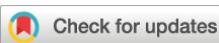RESEARCH ARTICLE

Augmented Reality as Techno-Scenography: Artistic Innovation and Infrastructural Constraint in Nigerian Theatre

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Abstract: This paper interrogates the emergent but uneven integration of augmented reality (AR) within contemporary Nigerian theatre as a symptomatic site where digital aesthetics, cultural performance, and infrastructural precarity collide. Centring on live performance rather than screen media, the study asks how AR reconfigures spatial design, spectatorship, and narrative world-building in the Nigerian theatre space, and why its uptake remains fragile despite widespread digital culture. Arguing that AR functions as a form of "techno-scenography" that extends but also destabilises inherited stage conventions, the paper examines both artistic opportunities, expanded immersion, dynamic scenographic layering, and transmedial storytelling, and practical challenges, including capital costs, technical expertise, unreliable power and internet, and culturally specific reservations about virtual mediation. The analysis is framed through performance studies, postcolonial media theory, and affordance theory, and is informed by a close reading of Nigerian scholarly discourse on digital theatre, practitioner testimonies, and international work on AR performance. The paper contends that AR in Nigerian theatre is best understood as a field of contested experimentation shaped by globalised digital imaginaries and local material constraints. It concludes that sustainable AR practice will depend less on technological novelty than on institution-building, practitioner training, and critical frameworks that foreground African performance epistemologies rather than simply importing Euro-American paradigms of "immersive" media.

Keywords: augmented reality, Nigerian theatre, techno-scenography, digital performance, postcolonial media, spectatorship

1 Introduction

The rapid expansion of digital technologies across Africa has significantly reshaped media production ecologies, with Nollywood and Nigerian music industries often foregrounded as paradigmatic cases of digital transformation, platform circulation, and global visibility (Adejunmobi, 2019). Within this landscape, the theatre sector has been slower to attract sustained scholarly attention, even though Nigerian theatre has a long history of innovating with sound, light, and scenography from the travelling Alarinjo troupes and Yoruba popular theatre through the work of Hubert Ogunde to contemporary university- and festival-based practices (Ogundeji, 2014). Recent experiments with virtual and augmented reality in Nigerian performance indicate that the stage is increasingly implicated in broader digital convergences, yet the artistic and infrastructural conditions of these experiments remain under-analysed.

Augmented reality, understood as the overlay of digital content onto physical environments in real time via headsets, smartphones, or projection systems, has been described globally as a tool for enhancing immersion, interactivity, and narrative complexity in theatre. In North American and European contexts, AR has been used to situate audiences inside character perspectives, to layer multiple temporalities onto a single site, and to turn urban spaces into dispersed performance venues (Hunter, 2023). Nigerian practitioners and scholars have begun to explore similar possibilities, arguing that AR and related immersive media can revitalise theatre's public appeal, especially among digitally native youth, by reshaping audience engagement and spatial experience (Eboh & Nwankwo, 2022; Nnamani, 2023). Yet these aspirations coexist with persistent structural obstacles, including underfunded arts institutions, patchy digital

infrastructure, and fragile professional training ecosystems for theatre technologists (Uwah & Isanbor, 2021).

The central research problem addressed in this paper is the tension between the artistic promise of AR as a mode of theatrical innovation and the practical constraints that shape its implementation in the Nigerian theatre space. While Nigerian scholarship has begun to document the potential of virtual and augmented reality to "revolutionise" theatre, most accounts either adopt a celebratory rhetoric of technological solutionism or foreground infrastructural deficiencies without fully theorising how these constraints themselves become aesthetic determinants and conceptual horizons. At stake is not only whether Nigerian theatre can "catch up" with global trends in immersive performance, but how AR might reconfigure relationships between liveness, embodiment, and digital mediation within a performance culture already deeply invested in collective presence, ritual, and orality.

This paper advances the thesis that AR in contemporary Nigerian theatre operates as a form of techno-scenography: a hybrid spatial practice in which digital overlays, sensor-based interaction, and networked media recompose stage design and spectatorship, but always in negotiation with local infrastructural realities and postcolonial media histories. Rather than treating AR as a neutral tool that can simply be added to existing practices, the paper argues that AR rearticulates core theatrical categories space, time, presence, and audience address along axes shaped by Nigeria's specific entanglements with global digital capitalism, colonial legacies of cultural policy, and emergent creative labour regimes. This framing foregrounds the theatre space as a contested site where the affordances of AR meet the affordances and constraints of power supply, bandwidth, institutional funding, and audience literacy.

The significance of this study is fourfold. First, it brings Nigerian theatre into conversation with international scholarship on AR and digital performance, which often overlooks African contexts or treats them as peripheral. Second, it enriches Nollywood-centred debates on digital visuality by considering the stage as a complementary locus of techno-aesthetic innovation, particularly in relation to production design and scenography. Third, it contributes to postcolonial media theory by showing how digital infrastructures in the Global South shape not only access but also the aesthetic form and conceptualisation of "immersion." Finally, it offers theatre practitioners and policy-makers a critically grounded account of both opportunities and constraints, thereby resisting narratives that reduce digital innovation to either utopian modernisation or dystopian cultural loss.

Methodologically, the paper combines a synthetic literature review of Nigerian and international scholarship on digital theatre, AR technology and theatre stage design, and Nigerian digital media cultures with a theoretical framework drawing on performance studies, postcolonial media theory, and affordance theory. While empirical case studies of specific productions using AR in Nigeria remain limited and often documented only in grey literature or practitioner reports, existing writing on "digital-era" Nigerian theatre, immersive media, and VR documentary practice offers a valuable archive for critical interpretation (Nwosu, 2020; Eboh & Nwankwo, 2022; Afolayan, 2023). While fully documented AR-enabled stage productions in Nigeria remain rare, scattered practitioner reports and festival showcases point to emergent experiments in hybrid scenography, such as university theatre productions that layer projection mapping over minimal sets and Lagos-based performance labs that invite audiences to access supplementary visual layers via mobile-phone AR during devised pieces. These forms of hybrid techno-scenography underscore that AR is already entering Nigerian performance ecologies, even if documentation is uneven and often confined to institutional newsletters, social media clips, or internal project reports rather than peer-reviewed scholarship. Where such materials cannot be systematically analysed, this paper treats their very ephemerality and partial visibility as symptomatic of the infrastructural and institutional constraints that shape AR's theatrical uptake

2   Literature Review

2.1   Global AR and Digital Performance Debates

Scholarly engagement with AR in theatre and performance has principally emerged from media arts, human–computer interaction, and performance studies. Early work on digital and mixed reality performance framed these practices as extensions of "intermedial performance,"

where live bodies and digital projections create hybrid spaces that reconfigure presence and representation (Giannachi, 2004). Subsequent studies have examined AR as a specific mode of real-time digital overlay, highlighting its capacity to embed virtual scenography into architectural space and to enable responsive environments that change according to performers' or spectators' actions (Dixon, 2007; Chatzichristodoulou & Zerihan, 2012).

Recent research in computer science and theatre design has explored the integration of AR into theatre stage design, analysing media characteristics and the interactive relationships between AR interfaces, performers, and audiences. These studies emphasise AR's promise in eliminating the perceived alienation of traditional "dead" scenery by making the entire theatre environment responsive and dynamically modifiable. AR has been deployed to bring virtual characters on stage, to visualise invisible forces or internal emotional states, and to allow audience members to see different layers of a performance depending on their position or device (Hogue, 2019). Such experiments resonate with Elizabeth Hunter's mixed-reality dramaturgy, which uses AR headsets to place audiences inside character perspectives and to situate classical texts such as Aeschylus's Agamemnon within everyday spaces (Hunter, 2023).

This body of work often celebrates AR as an inherently progressive aesthetic tool, linked to discourses of innovation, interactivity, and the blurring of boundaries between physical and virtual worlds. However, it has also raised critical questions. Performance theorists have interrogated how AR complicates notions of liveness, arguing that the simultaneous presence of co-located audiences and digitally mediated overlays produces layered temporalities and ontologies (Auslander, 2008). Concerns have also been raised about unequal access, the potential for technological glitches to disrupt performance, and the risk that spectacle may overshadow dramaturgical coherence (Chatzichristodoulou & Zerihan, 2012). These debates are crucial for thinking about AR in Nigerian theatre, where infrastructural and economic conditions are markedly different from the well-resourced institutions that anchor much Global North experimentation.

2.2 Nigerian Theatre in a Digital Era

Within Nigerian scholarship, digital technology in theatre has generally been approached under the broader rubric of "digital-era theatre" or "virtual performance," encompassing livestreamed productions, digital scenography, and, more recently, immersive media. A key strand of this work documents the shift from solely physical theatre spaces and analog stagecraft to hybrid and virtual modes, particularly in response to global digitalisation and, more recently, the Covid-19 pandemic (Nwosu, 2020; Adeyemi, 2021). This scholarship notes a marked change from exclusively co-present audiences to networked spectatorship, where performances may be streamed, archived, or remediated through social media.

One influential line of argument suggests that digital technologies, including VR and AR, offer Nigerian theatre an opportunity to overcome geographical barriers, reach diasporic audiences, and attract younger demographics habituated to interactive media (Eboh & Nwankwo, 2022; Emakunu, 2025). These studies emphasise the role of virtual platforms in expanding theatre's public, framing digital performance as an adaptive response to changing media ecologies. They also highlight Nigerian theatre's historical capacity for audience participation and community engagement, suggesting that immersive media may extend rather than disrupt this tradition.

At the same time, Nigerian scholars foreground the constraints of digital adoption. A widely cited discussion of "Nigerian theatre in a digital era" underscores infrastructural weaknesses (unstable electricity, limited access to high-end equipment), limited technical training, and the high cost of digital production tools as key impediments to widespread uptake of VR and AR technologies. These concerns echo wider analyses of Nigerian creative industries, which point to underinvestment in technical education, informal labour structures, and precarious funding as persistent challenges for sustainable media innovation (Krings & Okome, 2013).

2.3 Emerging Work on AR and Immersive Media in Nigerian Theatre

Specific scholarship on AR in Nigerian theatre remains relatively nascent but is beginning to crystallise. A recent paper explicitly examines "the challenges of implementing virtual and augmented reality in Nigerian theatres," arguing that while VR and AR can "revolutionise" the industry by enhancing storytelling and audience engagement, their adoption faces multiple

hurdles, including infrastructural deficits, cost, lack of specialised training, and cultural reservations about virtual mediation. This text positions AR as an extension of long-standing Nigerian theatre practices of lively performance and audience participation, proposing that immersive media can intensify these qualities by enabling new forms of interaction and spatial experience. The same study, however, notes that VR and AR have not entered mainstream culture in Nigeria and may be difficult for audiences to understand and appreciate. It highlights potential cultural resistance in contexts where live performance and in-person interaction are highly valued, such as community theatre traditions. These observations are significant for understanding AR not merely as a technical add-on but as a practice that intersects with local norms of sociality, embodiment, and ritual.

Parallel developments in Nigerian VR documentary and digital arts further suggest a growing ecosystem of immersive media experimentation. Practice-led research on VR historical documentary filmmaking in Nigeria, for example, demonstrates how VR can be used to document heritage sites such as St. Bartholomew's Anglican Church in Wusasa, creating a sense of presence and new forms of audience engagement with history. While oriented towards screen-based experiences rather than theatre per se, such projects contribute to a broader culture of immersive media practice, generating technical expertise, creative vocabularies, and institutional networks that may feed into theatrical AR experiments.

2.4   Nollywood, Digital Visuality, and Techno-Scenography

Although this paper focuses on theatre, Nollywood scholarship is indispensable for understanding the broader Nigerian discourse around digital visuality and production design. Studies of digital cinematography, virtual production, and VFX in Nollywood highlight how digital tools transform not only technical workflows but also aesthetic regimes, including colour grading, spatial composition, and the construction of spectacle (Haynes, 2016; Uwah & Isanbor, 2021). Commentary on "filmmaking trends in 2024" from Nigerian film academies, for instance, notes the rise of virtual set design and real-time VFX using engines such as Unreal, framed as ways to circumvent the costs of location shooting and elaborate physical sets.

This discourse around virtual sets and digital scenography in film has clear resonances with AR in theatre, insofar as both involve layering or substituting digital environments for physical scenographic labour. The notion of "techno-scenery" or techno-scenography emerges from such contexts as a way of describing integrated digital–physical production design that blurs boundaries between set, lighting, compositing, and visual effects (Badeji, 2022). By extending this concept to theatre, the paper situates AR within a continuum of Nigerian experimentation with digital spaces across media rather than treating it as an isolated phenomenon. However, Nollywood scholarship also reveals entrenched inequalities in access to high-end digital tools. Well-funded productions and streaming-oriented "New Nollywood" films are able to invest in complex VFX pipelines and virtual production infrastructures, while lower-budget projects remain reliant on more traditional location-based shooting and practical effects (Adejunmobi, 2019). These disparities mirror theatre's uneven access to AR technologies, suggesting that techno-scenographic innovation is stratified by capital, training, and institutional support.

2.5   Gaps and Positioning of the Present Study

Existing scholarship on AR and digital theatre in Nigeria has made important contributions by mapping possibilities and enumerating obstacles. Yet several gaps remain. First, much Nigerian writing on VR and AR is programmatic, presenting technology as a solution to declining theatre audiences or as an inevitable stage of modernisation, without sufficiently theorising how digital tools transform core theatrical concepts such as liveness, embodiment, and spectatorship. Second, while infrastructural challenges are frequently listed, they are rarely analysed as aesthetic determinants that is, as factors that shape not only whether AR can be used, but how it looks, feels, and is interpreted when it is used.

Third, the relationship between Nigerian AR theatre experiments and broader debates in performance studies and postcolonial media theory remains underdeveloped. International work on AR performance offers rich conceptual resources on intermediality, mixed reality, and interactive dramaturgy, but is seldom brought into sustained dialogue with African performance epistemologies or with postcolonial critiques of technological determinism. Finally, the interconnections between stage-based AR experiments and Nollywood's techno-scenographic

innovations have received little attention, despite their shared dependence on similar software, hardware, and creative labour.

This paper addresses these gaps by conceptualising AR in Nigerian theatre through the lens of techno-scenography, grounding its analysis in performance studies, postcolonial media theory, and affordance theory, and emphasising the mutual imbrication of artistic innovation and infrastructural constraint. In doing so, it positions Nigerian AR theatre as a crucial site for rethinking global discourses on immersive media and for foregrounding African contributions to the theorisation of digital performance.

3 Theoretical Framework

3.1 Performance Studies: Liveness, Mediation, and Embodiment

Performance studies provide a foundational framework for understanding how AR reconfigures the relationship between bodies, space, and representation in theatre. Debates around "liveness" have long interrogated whether and how mediated elements (video, sound recording, telepresence) alter the ontology of performance (Auslander, 2008). AR complicates these debates by inserting real-time digital overlays directly into the spectators' perceptual field, collapsing distinctions between stage and screen within a single embodied experience.

From a performance studies perspective, AR does not simply add new visual layers to existing practices; it transforms the dramaturgical grammar of theatrical events. The actor's body is now situated within a dynamic, algorithmically modulated environment; the scenography becomes responsive and contingent; and the spectator's attention is choreographed not only by the director but also by the interface and the logic of the AR system. In Nigerian theatre, where performance has historically been grounded in communal presence, call-and-response, and ritual enactment, this reconfiguration raises questions about how AR might amplify or disrupt existing modes of embodied participation (Nwosu, 2020).

Performance studies also offer tools for analysing how AR rearticulates spectatorship. Concepts such as the "participatory spectator," the "immersive spectator," and the "networked audience" help frame the shift from a primarily observational relationship to one of interaction and co-creation. In AR-enabled Nigerian theatre, spectators may be asked to navigate physical and virtual spaces simultaneously, to trigger events through movement or gesture, or to experience different narrative threads based on their location in the theatre. These dynamics demand a rethinking of audience discipline, safety, and consent within a context where theatre has often relied on social scripts of respect and decorum.

3.2 Postcolonial Media Theory: Technology, Power, and Modernity

Postcolonial media theory situates AR within broader histories of technological circulation, power, and representation in the Global South. Scholars of African media have long argued that media technologies are not neutral instruments but are embedded in colonial and postcolonial projects of governance, development, and cultural modernisation (Ukadike, 1994; Tcheuyap, 2011). In Nigeria, the theatre has historically been a site of anti-colonial critique, nationalist mobilisation, and cultural affirmation, from the work of Wole Soyinka to the popular Yoruba travelling theatres.

Applying postcolonial media theory to AR in Nigerian theatre involves questioning narratives that equate technological innovation with progress and universality. AR technologies are predominantly designed in Euro-American contexts and carry with them implicit assumptions about individualised spectatorship, proprietary hardware and software ecosystems, and the desirability of blurring reality and simulation. When imported into Nigerian theatre, these assumptions encounter local performance traditions, economic conditions, and ethical concerns about illusion, spiritual representation, and the commodification of culture.

Postcolonial perspectives thus foreground questions such as: Whose realities are being augmented? Which bodies and spaces are rendered visible or invisible through AR layers? How does AR intersect with existing hierarchies of language, class, and urban–rural divide in Nigerian theatre production and audiences? And how do infrastructural inequalities such as unequal access to high-speed internet, reliable electricity, or expensive headsets reproduce or

challenge older patterns of cultural centralisation around urban hubs like Lagos and Abuja? These dynamics are further complicated by the urban–rural divide in Nigerian theatre production. AR experiments are far more likely to emerge in urban centres with relatively reliable electricity, higher smartphone penetration, and proximity to universities, film schools, and media labs, whereas rural and peri-urban theatres often rely on itinerant troupes, community halls, and improvised venues with minimal digital infrastructure. As a result, AR-enabled techno-scenography risks becoming an urban-centric aesthetic, reinforcing long-standing patterns in which theatrical innovation and cultural policy investment are concentrated in Lagos, Abuja, and a few state capitals. At the same time, rural performance traditions with their flexible use of symbolic space, daylight performance, and portable scenographic materials offer conceptual resources for imagining low-tech, mobile AR interventions that could travel beyond metropolitan centres if infrastructural barriers are strategically addressed.

3.3   Affordance Theory: Technology, Practice, and Constraint

Affordance theory, originating in ecological psychology and adapted within media and technology studies, provides a vocabulary for analysing how AR both enables and constrains particular practices (Gibson, 1979; Hutchby, 2001). Affordances are not intrinsic properties of a technology; they emerge from the relationship between technological design and the capacities, needs, and contexts of users. In the context of Nigerian theatre, AR affords certain possibilities dynamic scenographic transformation, personalised perspectives, interactive storytelling but these are always conditioned by local skills, infrastructures, and institutional frameworks.

For example, AR systems afford real-time tracking of performers or objects, enabling visual effects that follow an actor's movement. Yet this affordance may be limited by the availability of tracking equipment, calibration expertise, and rehearsal time in Nigerian theatre companies that already operate under resource constraints (Uwah & Isanbor, 2021). Similarly, mobile-phone-based AR experiences afford relatively low-cost accessibility compared to specialised headsets, but they also depend on smartphone penetration, data costs, and audience digital literacy. Affordance theory encourages attention to these specificities rather than assuming a uniform set of possibilities across contexts.

Moreover, affordance theory underscores that constraints are as analytically significant as opportunities. The unreliability of power supply in many Nigerian theatre venues, for instance, may afford a particular aesthetic of contingency or improvisation, as performers and technicians develop backup plans, hybrid setups, or low-tech versions of AR effects that can survive blackouts (Nwosu, 2020). Such constraints shape not only logistical decisions but also artistic choices about when and how to rely on digital elements versus physical performance.

4   Analysis

4.1   AR and the Reconfiguration of Stage Space and Scenography

AR in theatre fundamentally reorients the relationship between physical stage architecture, scenographic elements, and digital imagery. In conventional Nigerian theatre, scenography has often relied on a combination of painted flats, props, costumes, and lighting, supplemented by minimal projection technology in better-resourced venues (Ogundeji, 2014). The introduction of AR promises to transform this regime by enabling digital overlays that can shift in real time, respond to performers, and create the illusion of three-dimensional environments without the need for extensive physical construction.

In global AR theatre practice, stage designs have integrated spatial AR projections to create interactive environments in which actors appear to move through dynamically changing landscapes. Nigerian discourse on VR and AR in theatre imagines similar possibilities, envisioning virtual sets that can transport audiences from Lagos street scenes to mythic forests or futuristic Lagos skylines within a single performance, all while preserving the presence of live performers. This vision aligns with broader Nollywood experiments in virtual set design and digital matte painting, where digital environments compensate for budgetary and logistical constraints on location shooting.

However, the reconfiguration of stage space through AR in Nigeria is not a straightforward substitution of physical sets with digital ones. Infrastructural constraints mean that much

AR experimentation is likely to occur in university theatres, festivals, or well-funded cultural centres rather than in commercial community venues, leading to a stratified geography of techno-scenographic innovation (Nwosu, 2020). The availability of projectors, tracking systems, or AR headsets, as well as technical staff trained to operate them, shapes which theatres can implement such designs and which remain tied to more traditional scenography.

Moreover, Nigerian theatre's historical emphasis on symbolic and ritual space complicates the adoption of hyper-literal AR environments. In many Nigerian plays, abstract or symbolic staging allows for fluid shifts between village and city, earthly and spiritual realms, often through minimal scenic cues and the interpretive labour of audiences (Soyinka, 1976). AR could either reinforce this tradition by visualising otherwise invisible forces ancestral presences, spiritual energies, or mythic landscapes or undermine it by substituting didactic digital illustration for symbolic ambiguity.

The concept of techno-scenography helps articulate this tension. AR does not simply generate realistic virtual spaces; it creates layered environments in which physical and digital elements interact. A Nigerian production might, for instance, retain a minimal physical set perhaps a single tree, doorway, or shrine while using AR projections or headset-based overlays to suggest shifting temporalities or unseen agents around it. Such a strategy would treat AR as a means of intensifying symbolic space rather than replacing it with pseudo-cinematic realism. Yet this requires careful dramaturgical integration and technical reliability; poorly calibrated AR effects risk appearing as gimmicks that distract from performance rather than deepening it.

In practice, the affordances and constraints of AR will likely produce hybrid scenographies. Unreliable power supply and equipment limitations may compel directors to design performances that can function both with and without AR elements, effectively building redundancy into techno-scenographic plans (Nwosu, 2020). This dual-mode design could itself become an aesthetic strategy, foregrounding the fragility and contingency of digital overlays within a performance that thematises technological precarity or digital inequality. In such cases, AR's failure or intermittence is not merely a technical problem but a dramaturgical resource.

In the Nigerian theatre context, it is useful to distinguish between three broad AR modalities: mobile-based AR accessed through smartphones or tablets, headset-based AR using dedicated devices such as smart glasses, and projection-based AR that overlays digital imagery onto stage architecture. Mobile AR is comparatively accessible where smartphone ownership is high, but it depends on audience data costs, battery life, and digital literacy, and it risks individualising perception by relocating key aspects of spectatorship onto personal screens. Headset-based AR affords highly immersive, personalised overlays and complex tracking but is least compatible with current Nigerian theatre infrastructures, given the cost of hardware, maintenance demands, and concerns about hygiene, accessibility, and audience management in crowded venues. Projection-based AR, by contrast, aligns most closely with existing scenographic practices: it can extend familiar projection and lighting setups into dynamic, responsive environments, but remains vulnerable to unstable power supply, limited black-box conditions, and the technical expertise required to calibrate projectors and tracking systems in non-standardised theatre spaces

4.2   AR, Spectatorship, and Participatory Dramaturgies

AR's most widely celebrated promise in theatre is its capacity to reshape spectatorship, offering personalised, interactive experiences that differ from seat to seat or device to device. Internationally, productions using AR headsets or mobile devices have placed audiences inside character perspectives, allowed them to unlock hidden narrative layers by moving through space, or enabled branching storylines based on audience choices (Hunter, 2023). Such practices resonate with Nigerian theatre's longstanding traditions of audience participation, improvisation, and call-and-response.

Nigerian scholarship on digital-era theatre notes that virtual platforms and digital technologies can help "engage a new theatre audience," particularly younger Nigerians who are accustomed to interactive media and social networks. AR could extend this engagement by allowing audience members to see themselves incorporated into the scenographic environment, to trigger effects through gestures or voice, or to receive personalised narrative cues via their phones. In a Lagos theatre, for example, an AR-enabled play might invite audiences to scan QR codes on their tickets to access supplementary visual layers or interactive polls that influence certain aspects of the performance.

Yet the translation of AR-based participatory dramaturgy into Nigerian contexts raises several issues. First, unequal access to devices and data may make mobile-based AR experiences more accessible to middle-class urban audiences than to working-class or rural spectators, reinforcing existing class-based segmentation of theatre audiences (Adejunmobi, 2019). Second, Nigerian theatre's participatory conventions are typically collective and vocal: audiences respond in chorus, sing along, or physically join processions on stage. AR, particularly when delivered via individual headsets or personal screens, risks individualising perception and attenuating shared, co-present forms of participation.

To reconcile these dynamics, Nigerian theatre-makers experimenting with AR may seek to design experiences that layer individualised digital perception onto collective embodied practices. For instance, shared AR projections visible to the entire audience can be combined with moments where individual devices deliver different textual or visual information, preserving a sense of communal spectatorship while introducing personalised interpretation. Alternatively, AR could be used sparingly, as a transitional device or as an occasional "slippage" between visible and invisible realms, rather than as a constant layer throughout the performance.

Performance studies concepts of the networked and immersive spectator underscore that participation is never purely technical; it is governed by social norms, expectations, and power relations. In Nigerian theatre, where audience–performer boundaries are often porous, AR-enabled participation might intensify the sense of co-creation, but it might also produce confusion if spectators are unsure when and how to interact with devices or overlays. Clear dramaturgical framing and perhaps pre-show orientation would therefore be crucial, especially for audiences unfamiliar with AR or wary of being recorded, tracked, or visually manipulated.

Cultural and spiritual concerns also shape spectator responses. The aforementioned Nigerian study on VR and AR implementation notes that some audiences may resist immersive media due to cultural beliefs that prioritise live, unmediated performance or that view certain forms of illusion as spiritually fraught. AR effects that render spirits, deities, or ancestral presences visible, for instance, may be interpreted differently depending on religious and cultural backgrounds. Theatre-makers must navigate these sensitivities, balancing the desire for spectacular visualisation with respect for local epistemologies of the invisible and the sacred.

Finally, AR's participatory affordances intersect with questions of surveillance and data. AR systems often collect positional, gestural, or biometric data to function. In contexts where data protection regimes are weak and digital literacy uneven, audiences may be unaware of what is being collected and how it might be used. A postcolonial media perspective mandates that Nigerian theatre experiments with AR address these issues transparently, perhaps incorporating them into the dramaturgy itself by foregrounding themes of visibility, tracking, and control. These different modalities intersect unevenly with Nigerian performance traditions. Projection-based AR preserves a shared field of vision and may therefore better sustain the communal, vocal modes of spectatorship associated with Yoruba popular theatre and contemporary urban stages, whereas mobile and headset-based systems tend to privilege individuated perception and raise more acute questions about how to maintain collective rhythms of call-and-response, chorus, and audience address.

4.3 Infrastructural and Institutional Challenges as Aesthetic Determinants

All discussions of AR in Nigerian theatre must reckon with the material conditions of infrastructure and institutional support. Nigerian scholarship on digital-era theatre consistently identifies unreliable electricity, high equipment costs, limited technical training, and inadequate institutional funding as major obstacles to sustained digital innovation. The specific demands of AR high-performance computing, calibrated tracking, networked devices, and sophisticated software intensify these challenges.

One key issue is the capital cost of AR hardware. While mobile-phone-based AR experiences can be relatively low-cost where smartphone penetration is high, theatre-specific AR solutions such as headsets, motion-tracking cameras, or specialised projection systems require significant investment. In a context where many theatre companies struggle to cover basic production costs, AR may be feasible only for a handful of well-funded venues, university departments, or international collaborations (Uwah & Isanbor, 2021). This stratification risks producing an "AR divide" within the Nigerian theatre ecology.

Technical expertise is another critical barrier. The Nigerian study on VR and AR in theatres notes a lack of specialised training for theatre technologists, with most practitioners learning informally or importing expertise from film and advertising sectors. AR requires collaboration between programmers, designers, and theatre practitioners who can negotiate both artistic and technical demands. While Nigerian film academies and media labs are beginning to introduce courses in virtual production and VFX, these initiatives are largely geared towards screen media rather than live performance. Bridging this gap will require intentional curriculum development and cross-sector collaboration.

However, infrastructural constraints are not only obstacles; they also shape the aesthetic and conceptual forms that AR theatre in Nigeria can take. Limited power reliability may encourage battery-powered, mobile AR installations that can tour to different venues without relying on fixed grid connections. Bandwidth constraints might privilege pre-downloaded AR content that functions offline, rather than continuous cloud-based streaming. Such constraints could lead to AR experiences that are more localised, site-specific, and resource-conscious than their Global North counterparts.

From an affordance perspective, these conditions produce a distinctive techno-scenographic sensibility. Instead of the seamless, high-resolution illusions often prized in Euro-American AR theatre, Nigerian AR theatre may embrace a patchier, intermittent, or stylised aesthetic, integrating glitches, latency, and resolution limits into its visual language. This aesthetic could be aligned with broader African media practices that creatively appropriate limited resources, such as the inventive use of found objects in set design or the improvisational staging practices of popular theatre.

Institutionally, the success of AR in Nigerian theatre will depend on how cultural policy, funding bodies, and educational institutions recognise and support such experimentation. Nigerian theatre journals and arts councils are beginning to acknowledge digital-era theatre as a priority area, documenting digital innovations and advocating for better infrastructure. Yet without sustained investment and capacity-building, AR risks remaining a marginal or short-lived trend. The institutionalisation of AR would involve not only hardware acquisition but also the development of critical discourse, documentation practices, and archiving methods that can capture the ephemerality of AR-based performances.

Crucially, institutional responses must avoid reproducing techno-determinist narratives that equate AR adoption with modernity or artistic legitimacy. A postcolonial media framework insists that AR be evaluated not by its novelty alone but by how it contributes to or detracts from theatre's social, political, and aesthetic functions in Nigeria. Institutions should thus support AR experiments that engage critically with Nigerian realities, rather than simply replicating imported models of "immersive" theatre.

5 Discussion

One prominent counterargument to the uptake of AR in Nigerian theatre is that it represents an unnecessary technological distraction from the core strengths of Nigerian performance traditions: live embodied presence, verbal artistry, music, dance, and communal engagement. From this perspective, AR threatens to substitute digital spectacle for the intimate, socially grounded dimensions of theatre, thereby undermining the medium's distinctive contributions within a media landscape already saturated with screens and visual effects (Nwosu, 2020).

Critics might argue that Nigerian theatre's most urgent needs are not technological upgrades but sustainable funding, audience development, and infrastructural repairs better auditoria, sound equipment, and lighting rather than experimental AR setups. They may warn against a form of "technological mimicry" in which Nigerian theatres adopt Euro-American digital trends in pursuit of prestige, without adequately considering local audience expectations, economic realities, or long-term maintenance costs (Tcheuyap, 2011). In this view, AR risks becoming a superficial marker of modernity.

A second line of scepticism emphasises cultural and spiritual concerns. As the Nigerian study on VR and AR in theatres observes, some communities may resist immersive technologies on the grounds that they prioritise live, unmediated interactions and view certain forms of illusion as spiritually unsettling. AR effects that render spiritual entities or supernatural phenomena visually present could be seen as trivialising or commodifying religious beliefs, or as crossing

boundaries between the permissible and the taboo. This concern is sharpened by the fact that AR technologies are developed largely outside African epistemic frameworks, raising questions about whose cosmologies they implicitly encode.

A third argument focuses on practicality: given the infrastructural constraints and limited technical expertise documented in Nigerian theatre, investing in AR may produce fragile, unsustainable interventions that quickly break down or become obsolete. Theatre companies might expend considerable resources on a single AR-enhanced production, only to find themselves unable to maintain or repurpose the equipment for future work. This scenario would divert scarce resources from more foundational needs and undermine confidence in digital experimentation.

The argument advanced in this paper takes these counterpoints seriously but contends that they do not warrant a wholesale rejection of AR in Nigerian theatre. Instead, they underscore the importance of critically grounded, context-sensitive approaches to AR as techno-scenography.

First, the concern about technological distraction rests on an implicit binary between "pure" theatre and "contaminating" technology that does not adequately reflect theatre's historical intermediality. Nigerian theatre has long incorporated technological elements from microphones and loudspeakers to film projections and electric lighting as part of its aesthetic repertoire (Ogundeji, 2014). AR can be understood as another stage in this evolving relationship rather than a radical rupture. The question is not whether to use technology but how to integrate it in ways that support rather than overshadow performance.

Second, fears of technological mimicry are justified to the extent that they highlight the risk of uncritical importation of Euro-American models. However, a postcolonial media framework suggests that technologies like AR are always subject to processes of localisation, appropriation, and re-signification. Nigerian theatre-makers have a track record of adapting foreign forms such as the proscenium stage, Shakespearean drama, or cinematic storytelling to local purposes, infusing them with indigenous aesthetics and political concerns (Ukadike, 1994; Adejunmobi, 2019). There is no reason to assume that AR would be any less subject to such creative appropriation.

The key is to centre Nigerian performance epistemologies in the design and interpretation of AR experiences. For example, AR could be used to visualise Yoruba cosmologies in ways that honour symbolic complexity rather than reducing them to exoticised spectacle, or to stage historical events in ways that invite critical reflection on colonial and postcolonial histories rather than merely offering immersive tourism. Theatre-makers can also draw on AR to comment reflexively on digital surveillance, data extraction, or infrastructural inequality, thereby aligning technological experimentation with critical social agendas.

Third, the practical concerns about sustainability point towards the need for incremental, scalable, and context-appropriate AR interventions rather than large-scale, resource-intensive projects. Mobile-based AR experiences that rely on widely available smartphones may be more viable than headset-based systems; minimal AR overlays that complement rather than replace physical scenography may be easier to maintain and adapt. Collaborations with Nollywood postproduction houses, VR documentary studios, and game developers could pool expertise and distribute costs, building a shared infrastructure for techno-scenographic experimentation.

The paper's position, then, is not that AR is an unqualified good for Nigerian theatre, but that it is a significant locus of negotiation where artistic innovation, infrastructural constraint, and postcolonial media politics intersect. To refuse AR outright would risk ceding the conceptual terrain of immersive media to other sectors (commercial entertainment, advertising, or foreign cultural institutions) and limiting Nigerian theatre's capacity to intervene in emerging digital imaginaries. Conversely, to embrace AR uncritically as a symbol of progress would obscure the power relations and material conditions that shape its deployment.

What remains most convincing in the paper's argument is the framing of AR as techno-scenography: a practice that reorganises stage space, spectatorship, and narrative in relation to both digital affordances and local constraints. This framing allows for critical evaluation of specific AR implementations, asking whether they deepen or dilute theatrical engagement, whether they reinforce or challenge existing inequalities without collapsing into blanket endorsement or rejection. It also foregrounds the possibility that some of the most innovative contributions of Nigerian theatre to global AR discourse may emerge precisely from its negotiation with infrastructural fragility, cultural pluralism, and postcolonial critique.

The analysis is therefore constrained by the paucity of formally documented AR theatre productions in Nigeria and the fragmentary nature of available grey literature. This limitation points to an urgent agenda for future research, including sustained documentation of AR-enabled performances, practice-based collaborations with theatre-makers, and archival strategies that can capture hybrid scenographies before they disappear from view.

6   Conclusion

Augmented reality in contemporary Nigerian theatre crystallises a complex set of tensions between artistic innovation and practical constraint, between global digital imaginaries and locally grounded performance traditions. Conceptualised as techno-scenography, AR does more than add visual effects; it reorganises stage space, reconfigures spectatorship, and invites new forms of dramaturgy that are simultaneously enabled and limited by Nigeria's infrastructural landscape and postcolonial media histories. In this sense, AR becomes a critical lens through which to examine how digital technologies are integrated into African performance cultures, not as neutral tools but as contested mediators of presence, embodiment, and visibility.

The analysis in this paper has shown that while Nigerian scholarly and practitioner discourse often highlights the transformative potential of VR and AR to revitalise theatre and engage new audiences, it also foregrounds the persistent obstacles of cost, technical expertise, and cultural acceptance. These constraints, however, are not merely barriers to be overcome; they are aesthetic determinants that shape the forms AR theatre can take. Hybrid scenographies, intermittent digital overlays, and mobile-based AR installations may emerge as distinctively Nigerian responses to resource limitations, generating new techno-scenographic idioms that depart from the seamless high-tech illusions often valorised in Euro-American contexts.

Theoretically, situating Nigerian AR theatre at the intersection of performance studies, postcolonial media theory, and affordance theory enables a nuanced understanding of how liveness, mediation, and infrastructure intersect in digital performance. It underscores that AR's affordances are always relational and that the same technology can support different aesthetic and political projects depending on how it is appropriated. In Nigerian theatre, AR holds the potential to extend long-standing traditions of symbolic space, participatory spectatorship, and socio-political critique, provided it is integrated with attentiveness to local epistemologies and material realities.

For humanities scholarship, the Nigerian case challenges universalising narratives about immersive media by demonstrating how global technologies are reworked in specific cultural and infrastructural settings. Future research would benefit from detailed case studies of AR-enabled productions, ethnographic work with theatre-makers and audiences, and comparative analyses across African contexts. Such work could further illuminate how African performance practices contribute to reimagining the boundaries of theatre in an age of augmented realities, ensuring that discussions of digital performance are not confined to the Global North but reflect the full diversity of contemporary theatrical innovation.

Conflicts of Interest

The authors declare that they have no conflict of interest.

AI Disclosure Statement

During manuscript preparation, we used Google Scholar's AI and Quilbot features to organize literature reviews, enhance readability, and format citations. All AI-generated content was carefully reviewed for accuracy and to verify that references were genuine. We extensively edited all AI outputs to ensure the manuscript represents their own scholarly analysis and insights. This work complies with the AI tool's terms of service and data privacy requirements. We accept full responsibility for the manuscript's content and integrity.

References

Adejunmobi, M. (2019). Media, technology, and creative industries in Africa. Polity.

Adeyemi, O. (2021). Digital theatre and the Covid-19 pandemic: Rethinking liveness in Nigerian performance. Nigerian Theatre Journal, 21(1), 45–62.

Afolayan, T. (2023). Virtual reality and the remediation of Nigerian historical memory. Journal of African Screen Studies, 5(2), 67–88.

Auslander, P. (2008). Liveness: Performance in a mediatized culture (2nd Ed.). Routledge.

Badeji, J. A. (2022). Communication Aesthetics of Techno-scenery and Lighting in Bolanle Austen-Peters Queen Moremi the Musical. Journal of Creative Arts, Communication and Media Studies, 1(2), 21–39.
https://doi.org/10.33886/jccm.v1i2.470

Chatzichristodoulou, M., & Zerihan, R. (Eds.). (2012). Intimacy Across Visceral and Digital Performance. Palgrave Macmillan UK.
https://doi.org/10.1057/9781137283337

Dixon, S. (2007). Digital Performance.
https://doi.org/10.7551/mitpress/2429.001.0001

Eboh, G., & Nwankwo, P. (2022). Streaming the stage: Digital platforms and the future of Nigerian theatre. Journal of African Cultural Studies, 34(3), 289–306.

Emakunu, E. (2025). Engaging a new theatre audience in Nigeria. Nigerian Theatre Journal, 22(2), 101–118.

Gibson, J. J. (1979). The ecological approach to visual perception. Houghton Mifflin.

Giannachi, G. (2004). Virtual Theatres. Routledge.
https://doi.org/10.4324/9780203500033

Haynes, J. (2016). Nollywood.
https://doi.org/10.7208/chicago/9780226388007.001.0001

Hogue, Z. (2019). Augmented dramaturgies: Immersive spectatorship in mixed reality performance. Theatre Journal, 71(4), 421–440.

Hunter, E. (2023, November 20). Theater in augmented reality: Technology bridges audience and stage. Arts & Sciences Ampersand, Washington University in St. Louis.

Hutchby, I. (2001). Technologies, Texts and Affordances. Sociology, 35(2), 441–456.
https://doi.org/10.1177/s0038038501000219

Imiti, A. L. (2022). Nigerian theatre in a digital era and environment. International Journal of Arts and Humanities, 3(1), 93-100.
https://doi.org/10.25082/IJAH.2022.01.002

Krings, M., & Okome, O. (Eds.). (2013). Nollywood and beyond: Transnational dimensions of an African video film industry. Indiana University Press.

Nnamani, C. (2023). Immersive media and youth audiences in Nigerian urban theatre. Review of Arts and Humanities, 12(1), 55–73.

Ogundeji, P. (2014). Scenography and the Nigerian stage: From itinerant theatre to university-based productions. The Creative Artist: A Journal of Theatre and Media Studies, 8 (2), 33–52.

Oke, A. E., & Arowoiya, V. A. (2022). Critical barriers to augmented reality technology adoption in developing countries: a case study of Nigeria. Journal of Engineering, Design and Technology, 20(5), 1320–1333.
https://doi.org/10.1108/JEDT-12-2020-0519

Tcheuyap, A. (2011). Postnationalist African cinemas. Manchester University Press.

Ukadike, N. F. (1994). Black African Cinema.
https://doi.org/10.1525/9780520912366

Uwah, I. E. (2019). The Rhetoric of Culture in Nollywood. Goldline & Jacobs.