

Contemporary Film Industry under the Influence of Visual and Immersive Technologies: A Strategic Change?

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Abstract: *The contemporary film industry is under increasing pressure from the rapid development of visual and immersive technologies, which reconfigure both production practices and forms of film reception. This paper analyzes how technologies such as real-time virtual production, XR stages, advanced CGI, real-time rendering and performance capture systems strategically influence contemporary cinema, going beyond the status of simple technical tools and becoming structural factors of industrial change. Starting from theoretical frameworks developed in studies on immersive art, visual culture and interactive media, the research proposes a qualitative and comparative approach, applied to representative case studies: The Mandalorian (2019), Avatar: The Way of Water (2022) and Dune (2021). The analysis highlights that immersive technologies are integrated differently, depending on the aesthetic objectives, economic models and industrial positioning of each production, generating distinct levels of immersion and strategic impact. The results suggest that the current transformation of the film industry does not follow a unitary trajectory of technological escalation, but reflects a spectrum of adaptive strategies that negotiate the tension between spectacle, narrative, artistic authenticity and market pressures. In this context, immersion appears not only as an aesthetic promise, but as a strategic tool that redefines the relationship between film, spectator and contemporary production infrastructure.*

Keywords: experimental film, digital technologies, immersive projections, immersive cinematography, immersive technologies.

Introduction

Cinematography has always been an evolving art, constantly relying on technological developments to bring visual and auditory experiences closer to reality. Although film has not yet reached complete perfection, modern technologies have made significant strides in rendering a more complete illusion of reality. Beyond the introduction of sound and natural colors, the most challenging stage remains the rendering of the image in relief, an essential aspect for the realization of the so-called integral cinematography.

The current orientation of the film industry towards immersive and extended visual environments can be understood as part of a much broader genealogy of spatial illusion and mediated experience. As Koeck argues, immersive experiences are not an exclusively digital phenomenon, but are “deeply rooted in historical, cultural, and architectural discourses”, evolving from the first image-spaces to the hybrid screen-based environments of today (Koeck, 2024). Drawing on Paul Valéry’s early anticipations of sensory media (Valery, 1928), Koeck recalls the prediction that artworks would acquire “a kind of ubiquity”, with an apparatus everywhere making their perception possible, thus prefiguring contemporary on-demand experiences mediated by screens (Koeck, 2024). This logic of reproducibility and spatial displacement resonates deeply with cinema, which historically functioned as a “space machine (Raum-Apparat), capable of producing unknown narrative worlds, virtual journeys, and other types of spatiotemporal illusions and simulations” (Koeck, 2024).

The contemporary film industry is increasingly shaped by the rapid development of visual and immersive technologies, which are profoundly reconfiguring the relationship between audiovisual content, viewer experience, and cultural value. Similar to the transformations observed in immersive art exhibitions, the cinematic experience has progressively shifted its focus from the intrinsic qualities of the art object to experiential intensity and sensory involvement. As Huang observes in the context of immersive exhibitions, “the primary emphasis shifts from the original art objects, bearing the authentic ‘aura’, to the sensationalism that the digitized version of art pursues and achieves” (Huang, 2023). This paradigm is directly applicable to contemporary cinema, where advanced CGI, virtual production, IMAX, and multisensory formats are increasingly redefining film as an immersive event rather than a purely narrative medium.

Literature review

The contemporary film industry is increasingly operating under the pressure of visual and immersive technologies that reconfigure the viewer’s experience and challenge traditional cinematic paradigms. As Meng argues, immersive media have reached unprecedented popularity through “recently developed digital technologies such as projection mapping and large-scale LED screens”, which, in turn, generate “a demand for a change in attitude towards artistic reception” (Meng, 2024).

This change directly affects cinema, historically anchored in a fixed viewing position and linear narrative, as immersive media privilege spatial experience and sensory involvement over classical cinematic distance. The logic of immersion echoes earlier visual regimes, as viewers of 19th-century panoramas described the experience as one that was “lived as the real presence of a second world” (Meng, 2024), a statement that resonates strongly with contemporary immersive cinema spaces, such as LED-dominated theaters and large-scale media architectures.

However, unlike classical cinema, contemporary immersive reception increasingly demands the active participation of the viewer, emphasizing “physical participation” and viewer activation rather than “optical contemplation (which is passive and detached)” (Meng, 2024).

This transformation puts pressure on the film industry to rethink its strategies, as today’s immersion is inseparable from the circulation on social networks, where viewers simultaneously consume, document, and distribute audiovisual experiences. As Meng observes, immersive media face a structural dilemma, as “the term ‘*immersion*’ becomes a commodity that obscures its originality in depth as it confronts the market” (Meng, 2024). As a result, contemporary cinema is forced to negotiate between technological spectacle, narrative coherence, and market-dictated visibility, signaling a strategic reconfiguration of production, distribution, and audience engagement in an increasingly immersive visual culture.

Essentially, Koeck positions early cinema not simply as a medium of representation, but as an immersive medium, in which architectural space, moving images, and collective spectacle merged into a unified experiential form. Continuing Walter Benjamin’s reflections on the desire of modern audiences to bring things “closer, spatially, and humanly” through technological reproduction (Benjamin, 1936), Koeck suggests that contemporary audiences have largely accepted the loss of material authenticity in favor of a digitally mediated presence. This shift is intensifying in the context of XR, VR, and AI-powered visual systems, which increasingly blur the line between representation and experience. Although he echoes Jean Baudrillard’s warning that simulation risks becoming “a gigantic simulacrum” detached from referential reality, Koeck qualifies this position, defining immersive environments as experiential simulations rather than total substitutions of reality. In this theoretical framework, contemporary cinema’s strategic

orientation towards immersive technologies appears less as a rupture and more as a historical continuation: an intensification of film's long-standing ambition to place the viewer inside narrative space, an ambition amplified today by real-time rendering, spatial computing, and hybrid screen architectures.

Technological innovation does not function simply as an aesthetic addition, but as a strategic mechanism geared toward accessibility and audience expansion. Huang argues that "technological strategy is largely what makes works of art more accessible, whether in terms of time and space or in relation to the demands of professional knowledge" (Huang, 2023).

In the film industry, immersive technologies similarly reduce cognitive and cultural barriers, allowing global audiences to engage with predominantly visual content without the need for complex interpretive frameworks. This strategic orientation is consistent with the industry's increasing reliance on transnational markets and franchise-based narratives. Furthermore, immersive technologies transform the viewer's experience by repositioning them from a passive observer to an active participant in the cinematic experience. As Huang points out, "these strategies allow the audience to take the initiative in living, understanding, and embodying a story, rather than passively accepting pre-established meanings" (Huang, 2023).

In cinema, this shift is evident in interactive narratives, VR cinema, and hybrid formats that blur the boundaries between film, video games, and virtual environments. The prioritization of multisensory stimulation further reinforces this trend, as "such multisensory immersion extends beyond the physical entities of art and encompasses the entire artistic space" (Huang, 2023), redefining the cinematic space as a comprehensive sensory environment. However, this strategic transformation is not without critical tensions. The increasing reliance on immersive spectacle has generated concerns about authenticity and artistic integrity. Huang notes that immersive practices are often criticized for their emphasis on "aesthetic adaptation" over "authentic display" (Huang, 2023), a criticism that resonates strongly in contemporary cinematic discourse.

As cinema increasingly orients itself toward spectacular immersion and immediate emotional impact, questions arise about the dilution of authorial vision and narrative depth. Ultimately, this evolution reflects a broader cultural shift, in which immersive technologies contribute to the "desacralization of cultural institutions and the democratization of art previously considered elitist" (Huang, 2023), placing the film industry at the intersection of artistic innovation, commercial strategy, and technological pressure.

Methodology

This research adopts a qualitative, theory-based methodology that draws on conceptual frameworks developed in immersive and interactive media studies to analyze contemporary cinema under the pressure of visual and immersive technologies.

In particular, the distinction between immersion and interactivity is used as an analytical tool, with immersion being understood not only as a form of technological closure, but as an experiential condition in which "for an experience to be considered immersive, it must be more than a three-dimensional image surrounding a user" (Charitonidou, 2020).

In line with Charitonidou's argument that immersive experiences reconfigure the role of the audience, the methodology treats viewers not as passive entities but as active agents, as immersive practices increasingly tend to "treat visitors not as spectators but as active agents in the process". This approach is further supported by the idea that meaning in technologically mediated experiences emerges through interaction, as "meaning emerges through the process of exchange, and interactivity itself constitutes the medium of the work" (Charitonidou, 2020).

By transferring these concepts from the realm of interactive art and exhibition design to film analysis, the study examines how contemporary cinema integrates immersive technologies as strategic tools that transform narrative structures, the position of the viewer, and modes of engagement. Finally, the methodological framework recognizes the interdependence between technological, aesthetic, and institutional dimensions, reflecting the assertion that immersive practices significantly influence “the interrelationships between technical, aesthetic, and institutional aspects” of cultural production (Charitonidou, 2020).

At the same time, this research adopts a comparative methodology, anchored in visual culture and media studies, capitalizing on theoretical perspectives from contemporary immersive art practices to contextualize transformations in the film industry. As Meng observes, “with the development of digital technologies such as projection mapping and large-scale LED screens, immersion has reached enormous popularity, generating the need for a change in attitude towards the viewer” (Meng, 2024).

Drawing on methodologies developed in the field of immersive exhibition design, the study conceptualizes immersive audiovisual environments as transformational processes, rather than simple representational tools. As Tang, Zhang, and Wang argue, immersive media practices are structured by “three stages of data visualization: data transformation - content transformation - and spatial transformation, which includes the transposition of data into an immersive spatial narrative within the exhibition space” (Tang et al., 2024).

This model is adapted here to analyze how contemporary cinema integrates virtual production, spatial computing, and real-time rendering into filmic workflows. Moreover, immersive environments are understood not as simple neutral containers, but as active narrative agents, as “the exhibition space is no longer just a support for objects, but an integral part of the artwork” (Tang et al., 2024).

To investigate how immersive visual technologies reshape audience spectatorship and engagement in the contemporary film industry, this study adopts a methodological framework inspired by empirical research on sensory-immersive environments. Following a comparative approach based on field studies, the methodology starts from the premise that “immersive experiences significantly enhance attention, experience, and overall satisfaction” by intensifying visual and auditory stimuli (Luo et al., 2025). Similar to immersive exhibitions, contemporary cinematic formats that utilize large-scale projections, spatial sound, and digitally augmented imagery operate in what the authors describe as a “multisensory environment” designed to “capture visitors’ attention, thereby expanding the framework of the experience economy by exploring cause-effect relationships” (Luo et al., 2025).

This methodological framework thus analyses film not only as a narrative medium, but also as a spatial and experiential system, increasingly shaped by immersive visual technologies. Furthermore, immersive participation is no longer limited to perceptual engagement, as “immersive participation involves not only viewers but also their behavior on social media”, challenging creators to negotiate “a balance between artistic design and market demands” (Meng, 2024).

Methodologically, the study combines detailed analysis of filmic form with case study-based observation of exhibition technologies and audience interaction, recognizing that “mirrors, projection mapping and LED screens are frequently used to achieve immersion”, each producing distinct perceptual and psychological effects (Meng, 2024).

Applied to film studies, this perspective allows for the analysis of how LED volumes, XR sets, and immersive scenography reshape cinematic authorship and the position of the viewer. The methodology thus emphasizes spatial analysis, technological mediation, and viewer involvement,

recognizing that immersive technologies generate “a new relationship between viewers, art, and the exhibition setting” (Tang et al., 2024), a relationship increasingly reflected in contemporary cinematic production and reception in immersive and virtual contexts.

From a methodological point of view, the research design aligns with the Stimulus-Organism-Response (SOR) model (Hochreiter et al., 2022), in which amplified sensory input functions as a stimulus that activates cognitive and affective processes at the viewer’s level, ultimately shaping evaluative responses. As the source study emphasizes, “instead of isolating individual sensory modalities, the study considers the global sensory environment”, a principle particularly relevant to film analysis, where visual immersion, sound design, and narrative temporality converge into a unified experiential system (Luo et al., 2025).

Consequently, this methodological orientation allows for the analysis of contemporary cinema not only as a narrative medium, but as an experiential platform increasingly shaped by immersive technologies, signaling a strategic transformation in film production, distribution, and reception.

By integrating these perspectives, the methodology investigates how contemporary cinema strategically adapts to the pressure of immersive technologies, signaling not just a technical evolution but a structural shift in models of spectatorship and film production.

Immersive Technologies and Strategic Transformation in Contemporary Filmmaking

1. *The Mandalorian (2019) - Real-time Virtual Production and XR Sets*
2. *Avatar: The Way of Water (2022) - Data-driven Immersion and Hybrid Virtual Pipelines*
3. *Dune (2021) - Controlled Immersion and Cinematic Worldbuilding*

The Mandalorian marks a turning point in contemporary film and television production through its systematic use of real-time virtual production, based on XR sets and Unreal Engine. The series replaces traditional green screen workflows with large-scale LED volumes, enabling real-time rendering of digital environments that dynamically respond to camera movement and lens data. This approach aligns with immersive media principles that emphasize spatial transformation, according to which “physical architectural dimensions do not constrain spatial narratives” (Tang et al., 2024).

The Mandalorian (2019) is a paradigmatic example of virtual production, using ILM’s XR StageCraft environment to combine real-time rendered backgrounds in Unreal Engine with live-action interpretation. In methodological terms, this production model exemplifies how immersive visual systems function as an “experience-centric” environment, where sensory intensity is designed to “capture attention” and guide perceptual focus, not only for viewers but also for directors, cinematographers, and actors during production (Luo et al., 2025).

Technologically, the pipeline integrates pre-visualization, real-time rendering, and visual effects created directly in the camera, compressing post-production processes into the filming phase. As a result, the film set becomes an active narrative system, rather than a neutral setting, reflecting the idea that immersive environments function as “an integral part of the work of art” (Tang et al., 2024). Strategically, this pipeline reconfigures production efficiency, reduces reliance on location shooting, and increases creative control during principal photography, indicating a structural transformation of cinematic flows.

In contrast to the real-time immediacy of *The Mandalorian*, *Avatar: The Way of Water* exemplifies a hybrid immersive pipeline that prioritizes data transformation and simulation-based realism. James Cameron’s production integrates advanced performance capture, virtual cameras, and large-scale environmental simulations to construct immersive underwater worlds. This process

reflects immersive methodologies based on sequential stages of transformation, in which content evolves through successive layers of technological mediation before its final spatial articulation.

Similarly, *Avatar: The Way of Water* (2022) extends the immersive logic through advanced performance capture and virtual camera systems, constructing a digitally embodied cinematic space that reinforces what immersive experience research defines as the enhancement of “experiential attention and engagement” through coherent multisensory integration (Luo et al., 2025).

Although Unreal Engine is widely used for pre-visualization and virtual cinematography, the final image results from a complex interplay between real-time tools and high-fidelity offline rendering. The immersive logic here is less focused on immediacy and more on world coherence and bodily performance, reinforcing the idea that immersive technologies create “specific modes of perception that affect the interaction between spectators, architecture, and narrative design” (Tang et al., 2024).

From a strategic perspective, *Avatar* demonstrates how immersive technologies go beyond the realm of production efficiency, functioning as long-term infrastructural investments that redefine cinematic worldbuilding and audience immersion.

Dune adopts a more restrained and selective integration of immersive technologies, combining real locations, built sets, and digital environments in a controlled pipeline. While not entirely based on XR sets, the film uses immersive visualization tools for pre-visualization, spatial planning, and environment augmentation, ensuring continuity between physical and digital spaces. This approach resonates with the view that immersive environments do not aim to replace traditional practices, but rather to “complement and extend spatial narratives with the help of new media technologies” (Tang et al., 2024).

Technologically, the pipeline balances practical cinematography with digital extensions, maintaining material realism while benefiting from immersive visualization in the production design and camera lock phases. Strategically, *Dune* illustrates how immersive technologies can be integrated into auteur cinema without dominating its aesthetic identity, positioning immersion as a supporting force rather than a dominant element of cinematic narrative.

In contrast, *Dune* (2021) adopts a hybrid strategy, combining large-scale physical sets with digitally augmented environments, demonstrating how immersive technologies can be selectively integrated to amplify sensory intensity while preserving traditional cinematic aesthetics.

Methodologically, these cases allow for a comparative analysis of how different degrees of immersion - fully virtual, performance-capture-based, or hybrid - shape production practices and the viewer’s experience. By examining these films through an experiential and sensory framework, the study aligns with the argument that immersive environments should be analyzed holistically, as “global sensory environments”, rather than as isolated technological innovations (Luo et al., 2025).

The theoretical framework derived from the literature on immersive exhibitions allows for a comparative analysis of how contemporary cinema strategically uses immersive technologies within different genres and aesthetic paradigms.

The comparative methodological framework presented above creates the premises for a critical analysis of immersive technologies in contemporary cinema that goes beyond the level of technical novelty.

By examining the virtual production flows of *The Mandalorian*, *Avatar: The Way of Water*, and *Dune*, the research shifts the focus from how these technologies work to the reasons for their industrial and strategic adoption.

The discussion thus places immersive cinema within a broader industrial logic, analyzing

whether these technologies enable sustainable strategic change or reinforce a cycle of continuous technological intensification, driven by competitive and commercial pressures.

The comparison highlights the fact that immersive technologies do not produce a uniform transformation in contemporary cinema. Rather, they function as strategic tools, deployed according to production scale, aesthetic goals, and industrial positioning. While *The Mandalorian* demonstrates immersion as a production-centric efficiency strategy, *Avatar: The Way of Water* frames immersion as a fundamental logic of worldbuilding, and *Dune* takes a moderate approach that resists total technological encapsulation.

This differentiation supports the argument that the current cinematic landscape does not reflect a single trajectory of technological escalation, but multiple strategic responses to industrial pressures.

Table 1. Comparative Table – Immersive Technology and Strategic Impact in Contemporary Cinema

Film	Core Technologies	Level of Immersion	Strategic Impact on the Film Industry
<i>The Mandalorian (2019)</i>	Virtual production, XR stages with LED screens, Unreal Engine, real-time rendering, camera tracking	High (immersion at the production level) the immersive environment mainly affects the film crew, actors and cinematographers through VFX made directly in the camera	Indicates a strategic restructuring of production flows, reducing dependence on real locations, compressing production times and integrating pre-production, filming and post-production into a single real-time pipeline
<i>Avatar: The Way of Water (2022)</i>	Performance capture, virtual cameras, digital world-building, advanced simulations (water, physics)	Very High (total world immersion) immersion operates at both the production and viewer levels through the complete coherence of the virtual universe	Represents a long-term strategic investment in proprietary technologies , strengthening the sustainability of the franchise and positioning immersion as a central narrative and industrial asset
<i>Dune (2021)</i>	Production hybrid: real locations, digital extensions, limited virtual sets, VFX integration	Medium-high (aesthetic immersion) immersion supports scale and atmosphere without completely enclosing the production in a virtual system	Illustrates a selective and adaptive strategy that uses immersive technologies to amplify realism while maintaining authorial values and filming on real locations

Source: Authors' own research.

This conceptual model frames immersive visual technologies not as a homogeneous technological trend, but as a spectrum of strategic applications within contemporary cinema. The level of immersion of the production functions as a mediating variable between technological infrastructure and industrial impact.

At lower levels of immersion, as exemplified by *Dune*, immersive tools function primarily as aesthetic enhancers, supporting scale and realism while preserving traditional cinematic authorship.

At higher levels, as in *The Mandalorian*, XR sets and real-time rendering restructure production flows, collapsing pre-production, filming, and post-production into a unified system.

At the extreme level, *Avatar: The Way of Water* demonstrates total immersion in worldbuilding, where proprietary technologies support a long-term franchise strategy and industrial positioning.

Thus, the model visualizes how immersive technologies can signal either a technological escalation or a strategic change, depending on their mode of integration into film production systems.

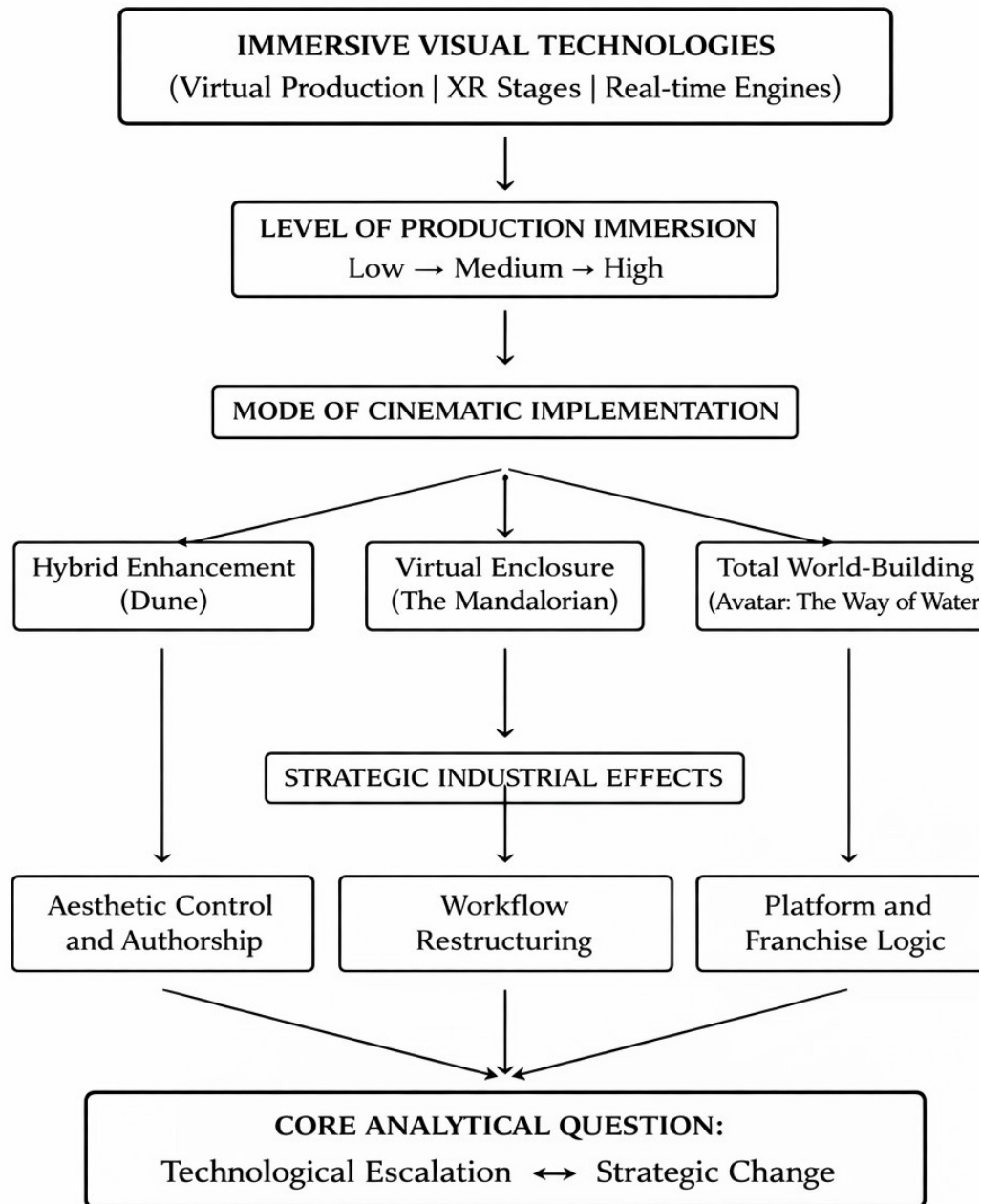


Figure 1. Conceptual model of immersive technologies in contemporary cinema

Source: Authors' own research.

The figure illustrates how immersive visual technologies function as strategic variables in contemporary cinema, mediating the relationship between immersion in production, cinematic

implementation modes, and industrial effects.

The model frames immersive cinema within the tension between technological escalation and strategic structural change.

Comparative analysis of immersive cinema case studies: scale, audience, and strategic impact

The comparative analysis of *The Mandalorian*, *Avatar: The Way of Water*, and *Dune (2021)* highlights the strategic implications of immersive technologies within different production and distribution models in the contemporary film industry. Although operating on distinct platforms - streaming and theatrical cinema - these case studies reveal how immersive production infrastructures correlate with production scale, audience reach, and institutional recognition.

Avatar: The Way of Water represents the largest application of immersive technologies in terms of production scale and global reach. With an estimated production budget of \$350–460 million and a worldwide gross of over \$2.3 billion, the film has reached an estimated audience of approximately 250 million viewers worldwide.

Its release on tens of thousands of theater screens worldwide, including in premium IMAX and 3D formats, underscores how immersive visual technologies are working as a strategic driver of movie attendance and premium ticket pricing. The film's recognition through major awards, including the Academy Award for Best Visual Effects, solidifies immersive production as a long-term industry investment, rather than a mere momentary aesthetic enhancement.

By contrast, *Dune (2021)* illustrates a hybrid strategic model, in which immersive technologies are selectively integrated into a more traditional production and distribution framework. Made on a relatively modest budget of approximately \$165 million, the film grossed over \$400 million worldwide, despite the constraints of the pandemic and a simultaneous release on streaming platforms in select markets.

Its extensive theatrical release, across over 4,000 screens in North America alone, demonstrates that immersive visual realism can enhance large-scale cinematic spectacle without requiring a complete transition to real-time virtual production workflows. The film's critical success - marked by ten Academy Award nominations and six wins - indicates that immersive technologies can support auteur cinema while maintaining institutional and artistic legitimacy.

In contrast to these cinematic models, *The Mandalorian* exemplifies a strategic use of immersive technologies geared toward streaming. With an estimated production cost of approximately \$15 million per episode, the series leveraged Unreal Engine-based virtual production environments to achieve cinematic visual quality in a serialized format.

Audience engagement metrics, measured in billions of minutes watched and millions of households per episode, indicate a scale of consumption comparable to that of major theatrical releases, albeit distributed through a platform-based ecosystem rather than theater attendance.

The series' extensive recognition at the Primetime and Creative Arts Emmy Awards further demonstrates how immersive technologies have redefined the standards of production value in premium television.

Taken together, these case studies illustrate how immersive technologies are exerting strategic pressure on the contemporary film industry, reshaping economic models, redefining audience engagement metrics, and altering the relationship between production scale and creative control.

Whether used in global blockbusters, hybrid theatrical productions, or premium streaming series, immersive technologies function as a converging force that challenges traditional distinctions between film and television, physical and virtual production, and between spectacle

and process.

The selection of cinematic case studies is guided by methodological principles derived from research on immersive technologies. As highlighted in the scoping review, case selection must take into account technological relevance, as “immersive technologies are implemented in diverse ways, depending on the technological configuration and project objectives” (Zhang et al., 2024).

Table 2. Comparative Table - *The Mandalorian*, *Avatar: The Way of Water*, *Dune*

Film / Series	Audience / Viewership	Production Budget	Box Office / Revenue	Theaters / Screens	Major Awards and Nominations
<i>The Mandalorian</i> (Disney+)	The first season accumulated 5.42 billion minutes watched and became the "most-watched streaming TV series in the US" during its second season, peaking at 1.336 billion minutes/week; Samba TV reported 1.04 million households for season 2 episode releases.	Estimated at ~\$15 million per episode ($\approx$ ~\$100 million per season).	N/A (streaming series).	N/A (not theatrical)	Numerous awards: 6 Primetime Emmy nominations, 42 Creative Arts Emmy nominations (15 won); BAFTA, Critics' Choice, Directors Guild, Golden Globe, Visual Effects Society awards.
<i>Avatar: The Way of Water</i> (2022)	Approximately 257 million viewers worldwide (estimated based on ticket sales).	\$350-460 million.	\$2.322 billion worldwide (& highest grossing film of 2022).	Released on >12.000 screens US & Canada, ~40.000 screens internationally (wide release).	Academy Awards: 4 nominations, winner for Best Visual Effects; BAFTA nomination and win for Best Special Effects; Visual Effects Society awards (9 won); Critics' Choice awards.
<i>Dune</i> (2021)	Box office audience derived from ticket sales in ~4,125 theaters at launch; performance indicates rapid global theatrical reach.	\$165 million.	~\$406 million worldwide.	Released in ~4.000+ theaters (US & Canada).	10 Academy Award nominations (including Best Picture) and 6 wins (Original Score, Sound, Cinematography, Production Design, Editing, Visual Effects).

Source: Authors' own research.

This criterion supports the inclusion of films that exemplify distinct immersive production pipelines, ranging from real-time virtual environments to hybrid physical–digital workflows.

Additionally, the article highlights the importance of examining practices that demonstrate a high degree of integration between technology and creative process, noting that “the most

significant impact of immersive technologies emerges when they are embedded within the production process rather than applied as an external layer” (Zhang et al., 2024).

Based on this criterion, *The Mandalorian* is selected as a paradigmatic case of fully integrated virtual production through Unreal Engine-driven LED volumes, while *Avatar: The Way of Water* represents an advanced, long-term investment in immersive performance capture and real-time visualization systems.

Finally, the scoping review stresses the value of comparative analysis across different implementation contexts, stating that “comparative case studies enable a deeper understanding of how immersive technologies shape experiential outcomes across different settings” (Zhang et al., 2024).

In this research, *Dune* is included as a contrasting case that adopts immersive technologies in a more hybrid and selective manner, allowing for a comparative evaluation of immersion levels and strategic impact. Together, these cases enable a structured analysis of how immersive technologies function not only as aesthetic tools but as strategic drivers of change within the contemporary film industry.

Results and discussion

The results of this study suggest that contemporary art cinema and experimental film occupy a critical position within the broader strategic transformation of the film industry, which is under pressure from immersive and visual technologies. While mainstream cinema has largely adopted immersive tools such as CGI, 3D, IMAX, and LED-based virtual production to enhance the spectacle and market competitiveness, art and experimental cinema tend to appropriate these technologies in a reflexive and conceptual manner.

This divergence confirms Meng’s claim that contemporary immersion involves “a change in the attitude of artistic spectacle”, driven not only by technological novelty, but also by transformations in cultural consumption and audience behavior (Meng, 2024).

In contrast to classical cinematic spectacle - characterized by fixed framing, narrative linearity, and optical distance - art and experimental cinema increasingly explore immersion as a spatial, bodily, and perceptual condition. As Meng demonstrates through the genealogy of panoramas, projection mapping, and LED media, immersive media have historically sought to produce the sensation of “the real presence of a second world” (Meng, 2024).

Contemporary experimental filmmakers extend this logic by integrating CGI environments, large-scale exhibition spaces, and virtual production techniques not only to simulate realism but to interrogate the boundaries between cinematic illusion and lived experience. This practice reflects a strategic repositioning of art cinema away from narrative dominance and toward experiential and affective engagement.

The findings discussed in the literature on immersive exhibitions provide a productive theoretical framework for understanding recent strategic shifts in the contemporary film industry.

The case of technology-driven blockbuster cinema, exemplified by James Cameron’s *Avatar* franchise, illustrates how immersive visual technologies have become central to the production, distribution, and engagement of audiences in cinema. Like immersive exhibitions, contemporary cinema increasingly prioritizes experiential intensity over traditional modes of narrative or aesthetic contemplation. As Huang argues, the emphasis has shifted “from original art objects, bearing an authentic ‘aura’, to the sensationalism that the digitized version of art pursues and achieves” (Huang, 2023). In the context of *Avatar*, cinematic value is largely constructed through stereoscopic 3D, virtual environments, and advanced motion-capture techniques,

transforming the film into an immersive spectacle designed to encompass and envelop the viewer.

This strategic orientation reflects a broader industrial response to changing audience expectations and competitive media environments. Similar to immersive exhibitions that use technology to expand accessibility, blockbuster cinema relies on immersive visual strategies to reach global audiences. As noted in the literature, “technological strategy is, to a large extent, what makes works of art more accessible, whether in terms of time-space or in terms of professional knowledge requirements” (Huang, 2023). *Avatar*’s visually-oriented narrative minimizes linguistic and cultural barriers, facilitating its commercial success worldwide. This supports the argument that immersive technologies function as strategic tools for market expansion, rather than simply aesthetic innovations.

From an industrial perspective, this shift signals a broader strategic transformation in how cinema defines its value proposition. Meng emphasizes that immersive environments increasingly operate within a market logic, in which “the word ‘immersion’ becomes a commodity that loses its original depth in the face of the market” (Meng, 2024).

Art and experimental cinema respond to this condition by resisting purely euphoric or spectacular uses of immersive technologies. Instead, they often foreground the tension between immersion and critical distance, exposing the mechanisms of illusion rather than hiding them. This strategy allows art cinema to maintain its cultural legitimacy while engaging with the same technological infrastructures that dominate commercial production.

Limitations and Further Research

Finally, the case of immersive blockbuster cinema confirms the broader cultural shift identified by Huang, whereby technological immersion contributes to the democratization of cultural consumption while simultaneously challenging traditional hierarchies of artistic value. This process aligns with the “desacralization of cultural institutions” and the repositioning of the audience as a consumer of experience rather than an interpreter of meaning (Huang, 2023).

In this sense, the strategic orientation of the contemporary film industry towards immersive technologies can be understood both as an adaptive response to digital competition and as a redefinition of the cultural function of cinema in an experience-oriented media landscape.

Contemporary cinema, like immersive exhibitions, increasingly positions the viewer as a consumer of experience rather than a detached interpreter. However, as the cases of *Gravity* and *Dune* demonstrate, immersive strategies can coexist with formal rigor and conceptual ambition, suggesting that the strategic change induced by immersive technologies is not monolithic, but contingent on directorial intent, genre conventions, and industrial context.

Despite their transformative potential, immersive technologies such as virtual production, XR sets, and real-time rendering engines present significant conceptual, technical, and strategic limitations that restrict their applicability in contemporary cinematography.

First, while XR sets allow for real-time visualization and spatial flexibility, they do not eliminate the need for extensive planning in the pre-production phase. Conversely, immersive pipelines impose creative and technical decisions upfront, often reducing spontaneity on set and limiting narrative or visual experimentation in the late stages of production.

Second, immersive technologies are limited in their ability to fully reproduce complex natural phenomena and bodily realism. While real-time engines offer increasingly sophisticated simulations, elements such as organic motion, environmental randomness, or subtle physical interactions often require hybrid workflows or high-fidelity offline rendering. This limitation is especially evident in productions that rely heavily on sensory realism, demonstrating that

immersive technologies cannot completely replace traditional cinematography, practical effects, or location shooting without perceptual compromises.

Third, the industrial implementation of immersive pipelines introduces new forms of technological dependency and standardization. Real-time engines and XR infrastructures impose specific aesthetic and technical parameters that can homogenize the visual language of productions. As immersive flows become increasingly standardized, there is a risk that cinematic spaces will converge towards similar spatial grammars, lighting conditions, and compositional strategies, limiting aesthetic diversity rather than amplifying it.

Moreover, immersive technologies do not inherently guarantee narrative depth or audience engagement. While they may enhance spatial immersion, they cannot substitute for dramaturgical coherence, performance quality, or thematic complexity. The presence of advanced visual systems may even privilege spectacle over narrative, reinforcing the criticism that immersive environments risk prioritizing “aesthetic adaptation” over substantive narrative meaning. In this sense, immersion remains a contingent outcome, shaped by creative intent, rather than a technological inevitability.

Finally, immersive production systems pose economic and labor-related constraints. High upfront costs, specialized technical expertise, and infrastructural requirements limit access to large studios and well-funded productions, reinforcing existing power asymmetries in the film industry. Independent or small-scale producers may find immersive technologies less adaptable to their production contexts, questioning the idea that these tools represent a universally applicable strategic shift.

Taken together, these limitations indicate that immersive technologies should not be understood as complete replacements for established filmmaking practices. Rather, they function as conditional and context-dependent tools, the effectiveness of which is determined by artistic strategy, production scale, and narrative objectives. Recognizing these constraints is essential for assessing whether immersive technologies signify a genuine strategic transformation of the contemporary film industry or merely a technologically driven reconfiguration of existing practices.

Conclusion

The film industry continues to explore and integrate new technologies to provide audiences with the most realistic and immersive experience possible. From advanced stereoscopy to immersive projections, modern cinema is rapidly approaching what could be described as a full-scale rendering of reality. By utilizing new media and projection technologies that include polarized light, spatialized sound, and 360-degree projections, the films of the future will provide an increasingly complete illusion of the world around us.

Immersive projections and new projection techniques have transformed the contemporary art landscape, bringing significant innovations to the way audiences interact with art. By using 360-degree projection technology and interactive systems, these exhibitions offer a unique sensory experience that involves both the visual and the audio.

Combined with unconventional architecture and spaces, immersive projections transform entire structures into canvases for digital art. Music plays a central role in these performances, amplifying emotion and visual depth. Thus, immersive projections have become a powerful way to bring technology and art together, offering innovative visual experiences and transforming urban spaces into a new form of artistic expression.

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