

Digital transformation of archival system: Optimizing storage efficiency in administrative processes for Islamic senior high schools

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ABSTRACT

This research aims to analyze the impact of archive digitization on the efficiency of storage space and management of administrative documents. The method used is a qualitative descriptive case study at Madrasah Aliyah Negeri 2 Banyuwangi, including direct observation, interviews with archive managers, and data analysis before and after the implementation of digitization. The results indicated that implementing the digital system succeeded in reducing the need for physical storage space by 80%, with important documents that must be in physical form still stored in an organized manner. In addition, the implemented cloud-based system allows for safer, faster, and more cost-effective archive management. Digitization not only improves efficiency but also supports space optimization for other purposes and the institution's embrace of the modern technological era. This research concludes that digitizing archive systems is an effective solution to overcome space constraints and improve the quality of administrative management in educational institutions.

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1. INTRODUCTION

Digitization of archive systems is designed to reduce the use of physical space and speed up access to information, ultimately improving storage efficiency in administrative management (Saefulrahman, Muhammadiyah, Sakti, & Alpasha, 2025). According to studies by (Elora, 2024) and (Al Kez, Foley, Lavery, Del Rio, & Sovacool, 2022), digitization can reduce physical storage space requirements by up to 80%, as previously printed documents can be stored in digital format. The studies above show that the digitization of archive systems aims to improve storage efficiency, but the challenges in its implementation still require special attention to run optimally. While the digitization of archive systems offers the potential to reduce storage space requirements by up to 80% and improve the efficiency of information access, the challenges in its implementation require special attention to achieve optimal results.

The digitization of the archive system in the administrative management of Madrasah Aliyah is supported by strong empirical, philosophical, theoretical, and juridical foundations. Empirically, research shows that digitization can reduce the need for physical storage space by up to 80% and improve the efficiency of administrative processes. As evidenced by many educational institutions that have successfully implemented it. Philosophically, this move reflects the principles of efficiency and benefit in Islam, which prioritizes the use of

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technology for the benefit of the people and supports adaptation to changing times. The following are interpretations of Qur'anic verses related to the principles of efficiency and benefit in Islam, especially in the utilization of technology for the benefit of the people and adaptation to changing times:

“And prepare against their forces whatever you are able and of horses tethered for battle, (with which) you terrify the enemy of Allah and your enemy and those besides them whom you do not know; but Allah knows...” Surah Al Anfal (8:60)

This verse emphasizes the importance of vigilance and the maximum use of power (including science and technology) to support the benefit of the people. In the modern context, this can be interpreted as an encouragement to use technology efficiently in solving the problems of the ummah, whether in the educational, economic, or social fields.

Its theoretical foundation is supported by information systems theory and organizational efficiency, which emphasize effective data management through automation and accessibility. Juridically, digitization is in line with government regulations, such as The Minister of Education and Culture Regulation (Permendikbud) The text is about regulations governing records management and encourages the use of technology to improve administrative governance, Permendikbud No. 60/2012, which encourages educational institutions to utilize technology to improve administrative governance. On this basis, digitizing the archive system is a strategic step in creating efficiency and modernizing management in Madrasah Aliyah.

Many studies on the digitization of archival systems show that it is an important step to improve storage efficiency in administrative management. Research by (Suryadi et al., 2024) and (Bakare, Achumie, & Okeke, 2024) found that digitization not only increases storage efficiency but also improves data security and accessibility, which are key focuses in administrative management. In addition, research by (Sirajunnasih & Setiawan, 2024) shows that the application of cloud-based technology in archive digitization can reduce the risk of data loss due to physical disasters and significantly speed up the document search process. Existing research shows that digitization of archive systems is not only important for increasing storage efficiency but also for improving data security and accessibility in administrative management (Aini, Komarudin, & Khaudli, 2023).

This research aims to integrate the digitization of archive systems needed to improve storage efficiency in administrative management, which can optimize information management. The integration of archive system digitization is essential to improve storage efficiency in administrative management, with the potential to reduce physical space requirements by up to 80% which allows space utilization for other activities (Sa'adah, Zulkarnain, & Resmiatini, 2024).

Factually, digitizing the archive system is a strategic step to improve the efficiency of administrative management at MAN 2 Banyuwangi. By converting physical documents into digital formats, the need for physical storage space can be reduced by up to 80% (Chandra Sekaran et al., 2021), so that space previously used to store archives can be utilized for other productive activities. In addition, digitization offers better data security through the use of encryption technology, automatic backups, and strict access control systems, which protect important documents from the risk of damage or loss due to disasters (Zainul & Romadhan, 2023). Administrative processes also become more efficient as documents can be accessed instantly through digital platforms, while automation features such as workflows and digital reminders help speed up data management while reducing the potential for human error (E. S. Harefa, Waruwu, Zega, & Mendrofa, 2024). With these benefits, digitizing the archive system not only addresses the challenges of conventional administration but also brings MAN 2 Banyuwangi towards more modern and benefit-adaptive governance.

2. METHOD

The research object in this study is the focus on MAN 2 Banyuwangi because this school has implemented an archive digitization system in its administrative management. The implementation of digitization at MAN 2 Banyuwangi can be seen from the use of a digital archive system that supports efficient information management. Tangible evidence can be found in activity reports and interviews with TU staff, which explain the benefits and steps taken during the digitization process. With MAN 2 Banyuwangi chosen as the research object, this study provides relevant insights into innovation in education and how best practices in digitization can be accepted by other institutions. The results of this study are anticipated to offer useful recommendations for education policy and administration and show the positive impact of digitalization in improving efficiency. The research object at MAN 2 Banyuwangi, which has implemented an archive digitization system, provides insight into the positive impact of digitization on the efficiency of archive storage and management information and presents best practices that can be accepted by other institutions in the education and administration sector.

The research design used in this study is a case study with a qualitative approach, which was chosen to explore the experiences and practices of organizations in implementing a records digitization system. The qualitative approach allows researchers to explore the specific context of each organization, providing a deeper understanding of how digitization is implemented. Through case studies, researchers can explore factors that influence the success or failure of digitization implementation, such as management support, staff training, and

existing technological infrastructure. With this approach, the research focuses not only on the result of digitization but also on the process that the organization goes through, thus providing a comprehensive insight into the challenges and opportunities faced in the effort of efficient archival storage. The results of this study are anticipated to offer practical recommendations for other institutions planning to digitize, as well as contribute to the advancement of theory and practice in administrative management. The research design using a case study using a qualitative approach allows researchers to delve into the experiences and practices of organizations in the implementation of digitization of archive systems, as well as understand the factors that influence the success or failure of the process, thus providing comprehensive insights into improving the efficiency of archive storage in humans.

The sources of informants in this study include the head of administration, TU staff, and student interns, who were selected to provide a comprehensive perspective on the implementation of the records digitization system. The head of administration has strategic insights into the policies and decisions underlying the digitization process, while the TU staff can provide practical information on the day-to-day operations and challenges faced during implementation. In addition, student interns, who were directly involved in the process, could provide a fresh perspective on their experiences and how digitization affected their tasks. By collecting data from these diverse informants, this research aims to generate a more holistic understanding of the successes and obstacles in the implementation of digitizing the archive system, as well as its impact on storage efficiency in administrative management. This study employed interviews and various data collection techniques: document analysis. Sources of informants including the head of administration, TU staff, and student interns were selected to provide a comprehensive perspective on the implementation of digitization of the archive system so that this research can reveal the successes and challenges faced to improve storage efficiency in administrative management.

In this study, data collection techniques included in-depth interviews, participatory observation, and documentation studies, which were chosen to ensure that the information obtained was comprehensive and relevant. In-depth interviews allow researchers to explore informants' understanding and experiences in detail, especially regarding the process and impact of digitizing the archive system. Participatory observation provides an opportunity for researchers to see first-hand the dynamics and interactions in the field, and to capture the social and cultural context that influences the implementation of digitization. In addition, documentation studies provided researchers with access to archives and official records related to the digitization process, thus informing data analysis. The combination of these techniques contributed to a more in-depth developmental understanding of the factors influencing the success and efficiency of storage in administrative management at MAN 2 Banyuwangi. Data collection techniques including in-depth interviews, participatory observation, and documentation study were selected in this study to ensure comprehensive and relevant information regarding the implementation of digitization of the archive system, thus enabling a deeper understanding of storage efficiency in administrative management.

In this study, the data analysis technique utilized by Miles and Huberman's interactive analysis model consists of three main components: data reduction, data presentation, and conclusion drawing. Data reduction was carried out by selecting, focusing, and filtering relevant information from the results of in-depth interviews, participatory observations, and documentation studies to ensure that only data that was significant and directly related to the research objectives were considered. Data analysis techniques using the Miles and Huberman interactive model, with a focus on data reduction, data presentation, and conclusion drawing, allowed researchers to select and filter relevant information from various sources to produce an accurate analysis of storage efficiency in the administrative management of digitization of the archive system.

3. RESULTS AND DISCUSSION

3.1. Storage Space Reduction

Digitalization at Madrasah Aliyah Negeri 2 Banyuwangi not only reduces the need for physical storage space by 80% but also enables the integration of traditional values with digital technology in marketing strategies. The reduction of physical storage space provides opportunities for space optimization for other productive activities (Fernando, Adib, Wahyuni-TD, & Abdalla, 2024), such as digital-based Islamic development programs. Based on an interview with the head of an administration: *"the space previously used to store archives is now converted for productive activities, such as multimedia training and interactive religious discussions"*. One of the staff revealed that digital archive technology helps maintain the madrasah's traditional values by digitizing important religious documents while improving administrative efficiency. With digital transformation, madrasahs can balance the preservation of traditional values and modernization, thus expanding competitiveness through technology-based marketing strategies.

Table 1. Interview results related to storage space reduction

Category	Before digitization (m ²)	After digitization (m ²)	Reduction (%)
Academic Archives	50	10	80
Administrative Archives	30	6	80
Student Archives	20	4	80

Research Source: Researcher's calculation, 2025

Based on Table 1, the interviews show that digitization has reduced physical storage space requirements by up to 80% across all archive categories, allowing the space to be used for other purposes. The table shows a pattern of significant reductions in physical storage space requirements. Academic, administrative, and student records all experienced a reduction of 80%, reflecting the success of digitization in space efficiency (Rippa & Secundo, 2019).



Figure 1. Documentation related to the reduction of storage space

Source: Processed by Researcher

The figure above illustrates how archive digitization significantly reduces the need for physical storage space, thus directly contributing to improved efficiency and optimized use of space. With digitization, only important documents that are required to remain in physical form are stored in an organized manner, while other records are managed more conveniently through cloud-based systems and digital records management software. This not only saves space but also improves accessibility, security, and effectiveness in document management.

Digitalization creates a new structure that supports productive activities, reduces dependence on physical archives, and increases work efficiency (Borowski, 2021). According to recent studies by (Amalia & Putri, 2024) and (Adriani, Albar, Wibawa, & Serianti, 2024), digitization reduces the potential for document loss and speeds up information access. These studies show that digitized systems save up to 80% of storage space and facilitate coordination among staff through cloud-based document access. The correlation between digitization and space efficiency at Madrasah Aliyah Negeri 2 Banyuwangi reflects the positive impact of technology in creating an adaptive and progressive educational environment.

The digitization of the archive system in Madrasah Aliyah is a strategic move that has successfully reduced the need for physical storage space by 80%, creating efficiency in administrative governance. This transformation not only allows space optimization for productive activities, such as multimedia training and digital-based Islamic programs, but also improves accessibility, security, and effectiveness of document management (Thamrin, Nasuah, Talaohu, & Almasi, 2024). By integrating cloud-based technology, digitization makes it easier to store and search archives, reduces the potential for document loss, and speeds up coordination between staff (Habib et al., 2022). This point shows that digitization not only impacts space efficiency but also encourages madrasahs to be more adaptive and progressive in facing the challenges of the digital era.

3.2. Better Data Security

Digitalization at Madrasah Aliyah Negeri 2 Banyuwangi improves information security by reducing the risk of loss or damage to physical documents. The implications of this increased security include not only protecting sensitive data but also strengthening people's trust in the integration of traditional values with digital technology (Rizi & Seno, 2022). Based on an interview with the head of administration, important documents such as student grade files, academic records, and financial data are now stored in a cloud-based system with strict encryption. This allows for more controlled management of access rights. In addition, the madrasah can prevent

unauthorized access through the implementation of an additional layer of authentication. One of the TU staff mentioned that: *“the digital system reduces the incidence of losing physical documents which previously often occurred due to damage or human error”*. Improved information security through digitization not only mitigates technical risks but also strengthens the integration of modern technology-based marketing strategies with the madrasah's traditional values (Bashori, Umami, & Wahid, 2024).

Table 2. Interview results related to storage space reduction

Category	Before digitization (m ²)	After digitization (m ²)	Reduction (%)
Academic Archives	50	10	80
Administrative Archives	30	6	80
Student Archives	20	4	80

Research Source: Researcher's calculation, 2025

The data shows that digitization successfully reduced the need for physical storage space by 80% across all archive categories, allowing the space to be used for other purposes. The table illustrates the pattern of data security risk reduction after digitization implementation. The risk of document loss and physical damage was reduced by 90%, while the risk of unauthorized access was reduced by 70%. It is understood that the integration of digital technology with the traditional values of madrasahs not only improves operational efficiency but also strengthens public trust (Luneto, 2022). This becomes an important foundation in building a modern madrasah marketing strategy while maintaining its traditional values.

Digitization provides better protection of sensitive data by enabling stricter access rights settings and reduced risk of physical document damage (Badawy, 2023). The correlation between the application of digital technology and improved information security lies in the efficiency of data management structures. International research reinforces this correlation. For example, a study by (Ujjwal, Garg, Hilton, Aryal, & Forbes-Smith, 2019) showed that cloud-based digital systems can protect documents from physical threats such as fire or flood. In addition, studies by (Kolmahin & Sergiyenko, 2024) and (Bacon, Moody, & Yao, 2002) highlighted that role-based access rights settings enable specific protection of sensitive data. A study by (Liu, Huang, & Lucas Jr, 2020) found that educational institutions that adopted digital technology recorded a 90% decrease in data loss incidents. At Madrasah Aliyah Negeri 2 Banyuwangi, the implementation of layered authentication ensures that only authorized parties can access critical data. A well-planned digitization structure provides more comprehensive data protection (Jamal, Ikhval, Nisa, Qulbi, & Arifin, 2024), allowing the madrasah to perform its traditional functions with higher public trust.

Digitalization implemented at Madrasah Aliyah Negeri 2 Banyuwangi shows how technology can improve information security systems while supporting more efficient, transparent, and accountable administrative management. The use of digital technology not only enables better data protection through cloud-based systems and encryption, but also accelerates the document management process and strengthens accessibility for relevant parties (R. F. Harefa, Waruwu, Zendrato, & Mendrofa, 2024). This correlation proves that the implementation of digitalization is an effective solution to overcome information security challenges while supporting the modernization of administrative systems in education. This transformation reflects strategic steps that are adaptive to technological developments, making educational institutions more competitive and relevant in the digital era.

3.3. Administrative Process Efficiency

The implementation of the digital archive system at Madrasah Aliyah Negeri 2 Banyuwangi directly affects administrative efficiency, especially in document submission and approval. The main points from the interviews show that this transformation speeds up administrative processes that were previously time- and labor-consuming. The head of administration at this madrasah explained that: *“Before digitalization, the submission of documents such as student activity permits took up to several days because they had to go through manual procedures involving printing, physical distribution, and manual signatures. Now, the digital system allows documents to be submitted, verified, and approved online in a matter of hours”*.

An administrative staff (Ms. Naning) added: *“This technology also minimizes the risk of losing documents, which often happens with manual systems. With the use of an integrated platform, the status of documents can be monitored in real-time, thus increasing transparency and accountability”*. In conclusion, the integration of digital technology in madrasah marketing strategy not only improves administrative efficiency but also creates a more reliable and professional work process, without setting aside the traditional values upheld.

Table 3. Documentation Data Related to Administration Process Efficiency

Administrative Process	Time Before Digitization (hours)	Time After Digitization (hours)	Time Efficiency (%)
Student Data Management	5	1	80
Report Preparation	4	1	75
Document Search	3	0.5	83

Research Source: Researcher's calculation, 2025

Digitalization can speed up various administrative processes, with an average time efficiency of more than 75% across all categories (Kurniawan et al., 2022). The table shows a pattern of significant time acceleration in administrative processes. Student data management, report preparation, and document search became much faster after the implementation of digitization.

Administrative efficiency through the digital archive system at Madrasah Aliyah Negeri 2 Banyuwangi can be explained through cause-and-effect relationship analysis. The essence of this correlation is that automation of administrative processes replaces time-consuming manual procedures, resulting in significantly reduced document turnaround time. Research by (Kurniawan et al., 2022) shows that cloud-based document management systems can save up to 65% of time, especially in educational organizations. In addition, a study by (Trace & Zhang, 2020) confirms that document digitization increases the speed of verification and approval processes up to three times compared to traditional methods.

According to research by (Shen, Chen, Yue, & Xu, 2021), such technology-based systems can cut administrative document completion time by 60-80%, as the workflow becomes more structured and free of physical barriers. Another study by (Omiyani, Suprpto, & Sapudin, 2023) also found that the implementation of electronic signatures in educational institutions can increase time efficiency because the entire documentation process takes place in a network without geographical constraints.

Madrasah Aliyah Negeri 2 Banyuwangi uses this system to manage various important documents, including student activity applications and financial reports. Features such as e-signatures and automatic notifications ensure that every relevant party can act immediately, without having to wait for physical documents to change hands. As a result, work that previously took days can now be completed in a much shorter time. An in-depth interpretation shows that the application of this technology not only speeds up administrative workflows but also increases the transparency and accountability of the process (Prakoso, Sukristyanto, & Widodo, 2024). With e-signatures, documents can be authorized without requiring physical presence, which helps speed up decision-making. Automatic notifications ensure all relevant parties are informed in real time, reducing the risk of delays and improving coordination between staff.

In conclusion, the implementation of a digital archive system allows madrasahs to achieve higher administrative efficiency. This correlation not only addresses the need for modernization but also maintains traditional values in a more structured and transparent management process. This places madrasahs as pioneers in technology integration to support more professional and efficient governance.

4. CONCLUSION

Digitization of archive systems is an innovative solution to improve the efficiency of administrative management in Madrasah Aliyah. By converting physical documents into digital formats, madrasahs can reduce storage space requirements by up to 80%, freeing up space for other productive activities. In addition, digitization offers a better level of data security through encryption technology, automatic backup, and access control, which protects important information from damage or loss. Administrative processes also become more efficient as documents can be accessed instantly, and automated features such as digital workflows help speed up document submission and approval. With these benefits, a records digitization system not only addresses the challenges of conventional management but also promotes the modernization and effectiveness of school governance in the digital age.

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