



Implementation of a Digital Archive System in Improving Work Efficiency at the Academic and Student Affairs Administration Office of the Business Administration Department, State Polytechnic of Bengkalis

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ABSTRACT

This study aims to analyze the application of the archiving system to improve work efficiency at the Academic and Student Affairs Administration Office (Biro Administrasi Akademik dan Kemahasiswaan, BAAK) of the Business Administration Department, State Polytechnic of Bengkalis. The study uses a descriptive method with a qualitative approach. Data were collected through observation and interviews with an Administrative employee directly involved in archive management. The results show that the implemented archiving system digitizes records through document scanning and computer-based storage, as well as online media. This accelerates the search distribution archives. Archive organization combines centralization and decentralization, which suits the organization's needs. Archive retrieval and maintenance are generally effective. However, archive destruction has not been optimal due to the absence of a retention schedule. Obstacles include limited human resources, inadequate archive room facilities, and accumulating old archives. Overall, the archiving system has the potential to improve work efficiency and is perceived by staff as supporting faster archive retrieval and better administrative performance. However, stronger policies, improved employee skills, and supporting facilities are still needed to optimize archive management.

Keywords: archive, digital, work efficiency, academic administration

1. Introduction

In the era of digital transformation, archive management has become an important aspect of improving operational efficiency across various fields, including government agencies, educational institutions, and event organizing organizations. Archive management is also a fundamental aspect of modern administration, especially in higher education institutions that produce various academic and student documents daily. Archives not only serve as a record of activities but also as a source of information that supports decision-making and ensures institutional accountability. Therefore, a well-organized archiving system is an important prerequisite for creating effective and efficient administrative services.

According to Mutmainah and Adrian (2023), archives management functions to maintain the balance of archives across creation, document flow, recording, forwarding, distribution, use, storage, maintenance, transfer, and destruction. In the context of office administration and event activities, digital archives serve not only as storage media but also as a coordination tool, enabling all team members to work in an integrated manner. As the role of archives in supporting administrative effectiveness becomes increasingly important, archives management needs to be carried out systematically and planned through the implementation of structured, sustainable practices. The absence of effective archive management can lead to document accumulation, difficulties in retrieving archives, and an increased risk of archive loss, ultimately hindering the smooth running of administrative activities.

In the Academic and Student Affairs Administration Office, or in Bahasa, is Biro Administrasi Akademik dan Kemahasiswaan (BAAK), of the Business Administration Department, Bengkalis State Polytechnic, document management activities are very intensive. The Academic and Student Affairs Administration Office, or in the Indonesian language, is Biro Administrasi Akademik dan Kemahasiswaan (BAAK), handles student academic data, correspondence files, student program documents, and archives related to other administrative activities. The high volume of documents requires an archiving system capable of organizing storage, maintenance, and retrieval of archives quickly and accurately. Without an adequate system in place, service processes can be disrupted, leading to difficulties in locating archives, administrative delays, and potential errors in information delivery.

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Based on Simbolon et al. (2024), Effective archive management not only helps with faster data storage and retrieval but also reduces the risk of losing important information. Implementing an electronic archiving system can optimize resource utilization, reduce operational costs, and increase productivity. A properly implemented archiving system is believed to have the potential to improve work efficiency, particularly by reducing document search time, improving storage efficiency, and facilitating employee access to information.

With the increasing volume of academic and administrative documents, the Academic and Student Affairs Administration Office (BAAK) is required to have an archiving system that supports smooth service and improves employee efficiency. Manual archive management, which is still in use, can lead to delays in document retrieval, irregular storage, and limited access to information. Therefore, the use of digital technology in archiving systems is a relevant necessity to improve administrative performance within the Academic and Student Affairs Administration Office (BAAK). In line with this, as stated by Rosa et al. (2025), this development aims to reduce reliance on manual management and make laboratory administrative processes more efficient by adopting digital technology.

Based on this background, this study focuses on examining how the archiving system is implemented in the Academic and Student Affairs Administration Office (BAAK) of the Business Administration Department, State Polytechnic of Bengkalis, and the extent to which this implementation affects work efficiency improvements. This study is expected to provide an empirical description of archiving practices in higher education administrative units, as well as recommendations to strengthen the system and align it with the organization's evolving needs.

2. Research Method

This study uses Descriptive research, which aims to systematically and factually describe phenomena and activities currently in place, particularly those related to dynamic archive management systems that support work efficiency (Normansyah in Ayudia et al., 2022).

The approach used is Qualitative, which is research conducted on objects in their natural conditions, with the researcher as the main instrument, resulting in data in the form of descriptive words (Sugiyono in Ayudia et al., 2022).

The research subjects were determined using purposive sampling, which is the selection of informants based on certain considerations, such as knowledge and direct involvement in archive management, who are able to provide relevant and in-depth information in accordance with the research objectives (Sugiyono in Ayudia et al., 2022).

This study is based on interviews and observations with one administrative staff member who is primarily responsible for archive management. While this provides in-depth insight into the implementation of the digital archive system, the findings may not fully reflect the experiences and perspectives of other staff members or archive users, such as lecturers and students.

3. Results and Discussion

Based on observations and interviews with an Administration employee of the Academic and Student Affairs Administration Office (BAAK), of the Business Administration Department, the following are the results and discussion regarding the Filing System in Improving Work Efficiency at the Academic and Student Affairs Administration Office (BAAK), of the Business Administration Department, State Polytechnic of Bengkalis.

3.1 Archive Storage System

An archive storage system is a mechanism used by organizations or agencies to organize, store, and maintain archives, ensuring they are systematically arranged and easily accessible when needed. Referring to Ariel et al. (2016) in their book entitled "Manajemen Perkantoran," in general, an archive storage system consists of five parts, namely:

1. **Alphabetical System**
The alphabetical storage system arranges archives in alphabetical order, starting with A and ending with Z.
2. **Subject System**
In this system, the index is based on the archive's subject matter as a code for storage and retrieval. The archive's subject matter is tailored to the scope of a company/agency's activities and business fields.
3. **Number System**
This storage system uses file numbers for storing and retrieving files.
4. **Chronological System**
This system is based on the order of receipt or creation of files. The time sequence used can be in the form of dates, months, or other time sequences.
5. **Regional System**
This system uses the file's origin or destination as the main keyword.

The archive storage system in the Academic and Student Affairs Administration Office (BAAK), State Polytechnic of Bengkalis, is currently moving towards the use of a digital archiving system. Archives are managed as computer files, where each document, such as incoming and outgoing letters, is scanned before being stored in a digital folder. Archives are grouped by the type or aspect of the document. For example, internal outgoing letters are stored in the outgoing letter folder, while incoming letters are stored in a dedicated incoming letter folder.

To ensure security and ease of access, all digital archives are stored on Google Drive. If any party requires a specific document, such as a Certificate, the file can be shared via email as needed. The method of storing archives in the digital system is alphabetical sorting, which is automatically applied by the computer system. In addition, archives are grouped by document type or subject. In the main folder, letters are sorted by letter number, and archives are organized into subfolders such as incoming letters, outgoing letters, research letters, and general letters. This grouping aims to facilitate searching and retrieving archives when needed.

To ensure data security and privacy, access to digital archives stored in Google Drive is restricted only to authorized administrative staff. User permissions are managed through institutional accounts, and regular backups are conducted to minimize the risk of data loss or unauthorized access. These measures help maintain the confidentiality and integrity of academic and student records.

The archive storage facilities at the Academic and Student Affairs Administration Office (BAAK) are considered adequate. This is demonstrated by the availability of digital storage systems on computers and Google Drive, as well as a manual storage system in the form of shelves or filing cabinets for physical documents. In digital archives, particularly for documents such as student research papers, archives can be retrieved from scanned documents, so they are no longer entirely dependent on paper archives. This supports work efficiency and more practical archive management.

However, obstacles still arise in the archiving process, especially those related to dependence on digital devices. During a power outage, access to archives stored on computers is hampered. In such conditions, physical archives stored on shelves or in warehouses can still be accessed, but the search process takes relatively longer than with digital archives. This highlights the need for a backup system to ensure smooth access to archives under various conditions.

3.2 Archive Organization

Archive management requires organization. According to Ayudia et al. (2022), archive organization is divided into three principles, consisting of:

1. Centralization

Principles of archives are to be stored centrally in a special work unit commonly referred to as the archive center. Thus, all archives from all office units that have been processed will be stored and centralized in the archive center.

The advantages of archive centralization are:

- a. Archive space and equipment can be saved.
- b. Officers can concentrate specifically on archival work.
- c. The office only stores 1 archive, and duplicates can be destroyed.
- d. The storage system for various types of archives can be standardized.

The disadvantages are:

- a. Centralization is only efficient and effective for small organizations.
- b. Not all types of archives can be stored using a single standardized storage system.
- c. Work units that need archives will take longer to obtain the necessary archives.

2. Decentralization

An archive management system in which all work units manage their own archives. In this case, all work units are free to organize their archive storage systems in accordance with the provisions of the unit concerned. All archiving activities, from recording to destruction, are carried out within their respective units.

The advantages of the principle of decentralization of archives are:

- d. Archive management can be carried out according to the needs of each work unit.
- a. Archive requirements will be easily met because they are located in the work unit itself.
- b. Handling archives is easier because the archives are well-known.

The disadvantages are:

- a. Archive storage is spread across various locations, which can lead to duplication of stored archives.
- b. The office must provide archival equipment and supplies in each work unit, making it difficult to implement equipment and supply savings.
- c. Archival training and practice need to be held because officers generally have multiple duties and do not have a background in archival education.
- d. Archive destruction activities must be carried out by each work unit, and this is wasteful.

3. Combination

Archive management is carried out by combining the principles of centralization and decentralization. This is intended to overcome the weaknesses of both methods (centralization and decentralization).

In this combined approach to archives management, archives that are still actively used, or active archives, are managed in their respective work units. Archives that are no longer actively used, or inactive archives, are managed in a central archive. Thus, active archives are managed in a decentralized manner, and inactive archives are managed in a centralized manner.

Implementation of the archiving system in the Academic and Student Affairs Administration Office (BAAK), of the Business Administration Department, Bengkalis State Polytechnic, in terms of organizing archives, applies a combined principle combining centralization and decentralization. General archives related to department administration are managed centrally by the Academic and Student Affairs Administration Office (BAAK) of the department. Meanwhile, archives directly related to learning activities are managed in a decentralized manner by each study program through its program coordinator, such as the International Business Administration Study Program, Financial and Banking Administration Study Program, and Digital Business Study Program. The combined principle was chosen because it was deemed most suitable for the needs of archive management within the department.

The classification of active and inactive archive systems in the Academic and Student Affairs Administration Office (BAAK), of the Business Administration Department, Bengkalis State Polytechnic, is based on the year and frequency of use. Archives that are still frequently used are categorized as active archives and placed in an easily accessible storage area to support the smooth running of work activities, i.e., in the office. Conversely, archives that are rarely used or have passed a certain period of time are classified as inactive archives and moved to a separate storage area, namely the warehouse. Old archives, such as student final projects from a certain period (for example, before 2010), have been bound and stored separately to prevent accumulation on the main archive shelves.

Overall, the implemented archive organization system is considered to have supported work efficiency. The use of digital archives and clear archiving grouping facilitates and speeds up the process of searching and sending documents, especially correspondence. Sending documents in digital file form also reduces paper usage and distribution time. The informants assessed that the current archive organization system has a positive impact on the effectiveness and efficiency of work performance within the Academic and Student Affairs Administration Office (BAAK), Department of Business Administration.

3.3 Archive Loan

Archive loan is the transfer of archives from the managing unit to the requesting party for temporary use in accordance with work requirements, with the provision that the archives remain under the supervision and responsibility of the archive manager. Based on Sapruni and Akib (2021), the Archive loan is the process of removing archives from the managing unit, which is surely the full responsibility of the manager and recipient of the borrowed archives. The process must be carried out according to established procedures.

The archival loan process at the Academic and Student Affairs Administration Office (BAAK), Business Administration Department, Bengkalis State Polytechnic, the procedure for loaning archives is carried out with restrictions on the number and duration of loans in order to maintain the security and availability of the archives. Each borrower is allowed to borrow a maximum of two archives for a period of three days. Student borrowing is carried out by showing an active identity card as a form of administrative control.

Recording of archive borrowing is still done manually in an agenda book, and supported by a simple recording using Microsoft Excel. This manual system is implemented because the archive management unit is not a library and does not yet use a special archive circulation application. Supervision of borrowed archives is carried out through the implementation of borrower responsibility. Lost or damaged archives must be replaced with the same or equivalent archives, or compensation must be provided in accordance with the provisions. This mechanism is implemented to maintain the integrity and sustainability of the archives. In general, the archive borrowing system has been running effectively and has not caused significant obstacles in supporting the smooth running of administrative activities within the Academic and Student Affairs Administration Office (BAAK), Department of Business Administration.

To improve the effectiveness of the archive lending service, it is necessary to develop a more structured and digitized record-keeping system. The use of information technology in the archive lending process can simplify record-keeping, facilitate the monitoring of the status of borrowed archives, and expedite the process of tracking borrowing history. Additionally, a digital system can minimize the risk of recording errors and loss of loan data. With more systematic management, the archive loan process at the Office of Academic and Student Affairs (BAAK) of the Business Administration Department at Bengkalis State Polytechnic is expected to run more efficiently and accurately, and to optimally support academic administrative needs.

3.4 Rediscovery of Archives

The rediscovery of archives is inseparable from archive organization, storage, borrowing, maintenance, and security. If all of these aspects are carried out properly, then retrieval will not be difficult for archivists (Sapruni and Akib 2021).

The procedure carried out by the Academic and Student Affairs Administration Office (BAAK), of the Business Administration Department, Bengkalis State Polytechnic, in the process of rediscovering archives is done by grouping them based on the year of storage. For thesis archives, grouping is done based on year and supervisor, then bound into one group for easy tracking. Active archives are placed on the main shelf according to year, so that searches can be done directly.

The archive retrieval process is also supported by a computer system for digital archives. Searches are conducted by browsing folders and file names organized by archive type and year, thereby speeding up the identification and access of required documents. Neat physical archive organization and clear digital archive grouping in folders are key factors that facilitate archive retrieval. Conversely, physical archive accumulation and unsystematic digital file naming can hinder the search process.

In general, archives can be found fairly quickly as needed. Digital archives are easier and faster to access via computer, while physical archives can be found by looking at storage shelves based on year or archive group. However, difficulties in retrieving archives can persist due to limited storage space, the large number of old archives that have not been reorganized, and the inconsistent management of digital archives.

3.5 Archive Maintenance

Archive maintenance is an activity aimed at storing archives optimally, ensuring their security, so that they are immediately available when needed. This activity aims to protect archives by storing, caring for, and safeguarding them from various factors that can damage or even destroy the archives themselves (Fu'adah et al., 2022).

The implementation of the archiving system in terms of archive maintenance is carried out in the Academic and Student Affairs Administration Office (BAAK) of the Business Administration Department, Bengkalis State Polytechnic, which is to organize archives neatly and separate damaged archives to prevent further damage. Archives that have been exposed to water or physical damage are moved to a separate section, while archives that are still in good condition are rearranged to avoid damage to the covers or other parts of the archives. Archives that are severely damaged and piled up are grouped separately and separated from archives that are still in frequent use.

Efforts to prevent damage to archives are carried out through several steps, especially for physical and digital archives. Physical archives are maintained by keeping the storage room clean, regularly organizing archives, and using folders or archive boxes as protection. Meanwhile, digital archives are maintained by storing files on relatively secure media and performing regular backups to prevent data loss. Archive maintenance facilities are generally considered adequate. Physical archives are stored on available shelves and in filing cabinets, while digital archives are stored on computers and online storage media.

The availability of these facilities allows archives to be maintained and reused as needed for administrative purposes. Temperature and humidity control in the archive storage room has not been specifically implemented. The maintenance of the archive room environment still relies on air conditioning to maintain stable temperatures and reduce the risk of water damage or other unfavorable environmental conditions. Overall, the archival maintenance carried out has supported work efficiency. Archives that are neatly organized, separated from damaged archives, and supported by the use of digital archives facilitate the process of searching and using archives, enabling administrative work to be carried out more smoothly and efficiently.

3.6 Archive Destruction

Destruction of archives means removing archives from storage. Destruction of archives is the act of physically destroying archives that have served their purpose and have no further value (Mulyono et al., in Ayudia et al., 2022).

The destruction of archives in the Academic and Student Affairs Administration Office (BAAK) of the Business Administration Department, Bengkalis State Polytechnic, has not been carried out optimally. Old archives are still being stored because they are considered potentially needed again, especially archives that have not been converted to digital form. Since the establishment of Business Administration around 2000–2003, most of the archives have been stored in a warehouse, and some of them are in poor condition. The archives placed on shelves generally only cover the last five years, while archives older than five years are bound and stored separately but remain accessible as reference materials for lecturers and students.

The suboptimal destruction of archives is due to the absence of a clear destruction schedule and concerns that certain archives may still be needed in the future. This situation has led to all archives, both physical and digital, being stored indefinitely. In addition, an archive retention schedule has not yet been implemented as a basis for determining the storage period and destruction of archives. The management and implementation of archive destruction is the responsibility of the department's administrative unit, particularly the Academic and Student Affairs Administration Office (BAAK) section, in accordance with its authority. The failure to destroy archives has resulted in the accumulation of physical archives and limited storage space. As a result, archive organization has become less than

optimal, and the process of searching for old archives takes longer, thereby affecting the efficiency of administrative work.

Although the destruction of records has not yet been fully implemented, the BAAK continues to manage records by sorting documents based on their level of importance and frequency of use. Records that still hold administrative, legal, or informational value are retained as reference materials and evidence of academic activities. However, this situation has led to an increase in the volume of records that must be stored, thereby requiring larger storage space and more structured management. Therefore, a clear records retention policy is needed, along with the acceleration of the records digitization process to support storage efficiency and facilitate the retrieval of information in the future.

3.7 Challenges Faced

Manual physical archives and digital archives are managed by existing administrative staff. Employees understand basic archiving procedures, though not all have specific archiving expertise. Physical archives are stored in the archive room, while digital archives are documented to facilitate retrieval. Therefore, there are several obstacles faced in the implementation of the Archiving System in Improving Work Efficiency at the Academic and Student Affairs Administration Office (BAAK) of the Business Administration Department, Bengkalis State Polytechnic, as follows:

1. The number of archival staff is still limited, and some of them have other duties, so that archive management, especially the organization of old archives, cannot yet be carried out optimally.
2. Archival facilities are generally adequate, but the building's condition, which often leaks, is a serious obstacle. Some physical archives have been damaged by water, although the existence of digital archives helps to maintain the continuity of information.
3. Limited facilities and difficulties in repairing and supporting facilities have resulted in suboptimal archive organization and reduced convenience and speed in searching for archives.

Based on the obstacles described above, the necessary improvements include increasing employee competence, repairing facilities and archive rooms, adding storage facilities, and strengthening the digital archive documentation system to improve the effectiveness of archive management. In addition to the challenges already mentioned, the process of digitizing archives still faces several obstacles, such as limited time and human resources for converting physical archives into digital formats. As a result, some archives are still stored in conventional formats, making the process of searching for and accessing specific information more time-consuming. Furthermore, the lack of a fully integrated digital archive management system means that the storage of digital documents still relies on manual management by administrative staff. Therefore, the development of a more structured and sustainable digital archive system is necessary to support work efficiency and ensure the long-term security and availability of information. In addition to improving archive facilities and human resources, maintaining data security and privacy in digital archives is also essential to ensure that academic and student records remain confidential and protected from unauthorized access.

4. Conclusion

Based on the results of research and discussion regarding the implementation of an archiving system to improve work efficiency in the Academic and Student Affairs Administration Office (BAAK) of the Business Administration Department, Bengkalis State Polytechnic, it can be concluded that:

1. The implemented archiving system has been running quite well and is perceived by staff as supporting employee work efficiency. The digitization of archives through document scanning and computer-based as well as online storage has facilitated access to information and accelerated archive retrieval. However, further quantitative evidence is needed to measure the extent of efficiency improvement objectively. This can be seen from the implementation of an archive storage system that has led to digitization through document scanning and computer-based storage and online media, facilitating access and speeding up archive retrieval.
2. The organization of archives at the Academic and Student Affairs Administration Office (BAAK), of the Business Administration Department, applies a combination of centralization and decentralization principles, which are considered appropriate for the needs of the organization. Active archives are managed in each work unit, while inactive archives are centralized and stored separately. This pattern supports the smooth running of administrative activities and minimizes obstacles to the search for archives.
3. Archives loan procedures have been implemented with controls on the number and duration of loans, although recording is still manual. Retrieval of archives, both physical and digital, can generally be done fairly quickly by grouping them by year and type. Archive maintenance has also been carried out through neat archiving, separation of damaged archives, and the use of digital archives as a form of information protection.
4. However, the destruction of the archive has not been optimal due to the lack of a clear archive retention schedule. This condition has led to the accumulation of old archives and limited storage space, which in turn can affect work efficiency. In addition, limited human resources and facility constraints, particularly the condition of the archive room, continue to be obstacles to optimal archive management.

5. The digitization of archives that has been implemented provides benefits in maintaining information security and reducing the risk of data loss due to damage to physical archives. The existence of digital archives also helps make the process of searching for and providing information faster than if we relied solely on conventional archives.
6. The implementation of a good archiving system not only supports the smooth operation of academic and student affairs administration but also improves the quality of service provided to faculty, students, and other parties who require information or archival documents. Thus, effective records management is a key factor in fostering organizational efficiency.

Based on these conclusions, several suggestions can be made for the future development of the archiving system, as follows:

1. The Academic and Student Affairs Administration Office (BAAK) of the Business Administration Department, Bengkalis State Polytechnic, is advised to develop and implement a systematic archive retention schedule as a basis for determining the storage period, transfer, and destruction of archives, so that the accumulation of archives can be minimized.
2. It is necessary to improve the competence of administrative staff through training or specialized guidance in archiving, thus archives can be managed more professionally and optimally.
3. Improvements to archive facilities and spaces, particularly in relation to building conditions and storage facilities, need to be addressed so that physical archives can be properly protected and the working environment can be made more comfortable.
4. Further research is expected to examine the implementation of archiving systems using a quantitative approach or by comparing archiving systems between units or other institutions to obtain a more comprehensive picture of the effectiveness of archive management.
5. There is a need to develop a more integrated digital archiving system by utilizing archiving management applications or software so that the processes of storing, searching, borrowing, and monitoring records can be carried out more effectively and efficiently.
6. Periodic evaluation and monitoring of the implemented archiving system are necessary to ensure that all records management procedures comply with standards and can adapt to the evolving needs of the organization and information technology.

7. References

- Asriel, A. S., Armiati, & Frista, L. (2016). *Manajemen kantor* (Edisi pertama). Jakarta: Kencana.
- Ayudia, R., Haryanto, H., & Lailani, E. O. (2022). Sistem Kearsipan Untuk Menunjang Efisiensi Kerja di Bagian Tata Usaha Direktorat I pada Inspektorat Jenderal Kemendikbudristek Ri. *Kompleksitas: Jurnal Ilmiah Manajemen, Organisasi Dan Bisnis*, 11(1), 70-79.
- Fu'adah, A. A., Sholihah, N., & Masthuroh, M. (2022). Pengelolaan arsip dalam menunjang layanan informasi pada bagian tata usaha di Madrasah Aliyah Negeri. *Munaddhomah: Jurnal Manajemen Pendidikan Islam*, 3(1), 57-69.
- Mutmainah, Z. A., & Andrian, R. (2023). Perancangan Pengembangan Sistem Manajemen Arsip Digital di BPJS Ketenagakerjaan Kabupaten Purwakarta. *Jurnal Media Infotama*, 19(1), 79-84.
- Rosa, N. T., Sulfah, F., & Rahayu, W. S. (2025). Establishing an Environmentally Friendly Work Behavior in Government Agencies in Bengkalis, Indonesia. *Jurnal Administrasi Profesional*, 6(1), 29-42.
- Sapruni, S., & Akib, K. (2021). Pengelolaan Arsip di Desa Saemba, Kecamatan Mori Atas, Kabupaten Morowali Utara. *Jurnal Ilmiah Administratie*, 16(1), 10-17.
- Simbolon, F. Z., Izhari, F., & Sitorus, Z. (2024). Implementasi Sistem Arsip Elektronik Dalam Meningkatkan Efisiensi Operasional di Smk Gelora Jaya Nusantara Medan. *Journal Minfo Polgan*, 13(2), 1582-1589.