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Preservation of Cultural Heritage in Contemporary Digital Landscape: A Scoping review of literature on methods and challenges

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Abstract

Cultural heritage preservation involves actions to maintain longevity and safeguard values. Recently, its relevance to image analysis, machine intelligence, and computer vision has raised interest in digitization, which enables digital representations and helps preserve knowledge. This study examines digital technologies in cultural heritage development and highlights challenges in literature. A systematic search across Scopus, Google Scholar, and Emerald Insight using terms related to digitization and digital preservation identified 52 relevant studies from over 400 papers. The review found that technologies such as 3D scanning, photogrammetry, GIS, artificial intelligence, virtual and augmented reality, and digital repositories have advanced documentation, conservation, and accessibility of heritage. However, challenges remain, including obsolescence, resource constraints, ethical and copyright issues, data security, and difficulties with intangible heritage. Digital preservation is a multidimensional, socio-technical process that requires innovation, infrastructure, governance, collaboration, and community engagement to ensure future accessibility.

Key Words: *Cultural heritage; Digitalization methods, Digital preservation; Digital conservation; Digital heritage preservation*

1. Introduction

Cultural heritage (CH) forms the cornerstone of human identity and legacy. It includes both what we experience today and what we pass on to future generations. Shaped by communities, it expresses collective identity and is classified as tangible or intangible. Tangible heritage comprises physical artefacts passed through society, such as clothing, transportation, tools, buildings, monuments, and artwork. Intangible heritage encompasses nonphysical intellectual wealth, such as oral traditions, performing arts, knowledge, traditional skills, and language.

Nations worldwide highly value their culture and traditions, prioritizing the preservation of their moral identity and CH. CH assets priceless historical treasures require careful maintenance and conservation. However, cultural knowledge, languages, and traditional skills have diminished, while many archaeological sites and artworks remain inadequately protected. In a globalized world, safeguarding

cultural diversity is vital for collective identity. CH digitization and preservation are complex processes that involve multiple underlying techniques and algorithms to make CH mockups available to current and future generations. Due to the widespread use of digital technologies to capture and store CH, preserving this data for the future is becoming increasingly important, especially given the high value of these assets. Digital preservation is becoming more reliable than physical preservation, thanks to the increasing performance of processing systems and the dropping costs of archival media.

The term "digital heritage" has dual meanings: it refers to CH in digital form and to digitized heritage. Researchers have explored the challenges and benefits of digital preservation in this area. Antoniazzi (2020) analyzed issues in sustaining film heritage digitally, noting a focus on theory rather than local challenges. Basic (2019) studied advanced technology use in CH from a global viewpoint. Dassler & Preuss (2019) examined digital preservation methods for small institutions. Ferrer-Yulfo (2022) addressed museum education and the transformation of intangible heritage through digital technologies. Fisher (2020) identified key digital preservation strategies, emphasizing the role of copyright. Flierl & Haspel (2022) discussed the impact of digital technology on the preservation and documentation of world heritage.

Accordingly, the preservation of both tangible and intangible cultural assets in this way is essential to maintain the richness and diversity of human cultures. Digital technology makes a significant contribution to this preservation by providing advanced tools and methods for documentation, analysis, conservation, environmental monitoring and public participation. Therefore, the task of digital preservation of CH has attracted the attention of various scholars around the world.

Despite the growing body of literature on digital heritage preservation, several specific gaps remain. First, most existing reviews focus on individual technologies such as 3D modelling, photogrammetry, or virtual reality in isolation, without providing a comprehensive synthesis that integrates the full spectrum of digitization strategies and their interrelationships. Second, the rapid emergence of artificial intelligence, digital twins, and immersive technologies in recent years means that earlier reviews are no longer representative of the field's current state. Third, the preservation of intangible cultural heritage, particularly in developing and non-Western contexts such as South Asia, remains underrepresented in the literature, with most studies drawing predominantly on European or East Asian case studies. Fourth, existing literature rarely addresses the intersection of sustainability, ethical governance, and community participation as integrated and mutually reinforcing dimensions of digital preservation. Fifth, there is a notable absence of practical, evidence-based recommendations directed at heritage professionals and policymakers, particularly in resource-constrained institutional settings. This review, therefore, addresses these gaps by providing an up-to-date, holistic, and critically engaged synthesis of recent scholarly work, with particular attention to emerging technologies, regional diversity, and the socio-technical dimensions of digital heritage preservation.

Against this background, this review is guided by the following research objectives:

1. To identify and examine the key digital technologies and strategies currently employed in cultural heritage preservation.
2. To analyses the opportunities and benefits that digital preservation offers for both tangible and intangible cultural heritage.
3. To identify and critically discuss the major challenges and limitations associated with digital heritage preservation as reported in recent literature.
4. To highlight regional contexts and emerging trends that shape the current and future landscape of digital heritage preservation.

2. Materials and Methods

This review was conducted through Scopus, Google Scholar, and Emerald Insight to explore research on the digitization of cultural heritage. The search terms "cultural heritage" or "intangible cultural heritage" and "digital preservation" were used to retrieve research papers. Over 400 papers were initially retrieved. Studies were included if they: (1) addressed digital technologies, tools, or strategies for cultural heritage preservation; (2) full paper were published in peer-reviewed journals or conference proceedings; and (3) were written in English. Studies were excluded if they were duplicates, focused solely on unrelated domains such as medical or industrial heritage, or lacking sufficient methodological detail. Following this screening process, 52 relevant articles were selected for the literature review.

3. Result and Discussion

Digital preservation has become a central strategy for safeguarding CH that is increasingly threatened by environmental degradation, climate change, armed conflict, urbanization, tourism pressures, and the erosion of traditional knowledge systems (Ross, 2012; Siliutina et al., 2024). Cultural assets, including monuments, archaeological sites, manuscripts, artworks, cultural landscapes, and living traditions, face both natural and human-induced risks that can result in irreversible loss (Mendoza et al., 2023; Belhi et al., 2017). In response, advances in digital technologies have enabled the creation of highly detailed and durable representations that support conservation, research, education, and public access (Poulopoulos & Wallace, 2022; Pandey & Kumar, 2020).

Techniques such as terrestrial laser scanning, photogrammetry, LiDAR, and three-dimensional (3D) modelling have largely replaced traditional two-dimensional documentation methods, allowing heritage objects and sites to be recorded with unprecedented accuracy, scalability, and analytical potential (Owda et al., 2018; García-Molina et al., 2021; Lu et al., 2023). Geographic Information Systems (GIS) further support spatial analysis of cultural landscapes by integrating environmental, archaeological, and historical data into comprehensive digital archives, thereby facilitating long-term management and planning (Wang et al., 2024; Kim & Lee, 2025; Tongyun et al., 2025). Such technologies also enable non-destructive documentation, which is particularly important for fragile or inaccessible heritage sites.

Building on the advances in digital technologies, artificial intelligence (AI) is increasingly transforming digital preservation by enhancing the analysis, classification, restoration, and interpretation of cultural assets. Machine learning algorithms can process large datasets generated through scanning and imaging technologies, identify stylistic patterns, reconstruct missing elements, and automate metadata generation, thereby improving efficiency and accuracy (Fu & Razmjooy, 2025; Ferro et al., 2023). AI-assisted transcription tools also expand access to archival materials by converting handwritten or deteriorated documents into searchable text, enabling broader scholarly use (Ferro et al., 2023). Additionally, AI-driven reconstruction can support the restoration of damaged monuments and artworks, offering new possibilities for conservation planning and virtual interpretation (Shaikhon, 2025; Marchello et al., 2023). However, these capabilities raise concerns regarding authenticity, ethical representation, and the potential distortion of cultural meaning when algorithmic outputs substitute for original contexts.

Immersive technologies such as virtual reality (VR), augmented reality (AR), mixed reality, and digital twins further expand the scope of digital preservation by enabling experiential engagement with heritage. Virtual reconstructions allow users to explore sites that are geographically distant, inaccessible, or destroyed, thereby democratizing access to cultural resources and supporting virtual tourism (Buragohain et al., 2024; Li et al., 2023). AR applications integrated with Building Information Modelling (BIM) enable conservation professionals to visualize structural conditions, simulate restoration scenarios, and support maintenance planning directly on site (Ling et al., 2025). Multisensory systems incorporating haptic feedback can recreate ritual practices and embodied experiences, addressing limitations of traditional documentation that often fail to capture sensory dimensions of intangible heritage (Ke et al., 2025; Crouzet et al., 2025). Digital twins, dynamic virtual replicas of physical assets, allow continuous monitoring of environmental conditions and structural changes, supporting preventive conservation strategies (Yang et al., 2024). These immersive tools also contribute to education and community engagement by providing interactive learning experiences that reduce physical pressure on vulnerable heritage sites.

Digitization initiatives extend beyond monumental heritage to include archival materials, museum collections, and traditional knowledge systems. High resolution scanning of manuscripts, photographs, and artefacts produces digital surrogates that preserve informational content while protecting originals from handling damage and environmental deterioration (Madden & Seifi, 2011; Kang, 2025). Digital libraries, repositories, and web archives enable the systematic storage and dissemination of both digitized and born digital materials, ensuring long-term access for researchers and the public (Rosenblum, 2008; Tallman, 2021). Such initiatives also support the preservation of institutional memory and facilitate interdisciplinary research. For intangible CH, including rituals, crafts, music, dance, and indigenous knowledge, digital preservation involves audiovisual recording, motion capture, interviews, and knowledge databases that document practices for future generations (Wan Isa et al., 2019; Pavlova, 2020). Because these traditions are often transmitted orally and depend on practitioner expertise, they are particularly vulnerable to disappearance when communities experience social or demographic change (Perera, 2023).

Interactive and participatory approaches increasingly emphasize the importance of engaging younger generations in heritage preservation. Serious games, virtual museums, and immersive platforms present cultural content in accessible and engaging formats, encouraging learning through exploration and participation (Abdullah et al., 2024; Ping & Zheng, 2024). These tools can simulate historical environments, craft processes, or ritual activities, thereby supporting informal education and cultural transmission. Similarly, multimedia storytelling and virtual environments can strengthen cultural identity, community resilience, and social cohesion, particularly among diasporic populations (Sobaih et al., 2024; García-Mieres et al., 2025). Digital presentation techniques also allow multi-angle visualization and interactive exploration of artefacts, enhancing user understanding and appreciation (Jin, 2025).

Despite these opportunities, literature consistently highlights significant challenges associated with digital preservation. Technological obsolescence remains a major concern, as rapid changes in hardware, software, and file formats can render digital assets inaccessible over time (Ross, 2012; Belhi et al., 2017). Maintaining long-term usability requires ongoing migration, emulation, and digital curation strategies, which demand specialized expertise and sustained funding (Pasqui, 2024). Large datasets generated by high-resolution imaging and 3D modelling also create storage and processing challenges, necessitating scalable infrastructure and robust data management systems (Milios et al., 2022; Siliutina et al., 2024). In addition, ensuring data integrity through replication, fixity checking, and redundancy requires continuous monitoring and institutional commitment (Tallman, 2021).

Financial and organizational constraints further hinder effective implementation, particularly for small institutions and developing countries. Digitization projects involve substantial initial investments in equipment, software, training, and personnel, as well as ongoing operational costs (Belhi et al., 2017; Matusiak et al., 2017). Limited technical expertise and inadequate infrastructure may limit organizations' ability to sustain long-term preservation programs. Consequently, many institutions rely on open-source platforms, cloud services, or collaborative networks to reduce costs, although these solutions may introduce new dependencies and risks (Matusiak et al., 2017).

Legal, ethical, and governance issues also complicate digital preservation efforts. Copyright restrictions can limit the digitization and dissemination of cultural materials, particularly when ownership rights are unclear or contested (Wagner & de Clippele, 2023; Markellou, 2023). Blockchain technologies have been proposed as potential solutions for ensuring transparency, authenticity, and traceability of digital records, although their practical implementation remains limited (Trček, 2022). Ethical considerations are especially important for indigenous and community-based heritage, where unauthorized reproduction or commercialization may constitute cultural appropriation. Ensuring culturally appropriate access, therefore, requires inclusive governance frameworks and stakeholder participation.

Preserving intangible CH presents additional complexities because it involves dynamic social practices rather than static objects. Traditional skills, craftsmanship, and ritual knowledge are embedded in human experience and may be difficult to capture fully through digital means. Motion capture, immersive recording, and

context-rich documentation can represent aspects of embodied knowledge, but they cannot replicate the social interactions and cultural meanings that sustain living traditions (Wan Isa et al., 2019; Crouzet et al., 2025). Effective preservation, therefore, depends on active community involvement, intergenerational transmission, and respect for cultural values. In many contexts, low awareness, declining practitioner populations, and reliance on undocumented knowledge further threaten sustainability (Wan Isa et al., 2018; Abdullah et al., 2024).

Regional contexts significantly shape both the opportunities and challenges of digital preservation, and the case of Sri Lanka offers a particularly instructive example. Sri Lanka possesses a rich and diverse cultural heritage that encompasses both tangible assets, such as ancient monuments, archaeological sites, and religious architecture, and a wide range of intangible traditions including Kandyan dance, Kolam masked drama, *Beeralu* lace making, traditional Ayurvedic knowledge, indigenous ritual practices, and a variety of craft traditions tied to specific communities and localities. Many of these intangible forms are transmitted exclusively through oral tradition and direct apprenticeship, making them especially vulnerable to disappearance as practitioner communities age, migrate, or face socioeconomic pressures (Perera, 2023). The erosion of these traditions is further accelerated by urbanization, globalization, and the declining interest of younger generations in maintaining traditional skills and practices.

In terms of tangible heritage, advanced digital technologies have been applied to document significant monuments in Sri Lanka. Notably, terrestrial laser scanning and photogrammetry have been used to create detailed three-dimensional records of the Sri Dalada Maligawa, the Temple of the Sacred Tooth Relic in Kandy, producing digital archives that support conservation planning and knowledge transfer to local specialists (Rahrig & Luib, 2017). Similarly, broader digitization initiatives have contributed to the documentation of heritage structures across the island (Corns et al., 2015). However, these efforts have been largely confined to monumental and tangible heritage, while the systematic digital documentation of intangible cultural heritage remains underdeveloped.

The digital preservation of Sri Lanka's intangible cultural heritage faces several interconnected challenges. First, institutional capacity for large-scale digitization remains limited, with many cultural institutions lacking the financial resources, technical expertise, and infrastructure required for sustained preservation programs. Second, awareness of digital preservation methods among community practitioners and local cultural organizations is generally low, limiting grassroots participation in documentation initiatives. Third, there is a significant absence of standardized frameworks or national policies specifically addressing the digital documentation and long-term management of intangible heritage in Sri Lanka. Fourth, the sensitive and sacred nature of certain ritual practices raises ethical questions regarding consent, access, and the appropriateness of digital representation, particularly when communities have not been meaningfully involved in preservation decisions.

Addressing these challenges requires a community-centered approach that prioritizes the active involvement of knowledge holders and local communities in the design and implementation of digital preservation initiatives. Audiovisual recording,

motion capture, oral history documentation, and knowledge databases offer promising tools for capturing the embodied and performative dimensions of intangible heritage, provided they are deployed with cultural sensitivity and ethical responsibility (Wan Isa et al., 2019; Pavlova, 2020). Furthermore, partnerships between universities, cultural institutions, government agencies, and international organizations could help mobilize the resources and expertise needed to develop a comprehensive national digital preservation strategy for Sri Lanka's intangible cultural heritage.

Sustainability is widely recognized as a critical issue across the digital preservation lifecycle. Long-term success depends not only on technological solutions but also on policy support, governance structures, and stable funding mechanisms (Ross, 2012; Tallman, 2021). Large-scale digital infrastructures consume significant energy and resources, raising environmental concerns that must be balanced against preservation benefits (Milios et al., 2022). Furthermore, digital preservation initiatives must address issues of accessibility, equity, and cultural sensitivity to ensure that digitised heritage serves diverse communities rather than reinforcing existing disparities (Mendoza et al., 2023).

Overall, digital preservation is best understood as a multidimensional socio-technical process that integrates technological innovation with cultural, institutional, legal, and social considerations. While advanced tools such as AI, 3D modelling, immersive environments, and digital repositories provide powerful means of documentation and access, their effectiveness depends on sustainable infrastructure, skilled personnel, ethical governance, and community engagement. Rather than replacing traditional conservation practices, digital preservation complements them by offering new ways to record, interpret, and disseminate CH. When implemented responsibly and inclusively, it can enhance resilience, promote education, and ensure that cultural knowledge remains accessible to future generations. However, achieving these outcomes requires coordinated interdisciplinary efforts to address the technical, financial, ethical, and environmental challenges inherent in preserving humanity's cultural legacy in digital form.

2.1 Overview of Digital Tools for Cultural Heritage Preservation and Associated Challenges

The various digitization methods, strategies for CH and the challenges identified in the literature review can be summarized as follows.

Table 01. Strategies

High-resolution imaging	Advanced cameras and imaging technologies are employed to capture high-resolution images of cultural artifacts, thereby facilitating comprehensive documentation.	(Madden & Seifi, 2011; Kang, 2025)

3D scanning	Three-dimensional scanning produces digital replicas of objects, capturing intricate details and enabling comprehensive virtual exploration.	Owda et al., 2018; Pavlidis et al., 2007)
Digital repositories	Digital repositories store cultural artefacts, historical documents, and multimedia materials, thereby establishing centralized databases that facilitate efficient archiving.	(Rosenblum, 2008; Tallman, 2021)
Metadata tagging	Each artefact is accompanied by metadata that offers essential contextual information, including its origin, significance, and historical background.	(Belhi et al., 2017)
Audio-visual recording	Audio and video technologies are employed to document traditional music, dance, rituals, and performances, thereby ensuring their accurate preservation.	(Wan Isa et al., 2019; Pavlova, 2020)
Virtual reality and augmented reality	These technologies offer immersive experiences.	(Buragohain et al., 2024; Zheng et al., 2024)
Language digitization	Digital technologies facilitate the transcription, recording, and digitization of endangered languages, thereby supporting their long-term preservation.	(Perera, 2023)
Translation tools	Machine translation tools facilitate the translation of cultural texts, thereby increasing accessibility for diverse audiences.	(Ferro et al., 2023)
Natural language processing	Technological tools facilitate the analysis and interpretation of linguistic nuances, thereby supporting the systematic documentation and study of languages.	(Fu & Razmjooy, 2025
Digital platforms	Online platforms and social media facilitate community engagement in documentation initiatives by enabling individuals to contribute their knowledge, personal narratives, and artefacts.	(Sobaih et al., 2024)
Crowdsourced translation	Community involvement in text translation enhances both accuracy and cultural sensitivity.	(García-Mieres et al., 2024)

Geographic information systems (GIS) mapping	Geographic Information Systems (GIS) are used to map cultural heritage sites, thereby supporting their documentation, conservation planning, and ongoing monitoring.	(Kim & Lee 2025; Tongyun et al., 2025)
Location-based apps	Mobile applications equipped with geolocation capabilities offer virtual tours and detailed information regarding cultural heritage sites.	(Buragohain et al., 2024)
Virtual exhibitions	Digital technologies facilitate the development of virtual exhibitions, thereby increasing global accessibility to cultural artifacts and traditions.	(Ping & Zheng, 2024; Jin, 2025)
Online collections	Institutions develop digital collections that enable users to access and study cultural heritage items globally.	(Rosenblum, 2008; Tallman, 2021)

Table 02. Challenges

Copyright and intellectual property issues	The digital reproduction and dissemination of cultural artifacts present complex copyright and intellectual property challenges. Achieving an equilibrium between protecting creators' rights and facilitating broader access to cultural heritage materials remains an ongoing challenge.	(Wagner & de Clippele, 2023; Markellou, 2023)
Data security and privacy concerns	The digitization of cultural artifacts introduces significant concerns regarding the security and privacy of sensitive information. Protecting digital heritage from unauthorized access, data breaches, and cyber threats is essential for preserving institutional trust and the integrity of cultural records.	(Belhi et al., 2017; Tallman, 2021)
Resource constraints	Preserving digital heritage requires substantial financial and human resources. Numerous cultural institutions, particularly smaller organizations, often face challenges in securing adequate funding and expertise for digital preservation initiatives.	(Belhi et al., 2017; Matusiak et al., 2017)
Standards and interoperability	The absence of standardized practices for digitization and metadata creation impedes interoperability among cultural heritage databases. The development of common standards is crucial for the	(Matusiak et al., 2017; Poulopoulos & Wallace, 2022)

	effective sharing and integration of digital heritage materials.	
Digital conservation and restoration challenges	In contrast to physical artifacts, digital materials often require continuous conservation efforts because of format degradation, software dependencies, and various technical challenges. It is necessary to develop and refine digital restoration practices to ensure the long-term preservation of digital cultural heritage.	(Ross, 2012; Pasqui, 2024)
Ethical considerations	Digitization presents ethical challenges, including the responsible use of cultural artifacts and the risks of misrepresentation or misuse. Addressing these issues requires developing ethical guidelines and actively involving relevant communities in decision-making.	(Mendoza et al., 2023; Motawea, 2025)
Cultural sensitivity and representation	Digitization initiatives should be approached with cultural sensitivity to prevent misappropriation or distortion of cultural narratives. It is essential to ensure accurate representation and active participation of relevant communities throughout the digitization process.	(Mendoza et al., 2023; Perera, 2023)
Global collaboration and coordination	Cultural heritage frequently transcends national boundaries, necessitating international collaboration for effective preservation. Coordinated efforts, the exchange of best practices, and the resolution of global challenges are critical to ensuring the comprehensive preservation of digital heritage.	(Siliutina et al., 2024; Lee, 2010)

4. Conclusion and Recommendations

This review has demonstrated that digital preservation is an essential and transformative approach to safeguarding CH amid accelerating environmental, technological, and socio-political threats. Both tangible and intangible cultural assets are increasingly vulnerable to climate change, urbanization, conflict, neglect, and the erosion of traditional knowledge systems. In response, advanced digital tools, including 3D scanning, photogrammetry, GIS, artificial intelligence, immersive technologies, and digital repositories, offer powerful mechanisms for documentation, analysis, restoration, monitoring, and public engagement.

The review highlights that digital preservation extends beyond technical digitization; it is a multidimensional socio-technical ecosystem that requires

coordinated infrastructure, governance, expertise, and ethical oversight. While technologies such as AI-driven reconstruction, virtual reality environments, and digital twins significantly enhance accessibility and conservation planning, they also introduce critical challenges related to authenticity, data security, technological obsolescence, sustainability, and cultural representation. The rapid pace of technological change demands long-term strategies grounded in established preservation frameworks such as the Open Archival Information System (OAIS), alongside adaptive policies that address evolving risks.

Overall, this review affirms that digital preservation should complement rather than replace traditional conservation practices. Its long-term success depends on interdisciplinary collaboration among technologists, conservators, policymakers, and communities. By integrating innovation with ethical responsibility, sustainable infrastructure, and community-centered approaches, digital preservation can enhance resilience, promote education, and ensure that cultural heritage remains accessible and meaningful for future generations.

Drawing from recent literature, the following evidence-based recommendations are presented for heritage professionals, institutional administrators, and policymakers involved in digital cultural heritage preservation.

1. Develop and Implement Standardized Digital Preservation Frameworks

Heritage institutions are encouraged to adopt established preservation standards, such as the Open Archival Information System (OAIS), to promote consistency, interoperability, and long-term accessibility of digital collections. Policymakers should support the creation of national and regional standards for metadata, file formats, and data management practices to enhance cross-institutional collaboration and knowledge sharing (Tallman, 2021; Matusiak et al., 2017).

2. Invest in Sustainable Digital Infrastructure

Long-term digital preservation depends on sustained investment in scalable storage systems, redundant backups, and regular migration strategies to mitigate technological obsolescence. Institutions with limited resources should receive support through government funding, public-private partnerships, and access to open-source preservation platforms that lower operational costs while maintaining data integrity (Pasqui, 2024; Belhi et al., 2017).

3. Integrate Artificial Intelligence and Emerging Technologies Responsibly

Policymakers and heritage professionals should develop ethical guidelines for the use of AI-driven tools in digitization, restoration, and metadata generation. While AI offers significant efficiency gains, its application must be governed by principles of authenticity, transparency, and cultural sensitivity to prevent misrepresentation or distortion of cultural meaning (Motawea, 2025; Fu & Razmjooy, 2025).

4. Strengthening Legal and Ethical Governance Frameworks

Governments should review and revise copyright legislation to enable digitization and open access dissemination of cultural heritage materials, while safeguarding the

rights of creators and communities. Ethical frameworks that address cultural appropriation, consent, and equitable access should be developed collaboratively with relevant stakeholder groups, particularly for indigenous and community-based heritage (Wagner & de Clippele, 2023; Markellou, 2023).

5. Address Regional Disparities Through Targeted Policy Support

Policymakers in developing countries, such as Sri Lanka, should prioritize the creation of national digital preservation strategies that address local institutional capacity, resource limitations, and the unique vulnerabilities of oral and intangible heritage traditions. International collaboration, capacity-building programs, and technology transfer initiatives are essential for bridging the digital divide in heritage preservation (Siliutina et al., 2024; Mendoza et al., 2023).3).

6. Promote Education and Awareness Among Heritage Professionals

Training programs, workshops, and professional development initiatives should be established to build digital literacy and technical expertise among heritage professionals, archivists, and museum curators. Universities and cultural institutions should collaborate to develop specialized curricula in digital heritage studies that equip the next generation of professionals with the skills needed to navigate the evolving technological landscape (Matusiak et al., 2017; Pandey & Kumar, 2020).

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