DIGITAL PRESERVATION IN THE PERSPECTIVE OF KNOWLEDGE AND INFORMATION TECHNOLOGY: A SYSTEMATIC LITERATURE REVIEW

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Abstract
Cultural heritage has valuable information that is maintained in ensuring the continuity of information from a culture. One form of activity that can be carried out to maintain cultural heritage is preservation. Preservation is an activity that aims to store and managing information contained in an object or document. In the era of development of information technology, the use of technology in preservation is also utilized to help maintain cultural heritage, namely by carrying out digital preservation activities. Digital preservation is a method that plays a role in maintaining and managing information collections by transferring media, creating storage and access to the information in order to ensure that cultural heritage can be stored for a long period of time and can be widely accessed. In carrying out digital preservation, the factors that support the success of digital preservation are closely related to the existence of science and information technology. Information technology has the advantage of being able to maintain the stability of stored information, ease of free access to information, and extensive storage space. There are other methods and factors that are considered in the use of technology for digital preservation, such as the use of devices, in information technology that are related to knowledge preservation practices in institutions. This research aims to understand the role of science and information technology in digital preservation activities. This research uses a systematic review method of related articles. The results of the systematic review shown the role of information technology in digital preservation activities and maintaining the cultural heritage.

Keywords: *Cultural heritage, preservation, digital preservation, information technology, systematic review*

INTRODUCTION

The digital era has an influence on the field of information management. The development of today's technology has a significant role in helping to maintain the sustainability of information. According to Marleni (2022), information technology makes it easy to input data into a database, so that the data can be managed more easily, quickly, and accurately. One of the roles of information technology can be carried out in carrying out preservation activities. Preservation is an activity that aims to maintain the values of the information contained in a document. According to Eden's view in Walker (2013), preservation can be interpreted as a management or managerial activity, technical, and budget considerations that are applied to prevent or slow down damage and extend the useful life of a document so that its availability

can continue to be guaranteed. Preservation activities are carried out with the aim of preventing damage to a document or other material that has information value and can be used continuously.

Another view related to preservation was put forward by Barthos (2003), namely that preservation is an activity that covers all aspects of a business with the aim of preserving library materials and archives which includes financial management policies, personnel methods, and storage techniques. Then, according to Eden and Feather (1997), the essence of preservation practice aims to ensure that the information material stored is in good condition to be accessed at any time, while preservation practice includes policies and strategies. Preservation activities can be carried out in various places that manage information collections, such as libraries, museums, and so on. Materials containing information have a utility value that is maintained for a long period of time.

This was also expressed by Sukaesih (2016), namely that preservation is very important to be carried out on ancient manuscripts and library materials, this is because preservation has a strong relationship with the handling of cultural objects. In Indonesia, the basis or basis for regulations related to preservation is issued by the government of the Republic of Indonesia in Law Number 11 of 2010 concerning Cultural Heritage. In the regulation, it is explained that cultural heritage is the nation's cultural wealth as a manifestation of human life thoughts and behavior that has an important meaning for the understanding and development of history, science, and culture in the life of society, nation, and state so that it needs to be preserved and managed properly through efforts to protect, develop, and utilize in order to advance national culture for the greatest prosperity of the people.

The regulation also explains that things included in the form of cultural heritage can be natural objects and/or man-made objects, both movable and immovable, in the form of a unit or group, or parts thereof, or remnants that have a close relationship with culture and the history of human development. The definition of cultural heritage was also put forward by Ramaiah (2017), namely cultural heritage is an expression, customs, rituals, artifacts, values developed by generations, both tangible and intangible by previous generations, and plays a role in connecting the past and the present so that society can find its identity.

Then, the regulation also explains about sites related to cultural heritage that are located both on land and at sea and are evidence of the existence of human activities in the past. With these rules, it can be understood that cultural heritage can be in the form of natural or human-made objects that have historical value or other information and are maintained so that the information value is not lost or damaged. This view was also expressed by Lu, Dongming & Pan (2011), namely that cultural heritage is considered to have a very important role in human survival because cultural heritage contains rich information about society, history, and cultural values.

The value of information held from a preserved community can help maintain the sustainability of the community. In the current development of information technology, preservation activities are often carried out digitally. Preservation carried out digitally utilizes information technology to store and also access stored information. The involvement of information technology in the field of knowledge preservation has its own advantages and disadvantages but can make a significant contribution to the world of information. According to Musrifah's view (2017), digital preservation activities in related institutional repositories are basically aimed at maintaining, preserving, and disseminating knowledge and information so that they can be reused by users in the long term and can be used optimally. In addition,

according to Pendit's view (2008), digital preservation is also an effort so that stored digital material does not depend on changes or damage to technology. One of the digital preservation activities carried out in terms of maintaining the sustainability of information is by digitizing information collections. According to Russel's view (1998), digital preservation is a process where data is provided in digital form that is offered so that collections can be reused, have durability and intellectual integration of information obtained from the collections that have been provided. In digitizing information, there are processes that need to be carried out. According to Marilyn and Simon (2002), the strategy for preserving digital library materials can be done in various ways, namely technological preservation, renewal, migration, emulation, digital archeology, and the transfer of analog documents to digital media.

Based on the explanation above, it can be seen that there is a relationship between preservation activities and the field of knowledge of technology and information. The relationship between the two cannot be separated from one another. Preservation, in the context of information, has a role in maintaining knowledge or information. Along with the development of technology, preservation activities by utilizing information technology have become activities that have an impact on this field. This then became the main focus of this study. Therefore, the question in this study is "What is the role of information technology in the implementation of knowledge preservation activities?" According to Probst (1999) quoted from Mifta Nur Halima (2019), knowledge preservation is a process in which selective retention activities related to information, documents and experiences are needed by ongoing management. Then, another view regarding knowledge preservation put forward by Primadesi (2013) quoted from Anindya Ambar Wati (2021), explains that knowledge preservation is an effort in preserving knowledge contained in an institution. Knowledge preservation is an activity carried out so that accumulated knowledge is maintained and remains or stored in an organization. The series of processes of knowledge preservation activities include selecting, collecting, storing, actualizing, protecting, and accessing. According to the ALA Annual Conference on June 24, 2007 in Irawati (2015) quoted from Ni Ketut Nila Cyntyawati (2020), digital preservation is a combination of policies, strategies and preventive measures aimed at ensuring that original content is converted correctly over time. Digital preservation activities are intended for collections published in digital form.

According to Katherine Skinner and Martin Halbert in A Guide to Distributed Digital Preservation (2010), along with the development of the digital era, cultural memory in a culture also participates in information digitization activities. This encourages the need for improvements in the field of preservation in digital techniques and technology. However, factors of imbalance in natural conditions and so on can cause problems in terms of the sustainability of digital preservation. Therefore, there is a need for digital preservation activities that can guarantee the sustainability of information preservation in sustainable communities. With this basic idea, a concept known as "Distributed digital preservation" or DDP was developed. DDP offers a collaborative approach to preservation because its approach is easy and different from other business scheme approaches. The basic concept of DDP is to focus on the distribution of preserved digital information into certain areas or regions.

According to Mitra Samiei (2020) in Digital Preservation: Concept and Strategies, there are strategies in digital preservation, including in terms of adopting the procedures needed to preserve digital objects. The preservation strategies and methods carried out mostly focus on short access to information stored in digital repositories. Digital preservation strategies are also

intended to deal with future problems by preserving the software and hardware used to access digital information sources.

There is research related to digital preservation activities. The first research was conducted by Arienda Addis Prasetyo in 2018 entitled "Digital Preservation as a Preventive Measure to Protect Library Materials as Cultural Objects". The article explains the role of preservation in maintaining and extending the existence of cultural objects. Preservation activities carried out by digital libraries involve elements related to financial management, storage, manpower, and so on. In addition, in his writing, the author explains that preservation is not only carried out in the library environment, but is also carried out in other fields that are engaged in information management.

Then, the second study conducted by Fatmawati, E. in 2017 entitled "The cultural revolution of digital information: its impact on librarians in managing knowledge." This study explains the role of the impact of the shift in the culture of digital information related to the management of librarian knowledge. In the article, the author explains that the development of information technology in the world of digital libraries has also changed the methods or mechanisms related to the reproduction and distribution of information content. In addition, with the increasingly rapid development of IT, access to complete information (as the original) has become a necessity in today's digital era. Finally, there is a study by Nuri Ifka Bengi in 2021 entitled "Digital archive preservation as an effort to save information in the cloud computing era". This study focuses on understanding the role of preservation activities in digital format which can be an alternative in efforts to save important information in an archive. There is a difference between conventional archive preservation and electronic or digital archives. There are important reasons for carrying out digital archive preservation activities

RESEARCH METHOD

This study uses a systematic literature review approach or method. Systematic literature review or SLR is a term used to refer to a research methodology or scope of a particular research and its development carried out and evaluating research related to a particular topic focus (Lusiana and M. Suryani, 2014). SLR aims to identify, evaluate, and interpret all research in interesting topic areas with relevant research questions.

In this study, the selection of articles that became literature material was obtained using the SCOPUS page using the keyword "digital preservation". Then, the first search results were reviewed and filtered again with a focus on the topic of computer science and focused on articles published in the 2019 to 2022 range with open access. The results of this filtering then became a source of literature material for the research focus.

RESULT AND DISCUSSION

Search results based on the keyword "digital preservation" on the SCOPUS page and using the computer science category and using the open access option. The article search uses a time span from 2019 to 2022, and displays 10 article search results. The article details are in the following table:

Code	Title	Journal	Author/Years	Goals
S1	Historical Scientific Analog Data: Life Sciences Faculty's Perspectives on Management, Reuse and Preservation	Data Science Journal 19(1),51, pp. 1-10	Farrell, S.L., Hendrickson, L.G., Mastel, K.L., Kelly, J.A./(2020)	To understand the role of historical data, including in data dissemination, reuse, and data preservation..
S2	Some assembly required: Low-cost digitization of materials from magnetic tape formats for preservation and access	Preservation, Digital Technology and Culture 49(3), pp. 89-98	Cain, S., Welch, B., Oelschlager, A., VandeCreek, D./(2020)	This article shows that librarians and archivists still lack the technical skills or access to expertise to digitize these materials themselves. It provides a detailed account, including the challenges faced, of how a team of practitioners with no prior training or experience in digitizing historical audio recordings on cassette and open-reel tape at the Northern University of Illinois Libraries.
S3	Preservation of intangible and tangible cultural heritage using digital technology	Indonesian Journal of Electrical Engineering and Computer Science 28(2), pp. 980-986	Amali, L.N., Katili, M.R., Ismail, W./(2022)	This research aims to provide information to increase public awareness about the distribution of tangible sites and intangible information about cultural heritage.
S4	Methodology to Evaluate the State of Conservation of Historical Plasterwork and Its Polychrome to Promote Its Conservation	Applied Sciences (Switzerland) 12(10),4814	Torres-González, M., Alejandre, F.J., Alducin-Ochoa, J.M., (...), Carrasco-Huertas, A., Flores-Alés, V./(2022)	This work presents a methodology for the assessment of ancient plasterwork based on traditional examination techniques, such as organoleptic tests and chemical characterization, and also on digital tools, such as photogrammetric surveys, thermographic images and measurements of ambient conditions

				with a thermohygrometer.
S5	Low-temperature storage improves the over-time stability of implantable glucose and lactate biosensors	Sensors (Switzerland) 19(2),422	Puggioni, G., Calia, G., Arrigo, P., (...), Serra, P.A., Rocchitta, G./(2019)	For this purpose, amperometric biosensors have proven to be particularly suitable due to their specificity and sensitivity. The operation and storage stability of the biosensor are quite important features and storage procedures therefore play an important role in maintaining the performance of the biosensor.
S6	A Method for Determining the Shape Similarity of Complex Three-Dimensional Structures to Aid Decay Restoration and Digitization Error Correction	Information (Switzerland) 13(3),145	Vasic, I., Quattrini, R., Pierdicca, R., Frontoni, E., Vasic, B./(2022)	This paper introduces a new method for determining the shape similarity of complex three-dimensional (3D) mesh structures based on the extraction of important node vectors, sorted by their most important geometric and topological feature matrices.
S7	Combining integrated informative system and historical digital twin for maintenance and preservation of artistic assets	Sensors 21(17),5956	Marra, A., Gerbino, S., Greco, A., Fabbrocino, G./(2021)	The protection of artistic and cultural heritage is a major challenge due to its specificity and its exposure to significant natural hazards. There are several methodologies to assess the condition of the artistic heritage and to protect it from extraordinary measures.
S8	Use of flat interwoven wooden strips in architecture and construction. Simulation	Sustainability (Switzerland) 13(11),6383	Casado, A., Sánchez, A., Marieta, C., Leon, I./(2021)	This research aims to promote the use of natural materials in construction. The goal is to rediscover the

	and optimization using 3d digital models			interweaving of flat pieces of wood. Taking into account environmental criteria, it focuses on the study of wood from a locally produced tree, the chestnut, in the north of Spain.
S9	Intelligent Digital Platform for Community-Based Rural Tourism—A Novel Concept Development in Peru	Sustainability (Switzerland) 14(13),7907	Maquera, G., da Costa, B.B.F., Mendoza, Ó., Salinas, R.A., Haddad, A.N./(2022)	The aim of this paper is to present a conceptual development model for an intelligent digital platform (IDP), where tourism products and services are visualized, articulated, and integrated with different CRT actors, offering personalized tourism experiences.
S10	3D Digital Preservation, Presentation, and Interpretation of Wooden Cultural Heritage on the Example of Sculptures of the FormaViva Kostanjevica Na Krki Collection	Applied Sciences (Switzerland) 12(17),8445	Učakar, A., Sterle, A., Vuga, M., (...), Gabrijelčič Tomc, H., Kočevar, T.N./(2022)	This paper presents an interdisciplinary approach to the treatment of FormaViva a collection of wooden sculptures exhibited outdoors in a natural environment near Božidar Jakac Art Museum in Kostanjevica na Krki in Slovenia. The study focuses on the 3D graphical representation of the sculptures created by photogrammetry and 3D modeling.

Research Question 1: How much research is related to digital preservation?

Based on the results of the systematic review analysis, each study is related to digital preservation. The articles above focus on methods and practices that can be used in digital preservation. There are 2 articles that discuss the types of materials that fall into the realm of digital preservation. Then, there is 1 article that discusses the effect of temperature on digital preservation. Finally, there are 7 articles that discuss the methods used in digital preservation.

Research Question 2: How to carry out digital preservation activities?

The results of the analysis of the articles above show that there are various methods that can be used to carry out digital preservation. Factors considered in digital preservation are the type of material used, temperature, and methods that can be used in digital preservation. In article S5, the study focuses on the effect of temperature on the stability of biosensor storage, which is useful in storing data information. Then, in article S8, it discusses the use of interwoven wood pieces that can be used in preserving knowledge, with the help of 3D models. Other articles (S1, S2, S3, S4, S6, S7, S9, S10) discuss the digital methods used to preserve knowledge, such as in article S9 which discusses the creation of an intelligent platform model to assist tourism activities.

DISCUSSION

Digital preservation has various factors that determine the level of success and success. The purpose of implementing digital preservation activities is to preserve information contained in an object or place, in accordance with the views contained in the ALA annual conference in 2007. Digital preservation is an important process that is useful for helping to preserve knowledge. As stated by Probst (1999), knowledge preservation is a process where selective retention activities related to information, documents and experiences required by ongoing management, so that an active and structured process is needed to carry out knowledge preservation.

In addition, the view put forward by Primadesi (2013), shows the role of institutions in knowledge preservation activities. In the analysis of the article review above, institutions actively conduct research on knowledge preservation. Digital preservation is closely related to information technology. In the article review above, the role of information technology is actively used to create applications, models, and methods used. This can also be seen from the use of 3D modeling representations in article S10 which plays a role in maintaining the sustainability of information from museums. In addition, the use of 3D printers, which are quite common in helping to maintain the preservation of cultural heritage information, is also a factor that supports the use of information technology in digital preservation activities. The use of technology used in digital preservation activities is not without challenges. Human resources (HR) can be an obstacle in digital preservation activities. This can be seen in the S2 article which explains the shortcomings of archivists and librarians in broad technical skills and access to materials that can be digitized by them.

Information technology can be a means of distributing information that can be accessed by users. In addition, digital preservation according to Mitra Samiei (2020) requires procedures that comply with applicable standards and policies. Digital preservation has procedures that are developed in accordance with applicable policies and the latest developments in information technology. Despite the obstacles, this does not dampen interest in digital preservation. This can be seen in the S3 article in promoting to the public about cultural heritage information about the distribution of tangible and intangible information sites using digital preservation methods.

The development of information technology also plays a role in creating new methods in preservation. This can be seen in article S7 which seeks to provide protection for cultural heritage that has special characteristics and the threats faced. Then, technological developments also provide opportunities to promote cultural heritage in tourism activities, as explained in article S9. The manifestation of the use of information technology in digital preservation includes various aspects of cultural heritage. Digital preservation of cultural heritage can include

the preservation of works of art, tangible and intangible cultural heritage, the tourism industry, and others. The sustainability of cultural heritage can be maintained in the long term and can be freely accessed by the public who want to understand the influence of cultural heritage on the identity of the community.

CONCLUSION

Based on the results of the discussion above, it can be concluded that research on digital preservation has various factors related to information technology, policies, methods, types of materials, and so on. These factors are needed for institutions or related parties who will carry out digital preservation. However, there needs to be an adjustment for each party regarding the methods needed or in accordance with the digital preservation activities that will be carried out. The role of information technology which continues to develop can determine the results of digital preservation carried out by related institutions.

SUGGESTION

Based on the conclusions above, the suggestion that can be taken in this study is that it is necessary to make adjustments or adaptations to the methods used by each party in carrying out preservation activities. The development of more sophisticated information technology today can be utilized by institutions to carry out more optimal digital preservation. With the development of information technology, this can provide better and more precise digital preservation results.

THANK YOU-NOTE

The author would like to express his deepest gratitude to Mrs. Ike Iswary for her invaluable contribution to this article. Her support and thoughts have had a significant positive impact, and her expertise and perspective have provided deep insights into the writing of this article. Thank you for your dedication and commitment.

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