

Preservation Strategies for Archives at the Archive Depot of Malang City Public Library and Archives Office

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ABSTRACT

Archive preservation plays an important role in an organization's preservation and accessibility of documents with historical, legal, administrative, and cultural values for future generations. The problem addressed in this study is how the Archive Depot of Malang City Library and Archives Office ensures the preservation of the archives it manages. This study aims to identify and analyze the preservation strategies of archives implemented in the Archive Depot of Malang City Library and Archives Office. The method used in this study was a case study with a qualitative approach. The data collection techniques used were observation, interviews, and documentation. This study used a theory of preservation strategy by Sari & Putranto (2023). The results of the study showed that there are three main strategies in maintaining archive preservation. First, the storage environment is managed by maintaining the room temperature according to the standard, using appropriate storage media, such as roll-o-pack shelves and acid-free materials, and controlling humidity using silica gel. Second, preventing damage from external factors is implemented through fumigation, disinfectant spraying, camphorization, proper air circulation, and disaster mitigation training for archivists. Third, the implementation of technology is carried out through archive digitalization, storage on the digital platform e-Arsip (a digital-based electronic archive management system in the institution environment) and SIKN/JIKN (National Archive Information System and Network managed by ANRI as a platform for national archive integration and access), and improving the quality of archive visuals through a photo editing application. Through these strategies, archive institutions such as the Archive Depot of Malang City Library and Archives Office contribute to building a solid foundation for preserving the nation's collective memory and providing opportunities for inclusive and sustainable information access.

Keywords: Archives, Archive Preservation Strategy, Archives Preservation, Archive Depot of Malang City Library and Archives Office.

I. Introduction

Archive preservation is a key aspect in maintaining document accessibility that has historical, legal, administrative, and cultural values. Besides supporting governance by providing accurate decision-making information (Teygeler et al., 2001), archive preservation ensures long-term access for future generations (Pandey & Kumar, 2020). Archive preservation, an effort to preserve archives, faces various challenges from

internal and external factors. Internal factors, such as limited technical expertise and a lack of competent workforces, are the main constraints in preservation activities, as Rakemane and Mosweu (2021) stated in their study in Sub-Saharan Africa.

This is in line with the findings by Wati & Rahmi (2021), who highlighted the lack of human resources in the preservation field as the cause of less-than-optimal handling of textual archives in the Archive Institution of Pati Regency. Moreover, Rifauddin & Pratama (2020) also explained that preservation strategies of library materials in the regional archive institution still face technical challenges and limited human resources. On the other hand, external factors, such as natural disasters, seriously threaten the sustainability of archives (Maisyaroh & Mahdi, 2020; Wigati & Rachman, 2019).

As one of the important elements with historical and national values for future generations, archives play a strategic role in supporting the nation, government, public services, and community welfare (Wigati & Rachman, 2019). Therefore, their preservation is the responsibility of the archive institution as mandated in Act Number 43 of 2009 concerning Archiving. Archive Depot of Malang City Library and Archives Office is an archive institution that plays a role in archive preservation to ensure the safety of archives in Malang City. This archive depot was initiated on December 27, 2023, to manage and store Regional Apparatus Organizations (OPD) archives in Malang City Government (Dispussipda, 2024).

Currently, the number of archives managed by the Archive Depot of Malang City Library and Archives Office, as shown in Table 1, is more than 1,000 archives, consisting of photo archives, textual archives, and audiovisual archives (JIKN Kota Malang, 2024).

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Table 1. Types of Archives

No.	Type of Archives	Description	Number
1.	Photo Archives	Open for public access	525
2.	Textual Archives	Limited access	500
3.	Audiovisual Archives	Limited access	5
Total			1030

Considering the number of archives in the Archive Depot of Malang City Library and Archives Office and their diversity as shown in Table 1, the presence of practitioners, especially archivists, has a strategic role in ensuring the orderliness, integrity, and sustainability of archives. According to ANRI Regulation Number 11 of 2018 concerning the Archival Service Standards, the preservation and maintenance of archives are ideally implemented by the practitioner team with adequate job composition, adjusted to the number of archives managed as follows:

Table 2. Standards for Implementing Archives Preservation and Maintenance Activities

No.	Position	Job	Number
1.	Head of the Office	Person in charge of the archive preservation program	1
2.	Head of the Archive Preservation and Maintenance Subdivision	Preparing archive preservation activities and reports, as well as serving as a technical supervisor	1
3.	Coordinator Archivist	Technical coordination of preservation activities	1
4.	Archivist	Technical officer of archives maintenance and preservation	6-10
5.	Archives Administrator / Secretary	Managing the administration and archiving system	1
6.	Goods and Services Analysis	Providing preservation materials	1
7.	Cooperation Analysis	Preparing for cooperation in preservation activities	1

The number of practitioners above is the standard for preservation activities in maintaining and managing archives of 1,000 sheets of documents (ANRI, 2018). However, conditions in the field show that the number of practitioners involved directly in the preservation activities in the Archive Depot is still limited. Through the preliminary interview with IWU as an archivist at the Archive Depot of Malang City Library and Archives Office, the researcher found that there is a gap between the number of archives and the number of archivists in implementing archive preservation in the Archive Depot of Malang City Library and Archives Office. This condition emphasizes the urgency of increasing the number of human resources and technical capacity in preservation strategies implemented. Based on the data of the organization structure, the practitioners consist of 10 individuals, including three expert archivists, one archival officer, one skilled archivist, and five proficient archivists (Dispussida, 2025). The following data shows the ratio between the number of archives managed and the number of practitioners involved in preservation activities in the Archive Depot.

Table 3. The Ratio of Archives and Archivists in the Archive Depot

Description	Number
Total static archives	1030
The number of practitioners (including archivists)	10
Ratio of archives per practitioner	103 archives/individual

Based on the current number of archives, which reaches 1,030 and will continue to increase over time, the ratio of archives management in the Archive Depot is 1:103 archives. This ratio reflects a high workload considering the complexity of preservation activities, which includes physical handling of archives, digitalization, and public access service. This high ratio impacts workload and contributes to the physical condition of archives, which are not entirely managed optimally. This can be seen from the results of

observation, which showed that more than 30% of archives were in damaged conditions, both minor and severe. The details of the archive conditions can be seen in Figure 1 below.

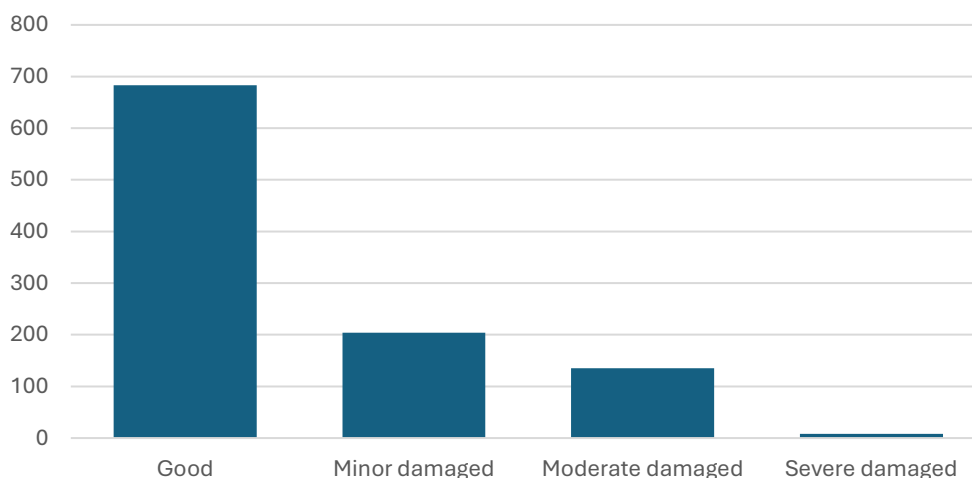


Figure 1. Data of the Archives Conditions in the Archive Depot of Malang City

Based on the observation results in Figure 1, the conditions of archives stored in the Archive Depot of Malang City Library and Archives Office indicate that most archives, approximately 683 (67%), are in good condition and suitable for storage. However, approximately 347 archives, or 33% of 1,030, have various damage, including minor, moderate, and severe (Dispussipda of Malang City, 2025). This indicates the need for comprehensive preservation strategies to preserve archives managed by the Archive Depot of Malang City.

Based on this background, the researcher wants to discover how preservation strategies are used in public institutions that manage important archives. Therefore, it is important to conduct this study to gain an in-depth understanding of the archives preservation strategies implemented in regional archive institutions. With its status as a newly initiated archives management institution, it is important to identify the archive preservation steps used in this Archive Depot. These archive preservation activities aim to protect archives from physical damage and ensure that the information stored is still accessible and usable by future generations. This understanding contributes to archive preservation as a nation's collective memory and addresses the challenges of archive sustainability and accessibility in the digital era. Narrow the focus by identifying specific problems or gaps in knowledge that your study addresses. This section should clarify why the research is necessary and how it contributes to advancing understanding in the field. Explain the research question or hypothesis guiding your investigation, emphasizing its novelty and significance.

Clearly outline the aims and objectives of the study, linking them to the identified research gaps. Avoid delving into detailed methodology or results here; instead, provide a conceptual overview that leads the reader logically to the following sections. If your research includes theoretical frameworks or assumptions, briefly introduce them, ensuring they align with the research aim. Conclude the Introduction by summarizing what the study seeks to achieve and how it aligns with or challenges existing knowledge. This should give the reader a clear understanding of the study's scope and potential impact, setting the stage for the subsequent sections.

II. Literature Review and Hypothesis Development

2.1. Archive Management

Archive management involves planning, organizing, controlling, and maintaining documents or records in physical and digital forms to ensure the accessibility, accuracy, and sustainability of information

stored (Hendrawan & Ulum, 2017). Archive management aims to ensure that the important archives for operational continuity can be easily identified and accessed. Understanding the archive management concept is crucial to understanding each stage's value easily. Archives management includes collection, processing, preservation, and providing access to archives that have historical or permanent value (Rosalin, 2017). In an archive's life cycle, archives management's position is in the disposition phase, where an archive gets into a sustainable and permanent life stage, which is helpful for research purposes (Sattar, 2020). In archive management, archive preservation is one of the steps used in archive preservation. Archives management means protecting and preserving archives and restoring them from damage factors to maintain their integrity and prevent the loss of stored data (Maisyaroh & Mahdi, 2020). The primary purpose of archive management is to preserve archives from loss of information or physical damage so that archives can be stored over a long period and protected from various threats, including factors causing damage and pest attack (Purnamasari, 2019).

The relationship between archive management, particularly in managerial functions, and preservation as part of implementing archive preservation strategies is significant. Rifauddin & Pratama (2020) explain that an institution's success in preserving archives depends on the technical methods and how archive management is carried out systematically. For example, if an institution has good archive management with clear policies, trained resources, and adequate budget allocation, preservation strategies, such as using protective materials, digitalization, or an environmental control system, will be more effective to implement. Thus, archive management theory is the primary conceptual foundation for explaining this relationship's causal mechanisms. Moreover, Bawono (2022) emphasized that challenges in archive management in Indonesia are the lack of integration between the digital preservation model and electronic archive management, which national policies, technology infrastructure, and human resource competencies should support. This finding indicates the need for archive management that is adaptive to digital changes and cross-sectoral. Meanwhile, a study by Mursyidah et.al (2024) shows that archive management transformation through implementing the Dynamic Archival Information System (SIKD) is proven to increase the efficiency and accountability of archive management, especially in secondary education institutions. This emphasizes that implementing appropriate information technology in archive management supports preservation and comprehensively strengthens information governance.

2.2. Types of Archive Preservation

According to the Regulation of the Head of National Archives of the Republic of Indonesia Number 23 of 2011 concerning the Guidelines of Archives Preservation, preservation is the entire process and performance to protect archives from damage or destructive elements, and restoration/repair of damaged parts of archives. Preservation is an effort to preserve and maintain the archive conditions to extend the life of archives so that they can be accessed and used optimally when needed (Wati & Rahmi, 2021). Teygeler et al. (2001) explained the preservation pyramid theory, which is divided into four levels: preventive preservation, passive conservation, active conservation, and restoration. This theory provides a comprehensive conceptual framework for understanding the levels of archive management and handling according to the level of damage.

Archives preservation is generally divided into two main approaches: preventive and curative (Mulyono, 1985). Preventive preservation is a proactive step in preventing archive damage by providing facilities, protection, and maintaining the physical environment according to the standards (Wati & Rahmi, 2021). According to the Regulation of the Head of ANRI Number 23 of 2011, these preventive measures include pest control, safe archives storage, reproduction activities, and disaster risk mitigation. On the other hand, curative preservation focuses on archive restoration that has experienced damage to maintain the usability of information value through actions, such as physical repair and advanced control of destructive elements (Rahman & Arfa, 2021).

Although preventive and curative approaches have fundamental differences, combining these two in one archive preservation system is considered more appropriate to address the challenges of current archive management. This integrated approach reflects a sustainable preservation process, where preventive and restorative measures can complement each other to maintain the availability and accessibility of archives in the long term. Implementing this approach is increasingly important, especially for archive institutions in the region facing natural disaster risk, environmental damage, and limited resources. Therefore, archive preservation strategies must follow the latest developments, including digital technology, information audits, and metadata-based data management. This effort reflects a transformation in preservation practice that is currently required to be faster, more responsive, and able to answer information needs sustainably in the digital era.

2.3. Strategies for Archives Preservation

Archives preservation strategies are a series of systematic planning and measures to prevent damage and maintain archives' conditions optimally (Sari & Putranto, 2023). In the context of archives, this strategy includes preservation policies, technology utilization, and social engagement, which are adjusted to the needs and challenges of each institution. Guccio et al. (2020) state that challenges in public archives preservation lie in storage and maintaining a balance between conservation and public accessibility. This approach emphasizes the importance of efficiency and accessibility of archives as a source of information. Local culture-based strategy is also one of the approaches that can be implemented. For example, preserving ancient manuscripts in Sumedang Regency demonstrates that community involvement and a contextual approach can increase the success of preservation strategies (Khadijah et.al, 2023). Meanwhile, digitalization efforts support physical preservation and strengthen cultural values through transcription and archives integration into public platforms, such as a digital museum (Marsili & Hassam, 2025). However, in the implementation in local government, archives preservation strategies still face technical challenges and limited human resources, which impact the effectiveness of their implementation (Rifauddin & Pratama, 2020).

The approach used in this study can be preventive or curative, such as managing the storage environment to prevent damage, restoring archives that have experienced degradation, and digitalization as a mitigation measure against the risk of information loss due to disaster or material damage (Azmi, 2020). This strategy must be described as measurable operational procedures to ensure effective implementation. For example, the storage room's temperature and humidity can be controlled by installing an automatic sensor that monitors real-time conditions, per the standard of the Regulation of the Head of ANRI Number 23 of 2011. The data obtained were then used for periodic evaluation and mitigation steps required. The success of preservation strategies can be evaluated through quantitative indicators, such as the number of archives successfully restored, the reduction in the level of damage, and the increased accessibility of digital archives. For example, the National Archives of the Republic of Indonesia (ANRI) successfully increased the number of digital archives that can be accessed by the public through the implementation of digital preservation imaging policies with an output of approximately 4,000-5,000 scans per week in high-quality formats, such as TIFF and JPG (Mursyidah et al., 2024).

Globally, similar strategies are implemented in the Internet Archive project in Aruba, which successfully digitized more than 101,000 items in documents, photos, and 3D objects. This project is a practical example of how cooperation between institutions and technical support can encourage large-scale digital preservation, even in a country with limited resources.

Globally, the implementation of similar strategies is also seen in the Internet Archive project in Aruba for the digitalization of national archive collections, which successfully digitized more than 101,000 items in the form of documents, photos, and 3D objects, which became a role model for countries with limited resources. This project is a practical example of how cooperation between institutions and technical support can encourage archive preservation, even in a country with limited resources (WIRED, 2024). In Indonesia, the implementation of the strategy can be seen in the ANRI project with the Corts Foundation to implement the

Digital Archive System at the ANRI (DASA) project using high-quality imaging and a structured workflow to scan VOC manuscripts in the 17th-18th centuries and become the physical preservation and digital content preservation (JDIH ANRI, 2024). Thus, the effectiveness of an archive preservation strategy depends on the integration between clear technical procedures, data-based evaluation, and collaboration between institutions. This approach ensures sustainable archive preservation and makes them adaptive to the challenges of the times.

III. Research Method

This study used a qualitative case study approach. The primary data were collected through in-depth and structured interviews in the form of dialogues regarding archive preservation strategies with the representative of the archivists from the Archive Depot of Malang City Library and Archives Office. The criteria for selecting informants in this study were individuals who understand policies or strategies of archive preservation, both physically and digitally, and those who have been or are directly involved in preservation programs, such as digitalization, restoration, or risk mitigation of archive damage. Besides conducting interviews, the researcher conducted observation and documentation by observing maintenance activities performed on the building and archive storage rooms, archive restoration rooms, and archive reproduction rooms in the Archive Depot of Malang City Library and Archives Office. This research site was chosen because the Archive Depot of Malang City Library and Archives Office is a newly established facility and is currently in the process of developing a system and infrastructure so that it can provide an actual overview of the implementation of standards, policies, and archive management strategies in modern facilities. The focus of this study was based on the theory of the archive preservation strategy proposed by Sari and Putranto. This theory explains that archive preservation strategies are a series of systematic planning and measures to prevent damage and maintain physical and digital archive conditions (Sari dan Putranto, 2023). This theory is the conceptual foundation for analyzing the effort of archival institutions in designing and implementing steps of archives preservation, especially in facing the potential risks of damage, including:

- a. Managing archive storage environment;
- b. Preventing damage from external factors (pests, pollution, and natural disasters);
- c. The use of technology in archives preservation.

The data analysis used in this study referred to a case study method by Robert K. Yin (2015). A case study was chosen because it allows researchers to investigate a phenomenon deeply and holistically in the context of real life. In this study, a case study was used to intensively explore archives preservation strategies in one research object by considering various aspects, such as the condition of archives, preservation methods implemented, and policies and challenges the related institution faces. The researcher used three triangulation techniques to eliminate the differences in reality constructions within the context of a study when collecting data regarding various events and relationships from various perspectives: source triangulation, technique triangulation, and time triangulation (Moleong, 2010).

IV. Results and Discussion

4.1. Archives Preservation Strategies in the Archive Depot of Malang City Library and Archives Office

Archive preservation aims to maintain the physical form of documents and ensure the continuity of the information value contained. Khan (2021) emphasized that manuscript preservation in an archival institution reflects the importance of systematic and sustainable efforts in keeping documentary heritage accessible for future generations. Archive Depot of Malang City and Archives Office has carried out various strategies, including preservation methods, modernization of facilities and infrastructure, socialization, and cooperation as follows:



4.1.1. Preservation Methods

Azmi (2020) explained that the implementation of the archives preservation method in an archival institution must involve two archive preservation methods: preventive preservation and curative/restorative preservation. Archive Depot has carried out several preventive preservation methods, including managing storage rooms; handling archives through digitalization or media transfer of archives; controlling integrated pests routinely by fumigation, giving camphor and silica gel in the archive storage boxes, and pest extermination with the assistance from third party, such as pest control; and planning in facing the disaster potential by conducting emergency mitigation training and providing fire extinguishers in the archive storage building. The implementation of these strategies is in line with Azmi (2020) and Sari & Putranto (2023), who emphasized the importance of systematic planning and proactive measures to prevent archive damage.

4.1.2. Modernization of Facilities and Infrastructure

Modernization of Facilities and Infrastructure in implementing archive preservation strategies refers to improving, updating, and optimizing facilities and equipment used in managing archives to align with technological development and current standards (Hayati, 2020). Archive Depot has modernized facilities and infrastructure for textual and photo archives by digitizing archives and transferring archive media. This strategy strengthens Hayati's (2020) argument regarding adapting to technological advancement in supporting archive preservation.

4.1.3. Sosialization

Archive Depot has conducted socialization with students and society. Archive Depot conducted socialization through the *Arsip Masuk Sekolah (ASOKA)* program by inviting students to visit the Archive Depot Building. Then, the children were educated on the role of the Regional Archive Institution (LKD) as a place for managing archives. Besides targeting students, socialization of the role of LKD was also carried out in the community, targeting the PKK in several districts in Malang City. This strategy aligns with the participative approach in archive preservation suggested by Teygeler et al. (2001), which involves society in awareness and an active role in maintaining archives.

4.1.4. Collaboration

Cooperation carried out by the Archive Depot included training and capacity improvement for archivists and sharing knowledge and technology in managing and preserving archives. In training and increasing capacity, archivists in the Archive Depot work with several parties, including the National Archives of the Republic of Indonesia (ANRI), the Regional Disaster Management Agency (BPBD), and the Malang City Fire Department. In sharing knowledge and technology, Archive Depot works with several parties, including the Library and Archives Office of West Java Province, the Ministry of Communication and Information (KOMINFO), and schools in Malang City. Moreover, in managing inactive archives, Archive Depot works with 9 Regional Apparatus Organizations (OPD), including the Regional Development Planning Agency (Bappeda), Public Works, Spatial Planning, Housing, and Settlement Area Office (DPUPRPKP), Human Resources Development and Staffing Agency (BKPSDM), Investment and One-Stop Integrated Services Office (DPMPTSP), and Procurement Service Unit (Dispusipda Kota Malang, 2024). This collaborative model supports the network-based preservation proposed by Riffaudin & Pratama (2020), where synergy between institutions can strengthen the sustainability of archive management.

4.2. Management of Archive Storage Environment

In managing archive storage rooms, Archive Depot of Malang City adheres to the standards of the Regulation of the Head of ANRI Number 23 of 2011 concerning the Guidelines of Archives Preservation and Malang City Regional Regulation Number 1 of 2022 concerning the Implementation of Archives. These two regulations are the foundation for the physical arrangement of storage rooms and the selection of storage media per the characteristics of each type of archive. Archive Depot divides archives storage into three categories according to the type of archives managed:

- a. Roll opack storage for textual archives. The textual archives managed by the Archive Depot of the Public Library and Local Archives Office of Malang City are stored in a dedicated roll opack system on the 2nd floor of the Archive Depot building. This roll opack system also features powder coating technology, which protects against corrosion and provides corrosion resistance.
- b. Fireproof cabinets for photographic archives. These cabinets are specifically designed to protect the archives from the risks of fire, high temperatures, and other environmental threats that could degrade the quality of the photographs.
- c. Hard-disk storage for audiovisual archives. The audiovisual archives managed by the Archive Depot of the Public Library and Local Archives Office of Malang City include video recordings, audio files, and documentary films. Hard drives were chosen as the storage medium for these audiovisual archives due to their large capacity, fast access, and good security, ensuring their long-term usability.



Figure 2. Roll Opack Storage & Fireproof Cabinets

Media storing textual archives in the Archive Depot is based on the Decree of the Head of ANRI Number 03 of 2000 concerning the Minimum Standards for Building and Rooms, which states that boxes used for storing archives must not be made of plastic. Boxes for storing archives are usually made of cardboard and coated with acid-free paper to prevent chemical reactions that can damage archives in the long term. Besides storage media, temperature and air humidity are the most important factors in preserving archives; instability of temperature and air humidity in archive storage rooms significantly impacts the quality of archives (Wati & Rahmi, 2021). Controlling the temperature of storage rooms aims to slow down the degradation process of archive materials, prevent mold growth, and avoid the potential of damage due to uncontrolled humidity. However, the technical constraints, such as a lack of temperature monitoring at night and the unavailability of a dehumidifier, indicate deviations from the ANRI standards (2015), as shown in Table 4.

Table 4. The Implementation of Storage Room Management in the Archive Depot of Malang City Library and Archives Office

The Management of Storage Rooms According to the Regulation of the Head of ANRI Number 31 of 2015	Facts in the Field	Desc.
Archive storage rooms are arranged based on the type of archive media	The Archive Depot of Malang City Library and Archives Office divides the archives storage	Meet the Standards

The Management of Storage Rooms According to the Regulation of the Head of ANRI Number 31 of 2015	Facts in the Field	Desc.
	into three categories according to the type of archives managed.	
Storage rooms must have the following general criteria: <ol style="list-style-type: none"> a. Isolated from the rest of the building; b. Using fireproof doors; c. Having several emergency exits; d. Not constructed below ground level; e. Having a large capacity of archive storage; f. Having a separate space between the elevator and the storage rooms; g. No work area; h. Limited access; and i. Maintaining temperature and humidity constantly according to the type of archives stored. 	Several points have been implemented in archive storage rooms; however, some have not been carried out optimally, including no monitoring of room temperature control at night, so that AC is only used during the day, and the absence of a dehumidifier to control humidity in storage rooms.	Not meet the Standards.

Based on the table above, it can be found that temperature control in the storage rooms in Archive Depot still faces challenges due to the absence of monitoring room temperature at night, so the AC is only used during the day. Moreover, the limited electrical capacity in the Archive Depot building also causes only minimal use of AC because it requires higher power capacity. Archive Depot does not have a dehumidifier to control humidity in storage rooms; thus, archivists take alternative measures by storing archives on shelves and boxes with silica gel (Asa et.al, 2024).

Sari & Putranto (2023) explained that silica gel can be an alternative when storage rooms are not equipped with a humidity control device or a dehumidifier. Liu et al. (2023) explained that the humidity adsorption rate using silica gel is influenced by the relative humidity of the surrounding air, where the higher the relative humidity, the higher the humidity adsorption rate. The use of silica gel in the storage shelves is proven to reduce the average humidity from 72% to 58%, based on the measurement results for two weeks using a digital hygrometer. This data indicates the effectiveness of silica gel in controlling humidity in storage rooms that are not equipped with a dehumidifier. However, using silica gel as the humidity controller in Archive Depot requires more supervision because it must be replaced regularly every three months. This finding confirms the statement of Wati & Rahmi (2021) that the stability of temperature and humidity is crucial in maintaining the quality of archives. Silica gel, as suggested by Sari & Putranto (2023) and Asa et.al (2024), is an appropriate alternative for limited infrastructure, although it requires more intensive supervision.

4.3. Prevention of Archive Damage from External Factors

External factors influencing the archive conditions include temperature, humidity, sunlight, air and dust pollution, natural disasters, and organisms, such as fungi, termites, ants, and rats (Hendrawan & Ulum, 2017). Efforts to prevent external factors are crucial in maintaining the preservation of archives. To prevent archive damage from external factors, the Archive Depot of Malang City Library and Archives Office regularly carries out various efforts, including:

4.3.1. Fumigation

Archive Depot regularly performs fumigation and inspects archive conditions to prevent damage caused by pests. Archive Depot currently carries out fumigation regularly to eradicate pests, such as insects, termites, and microorganisms that have the potential to damage archives.



Figure 3. Fumigation Process in Archive Depot

4.3.2. Spraying Disinfectant Liquid

Spraying disinfectant liquid is carried out regularly to ensure the archive storage environment remains sterile and free from pests that have the potential to damage documents. Spraying disinfectant liquid is carried out to eradicate insect nests, such as ants and termites, in the archive storage rooms and around the Archive Depot building. The spraying activity is usually carried out with the assistance of a third party or pest control service.



Figure 4. Disinfectant Spraying in Archive Depot

4.3.3. Camphorization

Archivists in the Archive Depot of Malang City Library and Archives Office also carry out camphorization every three months to prevent archive damage caused by termites or other rodents.

4.3.4. Maintaining the Air Quality

Archive Depot tries to maintain the air quality in archive storage rooms by maintaining air circulation in the archive storage area to keep it clean and controlling the temperature to remain stable. However, AC temperature control in the Archive Depot is not always turned on due to a lack of electrical capacity. Moreover, the Archive Depot of Malang City currently does not have an air purifier, so it only relies on the AC to maintain the stability of the air temperature.

4.3.5. Disaster Planning Management

Disaster Planning consists of several steps: prevention, preparation, response, and restoration (Nurani & Christiani, 2019). Malang City Library and Archives Office has also provided all archivists and librarians with steps that must be carried out when facing a disaster, such as fire. Every archivist and librarian has participated in disaster emergency mitigation training with BPBD and the Malang City Fire Department.



Figure 5. Disaster Emergency Mitigation Training

Various efforts, including temperature, light, dust, fumigation, spraying disinfectant, giving camphor, and controlling the air quality, follow the recommendation by Hendrawan & Ulum (2017), who emphasized the importance of environmental control in preservation strategy. Furthermore, disaster planning management also refers to four stages of disaster management, according to Nurani & Christiani (2019): prevention, preparation, response, and restoration, and demonstrates the readiness of human resources in facing unexpected risks. Archive Depot has performed various efforts to prevent archive damage from external factors properly. However, improvements in several aspects, such as temperature control and air quality, are required. Human resources are also crucial in facing natural disasters because they must always be ready when a disaster comes without warning.

4.4. The Use of Technology in Archives Preservation

Digital transformation in the archival field has encouraged fundamental transformation in how institutions manage, preserve, and provide access to archives. According to Anas & Salim (2023), digital preservation is a systematic approach that emphasizes the digitalization process, metadata management, long-term storage, and sustainability of information access in a digital environment. Zahara & Salim (2022) argued that digital preservation is not only media transformation but also includes multi-layered strategies designed to ensure the safety and integrity of electronic archives in the long term. Meanwhile, Oyelude (2019) emphasized the important role of GLAM (galleries, libraries, archives, museums) institutions in adopting new technology for digital preservation, including cross-sector collaboration that supports the successful implementation of the technology. Therefore, technology in archive preservation is currently an important part of the information preservation effort, considering the need for fast and accurate data access to support transparent governance. Archive Depot of Malang City Library and Archives Office carries out media transformation with archives digitalization using a scanner as one of the steps of archives preservation. The stages of the media transformation process were carried out using a scanner as follows: (1) Identification and selection of archives, (2) Archive preparation, (3) Media transformation process, (4) Storage and usage.



Figure 6. Scanner

Archives that have been through the media transformation process and changed into digital format were stored in the archiving system application owned by the Malang City Library and Archives Office. The archiving system application owned by Archive Depot is the e-Arsip application, which is an application developed through collaboration between Archive Depot and Kominfo of Malang City. Malang City Library and Archives Office also has an application and website for archives management in the form of photos, the National Archives Information System (SIKN) application, and the National Archives Information Network (JIKN) website.

Besides scanning, the Archive Depot of Malang City also reproduces archives. Archive reproduction in Archive Depot was carried out using a photo editing application, which enables an improvement in image quality to be clearer. After the photos were reproduced, the next stage was scanning to convert the physical document into a digital format. Archives that have been processed were then uploaded to the National Archive Information System (SIKN) and National Archive Information Network (JIKN) to be accessible widely.

The following is the implementation of technology in archives preservation carried out by the Archive Depot of Malang City Library and Archives Office.

Table 5. The Implementation of Using Media Transformation Technology

Media Transformation in Preservation According to the Regulation of the Head of ANRI Number 23 of 2011	Facts in the Field	Description
Media transformation of archives based on their types: <ol style="list-style-type: none"> a. Paper-based archives were transferred into microfilm and digital format. b. Film archives can be transferred into video and video into other formats. c. Video archives are reproduced from the old format to the new format. d. Reproduction of photo archives and film archives. 	The Archive Depot of Malang City Library and Archives Office only transforms media in photo archives.	Not yet meet the standards

Table 5 shows that the implementation of media transformation technology is still limited to photo archives. This is not entirely in accordance with the Regulation of the Head of ANRI Number 23 of 2011, which encourages the diversification of digital formats for all archives. This comparison demonstrates the gap between practice in the field and national standards, as found in a study by Lestari (2021) regarding the digitalization constraints in regional archive institutions. Based on the results of observation and field data, it is found that the implementation of media transformation in the Archive Depot of Malang City is still limited. Media transformation is only carried out on photo archives, while textual and audiovisual archives have not been through the conversion process or digital reproduction.

The use of technology in the preservation strategy of archives in this study shows that regional archive institutions are starting to adopt a digital approach to respond to physical limitations and the risk of

archive damage. Digitalization is done through archive scanning, storing in digital media, and implementing a metadata-based archive information system to facilitate access and data maintenance. This finding aligns with the results of a study by Bawono (2022), who compiled a digital preservation synthesis model and digital archive management in Indonesia. Bawono emphasized the importance of a contextual approach in implementing two main models: the Technology-Oriented Model and the Organization-Oriented Model, which consider technology an integral part of archival governance responsive to digital transformation challenges. This comparison indicates that although implementation at the regional level is still limited in infrastructure and policies, its strategic direction aligns with the national need for an adaptive and sustainable digital preservation system.

Moreover, this study's findings align with the study by Nurdiansyah et al. (2025), which emphasized that digital preservation is a technical solution and a mechanism to strengthen accountability and transparency of institutional archive governance. Based on them, using technology in archive preservation can increase public trust, particularly when supported by strong policies, competent human resources, and an integrated information audit system. This comparison emphasizes that the success of a digital preservation strategy highly depends on the synergy between the infrastructure readiness, adaptive regulations, and strengthening institution capacity, which are common challenges at the national and regional levels. Overall, preservation strategies carried out by the Archive Depot of Malang City generally have reflected the main principles of archive preservation proposed by previous theories. However, several aspects must be refined to align with national standards and the best practice reflected in the literature.

V. Conclusion

Based on the study results conducted through observation, interview, and documentation methods in the Archive Depot of Malang City Library and Archives Office regarding the preservation strategies in ensuring the preservation of archives, it can be concluded that three main strategies are implemented. First, the management of the archive storage environment is carried out by maintaining room temperature according to the standard (16°C–21°C), the use of roll-o-pack shelves, fireproof cabinets, and storage media, such as free-acid boxes and silica gel, to maintain humidity. This aims to create an ideal physical condition to ensure that archives remain protected from environmental damage. Second, prevention of damage from external factors is carried out through various measures, such as fumigation, spraying disinfectant, camphorization, maintaining air circulation, and disaster mitigation training for archivists to protect archives from pests, pollution, and the risk of natural disasters. Third, the use of technology in archive preservation is carried out by media transformation with archive digitalization using a scanner, digital storage in the e-Arsip application, and SIKN/JIKN, as well as archive reproduction to improve visual quality with a photo editing application. These strategies demonstrated the commitment of Archive Depot to maintaining the sustainability and accessibility of archives as information heritage. However, this study also revealed several limitations in preservation practices, including a lack of an automatic humidity control device and a limited scope of digitalization. Therefore, further in-depth study regarding the effectiveness of specific preservation methods is required, including continuous monitoring of storage room temperature and humidity, and their impact on the durability of archives. Moreover, this finding can be a basis for formulating policies or technical guidelines at the regional level related to archive preservation in disaster-prone areas.

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