# Digital Transformation in Archival Management: A Case Study of the PQX Study Program

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| Article Info | Abstract |
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| | The PQX Study Program is part of a State University in Indonesia, faces significant challenges in managing academic and administrative archives. Based on internal data until October, 2025, more than 6000 physical records are still managed manually or stored through online media such as Google Drive, without an integrated archiving system or adequate security mechanisms. This condition has resulted in delays in data retrieval, limited storage capacity, and increased operational costs due to the maintenance of physical archives. To address these issues, this study applies a software engineering approach using the System Development Life Cycle (SDLC) model to design a web-based archival information system prototype. The purpose of this research is to develop an integrated archival information system within the PQX Study Program. The research stages include user needs analysis, system design using a user-centered design approach, and prototype implementation. Data were collected through observation, and analysis of internal archival documents. The resulting digital archiving system design is expected to enhance document access efficiency, strengthen data security, and support the digital transformation of academic administration within the PQX Study Program. |

## 1. INTRODUCTION

With the rapid advancement of technology and the increasing demand for digital governance, the digital transformation of archival systems has become not merely an option but a necessity. At the national level, the National Archives of the Republic of Indonesia (ANRI), in collaboration with SRIKANDI—the Integrated Dynamic Archival Information System—has established a key initiative to accelerate the digitalization of archival management across Indonesia. Archival sustainability encompasses three priority program pillars: orderly archiving, digital transformation, and the nation's collective memory (National Archives of the Republic of Indonesia [ANRI], 2022). Since its implementation in October 2020, the SRIKANDI system has been adopted by more than 685 institutions across various provinces and municipalities, reflecting diverse levels of digital maturity (National Archives of the Republic of Indonesia [ANRI], 2024). Furthermore, Presidential Regulation No. 95 of 2018

on the Electronic-Based Government System (SPBE) underscores that archival systems are among the essential applications required to be integrated into the national electronic governance ecosystem (President of the Republic of Indonesia, 2018).

The COVID-19 pandemic has further accelerated the pace of digital transformation in higher education (Connell et al., 2021). This creates a growing demand for online services and secure remote access to institutional documents, as established by Park and Lee (2022). In this context, higher education institutions must align their archival management practices with national digital transformation strategies to ensure efficiency, accessibility, and long-term sustainability. Given the restricted access to physical archives and the reduced willingness to visit them during the COVID-19 pandemic, it becomes essential to examine three key aspects of digital archives: the types of sources utilized, the categories of collections accessed, and the strategies employed to identify relevant digital materials (Sye, 2022). A well-organized concept of public service management, information systems, and data storage is essential to ensure that data storage and retrieval can be carried out easily (Faristha et al., 2022).

However, several empirical studies indicate that digital archival management practices still face significant gaps and challenges. For instance, research conducted by Soulthoni and Itasari (2025) on the implementation of electronic archives in local governments found that the main obstacles lie in regulatory readiness, system integration across national platforms, and human resource competence. In addition, a study by Rahmayanti et al. (2025) highlighted that staff training, the establishment of digital standard operating procedures (SOPs), and technical sustainability greatly influence the success of digital archival systems (Rahmayanti et al., 2025). On an international scale, Nurbatyrova (2024), in her study on archival transformation, emphasized that metadata standards, interoperability, and legal frameworks are key components often overlooked in implementation (Nurbatyrova, 2024). Nevertheless, many educational institutions still rely on paper-based or semi-digital archival systems that have not been fully integrated into the academic environment (Jannah, 2024). Therefore, although policy frameworks are already in place, archival management units—such as academic programs—often lag in terms of technical capacity, business processes, and user adoption.

In the current higher education landscape, the volume of academic and administrative documents is growing rapidly. Within the PQX Study Program, a department under a public university, internal data indicate that from October 2024 to October 2025, more than 5,000 digital files and 1,000 printed documents were recorded. The archived materials include annual reports, activity reports (such as practitioner lectures, student training and workshops, and curriculum revisions), teaching and learning documents (including course schedules, academic guidance, final project reports, internship and comprehensive exam files, and practicum modules), official correspondence (decrees and memorandums of understanding), student and alumni data, as well as records of research and community service activities. This volume illustrates the increasing complexity of document management at the study program level, emphasizing the need for a systematic and digitally integrated archiving solution.

Based on observations conducted in the PQX Study Program, several issues have been identified, including the large number of physical archives, limited data access, lengthy data retrieval time, and restricted storage space. The volume of printed documents is quite high, resulting in file accumulation within the study program office. Furthermore, data access control has not been properly managed. Despite the implementation of electronic archiving systems in government institutions, traditional paper-based archiving remains dominant, resulting in operational inefficiencies (Soulthoni and Itasari, 2025). For instance, student academic guidance reports are collected through a Google Drive link shared via WhatsApp, which allows anyone with the link to access the files, leading to low data security. The PQX Study Program, as part of a public university, actually possesses its own institutional cloud storage system; however, it has not been utilized. If properly implemented, this cloud system could provide larger storage capacity and improved data security.Data collection and retrieval are still carried out manually, which requires considerable time. For example, retrieving documents for accreditation purposes can take several weeks, as soft-copy documents need to be printed and hard-copy documents must be scanned. Moreover, this process incurs additional costs for maintaining physical archives, including storage space such as cabinets, folders, and other equipment. These conditions create tangible operational constraints, such as slow document access, less responsive administrative services, and difficulties for staff and users (including lecturers, program secretaries, and administrative personnel). Consequently, the reliance on physical, non-digitized archiving has become a limiting factor in the efficiency and productivity of both academic and administrative activities within the PQX Study Program.

Based on the current conditions in the PQX Study Program and the findings from previous literature, the main problem identified is: how to design an information system for archiving that meets the needs of its users

(lecturers, program secretaries, and administrative staff). This study focuses on the design and development of a web-based archival information system prototype for the PQX Study Program as part of a broader effort toward digital transformation in records management. The research scope includes three main stages: system requirements analysis through data collection and business process observation; system design using a structured modeling approach—specifically the principles of User-Centered Design (UCD) and Unified Modeling Language (UML), which include use case diagrams, use case descriptions, activity and sequence diagrams, and interface design; and prototype implementation using web technologies suited to user needs and the available infrastructure. The modeling process was conducted using Visual Paradigm, the database was developed in MySQL PHPMyAdmin, and the system was programmed using PHP.

This study does not include a comprehensive user evaluation phase, such as usability testing, user acceptance testing, or system performance analysis. This limitation is intentional, as the primary objective of this research is to produce a preliminary design and prototype that will serve as the foundation for more comprehensive system development in future stages. Therefore, system evaluation and user satisfaction testing will be conducted in subsequent research once the prototype has been stabilized and is ready for pilot testing in an operational environment.

## 2. METHODS

This study employs a software engineering research approach with a focus on designing a digital archival information system within the PQX Study Program environment. The approach is descriptive-qualitative and applied experimental in nature, as the research not only describes the existing conditions but also produces a functional prototype of an information system (Anugrah et al., 2024; Pressman & Maxim, 2020). The system development method used in this study follows the System Development Life Cycle (SDLC) with the Waterfall model.

Sukarti and Ekastini (2025) suggested that designing a digital information system involves the first three stages: (1) requirements analysis, (2) system design, and (3) prototype implementation. The testing and full deployment phases are not conducted in this study, as the primary objective is to design and develop a prototype that serves as the foundation for future system development. The Waterfall model was chosen because it provides a structured and systematic framework suitable for system development projects with well-defined requirements (Sommerville, 2020).
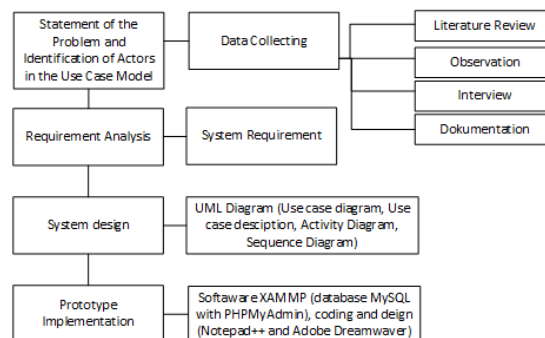


**Fig. 1. Research methodology stages according to Sukarti and Ekastini (2025)**

*Statement of the Problem and Identification of Actors in the Use Case Model*

In the current archiving process at the PQX Study Program, several operational inefficiencies and data management issues have been identified, including limited accessibility, lack of integration, and insufficient data security. The research was conducted in the PQX Study Program, one of the study programs within the environment of State University in Indonesia. The research subjects include: (1) administrative staff responsible for managing archives, (2) lecturers as system users, (3) the study program secretary as a system user, (4) the head of the study program as a policymaker and archive report user, and (5) the super administrator. This study utilizes two types of data sources—primary data and secondary data—to obtain comprehensive information regarding the existing conditions and the requirements of the archival system.

*Data Collecting*

Primary data were obtained directly from the PQX Study Program environment through several techniques: (1) Interviews were conducted with key stakeholders (the head of the study program, academic staff, lecturers, and the study program secretary) to explore the system's functional and non-functional requirements. (2) Direct observation was carried out on both manual (physical) and ongoing digital archiving processes to understand the workflow, processing time, and points of inefficiency.

Secondary data were used to strengthen the analysis and to design a system aligned with national policies. The sources of secondary data include institutional and study program regulations, such as standard operating procedures (SOPs) for managing academic documents and correspondence archives, as well as scientific literature in the form of journals, proceedings, and research reports related to archival system design in ministries, universities, and government agencies (e.g., Soulthoni and Itasari, 2025; Rahmayanti et al., 2025; Jannah, 2024; Nurbatyrova, 2024).

Data collection was conducted using four main techniques: (1) Semi-structured interviews to obtain in-depth qualitative data regarding implementation challenges and expectations for the new system.
(2) Observation of existing archival activities. (3) Literature study to collect secondary data from regulations, reports, and policy documents relevant to digital archiving in Indonesia. (4) Documentation of findings.The data were analyzed using a qualitative approach. Qualitative data (from interviews and observations) were analyzed through content analysis to identify key themes related to system requirements and archival management issues. The results of this analysis were then used to formulate the system requirement specifications.

*Requirement Analysis*

The actors identified in this use case include: (1) Administrative staff responsible for archive management, (2) Lecturers as system users, (3) The study program secretary as a system user, (4) The head of the study program as a policymaker and archive report user, and (5) The Super Admin. The use case development was based on the main duties and functions of each actor.

*System Design*

The design stage was carried out using the User-Centered Design (UCD) approach and the Unified Modeling Language (UML), including use case diagrams, use case descriptions, and sequence diagrams, all created using Visual Paradigm.

*Prototype Implementation*

The system was developed as a web-based application using the PHP programming language and MySQL as the database. The system interface was designed to be user-friendly and accessible for users with varying levels of digital literacy.

## 3. RESULT AND DISCUSSION

*Requirement Analysis*

The requirement analysis stage in the design of the Archival Information System for the PQX Study Program aims to identify, define, and document user needs as well as the functional and non-functional specifications of the system to be developed. The goal is to ensure that the designed system truly aligns with user requirements, business processes, and organizational objectives (Pressman & Maxim, 2020; Sommerville, 2020).

The outputs of the requirement analysis include the identification of involved actors and the description of each use case. The use cases for Administrative Staff include: (1) Managing student data, (2) Managing graduate data, (3) Managing seminar documents, (4) Managing comprehensive exam documents, (5) Managing academic activity data, (6) Managing and printing data for program activities, (7) Managing final project documents, and (8) Managing announcements. The use cases for Lecturers include: (1) Managing research data, (2) Managing community service and teaching data, and (3) Managing teaching activities. The use cases for the Study Program Secretary include: (1) Managing annual report data, (2) Managing activity implementation report data, (3) Managing course schedule data, (4) Managing learning process evaluation data, (5) Coordinating and summarizing academic data of students, (6) Managing correspondence, and (7) Summarizing research and community service activity data.

The use case for the Head of the Study Program allows them to view and download all study program documents. The main duties and functions of the Head of the Study Program include curriculum development,

work program planning, lecturer task distribution, academic evaluation, student development, and program collaboration management. The use case for the Super Admin involves the management of all system data.

*System Design*

At the system design stage of the Archival Information System for the PQX Study Program, the author designed: (1) Use Case Diagram, (2) Use Case Description, (3) Activity Diagram, and (4) Sequence Diagram. All diagrams were created using Visual Paradigm.
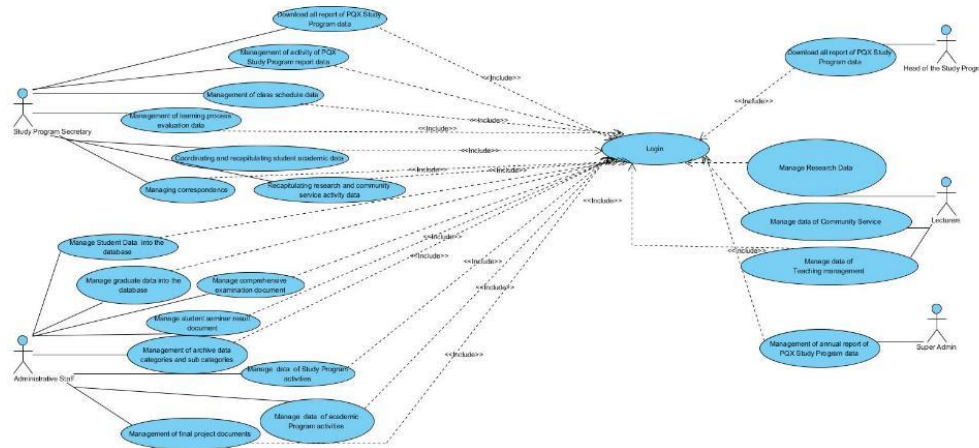


**Fig. 2. Use Case Diagram for Designing an Archiving Information System in the PQX Study Program**

At this stage of the use case diagram, the implementation of the CRUD (Create, Read, Update, Delete) operations will be illustrated in the use case description, activity diagram, and sequence diagram. The selected use case presented as an example is Management of Student Final Project Documents, as it represents the core workflow of the archival management process and demonstrates the main function of user interaction within the designed archival information system. The following is the use case description for Management of Student Final Project Documents.
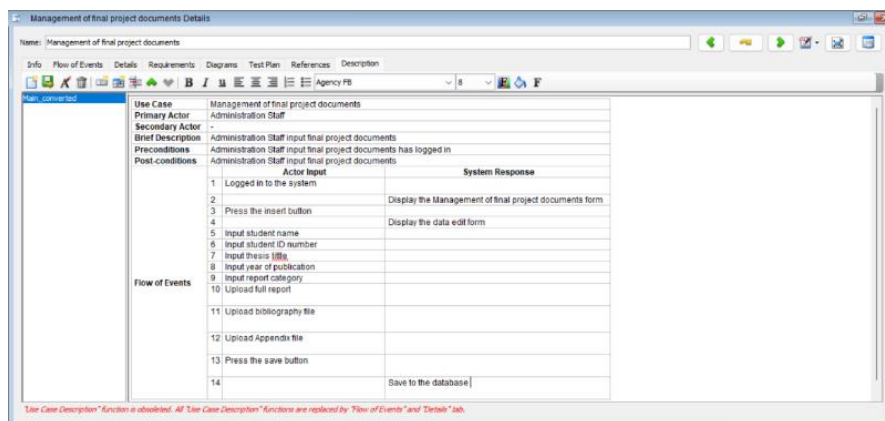


**Fig. 3. Use Case Description of Input Student Final Project Documents**

Administrative staff can add, modify, and delete student final project report data. Based on the use case description, a sequence diagram and activity diagram were created, with the example used being the addition of student final project report data.
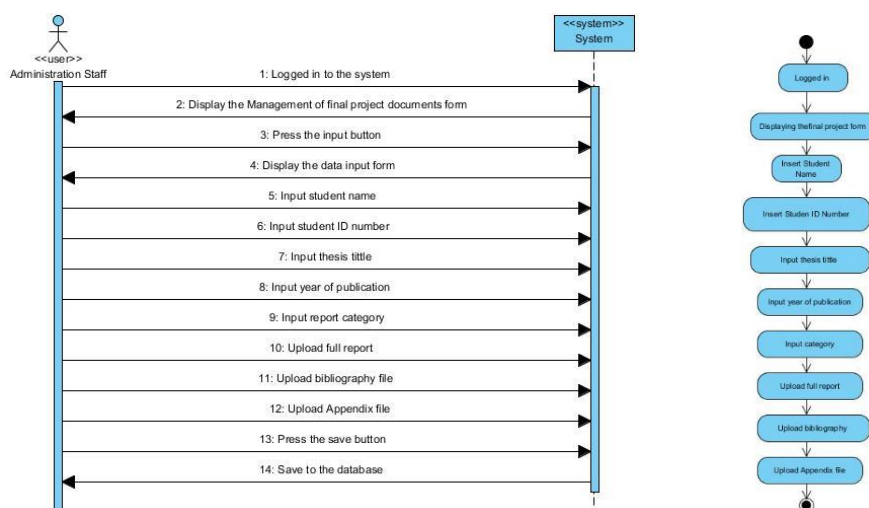
**Fig. 4. (a) Sequence Diagram (b) Activity Diagram of Input Student Final Project Documents**

*Prototype Implementation*

In the next stage, a web-based archiving application was developed. The software used was XAMPP, with the MySQL database created using PHPMyAdmin.
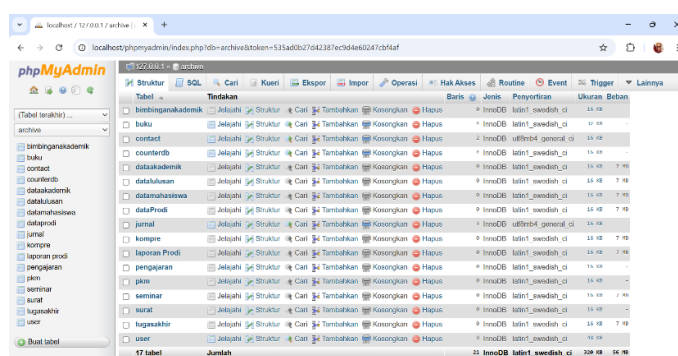


**Fig. 5. The MySQL database was created using PHP MyAdmin**

The application was developed using Notepad++ and Adobe Dreamweaver, with PHP as the programming language. The creation of the database for the web-based archiving system is shown in the following figure.
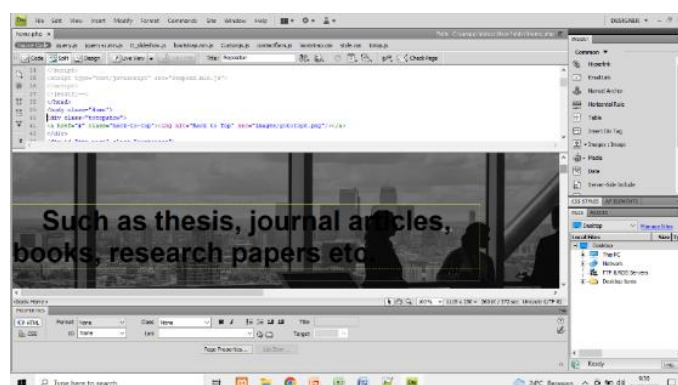


**Fig. 6. Programming for the Home Page Display Using Adobe Dreamweaver and Notepad++**

*User Interface*

The user interface is a visual and interactive component that serves as a bridge between the user and the system. It is designed to present document management features such as storage, search, and archive tracking

with an intuitive and easily accessible layout. The goal is to ensure that every archiving process can be carried out effectively, efficiently, and with minimal user error.

*Home Page*

The home page serves as the initial display when users first access the website. This page provides menus related to the PQX Study Program Archiving System (news, search, login, contact information, and other features).
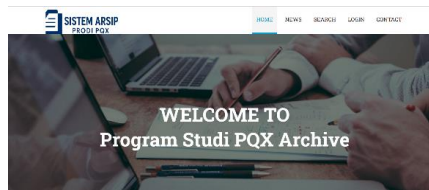


**Fig. 7. Home Page of the PQX Study Program Archiving System (Ikhsani et al., 2021)**

In the news menu, users can view announcements about activities that are planned or have been carried out by the Study Program. The search menu allows users to view the latest uploaded archive data, the contact menu is available for submitting complaints or issues, and the login menu is used to access the system.
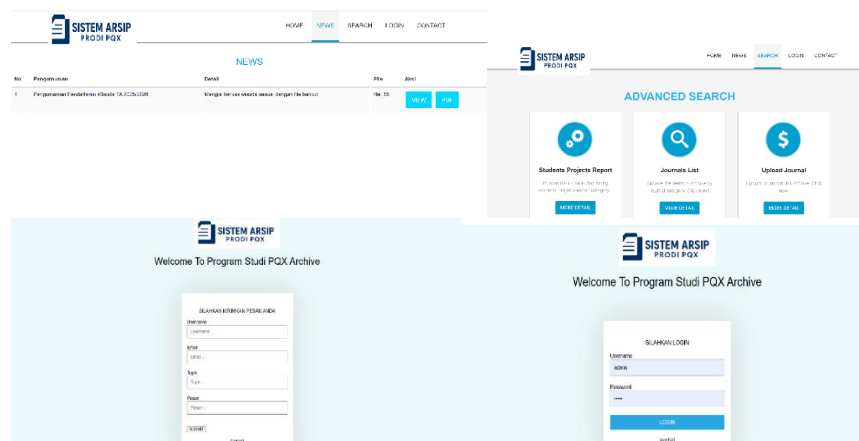


**Fig. 8. Home Page (a) News Menu (b) Search Menu (c) Login Menu (d) Contact/Complaint Menu**

*Super Admin Dashboard Page*

The Super Admin dashboard serves as the central control panel of the archival application, displaying key summary information and providing centralized access for efficient data and user management. On the Super Admin Dashboard page, all menus and data can be viewed, edited, added, downloaded, or deleted. However, on the Dashboard pages of other users (Administrative Staff, Lecturers, Study Program Secretary, and Head of the Study Program), only the menus and data relevant to their respective access rights are displayed.
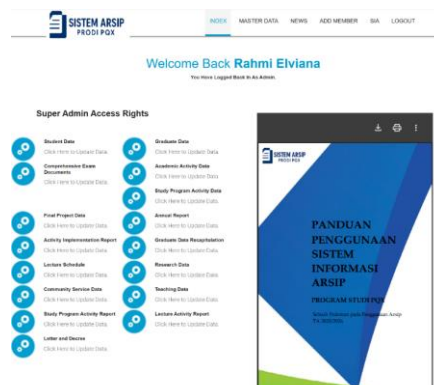


**Fig. 9. Super Admin Dashboard Page**

On the Super Admin menu page, there are options for managing master data, adding user accounts and assigning roles to determine access rights, posting announcements, and accessing the Academic Information System.

On the Super Admin menu page, centralized access is provided for efficient management of data and users. On the Super Admin Dashboard, all menus and data can be viewed, modified, added, downloaded, or deleted. The following is an example of user account data, which can also be viewed, modified, added, downloaded, or deleted.



**Fig. 10. Super Admin Menu (a) Add Account (b) Account Data and Data Modification Menu**

The following is an example of lecturer research data, which can be viewed, edited, added, downloaded, or deleted.
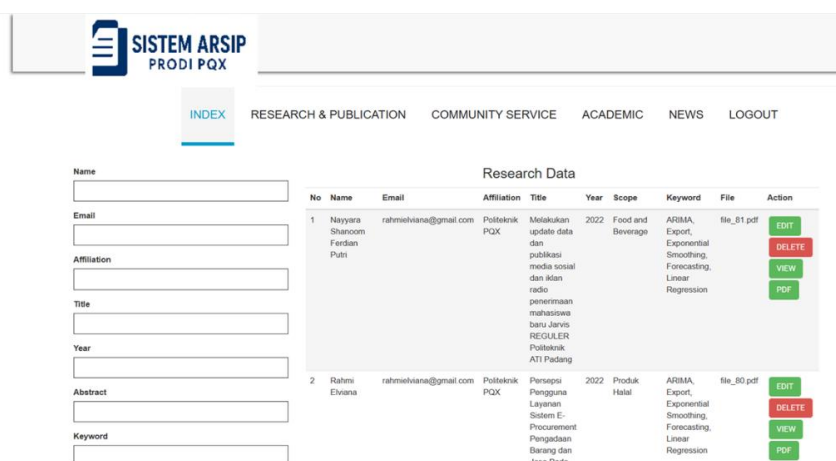


**Fig. 11. Add Data for Research Data Menu**
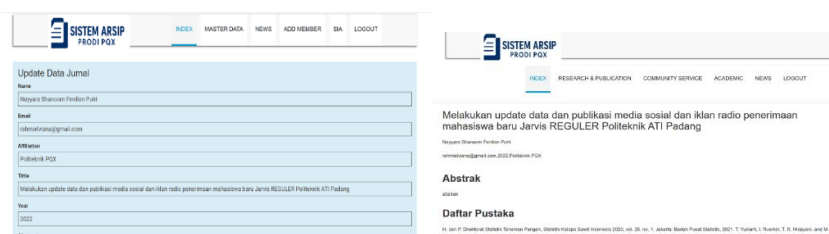


**Fig. 12. Research Menu (a) Data Modification (b) View Data**

*Administrative Staff Dashboard Page*

The administrative staff dashboard contains several menus, including: (1) Student data management, (2) Graduate data management, (3) Seminar document management, (4) Comprehensive exam document management, (5) Academic activity management, (6) Data management and printing for Study Program activities, and (7) Final project document management. In addition, staff members can also view announcements from the Head of the Study Program.
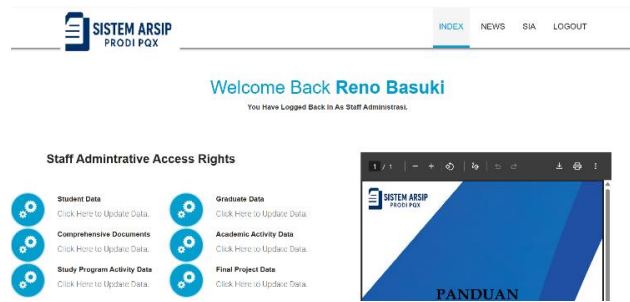
**Fig. 13. Administrative Staff Dashboard Page**

The following is an example of Managing Student Final Project Data on the administrative staff menu. The data can be viewed, modified, deleted, added, or downloaded.



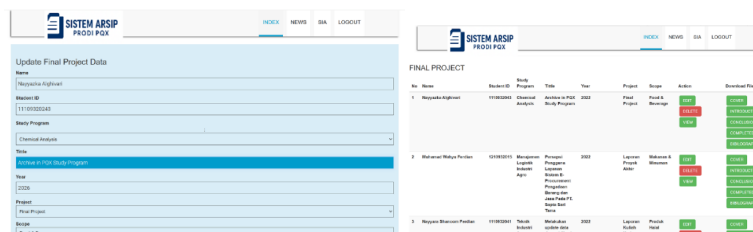**Fig. 14. Insert Data of Student Final Project Data**



**Fig. 15. Management of Student Final Project Data (a) Update data (b) Managing Data**

*Lecturer Dashboard Page*

The lecturer dashboard provides access rights specifically for lecturers. The available menus include: (1) Research data management, (2) Community service and teaching data management, and (3) Teaching management. In addition, lecturers can also view announcements from the Head of the Study Program.



**Fig. 16. Lecturer Dashboard Page**

The following is an example of community service data management on the lecturer menu. The data can be viewed, edited, deleted, added, or downloaded.
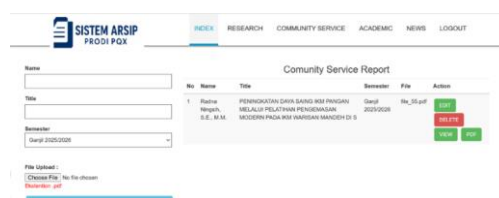
**Fig. 17. Management of Community Service Data on the Lecturer Page**

*Study Program Secretary Dashboard Page*

The Study Program Secretary Dashboard is an access level designated for the Secretary. The available menus include: (1) Management of annual report data, (2) Management of activity implementation report data, (3) Management of lecture schedule data, (4) Management of learning process evaluation results, (5) Coordination and recap of academic advising data, (6) Management of official letters, and (7) Data recap.



**Fig. 18. Study Program Secretary Dashboard Page**

The following is an example of managing study program report data in the Secretary menu. The data can be viewed, edited, deleted, added, and downloaded.
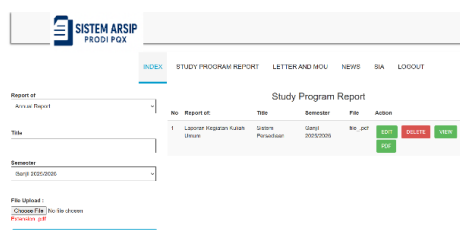


**Fig. 19. Management of Study Program Data in the Study Program Secretary Menu**

*Head of Study Program Dashboard Page*

The Head of the Study Program dashboard allows the user to view and download all available data.
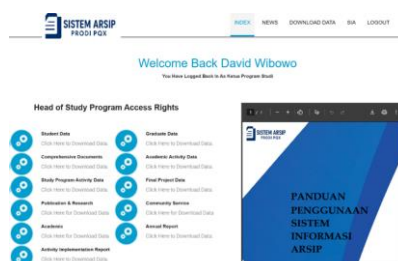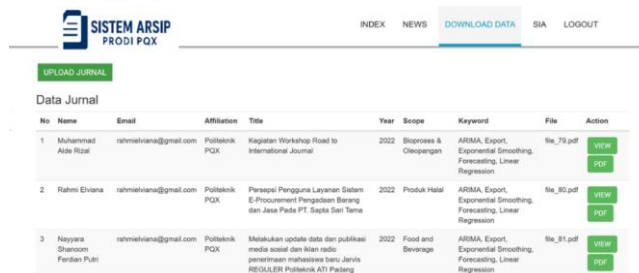


**Fig. 20. Head of Study Program Dashboard Page**

The following is an example of data management for downloading journal data from the Head of Study Program menu. This data can be viewed, added to, or downloaded. Data changes are still available to administrative staff and super admins.

**Fig. 21. Research Data Download Menu for Head of Study Program**

## 4. CONCLUSION

Based on the results of the study, it can be concluded that a digital archiving application has been successfully developed to manage and integrate the archival collection process in a unified manner. The system enables users to access archives anytime and anywhere, thereby improving efficiency in data storage, retrieval, and downloading. In terms of time efficiency, the implementation of the digital archiving system accelerates document access and management processes. In terms of quality, scholarly works can be accessed, downloaded, and cited online more quickly than printed versions, thus enhancing visibility and academic reputation. From a cost perspective, digital systems are more efficient than physical archiving, which requires additional space, labor, and maintenance resources.

The archiving application will continue to be developed through continuous monitoring, evaluation, and improvement based on the internal needs of the PQX Study Program. It is expected that the implementation of this system will provide tangible benefits for the organization, industry, and society at large. Future development will incorporate feedback from lecturers and students, along with periodic updates to maintain relevance with institutional requirements. Furthermore, future enhancements are recommended to include additional features such as data security through encryption, activity logging (audit trails) to ensure accountability, automated workflows for administrative processes such as document numbering and approval, as well as notification systems and advanced search functions to make the archiving system more efficient, transparent, and adaptable to technological advancements.

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