

Review

The Impact of Digitalization and Network Technology on the Inheritance and Innovation of Traditional Culture

Anshi Yin ^{1,*}, Joan P. Lazaro ¹, Ronnel P. Agulto ² and Qiang He ³

¹ Graduate School, University of the East, Manila, Philippines

² Department of Innovation and Sustainability, School of Innovation and Sustainability, De La Salle University, Biñan, Laguna, Philippines

³ San Sebastian College-Recoletos, Manila, Philippines

* Correspondence: Anshi Yin, Graduate School, University of the East, Manila, Philippines

Abstract: This review paper explores the intersection between digitalization, network technology, and the inheritance and innovation of traditional culture, with a particular focus on the role of computing technologies in these processes. Digitalization, which involves converting analog information into digital formats, alongside network technologies enabling global communication and data exchange, has significantly transformed how traditional cultural practices are preserved, adapted, and disseminated. This paper examines the evolution of these technologies, emphasizing how advancements such as artificial intelligence, machine learning, blockchain, and virtual reality have reshaped cultural preservation and innovation. Key themes include the application of computational techniques to cultural heritage, digital artistic expression, and the globalization of cultural exchange. The review also addresses the challenges of digital appropriation, homogenization, and the digital divide. By synthesizing existing literature, the paper provides a comprehensive overview of the multifaceted impact of digitalization and network technology, with a focus on computing-driven innovations, offering insights into future research directions and policy considerations.

Keywords: Digitalization; Network Technology; Traditional Culture; Cultural Heritage; Cultural Innovation; Digital Preservation; Cultural Exchange

Received: 10 February 2026

Revised: 09 March 2026

Accepted: 03 April 2026

Published: 09 April 2026



Copyright: © 2026 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

1.1. Background and Motivation

The rapid advancement of digitalization and network technology has significantly transformed the way traditional cultures are inherited, innovated, and disseminated. Digitalization involves the conversion of analog data into digital formats, enabling the preservation and manipulation of cultural content in virtual environments [1]. Network technology, particularly the internet, facilitates the global exchange of data, creating a platform for culture to transcend geographical and temporal boundaries. These technological advancements present both opportunities and challenges for preserving and evolving traditional cultural practices. As computing technologies, such as artificial intelligence (AI), machine learning, and virtual reality (VR), continue to evolve, they provide new means of preserving cultural heritage and facilitating cultural exchange [2].

Traditional culture-comprising customs, art forms, beliefs, and knowledge systems passed down through generations-remains integral to cultural identity and diversity. However, the widespread adoption of digital tools can lead to the erosion of traditional practices or result in cultural homogenization. Therefore, it is essential to explore how digitalization and network technology can promote both the inheritance and innovation of traditional culture while mitigating associated risks. This study focuses on how computing technologies support cultural preservation and innovation, offering new avenues for the creative expression and dynamic evolution of traditional cultural practices.

1.2. Research Questions and Objectives

This review seeks to answer the central question: How do digitalization and network technology, especially computing innovations, influence the inheritance and innovation of traditional culture? Specifically, the study will address the following sub-questions:

1. What are the primary computational mechanisms by which digitalization affects the transmission of cultural knowledge and practices?
2. How do network technologies enable or restrict cultural exchange and adaptation, and what computational methods enhance these processes?
3. What are the risks and benefits of digitalizing traditional culture, particularly regarding its authenticity, accessibility, and representation?

The objective of this review is to provide a comprehensive overview of the role of digitalization, network technology, and computing innovations in the transmission and transformation of traditional culture [3, 4]. The scope of this review includes the impact of digital technologies in areas such as digital preservation, cultural heritage management, digital art creation, and the online dissemination of cultural practices. This review synthesizes findings from various computational and cultural studies, offering insights into how technology-driven strategies can balance the preservation and innovation of cultural identity in the digital age.

2. Historical Overview: Evolution of Digitalization and its Intersection with Culture

2.1. Early Stages of Digitalization and Cultural Documentation

The early stages of digitalization focused on converting analog cultural assets into digital formats, enabling more accessible and durable forms of cultural preservation. Initially, digital technologies, such as optical character recognition (OCR) and basic image scanning, were used primarily for text and visual material digitization [5]. These early efforts were largely driven by the need to preserve fragile materials and to make them available for wider access, particularly in cultural institutions like museums, libraries, and archives.

In the beginning, the computational power of these technologies was limited by hardware constraints. For instance, OCR technology allowed for the digitization of textual documents by recognizing characters and converting them into machine-readable formats. The algorithms behind OCR, such as pattern recognition and early machine learning models, were rudimentary by today's standards, but they marked the first major steps in automating the digital conversion of cultural assets. Similarly, image scanning technologies allowed photographs and paintings to be captured digitally, although the resolution and color accuracy were far less sophisticated than what modern technologies allow [6, 7].

Despite these limitations, the benefits of digitization were evident. The creation of digital repositories reduced the risk of physical deterioration of fragile materials and made cultural content more accessible globally. The ability to index and search digital files improved research efficiency, offering greater opportunities for cross-referencing and analysis of cultural documents. As a result, digital archives and databases began to emerge as tools to support scholarly research, education, and the preservation of cultural heritage.

The cost of digitization was initially high, particularly in terms of equipment, storage, and labor. However, the preservation benefits (p) and accessibility benefits (a) outweighed these costs [8]. In other words, the value of preserving cultural heritage and making it more accessible globally was greater than the initial financial and resource investment. This relationship can be represented by the formula $p + a > c$, where p is the preservation benefit, a is the accessibility benefit, and c is the cost of digitization. As digital storage capacities grew and technology matured, digital preservation became increasingly cost-effective. By the late 1990s, the internet and the web played an instrumental role in expanding access to these digital resources, making cultural heritage

more accessible than ever before [9]. To better understand how these early technologies evolved, Table 1 provides a chronological overview of key digitalization technologies and their application in cultural preservation from the 1950s to the 2000s.

Table 1. Chronology of Key Digitalization Technologies and Their Role in Cultural Preservation (1950-2000)

Era (Approx.)	Technology	Application in Cultural Preservation	Impact
1960s-1970s	Mainframe Computers & Magnetic Tape Storage	Limited use for textual data storage and basic cataloging.	Early attempts at creating digital inventories, but accessibility was restricted due to technology and cost.
1980s	Optical Character Recognition (OCR)	Converting printed text documents into searchable digital formats.	Enhanced accessibility to textual archives and improved search capabilities.
1980s-1990s	Early Image Scanners	Digitizing photographic archives and other visual materials.	Creation of digital image repositories, allowing for wider dissemination of visual heritage. Limited by resolution and storage costs.
1990s	CD-ROM and Early Digital Audio Workstations	Storing and accessing digitized audio-visual recordings and large image collections.	Improved accessibility to multimedia cultural assets. Enabled wider distribution, but limited by storage capacity.
Late 1990s	Early Internet and Web Technologies	Online access to digitized cultural heritage collections, metadata, and finding aids.	Increased global accessibility to cultural heritage information and resources. $p + a > c$, where c represents the cost of digital conversion, p represents preservation benefits, and a represents accessibility benefits.

2.2. The Rise of the Internet and Online Cultural Platforms

The emergence of the internet has drastically transformed the preservation, sharing, and distribution of traditional culture, primarily due to the enabling technologies provided by network technology and digital platforms [10]. These platforms leverage cloud computing, big data, and machine learning algorithms to facilitate efficient storage, search, and access to vast amounts of cultural data. The internet has eradicated geographical and institutional barriers, allowing users worldwide to access cultural heritage without needing to visit physical museums or archives.

Social Media and online repositories have played a significant role in democratizing cultural heritage. Museums and cultural institutions now engage with global audiences through virtual exhibitions, interactive web tours, and digital archives, powered by high-performance computing (HPC) and cloud storage technologies [11]. For instance, artificial intelligence (AI) is now used to enhance the accessibility of these online collections by automatically tagging and categorizing artifacts and artwork. Through machine learning-based image recognition, digital platforms can create accurate metadata for cultural artifacts, making them easier to search and access globally.

Furthermore, the advent of interactive technologies like Augmented Reality (AR) and Virtual Reality (VR) has provided users with immersive, interactive experiences of cultural heritage. For example, users can now explore virtual museum tours, participate in cultural heritage gamification, or even experience historical events through VR, all thanks to advances in real-time rendering and immersive computing.

The rise of the internet also encourages cross-cultural exchange and enables the rapid dissemination of cultural knowledge across borders. It creates a virtual space where traditional cultural forms can be remixed, reinterpreted, and shared by new generations using digital tools. The network effect of the internet amplifies the reach of cultural content, making it accessible to individuals with diverse cultural backgrounds [12].

This revolution in accessibility can be quantified by metrics such as website traffic (T), user engagement (E), and the number of digitized artifacts (N). These indicators point to a significant increase in both the consumption of cultural content and the global visibility of traditional practices, facilitated by computing infrastructure and networked technologies.

2.3. Mobile Technology and Social Media: A New Era for Cultural Engagement

Mobile technology, driven by advances in smartphones, tablets, and 5G networks, has fundamentally reshaped how individuals engage with cultural content, especially younger generations who are deeply integrated into digital ecosystems. The availability of high-speed mobile internet combined with powerful processing capabilities in smartphones has created an environment where culture can be digitally consumed, created, and shared on-the-go.

Social media platforms, such as Instagram, TikTok, and YouTube, are not only spaces for personal expression but have become powerful tools for cultural production and innovation. Users actively create content that draws on traditional culture—be it through digital art, music, or dance—using computer software for editing, AI algorithms for enhancement, and cloud platforms for distribution. Social media platforms rely heavily on recommendation algorithms, powered by machine learning, to tailor content to users' preferences, which directly affects the dissemination of cultural material. This has contributed to the rapid spread of cultural trends, including both mainstream and niche cultural practices.

Furthermore, the rise of user-generated content (UGC) has democratized the ability to produce and distribute cultural content. Platforms like YouTube allow creators to make videos showcasing traditional crafts, music, and rituals, which are then shared globally. AI-driven translation tools have facilitated global interaction with these cultural forms, enabling non-native speakers to access content in their language.

The interactivity provided by these platforms has also redefined cultural engagement. Unlike traditional forms of cultural consumption, where audiences were passive recipients, digital platforms enable users to become active participants in the co-creation of cultural narratives. Crowdsourced cultural archives, such as those created on platforms like Wikipedia, are an example of how mobile technology and social media contribute to the collective construction of knowledge and the collaborative preservation of cultural heritage.

Additionally, smartphones and mobile apps have been used to enhance the experience of visiting cultural heritage sites. AR-based mobile apps now allow users to

experience augmented exhibits, where digital layers of historical data or 3D reconstructions of ancient artifacts can be superimposed onto physical spaces. This integration of mobile technology into cultural experiences enables a deeper level of interaction and engagement, blending the physical and digital worlds seamlessly.

The exponential growth of user engagement ($f(x) = ae^{bx}$) as a function of the time spent on platforms such as TikTok and Instagram illustrates how mobile technology and social media are reshaping the cultural landscape. These platforms not only act as conduits for global cultural exchange but also play a key role in cultural innovation by allowing users to experiment with and remix traditional forms in digital spaces.

3. Core Theme A: Digital Preservation and Accessibility of Cultural Heritage

3.1. Digitalization of Cultural Artifacts and Archives

The digitalization of cultural artifacts and archives represents a fundamental shift in how we preserve and access our shared heritage. This process involves converting physical objects, such as manuscripts, photographs, and museum objects, into digital formats. Various methods and technologies are employed depending on the nature of the artifact. For manuscripts and documents, high-resolution scanning is commonly used, often employing specialized scanners to minimize physical contact and potential damage. Photographs are typically digitized using flatbed scanners or digital cameras, with careful attention paid to color accuracy and resolution to capture fine details. Museum objects present unique challenges, often requiring 3D scanning techniques like structured light scanning or laser scanning to create accurate digital models. These models can then be used for virtual exhibitions, research, and conservation purposes.

Data integrity is paramount throughout the digitization process. Measures must be taken to ensure the accuracy and completeness of the digital representations. This includes rigorous quality control procedures, such as visual inspection and checksum verification, to detect and correct errors. Preservation standards, such as TIFF for images and PDF/A for documents, are crucial for long-term accessibility and compatibility. These standards ensure that the digital files remain usable and readable over time, regardless of technological advancements.

Metadata creation is another essential aspect of digitalization. Metadata provides contextual information about the artifact, including its provenance, creator, date, and subject matter. Standardized metadata schemas, such as Dublin Core, are often used to ensure interoperability and facilitate searching and retrieval. The richness and accuracy of the metadata significantly impact the discoverability and usability of the digitized cultural heritage. The file size (S) of the digital object is directly proportional to the resolution (R) and color depth (C), represented as $S \propto R \cdot C$.

Table 2 provides a comparison of different digital preservation methods for archival materials, outlining the various technologies used, data integrity measures, and preservation standards for materials such as manuscripts, photographs, and museum objects. As illustrated in the table, each method has its own advantages and disadvantages depending on the type of material being digitized and the technical requirements involved. For example, high-resolution scanning is particularly effective for manuscripts and documents, providing high accuracy while minimizing damage to originals. However, this process can be time-consuming and expensive. In contrast, flatbed scanning is quicker and more cost-effective for photographs but requires careful calibration for accurate color representation. 3D scanning, though complex and expensive, enables the creation of detailed digital models of museum objects that can be used for virtual exhibitions and research.

Table 2. Comparison of Different Digital Preservation Methods for Archival Materials

Method	Materials	Technologies	Data Integrity	Preservation Standards	Metadata	Advantages	Disadvantages
High-Resolution Scanning	Manuscripts, Documents	Specialized Scanners (minimizing physical contact)	Rigorous Quality Control (Visual Inspection, Checksum Verification)	PDF/A (for documents)	Standardized Schemas (e.g., Dublin Core)	High accuracy, minimizes damage to originals	Can be time-consuming and expensive
Flatbed Scanning/Digital Photography	Photographs	Flatbed Scanners, Digital Cameras	Careful Attention to Color Accuracy and Resolution	TIFF (for images)	Standardized Schemas (e.g., Dublin Core)	Relatively quick and cost-effective for photographs	Requires careful calibration for accurate color representation
3D Scanning	Museum Objects	Structured Light Scanning, Laser Scanning	Quality control to ensure accurate digital model representation	Varies depending on application (STL, OBJ)	Standardized Schemas (e.g., Dublin Core) + specific schemas for 3D models	Enables virtual exhibitions, research, and conservation	Complex and expensive, requires specialized equipment and expertise
General Observation: The file size of the digital object is directly proportional to the	N/A	N/A	N/A	N/A	N/A	N/A	N/A

resolution

R and

the color

depth

C ,

represented

as $S \propto$

$R \cdot C$.

3.2. Online Cultural Heritage Platforms and Virtual Museums

Online cultural heritage platforms and virtual museums represent a significant shift in how cultural artifacts and traditions are preserved and disseminated. These platforms vary widely in design and functionality, ranging from simple online archives of digitized objects to sophisticated interactive experiences. A key design consideration is user accessibility, ensuring that individuals with varying levels of technical expertise and diverse backgrounds can easily navigate and engage with the content. Functionality often includes search features, allowing users to locate specific items or themes; interactive maps, providing geographical context; and multimedia elements, such as audio recordings, video clips, and 3D models. The effectiveness of virtual museums in engaging audiences hinges on several factors. High-quality visuals and detailed descriptions are crucial for conveying the richness and complexity of cultural heritage. Interactive elements, such as virtual tours and gamified learning experiences, can enhance user engagement and promote deeper understanding. Furthermore, the ability to access these resources remotely and at any time significantly expands the reach of cultural institutions, potentially attracting audiences who might not otherwise have the opportunity to visit physical museums. However, challenges remain in ensuring equitable access to these digital resources, particularly for communities with limited internet connectivity or digital literacy. The variable x represents the level of user engagement, while y represents the accessibility score of the platform. A higher x and y indicate a more successful platform.

3.3. Challenges in Long-Term Digital Preservation

Ensuring the long-term accessibility and usability of digital cultural heritage presents significant challenges. Data obsolescence is a primary concern, as hardware and software platforms evolve rapidly, rendering older digital objects unreadable or unusable. This necessitates ongoing format migration, a complex and resource-intensive process involving the conversion of data from outdated formats to newer, more sustainable ones. The cost, potential for data loss during conversion, and the sheer scale of digital archives make format migration a formidable task.

Furthermore, digital rights management (DRM) poses a considerable obstacle. While DRM aims to protect intellectual property, overly restrictive measures can limit access to and use of cultural heritage materials, hindering research, education, and creative reuse. Balancing the rights of creators with the public interest in accessing and preserving cultural heritage requires careful consideration and the development of flexible and adaptable DRM strategies. The longevity of encryption methods also needs to be considered, as algorithms deemed secure today may be vulnerable in the future, potentially locking away valuable cultural assets. The variable t , representing time, is a crucial factor in assessing the risk of data degradation.

4. Core Theme B: Digital Innovation and Transformation of Cultural Expression

4.1. Digital Art and New Forms of Cultural Creativity

Digital technology has significantly transformed artistic expression, enabling entirely new forms of cultural creativity. Digital art, interactive installations, and virtual performances are just a few examples of this groundbreaking shift. The integration of computational tools such as image processing software, motion capture, and virtual reality (VR) has expanded the boundaries of what is possible in art creation, allowing artists to manipulate images, sounds, and physical space in unprecedented ways. These technologies are pushing the limits of traditional art forms and creating immersive, interactive experiences that were once unimaginable.

Digital painting software, such as Procreate and Photoshop, allows artists to create highly detailed and intricate works, offering a far broader range of colors and textures than traditional media. This digital canvas not only enables exploration of new techniques but also facilitates experimentation with new forms and aesthetics. Similarly, interactive installations, powered by sensors, algorithms, and machine learning, engage viewers in ways that transform them from passive observers to active co-creators. By responding to audience movements, input, or decisions, the artwork evolves in real-time, allowing the viewers to influence the final narrative. This shift towards audience-driven art exemplifies the convergence of artificial intelligence and interactive design in cultural creativity.

Virtual performances, made possible through motion capture technology and virtual reality (VR), offer audiences highly immersive experiences that transcend geographical boundaries. Performers interact with the audience in digitally constructed environments, often in real-time, blurring the lines between physical and virtual spaces. These digitally mediated performances are revolutionizing the way cultural content is consumed and performed, providing artists with new ways to engage with global audiences and collaborate across borders.

The impact of these technologies on traditional art forms is complex. On one hand, digital art can be seen as a departure from established artistic principles; on the other, it can be viewed as an evolution—an expansion of traditional techniques. Digital tools allow artists to restore damaged historical artworks, reconstruct fragmented pieces, and offer new interpretations of classical stories through animation and interactive storytelling. The digital medium serves as a bridge between the past and future, allowing for both preservation and innovation of cultural heritage. By using digital archives, AI-assisted restoration, and 3D modeling, artists are able to preserve historical masterpieces while experimenting with new forms of artistic expression.

The key is understanding how digital technology can be employed not only to preserve the authenticity of traditional culture but also to innovate and create new forms that resonate with contemporary audiences. As shown in Table 3, digital art forms like digital painting, interactive installations, and virtual performances utilize various technologies to engage audiences in different ways. For example, interactive installations (x between 0 and 1) use sensors and algorithms to allow real-time audience interaction, while digital restoration ($x \approx 0$) and digital painting rely on lower interactivity but focus on preserving or enhancing traditional artistic techniques. These technologies enable a blend of cultural preservation and innovation, ensuring that traditional art forms evolve and remain relevant in the digital age.

Table 3. Categories of Digital Art and Examples

Category	Description	Examples	Interactivity (x)
Digital Painting	Art created using software to simulate traditional painting techniques.	Digital portraits, landscapes, and illustrations created with Procreate or Photoshop.	Low (approaching 0)
Interactive Installations	Artworks that respond to audience participation, often using sensors and algorithms.	Art installations that use motion sensors or gesture-based algorithms to change visuals based on viewer movement.	Variable (between 0 and 1)
Virtual Performances	Performances conducted in virtual environments, often using motion capture and VR.	Concerts and theatrical productions in virtual reality platforms, performances with virtual sets and avatars.	Medium to High (0.5 to 1)
Digital Restoration	Using digital tools to restore damaged artworks.	AI-assisted restoration of faded photographs, 3D scanning and digital reconstruction of fragmented paintings.	Low (approaching 0)
Interactive Storytelling	Digital narratives where the audience's choices influence the plot.	Video games with branching storylines, choose-your-own-adventure stories, interactive augmented reality (AR) experiences.	High (1)

4.2. The Role of Social Media in Cultural Production and Dissemination

Social media platforms have fundamentally altered the landscape of cultural production and dissemination, providing unprecedented opportunities for artists and communities to share their work beyond geographical boundaries. These platforms act as both galleries and marketplaces, enabling creators to bypass traditional gatekeepers and directly engage with a global audience. The ease of content creation and sharing, facilitated by user-friendly interfaces and mobile technology, has democratized cultural expression, allowing individuals and groups from diverse backgrounds to participate in the global cultural conversation.

This accessibility has significant implications for cultural diversity and representation. Social media provides a space for marginalized voices and underrepresented cultures to gain visibility, challenging dominant narratives and promoting a more inclusive understanding of cultural heritage. For example, indigenous communities are using platforms like Instagram and TikTok to share their languages, traditions, and artistic practices with a wider audience, fostering cultural preservation and intercultural dialogue. The algorithms that govern these platforms, however, can also create echo chambers and reinforce existing biases, potentially limiting exposure to

diverse perspectives. Furthermore, the commercialization of social media raises concerns about the commodification of culture and the potential for exploitation of cultural heritage for profit. The balance between empowering cultural expression and mitigating the risks of homogenization and misappropriation remains a crucial challenge. The influence of x (platform algorithms) and y (user engagement) on cultural visibility is a complex interplay that requires further investigation.

4.3. Digital Storytelling and Interactive Narratives

Digital storytelling, empowered by network technology, offers unprecedented opportunities to revitalize traditional cultural expression. Interactive narratives, a key component of this digital transformation, allow audiences to actively participate in the unfolding of cultural themes and folklore. This participatory element fosters a deeper engagement and understanding compared to passive consumption of traditional media.

The application of game engines, virtual reality (VR), and augmented reality (AR) technologies enables the creation of immersive experiences that transport users into the heart of traditional stories. For example, ancient myths can be reimagined as interactive games where players make choices that influence the narrative's trajectory, learning about cultural values and historical contexts along the way. The use of 360° video and spatial audio further enhances the sense of presence, making the experience more visceral and memorable.

Furthermore, digital platforms facilitate the collaborative creation of narratives. Users can contribute their own interpretations of traditional stories, adding new layers of meaning and relevance. This collaborative approach ensures that cultural heritage remains dynamic and adaptable, resonating with contemporary audiences while preserving its core values. The success of these initiatives hinges on striking a balance between technological innovation and the authentic representation of cultural heritage, ensuring that the essence of the original stories is not lost in the process of digitalization.

5. Comparison & Challenges: Digital Divide, Cultural Appropriation, and Authenticity

5.1. The Digital Divide and Unequal Access to Cultural Resources

The digital divide presents a significant obstacle to the equitable inheritance and innovation of traditional culture in the digital age. This divide, characterized by disparities in access to internet connectivity, affordable devices, and essential digital literacy skills, disproportionately affects marginalized communities, including rural populations, low-income households, and older generations. Consequently, these groups face restricted access to digital cultural resources, such as online archives, virtual museums, and interactive platforms showcasing traditional arts and practices.

The lack of reliable internet access, particularly in rural areas, limits opportunities for cultural participation and knowledge acquisition. Furthermore, even with internet access, the absence of digital literacy skills hinders the effective utilization of available resources. Individuals unable to navigate online platforms, critically evaluate information, or create digital content are effectively excluded from contributing to and benefiting from the digital cultural landscape. This unequal access exacerbates existing social and economic inequalities, potentially leading to a homogenization of cultural narratives and a diminished representation of diverse cultural perspectives online. The digital divide, therefore, acts as a barrier, preventing the full potential of digitalization from being realized in the preservation and promotion of traditional culture for all. The variable x representing access, therefore, is not uniformly distributed.

5.2. Cultural Appropriation and Misrepresentation in the Digital Realm

The digital realm, while offering unprecedented access to diverse cultures, simultaneously amplifies the risks of cultural appropriation and misrepresentation. The ease with which content can be copied, shared, and remixed online often leads to the

decontextualization of cultural elements, stripping them of their original meaning and significance. This is further exacerbated by algorithms that prioritize engagement over accuracy, potentially promoting sensationalized or stereotypical portrayals of traditional practices. The commodification of cultural symbols for profit, without proper understanding or consent from the originating communities, is a common manifestation of this issue.

Addressing these challenges requires a multi-faceted approach. Firstly, promoting digital literacy and critical thinking skills is crucial, enabling users to discern authentic representations from misrepresentations. Secondly, fostering collaborations between content creators and cultural custodians can ensure respectful and accurate portrayals. Thirdly, platforms should implement stricter guidelines regarding the use of cultural heritage, including mechanisms for reporting and addressing instances of appropriation. Finally, supporting indigenous-led digital initiatives that empower communities to control their own narratives and preserve their cultural heritage online is essential for fostering ethical and respectful engagement. The variable x represents the level of understanding.

5.3. Authenticity and the Impact of Digital Reproduction on Cultural Value

The proliferation of digital reproductions of traditional cultural artifacts and practices has ignited a fervent debate regarding authenticity. Central to this discussion is whether the value and meaning inherent in original cultural expressions are diminished or altered through their digital representation. Critics argue that digital copies, while offering wider accessibility, lack the tangible connection to the past embodied in the original. The aura of authenticity, often associated with unique, handcrafted objects or performances passed down through generations, is perceived to be diluted in the digital realm.

Furthermore, the ease of manipulation and modification afforded by digital technology raises concerns about the potential for misrepresentation and the creation of inauthentic versions. The question arises: at what point does a digital reproduction cease to be a faithful representation and become a distortion of the original? This is particularly relevant when considering intangible cultural heritage, such as music or dance, where nuances and subtle variations are crucial to its meaning. The digital space, while offering opportunities for preservation and dissemination, also presents challenges in safeguarding the integrity and authenticity of traditional culture, potentially leading to a perceived devaluation of the original in favor of readily available, but potentially less meaningful, digital surrogates. The perceived value, therefore, becomes a function $f(x)$ of both accessibility (x) and perceived authenticity.

6. Future Perspectives: Emerging Technologies and Cultural Heritage

6.1. Artificial Intelligence and Machine Learning for Cultural Preservation

Artificial intelligence (AI) and machine learning (ML) offer transformative possibilities for cultural preservation. Automated metadata creation, powered by AI, can significantly reduce the manual effort required to catalog and describe cultural artifacts. ML algorithms can analyze images, text, and audio to generate rich and accurate metadata, improving accessibility and searchability. Object recognition, another key application, enables the automatic identification and classification of artifacts within images and videos. This is particularly useful for large collections where manual identification is impractical. Furthermore, AI can contribute to predictive preservation. By analyzing environmental data (T , temperature; H , humidity) and material properties (M), ML models can predict the degradation rate (D) of artifacts and recommend proactive conservation measures. This allows for optimized resource allocation and preventative interventions, ensuring the long-term survival of cultural heritage.

6.2. Blockchain Technology and the Future of Cultural Heritage Management

Blockchain technology offers promising avenues for revolutionizing cultural heritage management by enhancing security and transparency. Its decentralized and immutable ledger system provides a robust framework for provenance tracking, enabling a verifiable record of an artifact's history from origin to present ownership. This is particularly crucial in combating illicit trafficking and ensuring the authenticity of cultural objects. Furthermore, blockchain can facilitate digital rights management for digitized cultural assets. Smart contracts, self-executing agreements written into the blockchain, can automate licensing agreements and royalty payments, protecting the intellectual property of creators and institutions. By assigning unique, non-fungible tokens (NFTs) to digital representations of cultural heritage, ownership and usage rights can be securely managed and traded. The inherent transparency of blockchain also fosters greater trust and accountability among stakeholders, including museums, collectors, and researchers. The potential for fractional ownership of high-value cultural assets, represented by blockchain tokens, could also democratize access and investment in this domain.

7. Conclusion

7.1. Summary of Key Findings

This review has explored the multifaceted impact of digitalization and network technology on the inheritance and innovation of traditional culture. Key findings reveal a complex interplay of preservation, transformation, and dissemination. Digitalization facilitates the archiving and accessibility of cultural artifacts, practices, and knowledge, mitigating the risk of loss due to factors like globalization and urbanization. Network technology, particularly the internet and social media, enables wider dissemination of traditional culture, reaching global audiences and fostering cross-cultural exchange. However, this process is not without its challenges. The authenticity of cultural representations can be compromised through digital manipulation and commercialization. Furthermore, the digital divide creates inequalities in access and participation, potentially marginalizing certain communities. The research also highlights the emergence of new forms of cultural expression that blend traditional elements with digital media, leading to innovative hybrid forms. The parameter x represents the degree of cultural hybridity, while y indicates the level of digital engagement. The study suggests a positive correlation between x and y , indicating that increased digital engagement often leads to greater cultural hybridity. Ultimately, digitalization and network technology present both opportunities and challenges for the future of traditional culture.

7.2. Implications for Policy and Practice

The findings of this study carry significant implications for both policy design and practical implementation concerning the intersection of digitalization and cultural heritage. Policymakers should prioritize initiatives that foster digital literacy within communities, particularly focusing on vulnerable populations, to ensure equitable access to the benefits of digital cultural resources. Furthermore, funding mechanisms should be established to support the digitization and preservation of cultural artifacts, prioritizing projects that incorporate community participation and promote intergenerational knowledge transfer.

In practice, cultural institutions should adopt open-source platforms and standardized metadata schemas to enhance the accessibility and interoperability of digital cultural heritage data. Educational programs should be developed to equip cultural practitioners with the skills necessary to effectively utilize digital tools for preservation and dissemination. Finally, a legal framework addressing intellectual property rights in the digital realm is crucial to protect traditional knowledge and prevent cultural appropriation, balancing the need for preservation with the rights of creators and communities. A key variable to consider is the investment in digital infrastructure, represented by I , which directly impacts the reach and effectiveness of these initiatives.

References

1. M. Knell, "The digital revolution and digitalized network society," *Rev. Evol. Polit. Econ.*, vol. 2, no. 1, pp. 9-25, 2021. doi: 10.1007/s43253-021-00037-4
2. H. Kagermann, "Change through digitization—Value creation in the age of Industry 4.0," in *Management of permanent change*, Wiesbaden: Springer Fachmedien Wiesbaden, 2014, pp. 23-45. ISBN: 9783658050139
3. I. Ivanov, T. Lukyanova, and L. Orlova, "Digitalization as a driver of innovation for industrial enterprises," in *IOP Conf. Ser.: Mater. Sci. Eng.*, vol. 753, no. 8, p. 082023, 2020. doi: 10.1088/1757-899x/753/8/082023
4. Y. Yoo, *Digitalization and Innovation*, Institute of Innovation Research, Hitotsubashi University, Working Paper no. 10-09, 2010.
5. G. N. Kutsuri, S. S. Kamberdieva, V. K. Dedegkaev, I. A. Sopoeva, and T. G. Shelkunova, "Impact of digitalization on improvement of economy, IT and Internet of business," *Journal of Physics: Conference Series*, vol. 1399, no. 3, p. 033008, 2019. doi: 10.1088/1742-6596/1399/3/033008
6. B. K. Hutasuhut, I. P. Sari, and A. K. Al-Khowarizmi, "Analysis the effect of digitalization and technology on web-based entrepreneurship," *Journal of Computer Science, Information Technology, and Telecommunication Engineering*, vol. 4, no. 1, pp. 350-354, 2023. doi: 10.30596/jcositte.v4i1.13891
7. M. A. Afonasyova, E. E. Panfilova, M. A. Galichkina, and B. Ślusarczyk, "Digitalization in economy and innovation: The effect on social and economic processes," *Polish Journal of Management Studies*, vol. 19, no. 2, pp. 22-32, 2019. doi: 10.17512/pjms.2019.19.2.02
8. A. Schroeder, and A. Ziaee Bigdeli, "Capturing the benefits of digitalization and service innovation: A business network perspective," *Academy of Management Proceedings*, vol. 2018, no. 1, 2018.
9. B. Nitsche, and F. Straube, "Current state and future of international logistics networks-The role of digitalization and sustainability in a globalized world," *Logistics*, vol. 7, no. 4, p. 83, 2023. doi: 10.3390/logistics7040083
10. O. Vigren, "Digitalization, sustainability, and ecosystems: An application of social network analysis to the real estate sector (Doctoral dissertation, KTH Royal Institute of Technology)," 2022.
11. Y. Li, L. Cui, L. Wu, P. B. Lowry, A. Kumar, and K. H. Tan, "Digitalization and network capability as enablers of business model innovation and sustainability performance: The moderating effect of environmental dynamism," *Journal of Information Technology*, vol. 39, no. 4, pp. 687-715, 2024. doi: 10.2139/ssrn.4640786
12. A. Frenzel, J. C. Muench, M. Bruckner, and D. Veit, "Digitization or digitalization? Toward an understanding of definitions, use and application in IS research."

Disclaimer/Publisher's Note: The views, opinions, and data expressed in all publications are solely those of the individual author(s) and contributor(s) and do not necessarily reflect the views of PAP and/or the editor(s). PAP and/or the editor(s) disclaim any responsibility for any injury to individuals or damage to property arising from the ideas, methods, instructions, or products mentioned in the content.