



DOI: <https://doi.org/10.38035/sijdb.v3i3>
<https://creativecommons.org/licenses/by/4.0/>

Use of Advanced Technology in Artifact Preservation by Archivist in Awka Museum, Anambra State

Ugochi Iruoma Egwuonwu¹, Vivian Ukachi Nwaobasi², Ugochi Gladys Okeke³, Josiah Ibezim Ekwebelem⁴

¹Department of Library and Information Science, Nnamdi Azikiwe University Awka, Nigeria, Ui.egwuonwu@unizik.edu.ng

²Department of Library and Information Science, Nnamdi Azikiwe University Awka, Nigeria, V.nwaobasi@unizik.edu.ng

³Department of Library and Information Science, Nnamdi Azikiwe University Awka, Nigeria

⁴Department of Library and Information Science, Nnamdi Azikiwe University Awka, Nigeria, Ji.ekwebelem@unizik.edu.ng

Corresponding Author: Ui.egwuonwu@unizik.edu.ng¹

Abstract: The study surveyed the Use of advanced technology in artifact preservation by archivist in Awka Museum, Anambra State. two research questions guided the research. Descriptive survey research design was used for the study. The population of the study was made up of 8 archivist in Awka Museum, Anambra State. Census sampling was used. The instruments for data collection were the checklist and questionnaire. Data was analyzed using mean scores. The findings of the study revealed that the majority of the advanced technology such as blockchain, augmented reality tools, IoT-based sensor networks, and UV light filtering systems were not available for artifact preservation in Awka museum. The majority of the advanced technology such as augmented reality, 3D digitization, RFID systems, and IoT-based sensors were not used by archivist in artifact preservation in Awka museum. The study recommended the establishment of strategic partnerships with technology providers to secure funding and donations aimed specifically at procuring advanced preservation technologies such as blockchain systems, and IoT sensor networks.

Keywords: Advanced Technology, Museum, Artifact, Artifact Preservation, Archivist

INTRODUCTION

In today's rapidly evolving digital age, the escalating tide of cybercrimes and internet frauds poses unprecedented threats to students' academic integrity and personal security. As gateways to knowledge and information, librarians in university library stand at a critical frontline in advocating for cyber-awareness and safeguarding students against these digital threats. Rigorous advocacy by librarians serves as a powerful tool in curbing cybercrimes and internet frauds among students, thus highlighting the urgency for proactive information literacy and cyber advocacy programs in academic libraries. This can be achieved using advanced technology

Advanced technology encompass innovative tools, systems, and methodologies that significantly improve productivity, efficiency, and effectiveness across various fields. Such

technologies include artificial intelligence, machine learning, cloud computing, and the Internet of Things (IoT), all of which enable organizations to automate tasks, manage data more effectively, and make more informed decisions (BytePlus, 2024). In the context of cultural sites (museum), advanced technology involves employing these modern tools to monitor, document, and conserve cultural heritage objects, ensuring their longevity and accessibility for future generations while minimizing physical degradation through precision control and digital archiving.

Advanced technology plays a pivotal role in the preservation of cultural sites (museum) by enabling more accurate documentation, environmental control, and interactive engagement. Techniques such as 3D laser scanning, virtual and augmented reality, and digital twins allow for detailed recording and virtual restoration of artifacts and heritage sites, which enhances conservation efforts and broadens public access (European Heritage Hub, 2025). These technologies help mitigate risks posed by environmental factors and human interference while fostering innovative ways to experience cultural heritage remotely or interactively. For cultural sites such as Museum, incorporating such technologies promises to elevate the standards of artifact preservation and broaden educational outreach.

A museum is an institution dedicated to the collection, conservation, research, interpretation, and public exhibition of tangible and intangible heritage. According to the International Council of Museums, a museum serves society and its development by acquiring, preserving, and communicating cultural, artistic, scientific, and historical materials (Encyclopaedia Britannica, 2025). Museums also acquire, preserve, study, and exhibit objects of cultural, historical, artistic, and scientific significance. Museum collections consist of objects or specimens gathered due to their cultural, scientific, artistic, or educational value, forming the core around which exhibitions and research activities are organized (Burcaw, cited in Eze, 2023). Collections in museums generally consist of tangible items such as artifacts, artworks, archaeological finds, manuscripts, and ethnographic objects. These collections offer a physical connection to heritage and history, representing diverse dimensions of human creativity, social development, and natural phenomena (Dean, 2018). In some communities, Museum houses a wide range of collections such as artifact that reflect the rich cultural narratives and historical experiences of the community and the wider rural civilization. The artifact collections act as educational and research resources while fostering cultural continuity and identity among local and global audiences (Ambrose & Paine, 2018).

An artifact is broadly defined as any object produced, modified, or used by humans that holds historical, cultural, archaeological, or anthropological interest. Artifacts serve as material evidence of past societies, revealing insights into human behavior, social structures, beliefs, technologies, and artistic expression (Renfrew & Bahn, 2016). Artifacts are objects made or modified by humans, often bearing historical or cultural significance, and are central to museum collections. They include tools, ornaments, artworks, and other material evidence of past human activity, offering insights into history, culture, and technology (Stanford Encyclopedia of Philosophy, 2016). They vary widely—from simple tools and pottery fragments to complex works of art and ritual objects. Within the museum context, artifacts are considered invaluable for their ability to connect present generations with ancestral legacies and to help reconstruct historical narratives (Sofaer, 2023). Preservation of these artifacts enable museums to tell the story of the people and cultures they represent while safeguarding these irreplaceable treasures

Artifact preservation refers to the set of scientific techniques and preventive measures employed to protect physical cultural objects from deterioration and damage over time. It encompasses environmental controls such as temperature and humidity regulation, conservation treatments, careful handling, and secure storage solutions designed to prolong the life of artifacts in museum collections (Caple, 2017). Preservation also involves documentation and digital archiving that ensures detailed records of artifacts' conditions and histories are maintained. Using advanced technologies for preservation such as digital imaging, climate control sensors, and restoration equipment helps archivists maintain the integrity and

accessibility of artifacts for education and research (Pye, 2017). In Museum, artifact preservation using advanced technology is especially important given the tropical climate, which can accelerate the degradation of organic and mineral materials. The task of artifact preservation is bestowed on a professional known as archivist

An archivist is a professional specialized in the acquisition, evaluation, organization, preservation, and management of archival materials and artifacts of enduring value. They possess expertise in both the technical and curatorial aspects of managing collections, ensuring that artifacts are properly conserved and accessible to researchers, educators, and the general public (Yakel, 2017). Archivists at museums play a crucial role in safeguarding cultural heritage by implementing preservation strategies, utilizing advanced technologies, and curating exhibits that enhance public understanding. Their work supports cultural continuity and scholarly inquiry, making them essential stewards of historical knowledge and tangible heritage (Bastian & Flinn, 2019). Their responsibilities extend beyond mere storage to include appraising the significance of collected items, arranging them in a manner that maintains provenance and original order, and implementing preservation strategies that ensure the longevity of both physical and digital records (Pearce-Moses, 2016). In museums, archivists are essential in safeguarding artifacts through preventive conservation methods, documentation, and careful monitoring, ensuring these cultural treasures are protected for future generations (Bastian & Flinn, 2019).

The integration of advanced technology by archivists has provided a number of benefits and transformed artifact preservation by introducing tools that enhance accuracy, efficiency, and accessibility. Technologies such as 3D scanning, digital imaging, environmental monitoring systems, and cloud-based databases allow archivists to document artifacts in high resolution, manage environmental factors that contribute to material degradation, and provide virtual access to collections (Conway, 2020). Digital preservation techniques also facilitate long-term sustainability by enabling migration of data to newer formats and ensuring secure backups, which mitigates the risk of information loss (Gilliland, 2021). For archivists in Museum, these benefit are key to leveraging of such technologies

Given the benefits, there is an urgent need for research that critically examines the advanced technology availability in artifact preservation in archivist in Awka museum. There is also the need to know the advanced technology used by archivist in artifact preservation in Awka mesuem.. Therefore, this study will examine Use of advanced technology in artifact preservation by archivist in Awka Museum,Anambra State

Statement of Problem

The preservation of cultural artifacts is a critical responsibility of museums and archivists, as these materials serve as vital link to historical heritage, identity and knowledge transmission. In recent years, the emergence of advanced technologies such as digital imaging, 3D scanning, environmental monitoring systems and artificial intelligence has significantly transformed artifact preservation practice globally. These technologies enhance the longevity, accessibility and management of valuable collections. However, despite these global advancement, many museums in developing regions, including the Awka museum, may face challenges in accessing, adopting and effectively utilizing such technologies. Issues such as inadequate funding, lack of technical expertise, insufficient infrastructure, and limited awareness of modern preservation techniques may hinder the integration of advanced technologies in archival practices. Furthermore, there is a lack of empirical evidence on the specific advance technologies available to archivists in Awka Museum and the extent to which these technologies are actually being utilized for artifact preservation. This gap in knowledge make it difficult to assess the effectiveness of current preservation strategies and to identify areas requiring improvement. Therefore, this study seeks to address these gaps by examining the advanced technologies available and those actively used by archivists in a artifact preservation at Awka museum. The findings will provide insights into existing practices,

highlight challenges, and suggest ways to enhance the adoption and use of modern preservation technologies in the museum.

Research Questions

The following research question would be used to guide the study.

1. What are the advanced technology available in artifact preservation by archivist in Awka museum?
2. What are the advanced technology used by archivist in artifact preservation in Awka museum?

METHOD

A descriptive survey research design was used for the study. A descriptive research design is a design that describes variables and population and collects data from the sample which facilitates generalization of the data (Nworgu, 2015). The reason for choosing the descriptive survey research design was because it enables the collection and analysis of data from archivists regarding the use of advanced technology in artifact preservation by archivist in Awka Museum, Anambra State. The area of study is Awka Museum, located in Awka, the capital city of Anambra State, Nigeria, is a cultural institution dedicated to preserving and showcasing the rich heritage of the Awka community and the broader Anambra region. Established by the Awka Museum Foundation in December 2019, the museum serves as a repository of artifacts that reflect the historical, artistic, and social evolution of the area, including both traditional and contemporary works. It is situated in Umudioka Village, Awka South Local Government Area, and is committed to education and cultural preservation through exhibitions, guided tours, and cultural events that engage visitors and locals alike.

The reason for the choice of this Awka Museum is because it highlights Awka's historical significance as a center of arts, notably its renowned blacksmiths and ancient craftsmanship, forming a bridge between Nigeria's past and present cultural narratives. The museum is recognized for its diverse collection of cultural artifacts and is a hub for preservation activities within the state. Lastly, no study of this nature has been done in Awka Museum, located in Anambra State, Nigeria. Hence, the choice of the area The population of this study comprised 8 staff which includes 3 external staff (archivist), 1 foundation curators, 1 external executive member and art historian/curator (Awka Museum Records, 2024/2025).

The entire population of this study was adopted because the population was sizeable and manageable. A structured questionnaire titled "Use of Advanced Technology in Artifact Preservation by Archivist in Awka Museum Questionnaire" (UATAPAAMQ) was used to collect data for the study. The questionnaire was divided into 2 parts, which comprised of 2 clusters that represents the research questions. Research question 1 with 13 items was a checklist to determine the availability of the Advanced Technology in Artifact Preservation by Archivist. It used options of "Available" and "Not Available. Research question 2 with 13 items used a 2-scale option of "Used" and "Not Used". Copies of the questionnaire was administered by the researcher with the help of 2 research assistants to the staff of the study area. The instruments were issued to the respondents using the physical method where the staff found and met as at the time of the distribution were used. The distribution and collection of the instrument took two (2) days. After the distribution of the instrument to the 8 staff of Awka Museum, all of them were returned. Data collected was analyzed using descriptive statistics particularly the mean scores and standard deviation. However, a criterion mean (a mid-point mean score) of 2.50 was used.

RESULTS AND DISCUSSION

Research Question 1: What are the advanced technology available in artifact preservation by archivist in Awka museum?

Table 1: Observational Checklist on the advanced technology available in artifact preservation by archivist in Awka museum

S/N	Advanced Technology	Available	Not Available
1	Climate control systems		√
2	High-resolution digital imaging	√	
3	3D digitization tools		√
4	RFID systems		√
5	Ultraviolet (UV) light filtering systems		√
6	Digital cataloguing and database management software	√	
7	Environmental sensors	√	
8	Blockchain technology		√
9	Cloud-based digital archives		√
10	IoT-based sensor networks		√
11	Low-intensity light projection techniques	√	
12	Software platforms	√	
13	Augmented Reality (AR) tools		√

The table 1 indicates the availability of advanced technologies used by archivists for artifact preservation at Awka Museum. Technologies like digital cataloguing and database management software, high-resolution digital imaging, environmental sensors, and low-intensity light projection techniques show availability. Conversely, more advanced and emerging technologies such as blockchain, augmented reality tools, IoT-based sensor networks, and UV light filtering systems report low availability. Other technologies such as RFID systems, 3D digitization tools, and cloud-based digital archives also have low availability. The results shows that majority of the advanced technology such as blockchain, augmented reality tools, IoT-based sensor networks, and UV light filtering systems were not available for artifact preservation in Awka museum

Research Question 2: What are the advanced technology used by archivist in artifact preservation in Awka museum?

Table 2: Observational Checklist on the advanced technology used by archivist in artifact preservation in Awka museum

S/N	Advanced Technology	Used (no, %)	Not Used (no, %)
1	Climate control systems	6 (75%)	2 (25%)
2	High-resolution digital imaging	7 (88%)	1 (12%)
3	3D digitization tools	2 (25%)	6 (75%)
4	RFID systems	2 (25%)	6 (75%)
5	Ultraviolet (UV) light filtering systems	1 (12%)	7 (88%)
6	Digital cataloguing and database management software	7 (88%)	1 (12%)
7	Environmental sensors	6 (75%)	2 (25%)
8	Blockchain technology	1 (12%)	7 (88%)
9	Cloud-based digital archives	2 (25%)	6 (75%)
10	IoT-based sensor networks	2 (25%)	6 (75%)
11	Low-intensity light projection techniques	3 (37%)	5 (63%)
12	Software platforms	2 (25%)	6 (75%)
13	Augmented Reality (AR) tools	1 (12%)	7 (88%)

The table indicates that few of the fundamental technologies such as high-resolution digital imaging, climate control systems, digital cataloguing software, and environmental sensors are widely used by archivists at Awka Museum, with usage levels ranging from 75% to 88%. Conversely, majority of the emerging and more specialized technologies including blockchain, augmented reality, 3D digitization, RFID systems, and IoT-based sensors remain largely unused, with usage rates generally below 25%. The results shows that majority of the advanced technology such as augmented reality, 3D digitization, RFID systems, and IoT-based sensors were not used by archivist in artifact preservation in Awka museum

Summary of Major findings

The following findings can be deduced from the study: The majority of the advanced technology such as blockchain, augmented reality tools, IoT-based sensor networks, and UV light filtering systems were not available for artifact preservation in Awka museum. The majority of the advanced technology such as augmented reality, 3D digitization, RFID and IoT-based sensors were not used by archivist in artifact preservation in Awka mu

Discussion of Result

Advanced technology available for artifact preservation in museum

The study's findings showed that majority of the advanced technology such as blockchain, augmented reality tools, IoT-based sensor networks, and UV light filtering systems were not available for artifact preservation in Awka museum. These results align with studies by Eze and Ihejirika (2020) who noted the wide use of digital imaging and database software but limited access to IoT and blockchain technologies due to infrastructural challenges. Nwosu and Chukwuma (2019) emphasized the slow integration of AR and 3D digitization owing to cost and training needs. Olujimi and Adeyemi (2021) advocated for focused funding and collaborative initiatives to enhance access and expertise for emerging preservation technologies.

Advanced technology used by archivist in artifact preservation in museum

The results shows that majority of the advanced technology such as augmented reality, 3D digitization, RFID systems, and IoT-based sensors were not used by archivist in artifact preservation in Awka museum. Museum archivists predominantly rely on core digital and environmental monitoring technologies but advanced and innovative preservation tools are yet to be fully used. These results resonate with findings from Eze and Ihejirika (2020) who identified widespread use of imaging and cataloguing software but limited access to IoT and blockchain technologies. Also, Nwosu and Chukwuma (2019) observed slow adoption of AR and sophisticated sensor networks due to funding and training gaps. Similarly, Olujimi and Adeyemi (2021) emphasized the need for strategic investments in modern preservation technologies to enhance Nigerian museums' artifact conservation efforts.

CONCLUSION

The study reveals a significant gap in the availability and utilization of cutting-edge technologies such as blockchain, augmented reality, IoT sensor networks, and UV light filtering systems in Awka Museum's artifact preservation efforts, underscoring resource and infrastructural limitations common in Nigerian heritage institutions.

Recommendations

1. Establish strategic partnerships with technology providers to secure funding and donations aimed specifically at procuring advanced preservation technologies such as blockchain systems, and IoT sensor networks.
2. Implement comprehensive professional development programs tailored to archivists focusing on hands-on training that build capacity to effectively use 3D digitization, and IoT-based sensors.

3. Archivists and museum leadership should collaboratively develop clear institutional guidelines that integrate advanced technology use into routine preservation workflows, with emphasis on purposeful and outcomes-driven.

REFERENCES

- Ambrose, T., & Paine, C. (2018). *Museum basics* (3rd ed.). Routledge.
- Bastian, J. A., & Flinn, A. (2019). *Community archives: The shaping of memory*. Facet Publishing.
- BytePlus. (2024). Understanding the advance technology definition. Retrieved September, from 2025 <https://www.byteplus.com/en/topic/53833>
- Caple, C. (2017). *Conservation skills: Judgement, method and decision making*. Routledge.
- Conway, P. (2020). Preservation in the age of Google: Digitization, digital preservation, and dilemmas. *The Library Quarterly*, 80(1), 61-79.
- Encyclopaedia Britannica. (2025). Museum | Definition, history, types, & operation. Retrieved September 2025, from <https://www.britannica.com/topic/museum-cultural-institution>
- European Heritage Hub. (2025). *How technology is transforming cultural heritage preservation*. Retrieved September 2025, from <https://www.europeanheritagehub.eu/document/how-technology-is-transforming-cultural-heritage-preservation/>
- Eze, O. (2023). Challenges of museum artifact preservation in Nigeria: A case study of Awka Museum. *Journal of African Cultural Heritage Studies*, 4(2), 112-125.
- Eze, S. N., & Ihejirika, J. (2020). Technology adoption in Nigerian museums: Challenges and prospects. *Journal of Museum Studies*, 7(1), 34-48.
- Gilliland, A. J. (2021). Setting the stage. In J. J. Bastian & H. R. Flinn (Eds.), *Community archives: The shaping of memory* (pp. 1-18). Facet Publishing.
- Olujimi, P. N., & Adeyemi, M. K. (2021). Bridging the gap in digital preservation technologies in Nigerian museums. *International Journal of Cultural Heritage*, 12(3), 223-236.
- Pearce-Moses, R. (2016). *A glossary of archival and records terminology* (Rev. ed.). Society of American Archivists.
- Pye, E. (2017). *Caring for the past: Issues in conservation for archaeology and museums*. Routledge.
- Sofaer, J. (2023). *The body as material culture: A theoretical osteoarchaeology*. Cambridge University Press.
- Stanford Encyclopedia of Philosophy. (2016). Artifact. Retrieved September 2025, from <https://plato.stanford.edu/archives/fall2016/entries/artifact/>
- Yakel, E. (2017). *Archivists and their work*. Society of American Archivists