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FROM COLLECTION STEWARDSHIP TO EXPERIENCE DESIGN: ART MANAGEMENT OF VR-ENABLED MUSEUMS IN THE DIGITAL TRANSITION

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Abstract: Purpose: This article examines how virtual reality reshapes art management in museums. Methodology: It applies a narrative integrative review to peer-reviewed studies and a professional museum standard published between 1999 and 2025, focusing on experience design, audience inclusion and sustainable operation. Findings: Evidence from systematic reviews and visitor studies indicates that VR is generally received positively, that perceived usefulness, information quality, ease of use and psychological cognition influence behavioural intentions, and that social presence can support revisit intention. Contribution: The article argues that VR should be managed as a curatorial and organisational process rather than a technical add-on, proposes a framework linking experience design, ethical governance, staff competence and evaluation, and thereby translates technology-centred findings into managerial decisions.

Keywords: art management, virtual reality, museum studies, visitor experience, immersive exhibition, cultural heritage, digital inclusion, sustainability

Introduction

Art management has developed into a distinct professional field that combines artistic knowledge with strategic planning, resource mobilisation, marketing and institutional coordination [1]. Its object is not limited to the production of artworks; it includes the organisational conditions through which cultural meaning becomes available to the public. The 2022 ICOM definition reflects this broader mandate by describing museums as institutions that research, collect, conserve, interpret and exhibit heritage while remaining accessible, inclusive, sustainable and ethically governed [2]. These functions are managerial as much as curatorial, because each one requires decisions about priorities, audiences, resources and accountability.

The experience economy offers a useful lens for understanding why digital media matter to museums. Pine and Gilmore argue that economic value shifts when organisations stage memorable encounters rather than merely deliver goods or services [3]. A museum exhibition designed with virtual reality does not simply reproduce an object in digital form; it creates a mediated situation in

which the visitor acts, chooses and interprets. This shift changes the manager's task from controlling a physical display to designing a structured encounter.

Virtual reality also needs conceptual precision. Li and Othman distinguish immersive VR, which places the user inside a simulated environment, from augmented reality, which overlays digital elements on the physical world, and from extended reality, which covers both [4]. The present article uses VR in the narrow sense of a fully immersive environment. This distinction matters for management, because VR requires different equipment, space, safety rules and staffing from augmented reality or web-based digital displays.

The research problem is therefore practical: how should museum managers organise VR-enabled exhibitions so that technological affordances support, rather than displace, curatorial and educational goals? This problem is relevant because museums are under pressure to adopt immersive media without clear guidance on how such media affect their educational and institutional missions. The article pursues two objectives: first, to identify what the reviewed evidence indicates about visitor response to VR in museums; second, to translate those findings into decisions that museum managers control. Its scientific contribution is a four-part management framework that links experience design, audience design, operational governance and evaluation, and that can be applied in museum education and cultural policy. The article answers the research question through a secondary-data review.

Materials and methods

Sources and databases. The study uses a narrative integrative review of secondary sources. No survey, interview, experiment or observation was conducted, and no individual-level data were collected. The corpus comprises ten published sources: eight peer-reviewed journal articles, one book and one institutional standard. Sources were identified through academic publishers' platforms and repositories, including ScienceDirect (Computers in Human Behavior; Telematics and Informatics Reports), MDPI (Electronics; Heritage), Inderscience (International Journal of Mobile Communications), Frontiers (European Journal of Cultural Management and Policy), the ICOM official website and the Zenodo repository. These platforms were used because they host peer-reviewed literature on museum studies, immersive technology and cultural management.

Search terms and selection criteria. Topic-based searches were conducted in English, the working language of the review. Search terms combined three clusters: (i) "virtual reality", "augmented reality", "immersive exhibition" and "mixed reality"; (ii) "museum", "visitor experience", "cultural heritage" and "behavioural intention"; and (iii) "art management", "digital inclusion", "education" and "sustainability".

Inclusion and exclusion criteria.A source was included when it was a peer-reviewed journal article, a book or an official institutional standard; addressed immersive or digital technologies in a museum, heritage or cultural-management setting; and reported evidence or a framework relevant to experience design, audience inclusion or sustainable operation. A source was excluded when it lacked a stated method, addressed immersive technology outside a cultural or museum context, or was not published in English. Reference lists of the included reviews were checked for additional relevant sources. The final corpus spans 1999 to 2025, with the 1999 book retained as the conceptual foundation of the experience-economy lens.

Approach to analysis and synthesis. Each included source was read for its stated aim, method, sample or corpus, main findings and limitations. Reported evidence was grouped into three managerial themes: experience design, audience inclusion and sustainable operation. Because the sources differ in method, findings were synthesised narratively rather than statistically; no meta-analysis was attempted. Managerial implications were derived by interpreting this evidence against the decisions available to museum managers. The resulting framework is an authorial synthesis, not a model reported by a single source.

Three methodological cautions apply. First, the sources use different methods, including conceptual analysis, systematic review and questionnaire-based fieldwork; their findings are therefore synthesised narratively rather than statistically. Second, reported effects are context-dependent and cannot be treated as universal laws of visitor behaviour. Third, several studies focus

on visitor response rather than on management outcomes, so the managerial implications below are an interpretive synthesis and not direct survey findings. These limits are kept visible in the discussion.

Results and discussion

From collection stewardship to experience design

The ICOM definition assigns museums five core functions: research, collection, conservation, interpretation and exhibition [2]. VR does not replace these functions, but it changes how they are performed. Research can draw on digitised inventories; conservation can use non-invasive scanning; interpretation can be delivered through interactive narrative; and exhibition can extend beyond the physical gallery. The manager's role is to decide which of these changes serves the institution's mission and which merely adds novelty.

This decision is consistent with the professional definition of art management as an interdisciplinary field linked to strategic management, project management, marketing and human resources [1]. A VR project therefore cannot be delegated entirely to a technical team. It requires a curator to protect scholarly accuracy, an educator to define learning outcomes, an operations manager to allocate equipment and staff, and an evaluator to examine whether the intended experience actually occurs. The manager acts as the coordinator of these roles.

Evidence on visitor response and behavioural intentions

Li and Othman reviewed museum-VR literature from 2010 to 2023 and found that most visitors held positive attitudes towards the technology [4]. Their review also reports that quantitative methods dominate the field, accounting for 77.8 per cent of the studies, and that 38.9 per cent apply the Technology Acceptance Model or its extensions. Perceived usefulness, information quality, perceived ease of use and psychological cognition are identified as important influences on behavioural intentions [4]. For managers, this evidence suggests that hardware quality alone is insufficient. Visitors respond to the credibility of the content and to the ease with which they can enter the experience.

Wang and colleagues identified 78 studies from ACM and IEEE databases through a PRISMA-guided review of gamified cultural heritage in immersive virtual exhibitions [5]. Their synthesis highlights interactive narratives, multimodal data, three-dimensional reconstruction, personalisation and a balance between education and entertainment. The review also names cases such as Rome Reborn, Sutton House Stories and Assassin's Creed: Origins as examples of heritage communication through immersive or game-based formats [5]. These findings support a design principle: immersion becomes educational when it is structured by interpretation rather than by spectacle.

The visitor study by tom Dieck and colleagues surveyed 163 museum visitors and examined social presence within mixed-reality environments that combined AR and VR [6]. The authors report that social presence strongly predicts the four realms of the experience economy and that three realms, with the exception of aesthetic experience, influence visitor experience and subsequently revisit intention [6]. This result is directly relevant to art management, because it links the quality of a mediated encounter to an institutional outcome that managers value. A VR installation that isolates the visitor completely may reduce the social dimension that supports return visits.

Table 1 summarises the reviewed evidence and translates it into managerial implications.

Table 1 – Synopsis of reviewed evidence and managerial implications

Source	Reported evidence	Managerial implication
Li and Othman [4]	Positive attitudes; usefulness, information quality, ease of use and cognition shape intentions	Treat content quality and usability as management indicators
Wang et al. [5]	78 studies; narrative, reconstruction, personalisation and balance of education and entertainment	Align immersive design with curatorial interpretation

tom Dieck et al. [6]	163 visitors; social presence predicts experience realms and revisit intention	Preserve shared and social dimensions in VR design
Anastasovitis et al. [8]	Holistic framework for inclusion through advanced immersion	Include accessibility at the design stage, not after production
Avlonitou et al. [9]	Human-AI compass for sustainable art museum operations and engagement	Keep human oversight and mission alignment in digital projects

Note: The table is an interpretive synthesis prepared by the authors. The evidence column reports what the cited sources state; the implication column is managerial analysis.

Inclusion, education and sustainability

Educational applications of immersive technology require careful evaluation. AlGerafi and colleagues provide a comprehensive evaluation of AR and VR in education and treat the technologies as tools whose value depends on instructional design rather than on immersion alone [7]. In a museum context, this means that a VR module should begin with a learning objective. The manager must ask what a visitor should understand after the experience and how that understanding will be assessed.

Anastasovitis and colleagues propose a holistic framework for enhancing inclusion through advanced immersion in cultural heritage [8]. The title and framing of their work indicate that accessibility should be addressed at the level of system design. For art management, this shifts inclusion from a compliance task to a design criterion. Captioning, alternative sensory channels, seated use, clear instructions and non-immersive equivalents all become part of exhibition planning.

Sustainability introduces a second managerial constraint. Avlonitou and colleagues examine opportunities and challenges in art museum operations, collections management and visitor engagement, and they introduce a human-AI compass intended to align innovation with human values, ethical principles, museum mission and sustainability [9]. Although their study concerns AI rather than VR specifically, the governance logic transfers directly. Immersive systems should support staff judgement, protect cultural integrity and remain operable over time. Andrews and Hawcroft similarly argue that arts-led AI in cultural policy requires attention to artists and technological development rather than to efficiency alone [10]. Together these sources suggest that digital transition should be governed as a cultural policy issue.

A management framework for VR-enabled museums

The synthesis supports a four-part framework. The first part is curatorial alignment. Every immersive element should be traceable to an interpretive purpose, and the museum should record which source or object authorises the digital reconstruction. The second part is audience design. Usability, information quality, social presence and accessibility should be specified before production, because these factors shape visitor response [4][6][8]. The third part is operational governance. Equipment lifecycle, staff training, data protection and ethical oversight need clear responsibility, in line with the human-centred governance proposed for sustainable art museums [9][10]. The fourth part is evaluation. Visitor feedback, learning measures and revisit indicators should be collected in a way that respects privacy and allows comparison across exhibitions.

This framework is an authorial synthesis rather than a model reported by a single source. Its value lies in connecting dispersed findings to decisions that museum managers control. It also clarifies the boundary between art management and technical production. The technologist builds the system; the art manager decides why the system exists, who can use it and how its effects will be judged.

Conclusion

This article examined VR-enabled museums through the lens of art management. The review shows that visitors generally respond positively to VR, but that behavioural intentions depend on usefulness, information quality, ease of use and psychological cognition [4]. Gamified and narrative designs can support heritage interpretation when they are guided by curatorial goals [5], and social presence can influence visitor experience and revisit intention [6]. Inclusion and

sustainability require governance that keeps human judgement, accessibility and institutional mission at the centre of digital projects [8][9][10].

The study contributes to art management by treating technology as an organisational and curatorial question rather than as a purely technical one. Its practical implications are expressed in the proposed framework, which gives managers four areas of responsibility: curatorial alignment, audience design, operational governance and evaluation. These areas allow museum managers to translate visitor evidence into concrete decisions about content, accessibility, staffing and assessment. The main limitation is the reliance on secondary sources that use different methods and contexts. Future research should collect primary evidence from museums that have operated VR exhibitions over several seasons, and should compare staff decision-making with visitor outcomes.

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