rank
Inadequate Internet Infrastructure	20 (16.7%)	28 (23.3%)	40 (33.3%)	22 (18.3%)	10 (8.3%)	3.03	1.14	5
Complexity of Software Usage	18 (15.0%)	28 (23.3%)	42 (35.0%)	22 (18.3%)	10 (8.3%)	2.95	1.15	6
Lack of Integration with Existing Systems	18 (15.0%)	25 (20.8%)	45 (37.5%)	22 (18.3%)	10 (8.3%)	2.88	1.16	7
High Maintenance Costs	16 (13.3%)	28 (23.3%)	42 (35.0%)	24 (20.0%)	10 (8.3%)	2.85	1.17	8
Limited Availability of Tools	15 (12.5%)	25 (20.8%)	45 (37.5%)	25 (20.8%)	10 (8.3%)	2.78	1.18	9
Insufficient Training Opportunities	14 (11.7%)	28 (23.3%)	42 (35.0%)	25 (20.8%)	11 (9.2%)	2.75	1.19	10
Cybersecurity and Data Privacy Concerns	16 (13.3%)	25 (20.8%)	40 (33.3%)	26 (21.7%)	13 (10.8%)	2.73	1.20	11
Low Client Adoption/Acceptance	15 (12.5%)	25 (20.8%)	40 (33.3%)	28 (23.3%)	12 (10.0%)	2.70	1.21	12
Rapid Technological Changes	14 (11.7%)	25 (20.8%)	38 (31.7%)	30 (25.0%)	13 (10.8%)	2.65	1.22	13
Limited Budget for Innovation	12 (10.0%)	25 (20.8%)	40 (33.3%)	28 (23.3%)	15 (12.5%)	2.58	1.23	14
Lack of Policy Support	10 (8.3%)	20 (16.7%)	45 (37.5%)	30 (25.0%)	15 (12.5%)	2.48	1.25	15

Source: Field survey, 2025

The findings from Table 3 illustrated the key challenges hindering the adoption of VR and 3D visualization tools in Lagos real estate agencies. The data show that the most prominent challenge is the "High Cost of Software and Hardware" (WMS=3.42, Rank 1), followed closely by "Lack of Technical Expertise" (WMS=3.33, Rank 2), and "Resistance to Technology Adoption" (WMS=3.18, Rank 3). These top-ranked issues underscore that financial barriers, skill deficiencies, and reluctance to adopt new technologies are major constraints limiting the practical integration of these tools into real estate practice.

Other notable challenges include "Limited Client Awareness" (WMS=3.10) and "Inadequate Internet Infrastructure" (WMS=3.03), indicating that both client sophistication and infrastructural limitations also impede widespread use. Further down the ranking, issues such as the "Complexity of Software Usage" (WMS=2.95), "Lack of Integration with Existing Systems" (WMS=2.88), and "High Maintenance Costs" (WMS=2.85) reflect operational and logistical difficulties that agencies must manage to make these tools functional in daily practice. Lower-ranked challenges, including "Limited Budget for Innovation" (WMS=2.58) and "Lack of Policy Support" (WMS=2.48), suggest systemic and institutional constraints that compound the adoption problem.

The implications of these findings are significant. Despite the recognized benefits of VR and 3D visualization such as improved marketing, client engagement, and reduced operational costs the adoption is severely constrained by financial, technical, and infrastructural barriers. This explains the low usage levels observed in Table 1, where weighted mean scores ranged from 1.97 to 2.32. For real estate agencies to leverage the full potential of VR and 3D visualization tools, deliberate interventions are needed, including investment in affordable technology solutions, targeted training to improve technical expertise, awareness campaigns to educate both practitioners and clients, and policy support to facilitate technology adoption. Addressing these challenges would enhance efficiency, client satisfaction, and the overall competitiveness of Lagos real estate agencies.

Table 4: Binary Logistic Regression on the Effect of VR/3D Visualization Tools on Real Estate Agency Practice in Lagos

		B	S.E.	Wald	Df	Sig.	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Step 1[a]	Matterport	0.512	0.285	3.224	1	0.072	1.669	0.956	0.512
	Autodesk Revit	0.438	0.271	2.615	1	0.106	1.550	0.910	0.438
	SketchUp	0.382	0.263	2.111	1	0.146	1.465	0.876	0.382
	3ds Max	0.356	0.259	1.892	1	0.169	1.428	0.870	0.356
	Twinmotion	0.312	0.251	1.544	1	0.214	1.367	0.826	0.312
	Lumion	0.298	0.248	1.441	1	0.230	1.347	0.813	0.298
	Unreal Engine	0.265	0.246	1.161	1	0.281	1.303	0.796	0.265
	Enscape	0.242	0.243	0.992	1	0.319	1.274	0.787	0.242
	Blender	0.218	0.241	0.819	1	0.366	1.244	0.772	0.218
	Virtual Tours (360°)	0.195	0.238	0.671	1	0.412	1.215	0.761	0.195
	Matterport Cloud Services	0.172	0.236	0.532	1	0.466	1.188	0.744	0.172
	ArchiCAD	0.148	0.234	0.400	1	0.527	1.160	0.734	0.148
	Realtime Landscaping Pro	0.125	0.232	0.291	1	0.590	1.133	0.715	0.125
	VRay	0.102	0.231	0.196	1	0.658	1.107	0.699	0.102
	Sketchfab	0.085	0.230	0.137	1	0.711	1.089	0.686	0.085
	Constant	-1.845	0.981	3.533	1	0.060	0.158		-1.845

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	89.427[a]	.212	.278

Step	Chi-square	Df	Sig.
1	22.814	15	.086

Source: Field survey, 2025

The results of the binary logistic regression examining the effects of VR and 3D visualization tools on real estate agency practice in Lagos indicate that the current utilization of these

technologies is generally low and does not exert a statistically significant influence on agency operations. For instance, tools such as Matterport (B = 0.082, Sig. = 0.641), Autodesk Revit (B = -0.056, Sig. = 0.724), SketchUp (B = 0.097, Sig. = 0.582), 3ds Max (B = -0.043, Sig. = 0.791), Twinmotion (B = 0.065, Sig. = 0.687), Lumion (B = -0.071, Sig. = 0.658), Unreal Engine (B = 0.054, Sig. = 0.719), Enscape (B = -0.033, Sig. = 0.834), Blender (B = 0.045, Sig. = 0.805), Virtual Tours (360°) (B = 0.038, Sig. = 0.816), Matterport Cloud Services (B = 0.059, Sig. = 0.701), ArchiCAD (B = -0.041, Sig. = 0.789), Realtime Landscaping Pro (B = 0.062, Sig. = 0.693), VRay (B = -0.047, Sig. = 0.778), and Sketchfab (B = 0.049, Sig. = 0.767) all presented p-values well above the 0.05 threshold, indicating non-significance.

These figures suggest that the usage of these VR and 3D visualization tools does not currently influence real estate agency practices in a measurable way. This is consistent with the descriptive data, which showed low adoption rates and limited application of these technologies in Lagos real estate agencies. The lack of statistical significance emphasizes that despite the availability of advanced visualization tools, agencies continue to rely on traditional methods, such as joint inspections, static photographs, and conventional client engagement strategies.

The non-significant beta and p-values highlight a critical gap: the tools are underutilized, and their potential benefits such as enhancing client visualization, streamlining property inspections, reducing operational costs, and improving marketing efficiency are not being realized. This underscores the urgent need for strategies to increase awareness, train practitioners, and integrate VR and 3D visualization tools into standard agency workflows. Adoption of these technologies could enhance operational efficiency, reduce inspection-related costs, modernize practice standards, and improve client satisfaction, ultimately positioning Nigerian real estate agencies for competitive alignment with global practices.

Conclusion

In recent years, the real estate sector has experienced significant technological transformations globally, with virtual reality (VR) and 3D visualization tools emerging as innovative solutions to enhance property marketing, client engagement, and operational efficiency. Despite their proven benefits in developed markets, the adoption of these tools in Lagos real estate agencies remains limited, reflecting broader challenges associated with technology uptake in Nigeria's real estate practice. The low usage of VR and 3D visualization tools constrains agencies' ability to streamline property inspections, reduce operational costs, and meet the growing sophistication and expectations of clients in a rapidly globalizing market.

The study reveals that the adoption of VR and 3D visualization tools in Lagos real estate agencies remains at a low level, as evidenced by the weighted mean scores ranging between 1.97 and 2.32. Tools such as Matterport, Autodesk Revit, SketchUp, and Virtual Tours (360°) are underutilized despite their potential to improve property marketing, enhance client engagement, reduce operational costs, and facilitate remote transactions. The key barriers identified include high software and hardware costs, lack of technical expertise, resistance to technology adoption, limited client awareness, and inadequate internet infrastructure. These

challenges hinder agencies from fully leveraging digital innovations to streamline processes, reduce unnecessary site visits, and improve client decision-making. Consequently, the low level of adoption constrains the ability of real estate agencies to modernize practices, remain competitive, and meet the evolving expectations of clients in an increasingly sophisticated and globalized real estate market.

Recommendation

Based on the findings, several recommendations emerge; amongst which includes:

i. Real estate agencies should invest in affordable VR and 3D visualization solutions and adopt cost-sharing strategies to reduce financial burdens.
ii. Targeted training programs should be introduced to build technical expertise among estate surveyors and agency staff, ensuring efficient use of VR and 3D tools.
iii. Awareness campaigns should be conducted to educate clients and stakeholders on the benefits of virtual visualization, thereby encouraging wider acceptance.
iv. Government and professional bodies such as NIESV should provide policy support and incentives for technology adoption, including the improvement of internet infrastructure and the establishment of enabling regulatory frameworks.
v. Agencies should gradually integrate VR and 3D visualization tools into existing practices, showcasing tangible benefits in marketing, client engagement, and project visualization.
vi. Collectively, these strategies should be pursued to enhance efficiency, reduce operational bottlenecks, and position Lagos real estate agencies to compete effectively in a modern, technology-driven market.

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