The Influence of Digital Archiving and Digital Infrastructure Availability on Document Management Efficiency with Digital Literacy as a Moderating Variable among Economics and Administration Students at Jakarta State University in 2025

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Abstract. This study aims to analyze the influence of digital archiving and the availability of digital infrastructure on document management efficiency, with digital literacy as a moderating variable among EA students at Jakarta State University. The method used is a quantitative approach with purposive sampling, involving 108 respondents, and analyzed using Smart PLS. The results of the study indicate that digital archiving has a significant impact on document management efficiency, while the availability of digital infrastructure does not have a significant direct impact. Simultaneously, both variables influence efficiency, with digital archiving being the dominant factor. Digital literacy was not found to moderate the influence of digital archiving or digital infrastructure on document management efficiency. Students with high digital literacy also did not show higher efficiency compared to other students. These findings emphasize the importance of strengthening digital archiving systems and the need for a more applied approach to digital literacy to support optimal document efficiency in an academic environment..

Keywords: Digital Archiving, Digital Infrastructure, Document Management Efficiency, Digital Literacy.

Introduction

Digital transformation has brought significant changes in the way individuals and institutions manage archives. In the context of higher education, students are now increasingly shifting from physical storage systems to digital storage, which is considered more efficient, accessible, and secure (Law No. 43 of 2009; KBBI). Cloud-based storage services such as Google Drive and OneDrive have become the preferred choice for storing academic documents.

However, initial observations indicate real issues on the ground. Although most students acknowledge that digital archiving systems make it easier to search for documents, many of them still face obstacles in managing files. These issues include inconsistent file naming, poorly organized folder structures, and limited skills in digital archive management. This fact highlights the gap between the ideal conditions expected and the reality on the ground.

Ideally, digital archives should be managed systematically through uniform file naming, grouping documents based on specific categories, and using metadata to facilitate quick searches (Ghifari Aminudin Fad'li et al., 2023). However, in practice, most students have not consistently applied these principles, so the effectiveness of document management has not been optimally achieved.

In addition, the aspect of digital information security is also an important concern. Students generally still pay little attention to data protection, such as the use of encryption or file security with passwords. As a result, digital documents are vulnerable to illegal access, data loss, and cyber threats such as malware and ransomware. This situation reflects the low readiness of users to address digital security challenges, which

should be an integral part of the digital archiving system.

Thus, it can be concluded that there is a gap between the ideal condition namely, a structured, secure, and efficient digital archiving system and the actual condition where most students still struggle to manage digital archives properly and securely, and have not yet attained adequate digital literacy levels.

Therefore, this study is relevant to identify the extent to which the available digital archiving system and technological infrastructure support the efficiency of document management among students. Additionally, this study aims to examine the role of digital literacy as a moderating factor that can strengthen the effectiveness of digital archiving implementation. The findings from this study are expected to provide strategic contributions to the development of a more standardized, efficient, and secure digital archiving system in the higher education environment.

Literatur review Digital Archives

Digital archiving is the process of storing, managing, and preserving documents in a digital format that can be accessed electronically. According to Sugiarto (2020), digital archiving involves the use of information systems to store, classify, and secure administrative and academic documents. Digital archives are stored through technological devices such as computers, servers, or the cloud (Abi & Hakim in Hayyina Farahdiba et al., 2023), and can be in the form of text, images, sound, or video (Nyfantoro in Hayyina Farahdiba et al., 2023). Digital archive management has a cycle that includes the stages of creation and storage, distribution and utilization, maintenance, and archive shrinkage (Read & Ginn in Sukaesih et al., 2023). This process allows efficiency in document creation and dissemination, but still requires supervision and specialized equipment to ensure quality and security. The advantages of digital archives include space efficiency, reduced paper usage, accelerated access to information, labor savings, and data protection through backups (Surya Pradana in Sahidi et al., 2017). However, weaknesses include information security risks, dependence on technological infrastructure, potential data loss, format compatibility issues, management costs, and limited digital literacy that requires training for users.

According to Hendi Haryadi (2009) in Nur N. S & Sutarni (2017), there are several important indicators in measuring digital archiving. These indicators include hardware such as computers, scanners, and storage media that must be available and adequate to support digital archive management. In addition, the use of appropriate software or archival information systems is essential for managing archives electronically. Human resources are also a key factor, as the competence and skills of employees in operating the system and understanding digital archival procedures are crucial to the success of archive management. The availability of a reliable communication network also supports access to and exchange of digital archive information. Finally, the existence and implementation of clear standard operating procedures (SOPs) in the electronic archiving system are needed to ensure consistency and efficiency in digital archive management.

Digital Infrastructure Availability

Digital infrastructure is the technological foundation that supports all digital-based activities, including hardware, internet networks, and software that enables integration, communication, and innovation. Henfridsson & Bygstad in Lase et al. (2025) emphasized the generative nature of digital infrastructure that enables innovation through modularity, flexibility, and third-party contributions, particularly relevant in the development of open and adaptive digital archive systems. Nambisan (2017) highlights the role of digital infrastructure in supporting communication, collaboration and computing for innovation, such as through cloud computing and data analytics. Meanwhile, Febrianty in Supa (2023) explains that digital infrastructure is an information and communication technology network that connects individuals and institutions globally. According to Puskomedia (2024), the main components of digital infrastructure include physical (cables, data centers), virtual (cloud), hardware (computers, servers), software, and networks, which together support the exchange and management of data in digital systems.

According to Puskomedia (2024), digital infrastructure has several key indicators used in its measurement. These indicators include networks, which consist of various types of physical connectivity such as fiber optic cables, copper cables, and wireless connections to support data exchange between devices. In addition, data centers are an important component as large-scale facilities that function to store, manage, and process data

securely and efficiently. Servers also play a vital role as computers that provide services such as data storage, information processing, and internet access. Finally, software, which includes applications, operating systems, and digital platforms, enables connectivity between devices and access to various online services.

Document Management Efficiency

Document management efficiency is the ability to manage documents systematically, quickly, and save resources, making it easier to search, store, and archive. According to KBBI, efficiency means accuracy in doing something without wasting time, energy, or costs. Sedarmayanti in Mahardita (2017) states that efficiency is related to the efficient use of resources in a process. Peter F. Drucker in Aplonia Lau E (2023) emphasizes that efficiency is achieved if resources are used optimally without waste. Meanwhile, Stoner in Aplonia Lau E (2023) adds that efficiency is demonstrated by an organization's ability to achieve goals by minimizing the use of resources without reducing quality. Thus, document management efficiency aims to produce maximum output with minimal input through proper and effective document management.

According to Azzahra et al. (2025), document management efficiency can be measured through several key indicators. First, document access speed indicates how quickly users can find and retrieve archives from the system, where a responsive and user-friendly digital system greatly supports this efficiency. Second, storage space efficiency is achieved through document digitization, which reduces the need for physical space and enables document storage on servers or in the cloud. Third, reduced operational costs are an important indicator, as digital document management systems can cut expenses related to paper, ink, equipment, manual labor, and maintenance of physical archives. Finally, ease of cross-departmental collaboration reflects the system's ability to support quick and secure document exchange between work units, thereby accelerating decision-making and enhancing overall organizational productivity.

Digital literacy

Literacy, according to UNESCO (in Naufal, 2021), is an individual's competence in recognizing, understanding, interpreting, producing, and utilizing text-based information, both printed and written. Literacy plays an important role in the development of knowledge, self-potential, and active participation in society. Digital literacy, according to Paul Gilster (in Syafrial, 2023), is the skill of understanding and utilizing information from various formats and sources through computer devices. The National Institute for Literacy (in Suherdi, 2021) emphasizes that digital literacy also includes the ability to solve problems in various life contexts, not only limited to the ability to read and write. Douglas A. J. Belshaw (in Syafrial, 2023) outlines seven elements of digital literacy: awareness of media influence, understanding mass communication, ability to analyze media messages, awareness that media is a representation of text, understanding culture through media, respect for media content, and adaptability to the digital world. These elements become an important basis in assessing students' critical thinking skills and use of digital media, especially in managing information and academic archives efficiently and strategically.

According to Gilster (1997) in Kusumaningrum Hanifah and Hafida Siti Hadiyati Nur (2021), digital literacy consists of several key indicators that reflect an individual's ability to use information technology effectively. The first indicator is internet searching, which is the ability to use search engines to find relevant information online. Second, hypertextual navigation, which involves the skill of navigating and understanding complex web structures through links or hyperlinks. Third, content evaluation, which includes the ability to critically assess the accuracy, relevance, and credibility of information obtained from the internet. Finally, knowledge assembly is the ability to gather information from various sources, evaluate facts and opinions, and then synthesize them into meaningful new understanding or knowledge.

Research Framework and Hypothesis

Based on the literature review previously described, the flow of relationships between variables that form the basis of this research can be formulated. The relationship between these variables is depicted in the form of a conceptual framework that shows the effect of digital archives (X1) and the availability of digital infrastructure (X2) on document management efficiency, with digital literacy (Z) as a moderator variable.

This framework aims to provide direction in empirical testing and clarify the position of each variable in the

research model. In this model, digital archives and digital infrastructure availability are assumed to have a direct influence on document management efficiency. In addition, both variables also affect document management efficiency indirectly through increased digital literacy. Thus, digital literacy acts as a moderator variable that strengthens or weakens the relationship between digital archives and digital infrastructure availability with document management efficiency.

This model is the basis for empirically testing how the direct and indirect effects of these variables on document management efficiency among students of the Faculty of Economics and Administration, State University of Jakarta in 2025.

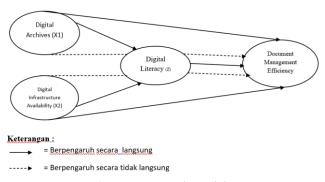


Figure 1. Research model

Methods

This study uses a quantitative approach with the aim of examining the relationship between variables, specifically the effect of digital archiving and the availability of digital infrastructure on document management efficiency, with digital literacy as a moderator variable. The software used is Smart PLS Data was collected through the distribution of questionnaires that were systematically arranged to respondents who had met certain criteria. The questionnaire data was designed to collect specific information about respondents' perceptions and experiences related to the application of digital archives, the level of digital infrastructure availability, digital literacy skills, and the level of efficiency in managing academic documents. Each question item is arranged using a Likert scale to facilitate the measurement of the respondent's level of agreement with the statement given.

Participant

Titled "The Influence of Digital Archiving and Digital Infrastructure Availability on Document Management Efficiency with Digital Literacy as a Moderating Variable among EA Students at Jakarta State University in 2025," this study specifically targets active Economics and Administration students at the State University of Jakarta who access digital documents in academic activities and have either occasionally or frequently managed documents digitally, with a total of 108 respondents. The objective of this research is to interpret the data on the influence of digital archiving and the availability of digital infrastructure on document management efficiency, with digital literacy as a moderating variable among EA students at the State University of Jakarta in 2025.

Instrument and Procedure

Title

The Influence of Digital Archiving and Digital Infrastructure Availability on Document Management Efficiency with Digital Literacy as a Moderating Variable among EA Students at Jakarta State University in 2025

Research Instrument

The instrument used was a questionnaire to measure the influence of digital archiving and infrastructure availability on document management efficiency among Economics and Administration Students at Jakarta State University.

Result

Tabel 1. ValidityTest

Indicator	Outer Loading	Description
X1.1	0.728	Good
X1.2	0.764	Good
X1.3	0.830	Very good
X1.4	0.800	Very good
X1.5	0.803	Very good
X1.6	0.822	Very good
X1.7	0.730	Good
X1.10	0.742	Good
X2.2	0.715	Good enough
X2.3	0.837	Very good
X2.4	0.787	Good
X2.5	0.820	Very good
X2.6	0.840	Very good
X2.7	0.823	Very good
Y1	0.873	Very good
Y3	0.829	Very good
Y4	0.809	Very good
Y5	0.829	Very good
Y7	0.711	Good enough
Z 1	0.722	Good enough
Z 3	0.765	Good
Z 4	0.707	Good enough
Z 5	0.786	Good
Z 6	0.725	Good
Z 7	0.775	Good
Z 8	0.788	Good

The validity test is a process to assess the extent to which the research instrument is able to measure what should be measured. The goal is to ensure that each item in the questionnaire or instrument truly reflects the construct under study. A valid instrument will produce accurate and reliable data. In the context of structural models (such as PLS-SEM), validity is generally tested through the loading factor value, where indicators are said to be valid if they have a value above 0.7. High validity indicates that the indicator has a strong correlation with the construct it represents.

Based on the validity test results, all indicators in this study have a loading factor value above 0.7, which indicates that all indicators are valid for measuring their respective constructs. High values, especially above 0.8, indicate a strong contribution to the variable, while values between 0.7 to 0.79 still meet the criteria for convergent validity.

Thus, all indicators used in this study can be declared valid and suitable for use in further analysis. Indicator validity ensures that each item in the instrument truly reflects the construct being measured, so that the data collected can be relied upon and used to support research conclusions.

Tabel 2: Reliability Test

variable	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
X1	0.907	0.909	0.925	0.606
X2	0.891	0.894	0.917	0.648
Y	0.870	0.887	0.906	0.659
Z	0.873	0.877	0.902	0.567

Based on the results of the reliability test, all constructs in this study have met the criteria for reliability and convergent validity. This is indicated by the Cronbach's Alpha and Composite Reliability (rho_A and rho_C) values which are all above 0.7, indicating excellent internal consistency in each construct. In addition, the Average Variance Extracted (AVE) value for all variables also exceeds the minimum limit of 0.5, which means that the construct has sufficient ability to explain the variance of its indicators. Thus, all constructs are declared reliable and valid, and are suitable for use in subsequent structural model analysis.

Tabel 3: Discriminant Validity Test

	X1	X2	Y	Z
X1	0.778			
X2	0.306	0.805		
Υ	0.612	0.372	0.812	
Z	0.630	0.398	0.487	0.753

Based on the results of the discriminant validity test using the Fornell Larcker method in the table above, it can be concluded that all constructs in this study X1 (Digital Archives), X2 (Digital Infrastructure Availability), Y (Document Management Efficiency), and Z (Digital Literacy) meet the criteria for good discriminant validity. This is indicated by the square root value of the Average Variance Extracted (AVE) displayed on the diagonal (bold value) is higher than the correlation between other constructs in the same row and column. For example, the $\sqrt{\text{AVE}}$ value of X1 is 0.778, higher than its correlation with X2 (0.306), Y (0.612), and Z (0.630). Likewise with other constructs, such as Y which has a $\sqrt{\text{AVE}}$ of 0.812, greater than its correlation with X1 (0.612), X2 (0.372), and Z (0.487). These results indicate that each construct in the research model is better able to explain its own indicators than indicators from other constructs, so discriminant validity has been met. Thus, it can be concluded that each construct has a clear difference and does not overlap with each other, which supports the quality of the measurement model used.

Tabel 4: R-Square

	R-Square	R-Square Adjusted
Y	0.419	0.402
Z	0.443	0.433

Based on the results of the R-square analysis in the table above, it is known that the R-square value for variable Y (Document Management Efficiency) is 0.419 and the adjusted R-square value is 0.402. This shows that 41.9% of the variation in Document Management Efficiency can be explained by the independent variables in the model, namely Digital Archives and Digital Infrastructure Availability, while the remaining 58.1% is explained by other factors outside the model.

Meanwhile, the R-square value for variable Z (Digital Literacy) as a moderator variable is 0.443, with an adjusted R-square value of 0.433. This means that 44.3% of the variation in Digital Literacy can be explained by the variables in the model that affect it, and the remaining 55.7% is influenced by other factors that are not included in this research model.

In general, both R-square values are in the moderately strong category, indicating that the structural model has moderate explanatory power over the dependent variables. Thus, this model is suitable for further hypothesis testing.

Tabel 5: Hypothesis Test of Direct Effect

	Original	Sample		T statistics	P values
	sample (O)	mean (M)	(STDEV)	(O/STDEV)	
X1 -> Y	0.490	0.479	0.108	4.521	0.000
$X1 \rightarrow Z$	0.560	0.556	0.076	7.341	0.000
X2> Y	0.180	0.190	0.106	1.700	0.089
$X2. \rightarrow Z$	0.227	0.237	0.099	2.293	0.022
Z -> Y	0.107	0.114	0.144	0.743	0.457

Based on the results of hypothesis testing, it can be concluded that Digital Archives (X1) is the most significant factor in improving Document Management Efficiency (Y) with an original sample value of 0.490, T-statistic of 4.521, and P-value of 0.000, and Digital Literacy (Z) with an original sample of 0.560, T-statistic of 7.341, and P-value of 0.000. The implementation of good digital archives is statistically proven to be able to improve the efficiency of document management and encourage an increase in digital literacy.

Meanwhile, Digital Infrastructure Availability (X2) only shows a significant effect on Digital Literacy (Z) with original sample 0.227, T-statistic 2.293, P-value 0.022, but not on Document Management Efficiency (Y). This suggests that while infrastructure is important to support the digitization process, its mere existence is not enough to improve document management efficiency.

On the other hand, Digital Literacy (Z) has no significant direct effect on Document Management Efficiency (Y). This means that although digital literacy has increased, it has not directly impacted the efficiency of student document management.

Thus, the main focus in improving the efficiency of document management should be directed at strengthening the application of digital archiving, as it is proven to be the most dominant variable in this research model.

	Tabel 0.11y pottlesis Test of Indirect Effect					
O		Original	Sample	Standard deviation	T statistics	P values
		sample (O)	mean (M)	(STDEV)	(O/STDEV)	
	$X1 \rightarrow Z \rightarrow Y$	0.06	0.063	0.081	0.739	0.460
	X2> Z -> Y	0.024	0.03	0.041	0.596	0.551

Tabel 6: Hypothesis Test of indirect Effect

Based on the results of the indirect effect hypothesis test in the table above, it is known that the path X1 (Digital Archives) \rightarrow Z (Digital Literacy) \rightarrow Y (Document Management Efficiency) has an original sample value of 0.060, a T-statistic value of 0.739, and a P-value of 0.460. Since the P-value is greater than 0.05, the indirect effect is statistically insignificant. This indicates that digital literacy is not able to significantly mediate the effect of digital archiving on document management efficiency. Meanwhile, the X2 (Digital Infrastructure Availability) \rightarrow Z (Digital Literacy) \rightarrow Y (Document Management Efficiency) path also shows insignificant results, with an original sample of 0.024, T-statistic 0.596, and P-value 0.551.

Thus, digital literacy also does not significantly mediate the effect of digital infrastructure availability on document management efficiency. Overall, these results suggest that although digital literacy has relationships with several variables in the model, its role as a mediating variable in indirect relationships has not been significantly proven in the context of this study.

Discussion

The results of this study indicate that digital archiving (X1) has a significant effect on document management efficiency (Y), both directly and in the context of its effect on digital literacy (Z). This is reflected in the F-square values of 0.247 for Y and 0.512 for Z, indicating a moderate to high contribution to both variables. Thus, it can be concluded that the effective use of a digital archiving system can enhance document management efficiency among students.

Meanwhile, the variable of digital infrastructure availability (X2) shows a weak influence on document management efficiency and digital literacy, with F-square values of 0.047 and 0.084, respectively. These results indicate that although digital infrastructure is available, its use has not had a significant impact on document management efficiency. This could be due to the suboptimal utilization of this infrastructure by students.

Interestingly, the results of this study indicate that digital literacy does not play a significant mediating role in the relationship between digital archiving and digital infrastructure on document management efficiency. This is evidenced by a P-value > 0.05 in the indirect path test, meaning that digital literacy is not strong enough to bridge the influence of the two independent variables on the dependent variable.

This finding differs from previous studies such as Handayani (2021), Pramudito (2022), and Fitria (2025), which state that digital literacy plays a significant role in strengthening the influence of digital archiving and infrastructure on document efficiency. This difference is likely influenced by the differing contexts of the study respondents, training methods, or students' levels of adaptation to technology.

Overall, the results of this study emphasize the importance of strengthening digital archiving as a primary

effort to improve document management efficiency in higher education. Meanwhile, digital literacy, although not proven to be a mediator, still needs to be improved through training and curriculum integration so that the benefits of technology use can be optimized.

For future research, it is recommended that the scope of respondents be expanded to include various universities with different technological backgrounds to obtain more generalizable results. Further research could also explore other factors such as digital culture, individual motivation, or institutional support that may influence the relationships between variables. Additionally, a mixed-methods approach could be used to delve deeper into students' perceptions and behaviors in utilizing digital technology.

Conclusion

This study analyzes the influence of digital archiving and the availability of digital infrastructure on document management efficiency, with digital literacy as a moderating variable, among EA students at Jakarta State University. The research findings indicate that the implementation of digital archiving has a positive and significant impact on the efficiency of academic document management among students, reflecting the importance of structured digital information management. Conversely, despite the availability of digital infrastructure, its influence is not directly significant, suggesting that the presence of technology without optimal utilization has not yet been able to enhance efficiency in a tangible manner. The findings also reveal that digital literacy does not moderate the relationship between digital archiving or digital infrastructure and document efficiency. This indicates that students' digital literacy levels are not yet strong enough to reinforce the impact of technology on document management performance. Overall, this study emphasizes that digital archiving plays a central role in enhancing student documentation efficiency, while literacy and infrastructure need to be optimized to maximize the potential of digital technology in the higher education context.

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