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RESEARCH ARTICLE

Digitalization and Its Role in Preserving Heritage

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ABSTRACT

In this article, we attempt to define heritage in general and digital heritage specifically, often referred to as digital heritage portals, circulated via electronic digital media. This involves the electronic conversion of existing materials and media recorded in any language or specialized in any field of knowledge. Digital heritage portals are also known as a method that relies on taking three-dimensional digital fingerprints of archaeological properties to preserve them in a database for future use in restoration if they are damaged due to war, natural, or human factors. The goal of this portal is to digitize and provide online access to as much of the heritage components as possible, to highlight its richness and diversity and make it accessible to the widest possible audience. We also discuss the features of digital heritage, reasons for its significance, the areas of information technology service for heritage, and the objectives of most digital software and applications (digitalization) for heritage, leading to suggestions and solutions in this context. We have a diverse and profound heritage dating back to prehistory, and we boast innovative minds in all fields and international forums, along with the necessary financial resources. Where then lies the problem in leading this field?

INTRODUCTION

Humanity has known libraries to collect and organize the published intellectual output of individuals and make it available for consultation. Societies have also recognized the role of archives and documentation centers in gathering, organizing, preserving, and facilitating access to documents issued by institutional or organizational activities.

Furthermore, museums have been known to assemble evidence and artifacts left by previous civilizations through archaeological, artistic, natural, or other means, preserving and making them available for public viewing, thereby conserving and organizing the memory of societies and individuals. -**Research Group, Hurdle Center for Digital Expression Support, Digitalization and Protection of Digital Heritage, Cairo, 2016, p. 53**

Heritage is the trace, intellectual, artistic, or natural creation that constitutes the legacy of peoples and belongs to them. We benefit from it today and strive to preserve and pass it on to future generations. This heritage includes manuscripts, ancient archaeological artifacts, artistic or archaeological products, practices, skills, knowledge, arts, customs, traditions, and more. Various classifications exist for heritage content or archaeological remains in general.

Classifications of Heritage Content:

First Division:

Based on the separation between the type of medium, there is documentary heritage, which includes manuscripts, books, maps, newspapers, documents, and others, and non-documentary heritage, encompassing most forms of arts, architecture, buildings, and various archaeological pieces. -**UNESCO Recommendation Project on Cultural Heritage and Its Accessibility, General Conference, 38th Session, Paris 2015, Resolutions: 36C/59 and 37C/53**

- **Second Division:**

It is categorized based on the belonging and identity of heritage into national local heritage, which includes everything belonging to a specific people, and global heritage, encompassing the legacy of previous civilizations and what has been transmitted by various peoples. **UNESCO Recommendation Project on Cultural Heritage and Its Accessibility, General Conference, 38th Session, Paris 2015, Resolutions: 36C/59 and 37C/53**

- **Third Division:**

It is based on separating the creator or innovator from the heritage work: including natural heritage, which comprises the earth, nature, living beings, plants, and others of God Almighty's creation, and human heritage, encompassing all human creations through different eras. **UNESCO Recommendation Project on Cultural Heritage and Its Accessibility, General Conference, 38th Session, Paris 2015, Resolutions: 36C/59 and 37C/53**

- **Fourth Division:**

Based on distinguishing between the materiality or method of embodying creativity in the heritage work, it is also of two types: the first is tangible material heritage, which includes stone, paper, leather, papyrus, cylinders, and tapes; the second is intangible or immaterial heritage, encompassing all forms of performative arts, social customs, and traditions. **UNESCO Recommendation Project on Cultural Heritage and Its Accessibility, General Conference, 38th Session, Paris 2015, Resolutions: 36C/59 and 37C/53**

- **Fifth Division:**

Digital heritage consists of heritage carried in digital form, easily managed through computers and smartphones, and circulated through digital electronic media, where the electronic conversion of existing materials and media in any language or specialized in any field of knowledge takes place.

Digital heritage is sometimes known as "digital heritage portals," a method relying on three-dimensional digital fingerprints of archaeological properties, aiming to preserve them in a database for later use in restoration, in case of damage by any cause, such as wars, human conflicts, theft, natural and environmental factors, among others.

These portals aim to digitize and make available online the largest possible amount of heritage components, to highlight their wealth, diversity, and richness, making them accessible to the largest audience. - **UNESCO Recommendation Project on Cultural Heritage and Its Accessibility, General Conference, 38th Session, Paris 2015, Resolutions: 36C/59 and 37C/53.**

Material heritage is not immune to digitization, especially "preventive digitization," through the repair of the monument in case of any damage. Besides the preventive aspect, digitization has other benefits, notably valuing archaeological landmarks and virtually identifying them by their architectural and geometric features, artistic and decorative components, and their material and heritage value, allowing for archiving and the creation of real models, facilitating study, research, and assisting in the reconstruction of nearly collapsed landmarks.

Digital heritage is sometimes described as public or communal heritage and includes written texts, databases, still and moving images, audio materials, drawings, and software, characterized by permanence. - **UNESCO Recommendation Project on Cultural Heritage and Its Accessibility, General Conference, 38th Session, Paris 2015, Resolutions: 36C/59 and 37C/53.**

Modern Technologies and Their Role in Heritage Protection:

Information technologies have offered humanity various opportunities to link descriptions and images of material artifacts, manuscripts, archaeological pieces, maps, books, documents, and other forms of human creativity. Without communication technologies, it would not be possible to introduce heritage works globally and allow for accessing and browsing their contents in their original language or any language worldwide.

Modern communication and information technologies have facilitated the establishment of libraries, exhibitions, virtual tours, and electronic archives available around the clock and throughout the

week, making them more affordable and accessible to everyone worldwide without significant expenses for equipment, labor, and other additional costs. **–Sofal Iman, Digitization of Heritage and Its Impact on Sustainable Tourism, International Models and Prospects in Algeria, International Journal of Social Communication, Vol 07, No 01, March 2020, p. 451**

Digital Repositories:

Those interested in information technology applications in the field of heritage and modern information sources have introduced a new concept known as digital repositories, which combine different types and forms of information sources. -**Mezhoud Salim, Concept of Historical Archive Digitization and the Importance of Acquiring its Skills, Bibliographia Studies of Possessions and Information, Vol. 02, No. 08, December 2008, p. 241**

It's worth noting that there are many global websites in the field of heritage and archaeology containing more than 5,000 digital repositories on the Internet, which describe the collections from primary sources such as manuscripts, rare books, historical images, and more.

Archaeological Remnants and Information Technology:

It is said that there is no heritage without collection, organization, restoration, preservation, accessibility, and display. Information technology is a real support and backbone for most of these processes as it serves as mechanisms and means for producing, displaying, preserving, maintaining, transferring, and exchanging intellectual and artistic creations, including computers, software, communication networks, restoration materials and devices, and asset detection mechanisms used in production, innovation, inventory, assembly, organization, restoration, conservation, and maintenance.

Service Areas of Information Technology for Archaeology:

There are three levels of archaeological heritage content available electronically:

First Level: The Originals

These include manuscripts, drawings, audio recordings, excavations, artifacts, statues, art paintings, coins, etc. The role of information technology here is evident in supporting this level by uncovering the originals, performing restorations, repairs, cataloging, identifying, preserving, maintaining, and museum display. - **UNESCO Recommendation Project on Cultural Heritage and its Accessibility, General Conference, 38th Session, Paris 2015, Resolutions: 36C/59 and 37C/53**

Second Level: Alternatives to the Originals

This level includes all forms of descriptive records and paper and electronic registration in databases, photographic images of the originals, printed copies, and film representations of the originals, whether on microfilm or in electronic files. Information technology's assistance is clear in this aspect through digital imaging devices and software, their various capabilities, inventory and identification software, electronic accessibility means, unlimited trading, global marketing, and support for preservation and maintenance.

Third Level: Derivatives of the Originals' Alternatives

This includes postcards, electronic discs, brochures, guides, and more. The assistance of information technology in this category is through supporting this level by facilitating global participation in local heritage, promoting its awareness, marketing, and profiting from the digital heritage industry as a commodity. **- UNESCO Recommendation Project on Cultural Heritage and its Accessibility, General Conference, 38th Session, Paris 2015, Resolutions: 36C/59 and 37C/53**

Objectives of Digital Applications for Heritage:

Most digital software and applications (digitization) for heritage aim to achieve:

Preservation, or producing an exact alternative to the original, which cannot withstand frequent use due to its poor condition or to minimize handling of valuable or rare materials.

Improvement of intellectual content control, meaning creating an electronic tool for source inspection linked to electronic images.

This indicates important aspects of the decision for electronic transformation, including:

- Legal dimensions - intellectual property, and social readiness of the beneficiary to interact with the electronic version.

- Technological dimensions - the presence of devices, tools, software, applications, networks, etc. - **José Luiz Pedersoli Junior, Risk Management Manual for Cultural Heritage, translated by Mary Awad, International Centre for the Study of the Preservation and Restoration of Cultural Property, Rome 2016, p. 67**

International Interest in Employing Technology in Heritage:

Among the most prominent aspects of global interest in employing modern technologies in heritage are:

The UNESCO World Cultural Heritage Project

Included in this program are the following types: **- UNESCO Recommendation Project on Cultural Heritage and its Accessibility, General Conference, 38th Session, Paris 2015, Resolutions: 36C/59 and 37C/53**

- **Monuments:**

Including archaeological landmarks, architectural works, sculptures, paintings, elements or structures of archaeological nature, inscriptions, and residential caves of distinctive global value from the perspectives of archaeology, history, and the arts.

- **Groups of Buildings:**

Consisting of groups of separate or connected buildings, which due to their architecture, homogeneity, or location, possess exceptional global value from the perspectives of the arts, history, and archaeology.

- **Sites:**

Including man-made sites or those resulting from the interaction between nature and humans, and other archaeological sites that have exceptional global, aesthetic, ethnic, or special archaeological value.

UNESCO's Memory of the World Program:

The aim of the program is to ensure the preservation of the global documentary heritage and make it accessible to as many people as possible using web networks. It began to be embodied starting from 1992, primarily due to the growing awareness of the importance and necessity of providing necessary protection to preserve the world heritage from all forms of risks and to provide access to this heritage amid increasing regional conflicts and wars, which are among the most significant victims of heritage and archaeological sites.

The International Federation of Library Associations and the International Council on Archives began supplying UNESCO with lists of books, libraries, and manuscripts at risk of deterioration and difficult to restore, distributed across various countries of the world. In 2012, UNESCO celebrated twenty years since the program's launch and organized an international conference titled "Memory of the World in the Digital Age: Digitization and Preservation," held in Canada on September 26/27, 2012.

The conference concluded with several recommendations and points, notably issues and challenges related to digitization technology of heritage, and the ethical, economic, cultural, and professional challenges faced, along with other projects in the same field, such as the Global Gateway to the Library of Congress and the World Digital Library project.

Digitization of Heritage in the Arab World:

In the Arab world, interest in this topic began late, with efforts to digitize manuscripts at risk of deterioration in many libraries of the Arab world, including Algeria, in addition to photographing many rare manuscripts, collections, and archaeological finds in various Arab museums.

The Importance of Digitizing and Electronically Publishing Arab Heritage:

Digitizing and electronically publishing heritage involves converting heritage and its sources from printed or physical archaeological forms to digital or electronic forms, storing them on various media, and making them available on CD-ROMs or via the Internet.

This electronic heritage can only be utilized, read, and analyzed through computers or smart devices relying on the internet. The significance of electronically publishing Arab and Islamic heritage stems from the importance of the Islamic heritage itself.

Indeed, a nation without heritage lacks history, and the value of nations lies in their ancient heritage accumulated over ages from the experiences of predecessors. This ancient heritage forms a solid ground on which the present stands, propelling nations into the future.

Today, it has become possible to compile dozens or even hundreds of heritage sites on a single CD-ROM, and these can be made accessible with a single click on an electronic portal on the World Wide Web.

Many reasons have tipped the balance in favor of the electronic form of Arab heritage sources over their original physical counterparts, especially with the now-common terms "digital museums" and "electronic museums" in contrast to traditional classical museums, as well as "electronic books" versus "printed books." Electronic and virtual digital libraries are taking the place of classic libraries. The reasons favoring the electronic form of heritage sources include:

- **Cost Reduction:**

Information technology has become available to the majority at affordable costs, allowing individuals to easily and conveniently study, view, and access heritage sources in their new form from anywhere and at any time, provided they have internet access and smart devices.

- **Space Saving:**

Digital or electronic sources do not require large spaces for storage. Most new-form sources are directly stored on computers, and even if stored on external media like CD-ROMs, they do not need much space, allowing thousands of sources to be owned on a small home library shelf, especially considering that one disc can contain many heritage books.

- **Ease of Access:**

Advancements in information technology and communication methods have made it easy to access heritage sources, requiring only internet connectivity to access sources online or the presence of CD-ROM readers.

- **Sharing of Resources:**

Electronic heritage sources enable sharing among individuals and entities in distant locations, allowing multiple parties or individuals to access and benefit from the same material simultaneously.

- **Multiple Access Points:**

Sources can be accessed from libraries, homes, workplaces, or any computer-connected location.

- **Ease of Information Access:**

Simple and advanced search techniques enable quick and easy access to information in electronic sources, saving time and effort for researchers compared to printed sources.

Storage of Multiple Forms of Heritage Sources:

The electronic form allows for the storage of books in digital format with textual and audio-visual media, such as accompanying audio reading the book, aiding researchers with special needs. Some heritage sites now include interactive features focused on literary and poetic content. - **Houda Kahli Guelab, Digitization of Heritage in Cyberspace and the Issue of Identity, Anthropologia Journal, Vol 3, No 01, March 2017, p. 57**

Areas of Utilizing Information Technology in Heritage:

The electronic publishing has made a significant development in utilizing information technology in the field of Arab heritage publishing on several levels, including:

- **Information Storage:**

The available space for storing a vast number of heritage sources has become possible through electronic publishing and digitizing Arab heritage sources. **Houda Kahli Guelab, Digitization of Heritage in the Siberian Space and the Problem of Identity, Anthropology Journal, Vol. 3, Issue 01, March 2017, p. 41**

- **Information Retrieval:**

Electronic publishing of heritage sources and communication tools has enabled the rapid and accurate retrieval of information from original heritage sources. **Jose Luther Pedrosoli Junior, Risk Management Guide for Cultural Heritage, translated by Mary Awad, International Center for the Study, Preservation, and Restoration of Cultural Properties, Rome, 2016**

- **Information Usage:**

Through electronic publishing of heritage sources, it has become possible to use information by multiple individuals, achieving maximum benefit from the information.

The preservation of cultural heritage requires active participation from various stakeholders, and it also requires a scientific basis while considering privacy and ethical issues. Information technology plays a significant role when deployed correctly, ensuring better preservation of heritage materials and archival in a digital system for a longer period at lower costs.

Additionally, it provides a better way to access these materials independently of distances, boundaries, and times, offering virtual tours and exhibitions with better explanations of materials and providing multilingual support for a larger audience.

The presentation methods that employ computer graphics, multimedia, virtual reality, and geographic information system tools help users query and understand data accurately**. Sabila Mohammed, Intellectual Foundations of Human Rights Culture, Casablanca, Morocco, Arab Cultural Center, 2018, p. 78**

Furthermore, information technology provides new collaboration possibilities in preserving cultural heritage by aggregating resources and democratizing this process by allowing a larger number of people to contribute, even in narrow areas, with controlled monitoring to ensure restricted guarantees.

The existing tools for resource aggregation remain mature and easily accessible, whether voluntary or paid contributions, aiding in inventory distribution and smooth access and caution against access interruption problems, annoyances, technical failures, and others. The open access to culture online poses a barrier against restricted practices by official administrations, despite offering tools for preserving individual privacy. **Cultural Archives Center, Cultural Heritage Documentation and Digital Archiving Guide, Ministry of Culture, Saudi Arabia, 2023, p. 38**

Reducing storage and bandwidth costs, increasing computational power through wireless technology and mobile devices, and the proliferation of multilingual tools and information retrieval methods are all factors contributing to better integration of information technology sources in cultural heritage preservation efforts.

However, information technology comes with a cost, as better access also means attempts at skewed access. **Cultural Archives Center, Cultural Heritage Documentation and Digital Archiving Guide, Ministry of Culture, Saudi Arabia, 2023, p. 41**

Dealing passively with real tools under the assumption that digital tools are an additional alternative, along with the usual failures affecting information technology systems, comes at the expense of the scientific and cultural aspects of heritage work. **Sabila Mohammed, Intellectual Foundations of Human Rights Culture, Casablanca, Morocco, Arab Cultural Center, 2018, p. 83**

Today, information technology and communication have facilitated the intangible cultural heritage and enriched it. It has also drawn public attention to its importance through:

Films, documentaries, and radio programs providing information to the public about the significance of intangible cultural heritage. Some documentary films discuss tangible and intangible cultural heritage in Algeria, raising awareness among Algerians and foreigners about its concept.

Modern technology provides an enhanced means to raise awareness about, preserve, and renew cultural heritage, especially its vulnerable elements prone to erosion and disappearance.

Modern technology can also facilitate access to educational opportunities, enhance educational and cultural exchange processes for everyone without exception.

Challenges facing heritage and archaeological sites in Algeria:

Heritage preservation occupies a limited place in the national economy. **Official Gazette of the People's Democratic Republic of Algeria, Issue 11, Law No. 03-01 dated 17/02/2003, related to sustainable tourism development**

Insufficient financial resources.
Legislative repetition and differences, and interference between authorities of relevant parties.
Low public awareness of the importance of heritage in general, with interest in heritage primarily limited to academic and research institutions.
Lack of media involvement in raising the desired awareness.
Majority of Algerians focus on providing for their daily livelihood.
Frequent changes in political leadership responsible for culture and heritage jeopardize the continuity of vision implementation.
Domination of political, social, religious, and even general sports events in the country over attention to cultural heritage.
Globalization and its impact on youth. Official Gazette of the People's Democratic Republic of Algeria, Issue 11, Law No. 03-01 dated 17/02/2003, related to sustainable tourism development.

CONCLUSION:

In concluding our brief overview of the vital role of modern technologies in preserving heritage, we offer a set of guidelines:

- ✓ We must not forget the origins and maintain them amidst the allure of modern electronic technology.
- ✓ Technology should not be treated as a bridge to infringe on the intellectual property rights of heritage origins.
- ✓ Promote informational awareness among citizens, combat information and electronic illiteracy, raise awareness of the value of cultural and creative industries and their impact on individuals and society.
- ✓ Provide legal and intellectual protection through copyright legislation and others, to ensure the fight against piracy and forgery in cultural products.
- ✓ Create a map of archaeological sites, serving as a catalog for all archaeological sites, enabling updates, viewing on the Internet, photography, and access to conducted studies. This archaeological map typically includes the national level, the archaeological site level, and the level specific to the archaeological piece itself.
- ✓ Government support for digital content projects - digitized heritage, regardless of various nomenclatures like cultural tourism or heritage industry or cultural and creative industry.
- ✓ Provide financial resources and encourage cooperation and investment in the field of cultural industries, especially digitized cultural heritage.
- ✓ Encourage the export of cultural goods, products, and services, as the electronic environment has opened fertile ground for low-cost promotion, advertising, and publicity.
- ✓ Ensure the preparation of accurate periodic statistics for the growth of industries and heritage crafts.
- ✓ Owners of collections often do not declare the real numbers of their possessions, nor do they present those considered of great scientific value, despite awareness of the importance of preservation.
- ✓ The cultural heritage industry in the electronic environment will not thrive without strategic plans to support intellectual creativity.

- ✓ Manuscripts, particularly ancient religious ones held in zawiyas spread across different regions, are among the most important knowledge pillars needing digitization due to their age and susceptibility to damage, representing a significant and rare heritage and a testament to the history and authenticity of Algerians.
- ✓ Establish portals for architectural and civilizational heritage, including descriptions of architecture and architectural heritage in various regions, with necessary illustrative images, studies, and excavations conducted in the area.
- ✓ Establish portals for artistic heritage, local history, folklore, manuscript research and publication, natural history, and photographic memory.

We have a diverse and profound heritage that stretches back to prehistory, boasting innovative minds recognized at all levels and in international forums across all knowledge fields. With the financial resources at our disposal, what stands in our way of leading in this field?

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