Digitizing Heritage: Development and Impact of an Electronic Archiving System at the Archaeological Museum of the University of Jordan

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Abstract. *This study investigates the necessary processes to develop and implement a system of electronic archiving for the artifacts of the Archaeological Museum of the University of Jordan. The museum, established in 1962, has changed dramatically from its humble beginnings to electronic documentation. The overarching goal of this study is to present a safe, and user-friendly electronic archiving system for museum collections. This system was developed in partnership with the Information Technology Center at the University. The system was developed in Microsoft. NET and MS SQL Server which are used as functional databases to ensure data integrity, security, and efficient retrieval. The system allows museum staff to enter and update artifact data, and it is easy to use as it has many fields for record such as type of artifact, location among facilities, and other fields that describe the artifact's material, size, restoration history, and historical context. The findings reveal that developing the electronic archiving system is easier to discuss than in reality. The level of accessibility to records and data can immensely increase the security of documentation. Finally, the electronic archiving system has made searching for the documentation and modifying it easy and fast, and provided a stable platform with great potential for improvements in the future.*

Keywords: *Digitizing Heritage - Electronic Archiving - Museum - Archiving.*

Introduction

In the digital age, preserving cultural heritage is more critical than ever, especially for institutions dedicated to archaeology and history. The Archaeological Museum at the University of Jordan, established in 1962, has evolved significantly in its efforts to document and protect valuable artifacts. Initially relying on traditional manual record-keeping, the museum has transitioned to an advanced electronic archiving system designed to enhance efficiency, accuracy, and accessibility. This study explores the development and implementation of the museum's digital archiving system, created in collaboration with the University of Jordan's Information Technology Center. Using Microsoft .NET and MS-SQL Server, the system ensures secure data storage, quick retrieval, and comprehensive documentation of artifacts. The research highlights the significance of this technological shift in museum management, discussing both the challenges encountered and the benefits achieved. Beyond improving artifact documentation, the electronic system supports academic research, facilitates conservation efforts, and enhances the educational role of the museum. As museums worldwide increasingly adopt digital solutions, this study provides valuable insights into how technology can revolutionize the preservation and study of archaeological heritage.

Establishment of the Archaeological Museum and Its Mission

The Archaeological Museum at the University of Jordan was founded in 1962

ISSN: 1319-8947 (pp. 7-22)

Fig.1: Exterior View of the Archaeological Museum at the University of Jordan.

(Fig.1), coinciding with the establishment of the university itself. Initially housed in a modest structure on the site now occupied by the University Nursery building near the University of Jordan Mosque, the museum relocated in the early 1970s to accommodate the institution's expansion. It was temporarily situated on the ground floor of the Faculty of Arts building (now the College of Sharia and the Martyr Abdullah Al-Azzam Chapel), where it displayed a limited collection of artifacts. In 1986, the museum moved to its current location at the heart of the university campus. Surrounded by landscaped gardens, the site was transformed into an open-air exhibition space, showcasing larger artifacts while fostering student engagement with Jordan's cultural, historical, and national heritage. This strategic placement underscored the museum's dual role as both an academic resource and a public institution. To align with the university's prestigious academic standing, the museum underwent significant renovations in 2008, supported by the University of Jordan and private-sector donors. These upgrades included state-of-the-art display cases, advanced environmental monitoring systems to regulate temperature and humidity, and modern climate control technology to preserve delicate artifacts. Subsequent enhancements featured high-security surveillance systems to safeguard against theft and vandalism. The outdoor courtyard was redesigned with an aesthetic vision, repurposing it as a curated space for monumental artifacts and further solidifying its identity as an open-air museum.

Mission and Vision

The Archaeological Museum's primary mission is to serve as an educational and cultural hub for students of Archaeology and Tourism Studies, the broader university community, and the Jordanian public. By integrating artifacts into academic programs and public exhibitions, the museum cultivates awareness of heritage conservation and promotes scholarly research. Its evolution from a modest collection to a technologically advanced institution reflects the University of Jordan's commitment to preserving history while inspiring future generations to value their shared legacy.

Objectives of the Archaeological Museum

The Archaeological Museum at the University of Jordan is dedicated to deepening scientific knowledge of Jordan's rich cultural heritage across various historical periods. It also aims to foster national identity and awareness among students of the School of Archaeology and Tourism, university students in general, and visitors. Additionally, the museum plays a vital role in organizing archaeological exhibitions both locally and internationally, as well as strengthening academic and intellectual collaborations with cultural institutions of shared interest.

The museum's collection has been sourced from two primary channels:

Excavations conducted by the General Department of Antiquities.

Training excavations carried out by the Department of Archaeology at the University of Jordan across multiple archaeological sites in

Jordan, including Jerash, Petra, Tell al-Mazar, Tell Salama, Rujīm al-Kursi, Yajuz, Tell Siran, Tell Abu Nasser, Tell Abu As-Sawwan, and ‘Tell es-Sukhnah.

Museum Facilities

The Archaeological Museum at the University of Jordan comprises several specialized facilities designed to enhance research, conservation, and education:

Main Entrance & Administration Offices:

Visitors access the museum through an entrance with eight steps leading to the main door. Upon entry, the administrative offices are to the right, housing the museum curator’s office, the secretariat, the museum supervisor’s office, and an information and control center.

Studio:

An essential facility for documenting the museum’s collection, supporting artifact registration and research.

Photography Room:

A crucial component of the documentation process, where every artifact is photographed and systematically recorded in the museum’s database.

Lecture and Seminar Hall:

This hall serves as a venue for workshops, lectures, and seminars conducted by experts in archaeology and museology, reinforcing the museum’s educational role.

Exhibition Halls:

The museum’s collection is displayed in three primary exhibition halls, arranged in chronological order:

Prehistoric and Early Historic Periods: Includes artifacts from the Paleolithic, Neolithic, Chalcolithic, Bronze, and Iron Ages. Notable items in this section originate from archaeological sites such as Tell Abu as-Sawwan, Tell al-Mazar, Sahāb, and Jericho.

Classical Periods: Showcasing artifacts from the Hellenistic, Roman, and Nabataean civilizations.

Byzantine and Islamic Periods: Featuring significant artifacts from these eras, including Fatimid-era colored glazed pottery gifted to the museum from Egypt.

The Traditional Method of Archiving Artifacts in Museums

Museum documentation, or the archiving system, refers to the procedures used by museums to manage their collections and curatorial functions. The primary objectives of such a system include monitoring and facilitating the use of collections while ensuring the preservation of cultural and environmental heritage information (Light et al., 1986:1). Both large and small museums, such as the Archaeological Museum at the University of Jordan, develop specialized archiving programs tailored to their specific needs. This highlights the importance of each museum establishing its own archiving system (Deiss, 1984: 7).

A fundamental question that frequently arises is: Why should every museum have an archiving system? The answer lies in the fact that every institution, including museums, has a past, present, and future, as well as a distinct identity through which it operates and presents itself. The ongoing activities carried out by a museum shape its identity and provide insight into its future directions. Documents, artifacts, and the research conducted on them at any given time form an integral part of the museum’s historical record (Deiss, 1984: 8).

The Code of Ethics issued by the International Council of Museums (ICOM) emphasizes that

museum collections must be documented in accordance with professional standards. This includes providing a comprehensive description of each artifact, detailing its associations, current location, method of processing, and handling. Additionally, artifact data must be preserved in a secure environment supported by systems that allow museum staff and other users easy access for reference (Avaro et al., 2009:7). Proper museum documentation is crucial for several reasons:

It enables the museum to quickly inventory its collection and determine the total number of artifacts. It helps to verify ownership, locate artifacts, and access data in a structured and efficient manner. It ensures the preservation of the museum's collection and allows for security assessments to protect valuable items (Avaro et al., 2009:7).

Overview: Digital Transformation in Cultural Heritage in the Arab World

The trend in the most up-to-date literature shows a deepening of scholarship engaging with digital technologies for the purpose of conserving, documenting, and presenting cultural heritage in the Arab world. However, while digital transformation is developing, it is fragmented to different degrees depending on the context (i.e., within the Arab world, each country and region are different) and there are technological issues and institutional barriers.

1. Digital Archiving in the Arab World (Bayoumi & Oliveau, 2020)

This paper provides a regional overview of the current digital archiving landscape in the Arab world, with examples of exemplary projects such as the Bibliotheca Alexandrina and the Qatar National Library. The authors highlight challenges including: Lack of standardization in metadata practices and Arabic script. Accessibility issues for the diverse user base. Preservation issues during times of political conflict. Lack of awareness of digital humanities methods that are emerging. The authors stress the most serious limitation: "the lack of common standards for digitization and limited cross-national networks, despite the DAAW symposium serving as a boundary object for dialogue and exchange".

2. Artificial Intelligence in Museums (Aliya Atef Attia, 2023)

Attia investigates, as part of a larger project, how AI technologies are transforming museum practice: Uses are broad: document artifacts, predictive conservation, and interactive storytelling. VR/AR and 3D scanning and machine learning are currently shifting visitor engagement. Examples of limitations include costs, availability of technical infrastructure, and reliability of data, especially in less resourced or small institutions.

3. Museums in the Digital Age (2021)

This article serves to highlight the importance of digital tools in the shifting context of a museum's evolving form and position, particularly due to crises like COVID-19, in which museums were forced to create ways to remain accessible to the public via technology. Key themes included: Digital accessibility and outreach-style remote engagement practices, as referenced in this article. Understanding museums as interactive and educational learning platforms, not as static or passive objects. Ethical concerns about digital equity, digital resources ownership, and including an audience.

4. Digital Preservation at Petra Museum (SHAJ-ICHAJ, pp. 429–432)

As a conference report, this article provides a useful overview concerning a series of methods for documenting Nabataean heritage in Petra

utilizing 3D scanning and photogrammetry. It is interesting for: Use of digital methods in a field-based approach. Artefacts of resource limitations, such as funding, equipment, and skilled personnel.

5. Digital Heritage in Northern Jordan (SJRC, Vol. 33, pp. 285–352)

This study summarized case studies from digital heritage projects across northern Jordan: These include online archives, GIS mapping, and a variety of different manuscripts digitized. A good amount of emphasis was placed on capacity building, collaborative approaches, and pub-academic partnerships. Challenges highlighted were fragmented infrastructure and limited ability to secure equitable access to digitization methods.

In the Arab world, the use of digital technologies directed at cultural heritage is increasing, but is diverse. The literature reviews consistently report the importance of standards, technical capacity, and ongoing source of funding. The prospects of AI and immersive media will present potential, but will be constrained by systemic and logistical challenges.

Efforts in Jordan to Archive Cultural Heritage

In recent decades, Jordan has made significant strides in archiving its cultural heritage. One of the most notable initiatives is the JADIS Project (Jordan Antiquities Database and Information System), which was launched in 1988. This project was a collaboration between the American Center of Oriental Research in Amman (ACOR) and the Department of Antiquities of Jordan (DoA) (Palumbo, 1992:183). The JADIS Project aimed to assist the Department of Antiquities in developing an independent system for coordinating with government agencies responsible for infrastructure and development projects. Before the introduction of this system, the Department of Antiquities was often informed of construction projects only when antiquities were already being damaged by bulldozers and machinery. This forced the department to carry out emergency salvage excavations (Palumbo, 1992:183). However, with the implementation of JADIS, authorities had sufficient time to assess potential damages to archaeological sites before construction began. To achieve this, a comprehensive legislative framework and a national registry of archaeological sites were established (Palumbo, 1992:183). One of the primary objectives of JADIS was to computerize information related to Jordan's archaeological sites. This marked the first step in systematically archiving archaeological data, including geographical coordinates and site maps (Palumbo, 1992:184). The database was later updated to include additional features such as:

- Information on archaeological projects and their methodologies.
- Digital images of artifacts.
- GPS mapping for more precise site identification (Savage, 2004:141).

Most museums in Jordan, including the Archaeological Museum at the University of Jordan, are primarily archaeological museums. Their collections are largely derived from archaeological excavations conducted by the Department of Antiquities (DoA), Jordanian universities, and international excavation teams (Alghazawi, 2011:12). These museums rely on structured documentation systems to manage and safeguard their collections, ensuring that artifacts remain accessible for research, education, and cultural preservation.

In 2020, the Department of Antiquities (DoA) launched a project to document and archive artifacts housed in museums and storage facilities across Jordan (DoA, 2020). As part of

this initiative, an evaluation study was conducted to compare museum and warehouse artifacts with existing paper records. These records were then fully digitized and incorporated into the FileMaker program, enhancing accessibility and preservation efforts (DoA, 2020).

When an artifact is first acquired, it must be registered in the museum's official records. This is done through the acquisition register, which is exclusively used for items entering the permanent collection. Additionally, a separate register is maintained for artifacts under temporary loan status (Ericksen & Unger, 2009:30).

The planning of an archiving system depends on three fundamental factors:

1. Location (storage space) – ensuring proper conditions for artifact preservation.
2. Staffing – having trained personnel to manage and maintain records.
3. Financial resources – securing funding for technological and logistical needs (Deiss, 1984:12).

Once an artifact is entered into the museum's archives, its records become a vital reference for future research and documentation (Deiss, 1984:17). The museum's traditional written archiving system, used in collaboration with the DoA, assigns each artifact a unique registration number. The museum curator is responsible for the registration process, ensuring that records are meticulously maintained using high-quality paper and ink that can withstand environmental conditions (Abd al-Latif, 1993:37; Alghazawi, 2011:14-15).

Each artifact record contains comprehensive information, including:

- Registration number – the unique identifier assigned by the museum.
- Jordanian number – the identification number issued by the General Department of Antiquities.
- Date of registration.
- Place of discovery.
- Register book number.
- General description – including artifact type, material, and distinguishing features.
- Name of the discoverer or the archaeological expedition responsible for its excavation.
- Artifact location – specifying the exact cabinet, shelf, or box number where it is stored.
- Archaeological dating – period classification based on scholarly research.
- Photographic documentation – a black-and-white image included in the record.

These written records are treated with the same level of care as the artifacts themselves. They are stored in secure safes, away from heat, moisture, and other damaging environmental factors.

With modern advancements in technology, particularly in computer science and the widespread use of the internet, the digitization of museum records has become essential. The integration of electronic archiving systems significantly enhances data management, making artifact retrieval faster and more efficient. As museums continue to adopt digital solutions, they can better preserve cultural heritage while improving research accessibility and administrative efficiency.

The Electronic Archiving of Artifacts at the Archaeological Museum

The transition to computer-based documentation has provided a practical and efficient solution for managing museum records

(Sarasan, 1986:89). Initially, the process required high-capacity computers capable of handling the vast amount of information contained in the museum's paper records and artifact photographs. The first challenge was finding suitable software for archiving. At the time, there was no established digital system for artifact documentation, so consultations were held with specialists, and inquiries were made to the Department of Antiquities (DoA). However, the response indicated that no such programs were in use, as museum documentation remained reliant on manual records.

Early Attempts at Digital Archiving

The museum's first digital documentation attempt began with Microsoft Word, where artifacts were recorded in basic documents. However, after cataloging approximately 50 artifacts, it became evident that retrieving data was cumbersome, and the program was not suitable for managing large datasets. As a result, Microsoft Word was abandoned for archiving purposes and was instead used solely for statistical inventory.

Seeking a more specialized solution, the museum explored FileMaker, a database management software recommended by colleagues in the archaeological and museum fields. Initially, FileMaker provided an improved workflow, and over 150 artifacts were archived. However, as the database expanded, significant performance issues arose. The system became slow and inefficient, making data retrieval difficult, which defeated the purpose of using a digital system. Additionally, FileMaker lacked essential security features, leaving the data vulnerable to computer failures, viruses, or accidental deletions.

Developing a Custom Archiving System

Recognizing the limitations of existing software, the museum collaborated with the Information Technology Center at the University of Jordan to develop a customized electronic archiving system. This new system was designed specifically to meet the museum's needs, ensuring efficient artifact documentation and secure data storage. With the introduction of this tailor-made program, the museum successfully transitioned to a modern, structured digital archiving system that provides:

- Secure storage for artifact records.
- Efficient retrieval of information.
- Improved data integrity and backup capabilities.

This shift marks a significant milestone in the preservation and management of Jordan's cultural heritage, ensuring that valuable artifacts are safeguarded for future research and educational purposes.

A review of the program of documenting and archiving artifacts

The current system of archiving and documenting artifacts in the museum[(1)] was designed using a programming language (Microsoft.Net), the data and images are stored on a database (MS-SQL server) in the information technology center to preserve them from being lost, and backups are taken permanently by the staff of the information center. The system restored all the data of the artifacts according to what is provided to it by the museum staff or the person in charge. The system contains special screens (functions) that contain the features of deleting and modifying data; it can be accessed through a user name and password. The archiving system aims to document the contents of the museum electronically and quickly access data about any artifact by searching for it either by name

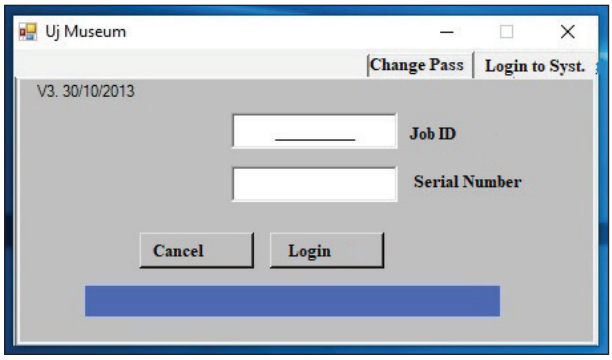


Fig.2: The Desktop icon of Archiving system.

or part of the name or through the museum number of every artifact and to facilitate reusing entered data for research, documentation, and conducting comparisons in the case of similar materials to those in the museum. The archiving system is accessed through the computer of the curator of the museum, where there is a special icon on the desktop interface of the computer (Fig.2); this icon contains two options:

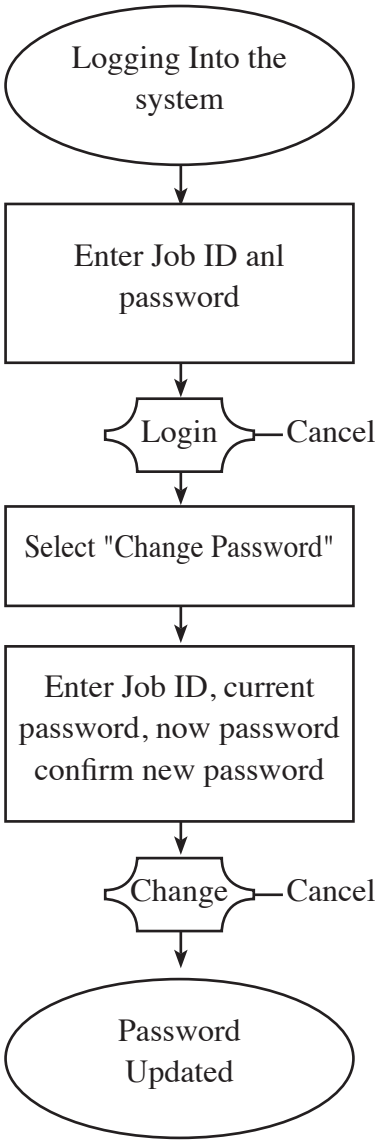
1- Log in to the system

2- Change the password

Logging into the system requires the museum curator's job ID and a password. Once these credentials are entered, the user is granted access to the system interface, which presents two options: "Login" and "Cancel." . To change the password, the user must select the "Change Password" option, which prompts four input fields: (1) Job ID, (2) Current Password, (3) New Password, and (4) Confirm New Password. Upon completing these fields, clicking the "Change" button will update the password automatically. If the user decides not to proceed with the update, the process can be aborted by selecting the "Cancel" option.

Flowchart of the login process.

Many icons represent the elements of the system when entering the program. On the first page from the top, there is an icon to add new data in case a new statement for an artifact in



the system, followed by an icon to edit or add an image, this icon is related to the uploading the image to the system, where there is a space on the right of the page representing the image of the artifact to be uploaded to the system, and this icon is used to upload the image. Furthermore, the system allows the replacement of existing images with higher-resolution versions, thereby enhancing the visual quality and accuracy of the digital records. There is an icon to search for artifacts; it can search by the name of the artifact, which is the name under which the artifact is stored in the system, this is followed by a print option to print the statement of the

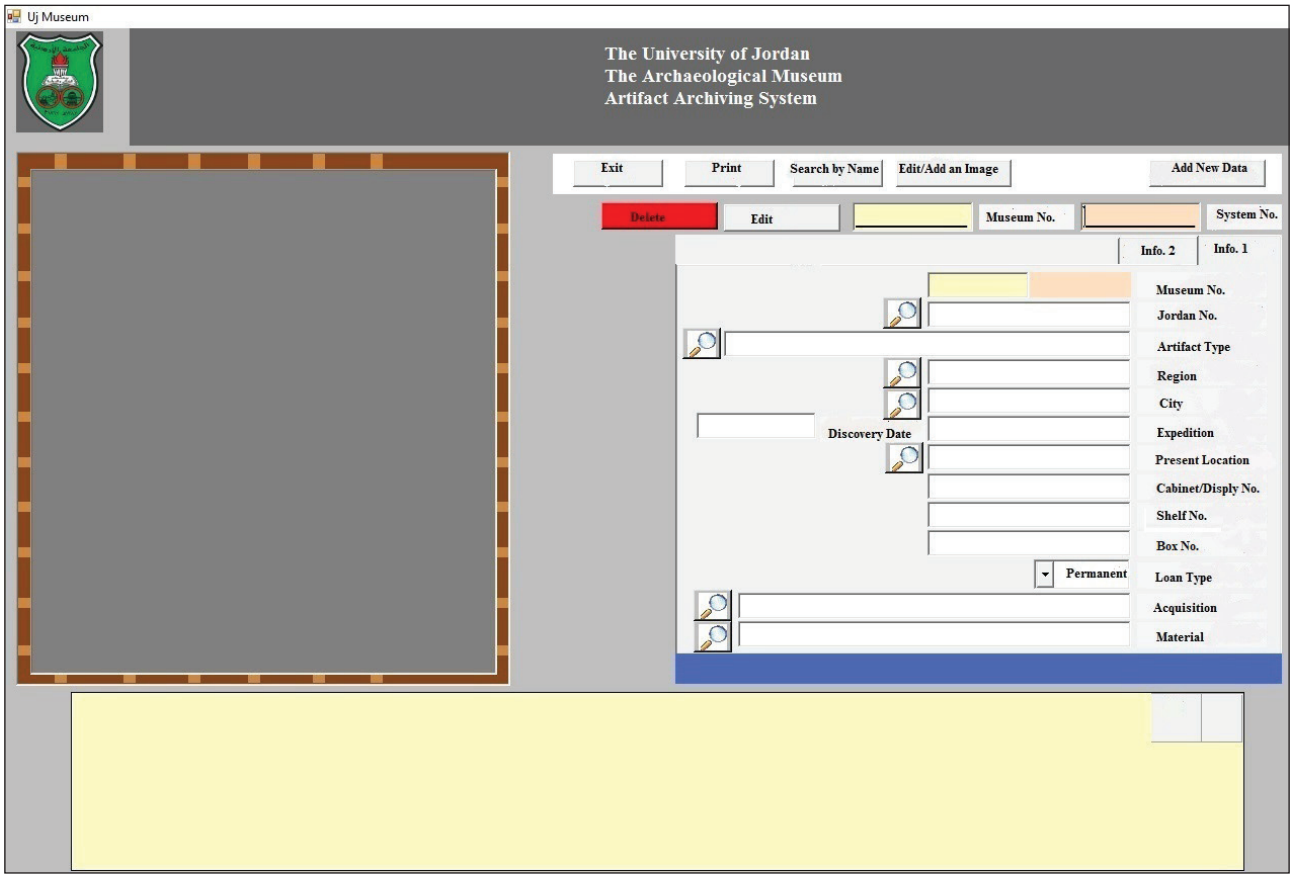


Fig.3: The Archiving system interface (information.1).

current page. Finally, there is an icon to exit, if the procedure is completed and there is a need to finish and exit permanently, you can press the exit icon. The first page is represented by the (Information 1) interface (Fig.3). Two icons represent the fields to be filled in with data about the artifact, they are arranged vertically as follows:

- Museum No: It represents the museum number that is registered on the artifact and on the written records that are approved by Jordan University; it signifies the symbol (U.M.).
- The Jordanian number: It represents the number of the General Department of Antiquities, which is the government agency authorized to lend the artifacts; this number is symbolized by the symbol (U.J).
- Artifact type: It represents the type of artifact, such as a pottery jar, jug, bowl, coin, statue, etc.
- Region: It represents the region or governorate in which the artifact was found.
- City: It represents the city or town in which the artifact was found.
- Expedition: It represents the archaeological expedition or the entity, whether a local or foreign entity, that excavated the site; this icon contains a corresponding icon to the year of discovery (e.g., the Jordan University expedition at Yajuz 2000).
- Place in the Museum: It is the place where the artifact is stored or exhibited in the museum (the exhibit room where there are cabinets that contain artifacts, and some of these cabinets contain a built-in small

warehouse). In the case of the artifacts exhibited outside cabinets, especially those made of stone materials such as statues or large jars that are used to store liquids (storage jars), or to be exhibited outside of the museum (the archaeological garden), in which huge stone statues or artifacts are exhibited.

- Cabinet/display number: it represents the cabinet number in the exhibit room; each cabinet has a serial number to facilitate documentation and archiving.
- Shelf number: each cabinet contains two or four shelves, represented by a letter, for example, Cabinet No. 1, shelves A, B, C, and D.
- Box number: It represents the number of the box in the warehouse or the storage place integrated into each cabinet; each warehouse contains several boxes of different sizes. Their number usually ranges between 3 and 6 boxes.
- Loan type: This type is represented by two icons; the first icon is the permanent loan, while the second is the temporary loan. This type is rarely used because the exhibited artifacts are usually on permanent loan and are registered in both records of the Museum of Archaeology and the General Department of Antiquities according to the agreements between two parties.
- Acquisition source: It represents the mechanism through which the artifacts were obtained, either through a permanent loan or direct purchase from the local market. Finally, the artifacts can be obtained through a donation from government agencies or the local community.
- Artifact material: It represents the material from which the artifact was made; for example, there are clay, iron, bronze, gold, silver, copper, and stone.
- The second interface page includes the following icons (Fig.4):
- Measurements: It represents the dimensions of the artifact, which include weight, diameter, length, depth, width, and height
- The state of the artifact: It represents the current state of the artifact, such as incomplete, restored, brittle, or brittle and in need of restoration or special care, and finally, the current situation of the artifact. Restoration status: this icon is used if the artifact has been restored in the past, and the state of restoration is described at present, this can be used to help restore the artifact and take care of it by the restoration technician in the museum and to monitor of the general condition of the artifacts.
- Manufacturing technique: This is used to describe the technical methods and techniques in executing artifacts. There are many techniques, such as handmade pottery, wheel-made, engraving, mold, etc.
- Description: It represents a complete description of the artifact in terms of the name, the purpose for which it was used, and the shape of the artifact, as each type of artifact has its description; for example, a pottery artifact has a different description than artifacts made of stone, textile, and so on.
- Style: This represents the artistic form that prevails, to which that artifact belongs, such as the Doric, Ionic, and Corinthian styles of columns.
- Dating: Here is a brief mention of the general history of the artifact, for example, Iron Age III, Early Roman, and late Islamic periods, etc. With a mention of the time

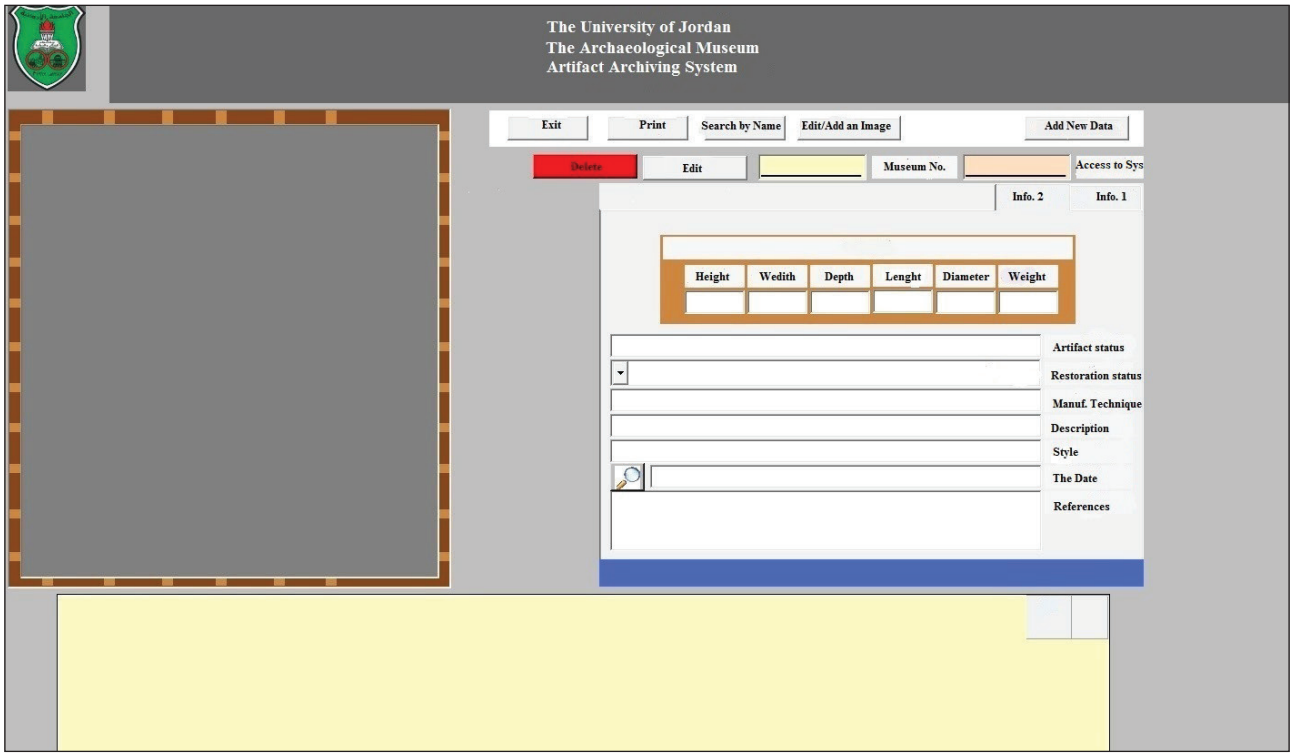


Fig.4: The Archiving system interface (information.2).

in numbers, is this possible? or is there a specific date based on archaeological and scientific studies?

- References: This represents the studies and research that were conducted on the artifact by scholars and researchers. If there are no scientific studies on the artifact, this is indicated. This is useful in listing the artifacts that the students and researchers benefit from in their studies and research.

Museum and AI Applications

Museum archives are one of the most important tools that help preserve cultural and historical heritage, as they contain various documents, artifacts, and audio and visual records. With the development of technology, artificial intelligence (AI) has become an effective tool in improving museum archive management through data analysis, classification, and even more accurate information (Bunz 2023:24-25).

The use of artificial intelligence by museums is an important advantage in order to use these technologies in order to facilitate the management of museum groups and obtain satisfactory results faster and less expensively, and it is very much looking forward to using artificial intelligence applications in the museum archive.

Classification and indexing of content: Artificial intelligence can analyze images and texts and classify them automatically based on their content. Algorithms can recognize and classify archaeological images according to the time period or geographical region; for example, the use of machine learning to analyze archaeological images and determine their identity. Artificial intelligence can analyze and automatically classify antique images based on the historical period, materials, or style (Caramiaux 2023:122).

Digital memorization and restoration:

Artificial intelligence can help the restoration of old images and documents through techniques such as the convolutional networks that rebuild damaged or missing images. Virtual and enhanced reality can use artificial intelligence to create interactive experiments in museums through virtual reality (VR) and augmented reality (AR), allowing visitors to try artifacts more interactively, for example, the use of artificial intelligence to create virtual tours in museums. On a museum website or mobile application (Caramiaux 2023:123-124). Artificial intelligence can predict the deterioration of artifacts based on environmental conditions and measures used in preservation. Automatic learning algorithms can analyze the exploration date data for the unveiled artifact proposal in a specific area (Bunz 2023:27-28; Caramiaux 2023:123).

Despite the great positives in the use of artificial intelligence in museums in general and archiving in particular, there are many challenges that many see that they may face workers in the museum field like:

1. Data quality: Artificial intelligence algorithms need high -quality training data, and some museum archives may be incomplete or inaccurate (Fuchsgruber 2023:68).
2. Safety and privacy: Archive data must be protected from breakthroughs and

Term	Explanation
Artifact	A physical object of historical, cultural, or archaeological significance, often discovered during excavations and exhibited in museums.
Registration Number	A unique identifier assigned to each artifact for tracking and documentation purposes.
Jordanian Number	An identification number issued by the General Department of Antiquities in Jordan to uniquely identify each artifact.
Register Book Number	The number assigned to the entry in the museum's physical or digital register for each artifact.
Archaeological Dating	The process of determining the time period an artifact originated from based on scientific or historical evidence.
Photographic Documentation	Images of artifacts taken as part of the record-keeping process, crucial for identification and research.
Cabinet Number	A unique number assigned to a storage cabinet in the museum, helping to locate artifacts.
Shelf Number	The specific shelf within a cabinet where an artifact is stored, typically labeled with a letter (e.g., A, B, C, D).
Box Number	The number assigned to boxes within a cabinet, used for organizing artifacts in storage.
Loan Type	Refers to whether an artifact is on a permanent or temporary loan, often based on agreements between museums or institutions.
Acquisition Source	The method through which the artifact was obtained, e.g., purchase, donation, or loan from another institution.

Term	Explanation
Artifact Material	Describes the material(s) from which the artifact is made, such as clay, bronze, or stone.
Restoration Status	The condition of an artifact regarding its preservation, such as restored, brittle, or in need of restoration.
Manufacturing Technique	The method used in the creation of the artifact, e.g., handcrafting, wheel-made pottery, or mold casting.
Artifact Style	The artistic form or design characteristic of the artifact, which may reflect the time period or culture from which it originated (e.g., Doric, Ionic, or Corinthian columns).
Scientific References	Research, studies, and scholarly works that have been published on the artifact, offering more in-depth insights into its significance.
Digital Archiving System	A computer-based system used for cataloging and storing artifact information electronically, which makes the retrieval and management of data more efficient.
Database Management System (DBMS)	A software system (such as MS-SQL) used for storing and organizing artifact data, supporting secure storage and efficient retrieval.

unauthorized access (Murphy 2023:73-74).

3. Cost: The cost of applying artificial intelligence technologies may be high, especially in small institutions (Bunz 2023: 25-26; Fuchsgruber 2023:70).

It is expected as a result of this artificial intelligence that there will be:

1. Improving access to data and safety, creating a cloud storage base to allow a distance from researchers and students, and developing multiple contacts for users at different levels (for example, secretary, researcher, visitor).
2. Enhancing cybersecurity measures to prevent unauthorized access or data loss.
3. Artificial intelligence can contribute to strengthening the documentation of artifacts by integrating 3D and modeling to create digital representations of artifacts, including high-resolution photography and spectral analysis to document microscopic details, and merging geographical location data to connect artifacts to their original excavation sites.
4. Find an easy-to-use user interface backed in several languages and develop a mobile application for easy access to artifact data, in addition to providing multi-language support (Arabic, English, and other languages) to expand access.

Conclusion

The establishment of an electronic archiving system at the Archaeological Museum of the University of Jordan will advance imperative documentation, preservation and accessibility of cultural heritage. The findings of this study indicate that shifting from manual to digital case management has substantially enhanced operational efficiency for museum personnel involved in artifact administration. The system stores the documents using Microsoft .NET and MS-SQL Server for secure storage of records, structured data extraction and long-term preservation of records.

In summary, the project resulted in a number of positive outcomes:

1. Improved efficiency and accessibility: Artifact data can be searched more quickly and comprehensively, using multiple parameters enabling better research and administrative workflows. 2. Improved accuracy of documentation: Our highly structured digital database diminishes the likelihood of errors that can occur with manual documentation, providing consistent and complete field records for artifact collections. 3. Safe and reliable storage of data: Using logins and regular backups virtually eliminates the chance of losing, corrupting or tampering documents. Scalability and Future Potential: The system is flexible for future development, including cloud storage, AI-powered data processing, and collaboration with the global community. The study also implies the future development of AI will improve artifact classification, automated metadata extraction, predictive conservation analyses, and much more. In addition, AI-driven image recognition, optical character recognition (OCR), and natural language processing (NLP) technologies can further improve the efficiency, accuracy, and depth of insights into developments and exhibitions of Jordan's cultural heritage. In summary, while modernized and fully functioning electronic archiving system for the artifacts at the Archaeological Museum of the University of Jordan has a considerable number of features and laid an excellent foundation, it is still relatively basic. The (future) growth of capabilities through AI, and integration within digital (museum) research projects can change the way museums archive artifacts, conduct collaborative research and develop more engaging public access to historical artifacts.

A table summarizing the key technical terms related to the archaeological museum archiving system at the University of Jordan, along with their explanations:

Acknowledgments:

I would like to extend my sincere thanks to the Deanship of the School of Archaeology and Tourism and the Center of Information Technology at the University of Jordan, especially Eng. Ahmed Khreisat for his continuous work with us in designing the program.

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ملخّص: ملخص: تهدف هذه الدراسة تطوير وتنفيذ نظام أرشفة إلكتروني للقطع الأثرية في متحف الآثار في الجامعة الأردنية. خضع المتحف، الذي أنشئ في عام ١٩٦٢، إلى العديد من التحولات، وبلغت ذروتها باعتماد نظام توثيق رقمي. يسلط الدراسة الضوء على الانتقال من حفظ السجلات اليدوية التقليدية إلى الأرشفة الإلكترونية، مع التركيز على أهمية التطورات التقنية في الحفاظ على التراث. الهدف الرئيس من الدراسة إنشاء نظام فعال وآمن وسهل الاستخدام لتصنيف القطع الأثرية. يوضح البحث تصميم ووظائف النظام، الذي تم تطويره بالتعاون مع مركز تكنولوجيا المعلومات في الجامعة الأردنية.ُصمّم النظام باستخدام خادم Microsoft .NET. و MS-SQL لضمان سلامة البيانات والأمان وسهولة الاسترجاع. وهو يمكّن موظفي المتحف من إدخال بيانات القطع الأثرية، وتحديثها، واستردادها، باستخدام واجهة منظمة مع حقول متعددة، بما في ذلك تحديد نوع القطع الأثرية، والموقع، والمواد، والأبعاد، وحالة الترميم، والسياق التاريخي. وجدت الدراسة أن تنفيذ نظام الأرشفة الإلكترونية يعزز إلى حد بعيد إمكانية الوصول، وأمن وثائق القطع الأثرية، كما يمكّن النظام البحث السريع، والتعديل السهل للبيانات، والتتبع الفعّال للقطع الأثرية، مع الحفاظ على نسخة احتياطية لمنع فقدان البيانات. على الرغم من التحديات الأولية مع اختيار البرامج وإدارة البيانات، يوفر النظام الحالي أساسًا مستقرًا للتحسينات المستقبلية، بما في ذلك التكامل المحتمل مع قواعد البيانات على الإنترنت وشبكات المتاحف العالمية.

Notes

(1) It is a free, multiple-platform, and open-source platform where developers can create many applications, and using this platform, many languages, editors, and libraries can be used to create web, mobile, desktop, IoT, and more (dotnet.microsoft.com/en-us/learn/dotnet/what-is-dotnet).

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