Conversational AI in museums: a systematic literature review using the people–process–technology framework

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ABSTRACT

The adoption of conversational artificial intelligence (AI) in museums has opened a new opportunity to create a richer visiting experience to tell stories for the preservation of culture. This paper contributes a systematic literature review (SLR) of 33 peer-reviewed papers covering the period from 2020 to mid-2025, by applying the people–process–technology (PPT) model to examine the social technological aspects of AI implementation. This combination is novel in a museum context, as previous research has largely treated these separately. Findings indicate a pronounced shift from text-based chatbots (21% or 7 of 33 papers) to more immersive and interactive platforms (30% or 10 of 33 papers), reflecting the transition from the pandemic (2020 – 2023) to the post-pandemic period (2024 – 2025). Besides the evolution of these technologies, the technology component highlights the importance of data governance, digital preparedness, and value alignment at and across different levels. The people component includes the relevance of hedonic and utilitarian values. Meanwhile, the process component emphasizes both strategic and technical aspects of AI design and implementation, such as knowledge structuring, media selection, and narrative representation. In line with this agenda, this study addresses the trends in literature and provides a path for sustainable appropriation by museums.

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1. INTRODUCTION

Museums and historic sites are crucial to preserving our heritage and interpreting our past for future generations. They safeguard a great number of physical relics of the accomplishments of human civilization and are major tellers of our history [1]. However, they are frequently considered to be outdated and out of touch with the interests and expectations of nowadays generation [2], [3]. To retain their relevance and the interest of visitors, museums should constantly rejuvenate their policies by adopting upcoming technologies that redefine the visitors' experience. Adoption of technology allows museums to further emotional engagement, increase levels of accessibility, and enrich educational quality [2], [4]. As a result, more institutions are turning digital not only to proactively manage their collections better and cater to the demands of diverse contemporary audiences, but also to meet their societies' organisational requirements [1], [5].

This transformation was significantly accelerated during the COVID-19 pandemic, spurring the rise of the virtual museum visit. This digital approach provided continuity in public access to works of art and heritage, not least for educational purposes [6]. However, pre-programmed virtual agents also have a way of making visitor experiences feel stagnant and uneventful, stifling interaction and turning the user into a passive observer [7]. Unlike earlier technologies, artificial intelligence (AI) allows systems to adapt to user input in real time, creating visitor-centric and personalised experiences based on preferences [5], [8]. The question is no longer whether AI should be used in museums, but rather how and when it should be implemented [9]. Studies have shown that interacting with intelligent agents can positively influence cultural awareness and interest, especially among younger generations [10].

The rapid evolution of AI, especially in the areas of natural language understanding (NLU) and natural language processing (NLP), has significantly advanced human-computer interaction [1]. Large language models (LLMs) such as GPT-5 can be leveraged to facilitate dynamic, natural communication tools by combining with a conversational artificial intelligence (CAI) system like Siri or Google Assistant to enable live interaction. AI is being used in museums mostly for collection visualisation, visitor data analysis, and conversational interfaces [5], [11]. Of the latter, conversational AI is key, as it can deliver real-time, tailored answers and cater to an array of visitor interests that can improve engagement and learning. It acts as a smart virtual agent, providing personalized storytelling in response to visitors' interests and questions. This increases the museum's didactic role, making it a dynamic historical knowledge site. Although there has been increasing attention to the adoption of AI in the museum context, conversational AI in facilitating visitor engagement, especially in non-Western territories such as Indonesia, is still very limited. Indonesia, the residence of numerous historical artefacts and museums totaling more than 300, has a wealth of cultural heritage across its thousands of islands [3]. Such stories are necessary for maintaining and strengthening national identity. Despite one of the highest levels of daily internet usage in Southeast Asia, digital literacy is still low in Indonesia [12]. This gap reflects an access–knowledge paradox, where widespread access does not necessarily result into meaningful digital competence. Conversational AI has the potential to address the challenges inherent in this domain. Its interactive and user-friendly format is a highly user-friendly and scalable tool for delivering cultural and historical information in an engaging and personalized manner.

Therefore, in this research, we would like to investigate how conversational AI systems can help to engage museum visitors actively, and capture their interests, encouraging them to learn more about the historical values. In this context, AI serves as a front-end initiative that facilitates user inputs, preference-based personalisation, and participatory co-creation to generate user-driven content [13]. To address this goal, this study employs a systematic literature review (SLR) approach, focusing on scholarly publications from 2020 to 2025 to capture recent advancements of conversational AI in the museum context. The primary objective of this review is to identify and analyse key themes and discourse surrounding the use of AI in museums, with a particular emphasis on front-end applications that facilitate direct engagement with visitors.

To systematically structure the findings, we categorize the emerging topics using the people–process–technology (PPT) framework. This framework highlights the interdependence of human, organizational, and technical factors within a balanced socio-technical system, often referred to as the "golden triangle." [14] This PPT model is particularly relevant to conversational AI in the museum context because the interactions are mainly human-centered. Accordingly, this study is guided by the following:

- RQ1: what are the key challenges and considerations related to the people components in the adoption of AI in museums?
- RQ2: what is the current landscape of generative AI applied in the museum context?
- RQ3: what are the critical issues and developments concerning the Process component in the implementation of AI in museums?

The remainder of this paper is structured as follows: section 2 outlines the methodology used and the development of the research agenda. In section 3 presents the findings from our analysis, highlighting trends in technology utilization and key insights related to the PPT framework. Finally, section 4 concludes the paper by discussing the implications, acknowledging its limitations, and proposing directions for future research.

2. RESEARCH METHOD

This study adopts a SLR methodology guided by the preferred reporting items for systematic reviews and meta-analyses (PRISMA) framework. The PRISMA framework provides structured guidelines to ensure the review process is conducted with transparency, allowing for clear documentation of the rationale, methodology, inclusion/exclusion criteria, and key findings [15].

2.1. Literature identification

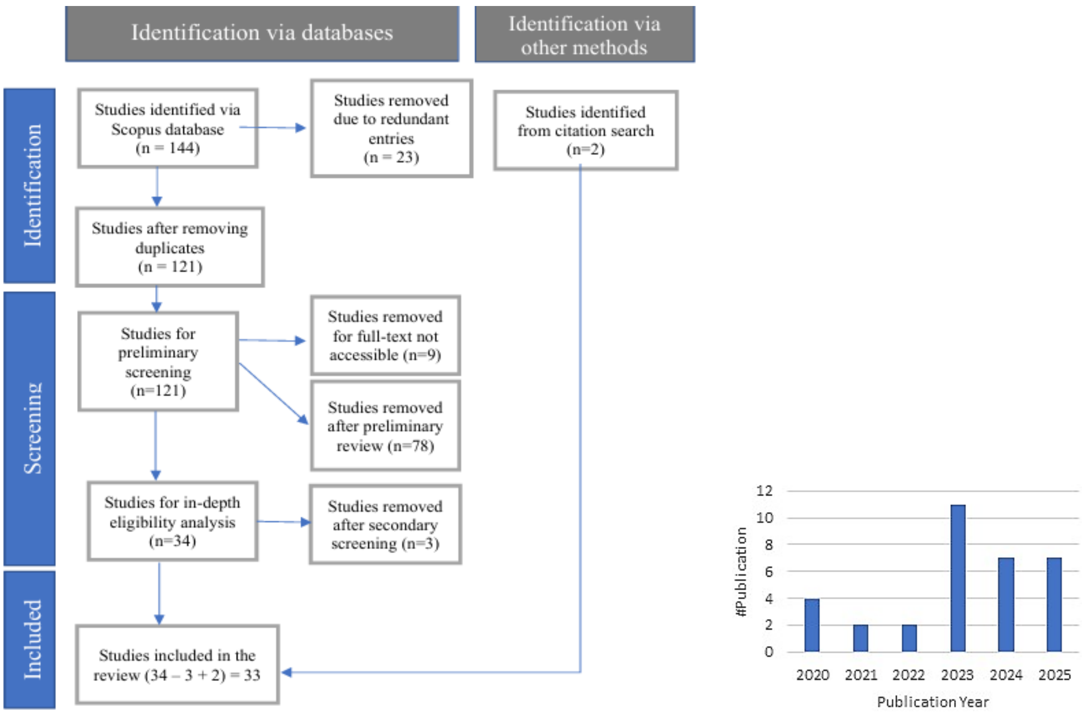
The review was started with the exposition of papers from the academy, for which relevant references were searched on the Scopus database via the tool Publish or Perish. A search was conducted of all peer-reviewed journal articles and conference papers published in English between 2020 and mid-2025. Scopus database was selected due to its large selection of indexed publications and the uniform quality standard, thus ensuring a meticulous check of only solid and peer-reviewed sources. To capture a broad range of relevant studies, the following search terms were applied: “AI Museum” OR “Artificial Intelligence Museum”, “Conversational Museum” OR “Intelligent Museum”, and “Virtual Agent Museum” OR “Virtual Technology Museum”. After removing 23 duplicate entries (n=23), the initial search yielded 121 unique records (n=121).

2.2. Screening and eligibility result

A two-stage screening process was conducted to refine the corpus, as depicted in Figure 1. The first stage involves preliminary screening on the title and abstract with the following inclusion criteria: 1) the presence of relevant keywords in the title or abstract, 2) full-text availability, 3) publications written in English. This stage led to the exclusion of 9 papers due to inaccessible full text, resulting in 113 records. Further filtering based on keyword relevance narrowed the pool to 34 studies (n=34).

The second stage employs full-text review to assess the eligibility to assess their alignment with the study’s research objectives. Papers were included if they met the following criteria: i) explicitly addressed at least one of the research questions, ii) focused on the use of AI for visitor engagement in museum settings, and iii) discussed applications of generative AI for conversational or storytelling purposes. At this stage, 3 papers were excluded for lacking relevance to the core theme of AI-enhanced visitor engagement. Additionally, a backward and forward citation search was performed, which resulted in the inclusion of 2 more studies. After the identification, screening, and eligibility assessments, a total of 33 studies were selected for the final analysis. Figure 1(a) illustrates the complete review process, detailing the number of records included and excluded at each stage.

As shown in Figure 1(b), there has been a notable increase in research related to the use of AI in museums, particularly in 2023, which recorded 11 publications, over five times the number in 2021 and 2022 (each with only two studies). This surge likely reflects the post-COVID-19 shift, where museum closures and restrictions on public gatherings prompted greater adoption of digital technologies to enhance visitor engagement and accessibility [6]. Following this peak, the number of studies remained relatively high, with seven publications each in 2024 and in the first half of 2025, indicating sustained academic interest in the field. This trend underscores the growing recognition of AI’s potential in reshaping museum experiences and suggests that this topic continues to attract scholarly attention.



(a) (b)

Figure 1. Literature screening process (a) PRISMA flow diagram and (b) yearly distribution of selected studies

3. RESULTS AND DISCUSSION

3.1. Descriptive overview of the reviewed studies

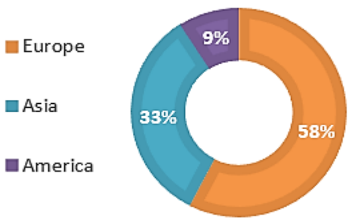
This section outlines a descriptive analysis of the selected literature on conversational AI in museum contexts, as illustrated in Figure 2. The study focuses on the country of origin of the first author, which also reflects the geographical context of the study, and the discipline of the field or subject domain of the publication. Table 1 presents the distribution of source types among the selected papers, comprising 19 conference papers (58%), 8 journal articles (24%), and 6 other sources, such as reviews or book chapters.

Most of the reviewed studies (58%, or 19 publications) were authored by researchers based in European countries as depicted in Figure 2(a), with Germany and Greece emerging as the most prolific contributors. This finding aligns with previous reports highlighting the prominence of chatbot adoption in European nations, particularly Germany, France, Italy, and the Netherlands [16]. The high level of engagement from European researchers reflects the region's broader investment in digital transformation within the cultural heritage sector. This trend is followed by a significant contribution from Asia (33% or 11 studies) with China emerging as the leading contributor in the region. This is consistent with national efforts such as the "Smart Museum Initiative" launched in 2014, which aims to integrate emerging technologies into museum operations and visitor experiences [16].

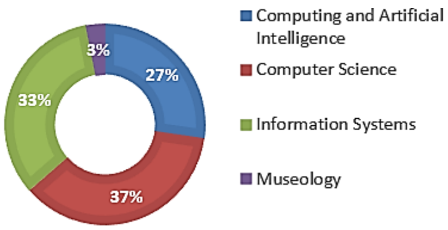
As outlined in Figure 2(b), the majority of studies on conversational AI in museums were published in venues associated with technical and computational disciplines. Specifically, 36% - 12 studies of the publications appeared in journals or conferences related to computer science, followed by information systems (33% - 11 studies), computing and AI (27% - 9 studies), and a small fraction (3% - 1 study) originated from the field of Museology. This distribution indicates that the development and implementation of AI in museum contexts is predominantly shaped by computing disciplines.

Table 1. Distribution of source types

Publisher	Conference	Journal	Others	Total	%
IEEE	7	0	0	7	21%
ACM	5	0	0	5	15%
transcript Verlag	0	0	5	5	15%
Springer	3	1	0	4	12%
MDPI	0	2	1	3	9%
Elsevier	1	1	0	2	6%
AAAI Press	1	0	0	1	3%
Hindawi	1	0	0	1	3%
ISYOU	0	1	0	1	3%
SAI	0	1	0	1	3%
Scitepress	1	0	0	1	3%
Taylor and Francis	0	1	0	1	3%
Wiley Online Library	0	1	0	1	3%
Total	19	8	6	33	100%



(a)



(b)

Figure 2. Descriptive overview (a) first author's origins and (b) research domain

3.2. Narrative interpretation

The integration of AI technologies has led to significant advancements in executing complex, skill-intensive tasks with greater efficiency. Beyond technical improvements, these innovations have also influenced human behavior and motivation, implementing AI not solely as a technical undertaking but also as a socio-technical process. Considering this, it becomes essential to adopt a holistic framework that captures the interplay between technological capabilities, organizational processes, and human factors. One such widely recognized model is the PPT framework, commonly referred to as the “golden triangle”, which provides a balanced lens for assessing socio-technical systems [14].

“People” component emphasizes the impact of AI on individuals and organizational stakeholders [17]. For AI initiatives to be effective, it is critical to involve stakeholders early in the development cycle to ensure the technology addresses their specific needs and expectations [14]. Engaging stakeholders from the outset facilitates value co-creation, increases trust, and minimizes resistance to adoption. In this study, we focus specifically on two key aspects under the people component: (i) the perceived value from various stakeholder groups (e.g., visitors, curators, policymakers), and (ii) user perceptions of AI systems through common technology acceptance constructs such as perceived usefulness, ease of use, and intention to adopt. These aspects are detailed in Table 2.

“Process” component pertains to how AI technologies are integrated into operational workflows and aligned with institutional goals. Successful implementation requires mutual understanding between technical teams and decision-makers to ensure that both the development and output of AI solutions are relevant to the museum’s broader objectives [14]. In this study, we conduct an in-depth full-text analysis of the selected literature to identify key considerations in the design, implementation, and evaluation of AI systems in museum settings. These include issues such as organizational readiness, ethical implications, data governance, and project execution methodologies

“Technology” component concerns the alignment between technological solutions and organizational needs, often evaluated through the lenses of relative advantage, usability, and compatibility with existing systems [14], [18]. In our review, we map the technology landscape of conversational AI in museums between 2020 and mid-2025. This includes identifying dominant AI tools, interaction modalities (e.g., text, voice, multimodal), and integration platforms, to highlight trends and provide strategic insights into emerging technological directions.

The keyword landscape derived from the abstracts of the selected papers is illustrated in Figure 3. The dominant clusters can be categorized into three main groups: (i) technologies applied in museums, including AI, IoT, related developments, and associated challenges; (ii) people involved, such as agents, participants, and users, along with approaches for disseminating information to them, including virtual methods; and (iii) processes, encompassing system design and implementation approaches, maturity assessments, ethical frameworks, and data ethics. Based on this keyword landscape, the key factors that need to be considered for the implementation of generative AI in museums are identified in Table 2.

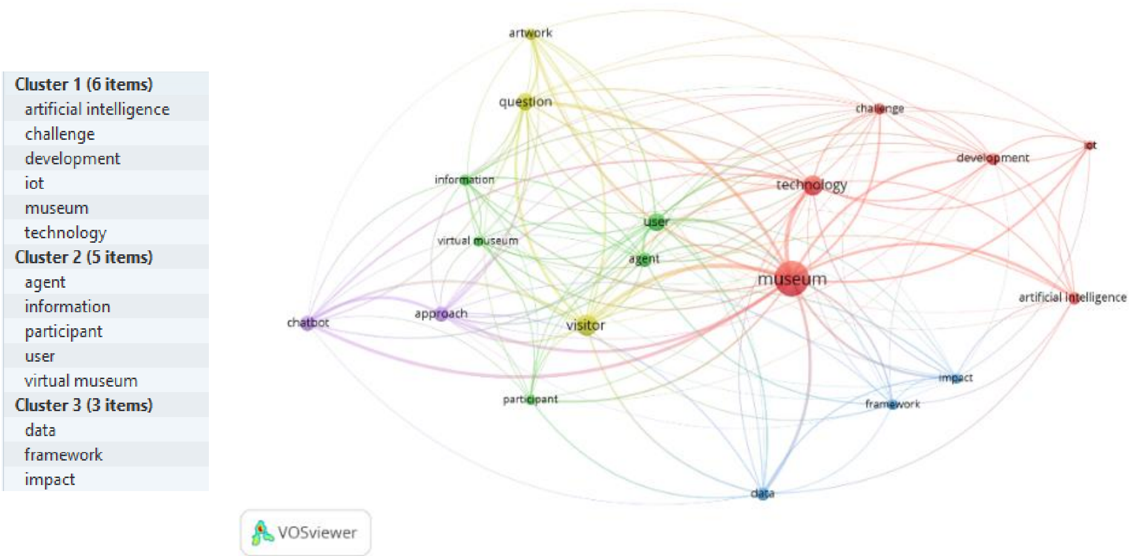


Figure 3. Keywords clustering using VOSViewer

3.2.1. RQ1: What are the key challenges and considerations related to the people components in the adoption of AI in museums?

The literature identifies two primary considerations under the “People” dimension in the implementation of AI in museums: (i) the values perceived by key stakeholders, and (ii) their perception of technology acceptance. A comprehensive understanding of stakeholder values is essential. This process requires active engagement and collaborative dialogue to identify opportunities, foster innovation, build mutual understanding, and evaluate the realization of expected outcomes [19]. This should be complemented by a wider and larger network of stakeholders, including policy makers, museum workers, visitor representatives, and funding institutes, that should be engaging in workshops, professional forums, and collaborative networks, to co-create strategic roadmaps for AI adoption in museums [20].

Two forms of value emerge as most discussed with museum visitors: hedonic and utilitarian. Hedonic value relates to the sensory rewarding and affective and experiential aspects of the museum visit, such as immersive visual interactions, personalized storytelling, and reflective engagement that can be provided by intelligent virtual assistants. Visitor continued interest, cultural and personal relevance can be prompted by these experiences [21], [22]. By contrast, utilitarian value involves practical, functional benefits such as improved learning outcomes, personalized content recommendations, behaviour analytics, and gesture or pose recognition abilities that serve accessibility and navigation purposes [21]-[23].

However, interviews with museum curators reveal a degree of scepticism toward AI technologies. Current perceptions are usually dichotomized between overly optimistic futures and transformative possibilities and highly cautious or even pessimistic analysis of potential risks. Admittedly, much of this is speculative because it is often drawn from hypothetical situations and not from direct experience [24]. This scepticism might be due to relatively limited exposure or the common domain-specific fear of the unknown and thus causes practitioners to consider AI as a good secondary or tertiary tool within the existing institutional context [5]. Another important factor of the “People” component is perception and end-user acceptance of the technology. For museum users, perceived enjoyment (PE), perceived ease of use (PEoU), perceived usefulness (PU), personal innovativeness (PI), and Intention to Use (IU) are prominent determinants in technology acceptance [5], [25]. Specifically, during the design and development phases, these factors can be beneficial by addressing perceived system complexity and aiding user acceptance.

In other frameworks, subscales such as interactivity, user satisfaction, visual attractiveness, perspicuity, efficiency, dependability, stimulation, novelty, perceived personality, and error handling have been integrated to measure user experiences and system appeal [6], [10]. In empirical studies, it has been demonstrated that technology in museums can have positive effects on engagement, emotional involvement, and social interaction of visitors [4]. However, while AI may enhance the overall visitor experience, the visitor experience provided by AI does not necessarily equate to higher attendance. The geographical location, museum reputation, and appeal of the museum’s collection often have a greater impact on visitation numbers [26]. As such, the business case for investing in AI should not be measured based on financial return or visit numbers. Instead, it should be following the museum’s larger goals as a non-profit organization that sponsors the conservation, communication, and accumulation of knowledge for cultural enrichment [13], [20]. Museums are also to be seen as experimental places for technology development and the support of innovative creation, by the institution’s mission and its identity [13]. This entails a delicate balance between involving visitor-centric perspectives and upholding the museum’s strategic objectives and singular cultural position [5].

3.2.2. RQ2: What is the current landscape of generative AI applied in the museum context?

Our literature review spans the period from 2020 to 2025, coinciding with the onset and aftermath of the COVID-19 pandemic, which significantly influenced the adoption and development of AI technologies in museums. The pandemic period (2020–2023) marked a shift in how museums leveraged digital tools to engage audiences, especially as physical distancing measures restricted in-person visits. During this time, text-based AI chatbots emerged as a practical alternative to facilitate interaction with museum content, replacing traditional guided tours

Between 2020 and 2023, the studies mainly focused on text-based chatbot systems. These systems enabled visitors to receive real-time, personalized responses to queries about museum exhibits, and even incorporating reflective questions to encourage deeper engagement. The responses are presented in multimodal outputs such as text, video, or images [1], [27]-[29]. For instance, some applications allowed users to engage in imaginative conversations with virtual characters, such as dinosaurs, enhancing user engagement during remote experiences. In this phase, chatbots evolved beyond simple information retrieval tools into more interactive agents capable of sustaining dialogue, exemplified by projects like the

"Maximo the Titanosaur" chatbot at the Field Museum in Chicago [30]. This transition reflects a broader technological trend: chatbots are increasingly designed to simulate human-like interactions, supported by advances in NLP and conversational AI.

However, a key challenge remains—bridging the semantic gap between user queries and the underlying knowledge base of the system. Despite this, chatbots are anticipated to play a growing role in personalized learning experiences in museums [22], with features such as adaptive educational content generated based on user preferences collected via pre-visit surveys, as demonstrated in the Universal Hip Hop Museum.

Table 2. Overall PPT components for conversational AI in museum settings

Constructs	Papers	Main results
People factors		
Values for key stakeholders	[13], [20]-[24], [26]	In addition to visitors, key stakeholders encompass museum professionals, the museum community, funding bodies, and government or policymakers. The value propositions associated with AI adoption in museums vary across stakeholder groups, ranging from hedonic values (e.g., enjoyment, engagement) to utilitarian values (e.g., practicality, efficiency, and support).
User perceptions on technology acceptance	[4]-[6], [10], [27]	The key variables to be assessed for user acceptance of museum visitors are PE, PEoU, usefulness PU, PI, and ITU. The presence of intelligent virtual avatars also encourages users to be more engaged in storytelling and game-based interactions.
Process factors		
Maturity assessment, ethical framework, data ethics canvas	[3]-[5], [13], [20], [28]	As museums increasingly utilize diverse datasets, ranging from restricted to open-access sources, integrated with AI through APIs, concerns about data ethics and accuracy have become more prominent. To respond to these challenges, organised tools, including the DEDA and the data ethics canvas, have been suggested to support responsible AI deployment. It is imperative to consider the ethical implications and organizational readiness due to the accelerated development in AI technologies, in particular, policymakers and practitioners who are concerned about responsible and sustainable adoption.
System design and implementation	[7], [8], [10], [16], [29]-[34]	Various important issues that need to be taken into account during the development, implementation, and designing of conversational AI systems include the selection of proper AI platform for being flexible and compatible, training and structuring of chatbot knowledge, choosing of media and delivery channel, narrative design and agent representation, avatar design, voice integration, knowledge management and data analysis.
Technology factors	[1], [7], [8], [10], [13], [22], [23], [25], [26], [29], [30], [35]-[41]	It is evident that conversational AI usage in museums has shifted from text chatbots in the year range of 2020-2023 to interactive and virtually immersive experiences over the past few years. This trend is characterized by the rise of eXtended reality (XR) technologies, such as virtual reality (VR), augmented reality (AR), and mixed reality (MR) technology, that are increasingly enhanced by AI to offer more adaptive and personalized experiences. These AI-enabled systems consider and learn from user behaviour and preferences to deliver personalized recommendations and even dynamic storytelling that can increase engagement and enrich the learning experience for all types of audiences.

Only one study from 2021 [25] introduced a more immersive application of AI through an intelligent virtual museum, integrating robotic systems and digital twins that operate in both physical and virtual spaces. In 2023, another notable advancement was the development of autonomous voice-guided systems that deliver personalized information based on sensor-detected head movements, aiming to reduce cognitive load and avoid visual distractions [39]. Additionally, a single study in 2023 explored the use of virtual agents in virtual reality environments, signalling the beginning of a shift from text-based interfaces to more immersive, embodied AI interactions [6].

In the post-pandemic era (2024–2025), the adoption of the latest technology in museums has shifted from text-based systems to highly immersive and interactive encounters. This trend demonstrates how museums are progressing from basic, text-based systems to more dynamic and technology-enhanced AI applications that support deeper visitor engagement. Several recent literature works have focused on the development of virtual museums in a wide sense by using XR, such as the combination of VR, AR, and MR, often associated with AI.

One of the key innovations is the adoption of AI-driven virtual agents combined with gamification tactics. These activities include thematic quizzes and task of classification of artifacts which could provide educational, enjoyable, and personalized experiences-productive for remote users who cannot visit museum physically [36]. By integrating generative AI models, such as ChatGPT, these systems can ask users contextually relevant questions, explain, and illustrate feedback, and personalize content related to their learning level. For example, a smart chatbot known as Bubi is utilized in an alternate reality game (ARG) designed for student-centered learning, providing personalized responses based on an individual's profile [23].

Museums have been using AI in a similar way to replicate history and cultural narrations in the form of virtual impersonations. Other museums have developed holographic representations of iconic figures (e.g., Salvador Dalí) to allow interaction by the visitors on a real-time basis through personalized storytelling experiences [13], [26]. Task-specific education environments also leverage multimodal intelligent avatars, such as the VR Liquor Culture Museum in China, where an AI assistant is used to narrate to users the traditional art of brewing liquor [10]. In addition to human avatars, animated artifacts as a format of child-computer interaction have also been found to stimulate higher levels of curiosity and object-specific inquiry in children [8]. Other implementations involve the use of AI avatars representing iconic artists as non-player characters (NPCs) in virtual galleries hosted in the metaverse, offering personalized, narrative-driven tours [37].

While virtual museums create fully digital environments, MR integrates digital content into the physical museum space, enhancing rather than replacing the real-world exhibits [23]. MR technologies animate static objects, enriching the sensory experience and conveying holistic information. For instance, the MR-based immersive tour at Kennin-ji Temple in Kyoto employs a virtual monk, facilitated through Microsoft HoloLens, to guide visitors through the temple's exhibits in an engaging and culturally sensitive manner. Additionally, AI is increasingly used to personalize recommendations within virtual museums, suggesting exhibits based on users' behavioural patterns and preferences [38]. This data-driven personalization further supports deeper visitor engagement and promotes inclusive learning experiences.

These advancements in AI technology compel institutions such as museums to carefully evaluate which technological solutions best align with their digital strategies. These decisions must also be grounded in the institution's overarching vision and mission. Equally important is the strategic management of both existing and future infrastructure capacity, including the development of human competencies necessary to support the implementation, maintenance, and sustainability of AI-XR ecosystems.

3.2.3. RQ3: What are the critical issues and developments concerning the process component in the implementation of AI in museums?

Museums inherently operate within data-rich environments, encompassing extensive datasets related to collections, visitors, and operational activities. This abundance and diversity of data offer significant potential for machine learning applications. However, their use must be approached with careful ethical consideration, particularly given the involvement of multiple stakeholders and persistent issues of exclusion and bias in the representation of cultural heritage [13], [20], [28]. As technological advancements continue, museum data is increasingly shifting from being restricted to becoming open-access and downloadable, enabling more meaningful applications in machine learning. However, this move also entails issues of user privacy, biases, abuse, and the risk of private data getting out, all of which influence user trust [3], [5], [28]. There are also limitations in the evaluation of the quality of AI outputs, such as generalizability and validity of a conclusion drawn from the data [5].

To address these ethical challenges, a number of structured methodologies, such as the data ethics decision aid (DEDA) developed by the Utrecht Data School [28], [42] and the data ethics canvas by the Open Data Institute [20] have been suggested. These instruments help organisations to critically assess why, what, and who of AI integration (i.e., reasons, the primary purpose, and the target individuals, respectively), including the goals of AI integration, how far AI solutions enhance current approaches, and the impact on potentially negatively affected stakeholders [43].

Given the rapid pace of AI development, assessing the implications and consequences of its implementation poses significant challenges for both policymakers and scientists. Therefore, a thorough evaluation of an organization's readiness is essential before adopting AI. This includes examining the alignment between AI initiatives and the institution's strategic objectives, the availability of relevant expertise, a comprehensive understanding of ethical and operational risks, the establishment of clear performance indicators, and mechanisms to ensure ethical accountability throughout the process [13], [28]. Another critical aspect of the process component involves designing and implementing AI systems within museum contexts. Several studies highlight key considerations during this phase:

- Platform selection. Selecting an appropriate AI platform, whether developed by start-ups or major technology providers, should align with the institution's financial resources, desired level of conversational complexity, and long-term scalability. Ease of integration via accessible APIs is essential to support system flexibility and interoperability [30].
- Chatbot training and knowledge structuring. Effective training of chatbot systems involves the systematic collection and classification of potential visitor inquiries related to artworks or cultural objects. These include factual questions, artist information, interpretations of meaning, visual elements (e.g., color, shape), stylistic analysis, cultural context, and questions reflecting playful engagement.

Notably, the most frequently asked questions often concern the intention, symbolism, and narrative aspects of the artworks [30]. To foster open-ended dialogue and promote informal learning, the chatbot can be designed to generate reflective questions that encourage deeper contemplation and critical thinking among visitors [29]. To enhance accuracy and semantic understanding, domain-specific knowledge graphs (KGs) can be developed. These structured data representations allow AI systems to retrieve relevant, curator-approved responses through integrated APIs [30], [31]. Furthermore, unrecognized utterances can be logged and analysed to improve future system performance and expand coverage.

- Media and delivery channel selection. Institutions should also determine the most suitable media through which conversational agents are deployed. These channels may include web-based chatbots, messaging platforms, mobile apps accessed via QR codes, RFID-triggered content delivery at exhibits, or embodied robots integrated into physical gallery spaces. It is important to note that technologies like RFID serve as interaction triggers rather than conversational media themselves [31].
- Narrative design and agent representation. Decisions about how narratives are conveyed—whether via humanoid avatars, animated objects, or abstract representations—should be guided by the intended visitor experience and exhibition context. These digital embodiments may vary from stylized or symbolic forms to lifelike avatars or physical robots, each offering distinct affordances for engagement [8].
- Avatar design: appearance, gesture, and intelligence. When implementing avatars as conversational agents, two core design domains should be addressed: (i) the avatar's appearance and gestural behaviours, and (ii) its underlying cognitive architecture for generating coherent and contextually appropriate responses [10]. Tools such as iClone 8 and Reallusion 4 can assist in creating customized visual identities. Gesture design plays a crucial role in fostering naturalistic interaction and must align with the communicative intent of the dialogue [7], [32]. Gestures may be categorized into explanatory, guiding, and integrative types. Advanced motion modelling techniques such as adversarial skill embeddings (ASE) and conditional motion in-betweening (CMIB) have been employed in research settings to generate realistic, adaptive motion sequences that enhance social presence and immersion [32].
- Voice integration. To enhance convenience and engagement in the visitor experience, intelligent speech recognition systems are employed to convert spoken input into text or executable commands. These systems often support multiple languages, enable user personalization, and may incorporate emotion recognition to further tailor responses based on visitor sentiment [33]. For implementing natural and immersive voice-based interactions, cloud-based text-to-speech (TTS) services such as Microsoft Azure, iFlytek, Baidu, and Google can be utilized [10], [33]. Ensuring compatibility across a range of devices—such as smartphones, tablets, and smart displays—requires careful attention to data format standardization, platform integration, and network reliability to support seamless cross-platform functionality [33].
- Knowledge management. Information and knowledge presented during the exhibition are systematically organized and structured into a shared knowledge map accessible to all users. Users are granted the ability to modify content independently, as well as to share, exchange, search, and retrieve information collaboratively within the platform [34].
- Data analysis. Voice inputs can be analysed to detect visitors' emotional states, enabling real-time adjustments to intonation, narrative style, or even personalized tour routes. Additionally, the collected data can be leveraged to enhance service quality, for instance, by identifying popular exhibits, analysing visitor feedback to refine exhibition design, and informing personalized recommendation systems [16], [33].

4. CONCLUSION

This study has conducted an in-depth SLR to examine the role of conversational AI in transforming museum experiences, synthesizing insights using the PPT framework. This structured approach allows for a nuanced understanding of how AI is reshaping museum engagement, storytelling, and educational outreach. The people component highlights that besides providing enjoyable or convenient visitor experiences, AI in museums should support the institution's long-term cultural mission. The review also reveals a significant gap that existing studies have not yet provided a comprehensive account of the diverse stakeholder viewpoints or the ways in which their values intersect, conflict, or support AI initiatives. Meanwhile, the process component emphasizes the importance of organizational readiness and ethical considerations in developing accurate, culturally appropriate interactions and building public trust. Lastly, the technology component demonstrates a progression from text-based chatbots to immersive experiences, underpinning the importance of selecting solutions accordingly to museum's financial and technological capacity.

In addition to its contributions, this study also acknowledges several limitations. First, the selection of literature was constrained by specific inclusion and exclusion criteria, which may have led to the omission of relevant studies outside the defined scope. Additionally, the review focuses exclusively on applications of conversational AI in museum settings, despite the broader applicability of such technologies across other domains. Future research should consider a more comprehensive mapping of value propositions from a wider range of stakeholders, including curators, policymakers, funders, and museum professionals, not just visitors as end users. Moreover, while this study applies the PPT framework to structure its analysis, further empirical validation through real-world case studies is necessary to test its applicability, refine the framework, and strengthen its theoretical contributions. Conducting case studies in Indonesia would reveal unique socio-technical dynamics and refine strategies for AI adoption to better align with local conditions.

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Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

DATA AVAILABILITY

Data availability is not applicable to this paper as no new data were created or analyzed in this study.

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