Electronic Archive Management System: A Case Study in University of Basrah, Iraq

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ABSTRACT: The problem of the university employee's file is summarized by the almost daily need to review administrative orders, documents, and other details that are needed periodically, and at the same time it is difficult to refer to the university employee or even the paper folder to extract the required information. As time progresses, techniques and tools appear that facilitate work, reduce the resources used, and reduce the manual and paper-based approach to solving administrative problems. The electronic archive management system is a web-based system that works that provides special interfaces for the university employee (lecturer or employee) and the administration, as well as management staff. Based on interview, documentation, and observation, and qualitative analysis, the proposed system allows stakeholders to download and view his/her scientific activities and active participation from all over the world on a regular basis, which enables the management staff to conduct all statistics easily and quickly without fatigue or time consuming. The system provides the statistics required by the academic agencies, and allow managers downloading and reviewing all university employee activities. It also archives all data for lecturers with the date they were obtained and the place where they were obtained, as well as academic titles with their dates and other details. The system reduces the resources required in the paper-based system which are susceptible to damage, require space and files to store, and are easily lost and cannot be accessed easily. The system also essentially reduces human effort and provides high accuracy in retrieving the required information.

1. INTRODUCTION

The increasing volume of information related to employees in all private and government agencies makes the need for implementing system to store and retrieve all required information very urgent. Storing and tracking this information make the agency in a right path to achieve both of their mission and vision [1], [2],

[3]. The need for a system to archive and store all information makes it easy to facilitate accomplish all the services within agency. The role of archive within agencies is vital to the success of agencies [4], [5], [6]. The role of electronic archive management system is to store and retrieve the archived documents and ensure that it can be found easily. The use of electronic archive management system helps in overcome the manual storing the paper-based archive. The aim is overcoming

the problem of traditional data storage where it takes times and resources, and takes time to achieve commitment and maintenance [7], [8]. The system consists of interconnected components which collecting, processing, storing, and disseminating the information and data, providing feedback that helps in achieving the goal [9].

The importance of archive management system is utilized in different universities and agencies around the world [10][9], [11], [12], [13]. Based on the observation, documentation, and interview in the college of computer science and information technology, university of Basrah, the annual evaluation of an employee is based on the extent of his development in his field of work and the experiences he has acquired during his career. The annual evaluation mainly affects the employee's development in the career ladder and the extent of his eligibility for annual bonuses and promotions. Deans and Department heads conduct a comprehensive evaluation of each employee that includes several aspects, including the number of acknowledgement and appreciation letters from the dean of the college, the university president, or the minister, participation in conferences and seminars, holding courses, workshops, seminars, and publishing scientific research in various local and international journals.

 Almost, the folder of employee is based on a paper-based system, where all the activities carried out by the university employee are documented on paper, and copy of every related documents (scientific and academic activities) are kept in the personal folder, as this work causes a burden on the departmental secretariat and the employee responsible for files, in addition to the large resources. The consuming and exceptional effort involved in preserving and archiving all university employee activities. During the period of completion of evaluations related to employees and lecturers by department heads and deans, all administrative orders regarding assignments and activities carried out by the employee during the year are relied upon. The university employee is required to bring certified copies of all his activities during this year, which causes a state of frequent reviews to retrieve and re-copy paper orders. This search process consumes the effort of the employee, the secretariat, and the department head. In this process, any loss of any administrative order will cause the loss of points that may cause unintended injustice to the employee due to the loss of this error.

Based on the above, finding a solution to this problem is considered an urgent necessity, especially with the presence of appropriate tools and programming languages that allow us to design a network system that facilitates the completion of administrative tasks. The designed system is based on finding immediate, fast and accurate solutions to avoid problems related to archiving and retrieving administrative orders. Several interfaces have been designed to make it easy for the employee to add all his activities and provide ease of saving and retrieving to the secretariat, thus reducing the effort of creating the statistics and information required periodically by the university presidency and the ministry, quickly and accurately.

The main objectives of the proposed system are summarized in the following points:

•   Archiving university employee files (teacher or employee) including research, certificates, files, holding courses, participation in courses, seminars, and workshops, acknowledgements letters, permanent and temporary committees, and other belongings, which contributes to reducing resources and efforts in retrieving them.

•   Providing a platform for the teaching staff, the employee, the department secretariat, the department's rapporteur, and the quality unit, which is characterized by ease of adding and accessing all the university employee's belongings.

•   Facilitating the annual and monthly statistics that the department or Ministry of Education institutions need and which come urgently.

•   Facilitating the annual evaluation of all university employees without the need to ask the university employee for all documents, thus reducing the effort and resources required.

•   Archiving file and sending it to those concerned without distributing paper copy, and sending it to those concerned (such as a letter of thanks that includes a group of university employees. Archiving the files and listing the names through the system, and each employee will find a copy of the file within his personal account details.

2. LITERATURE REVIEW

In [14] Sumarni Sumarni et al. utilized a qualitative approach with fixed strategy to implement the archive management for public elementary school in South Sulawesi. The snowball and purposive sampling techniques were used, where the source of data are places, events, archives, documents, and informants. The archive management system was implemented

based on analysis of the collected data from participants by observation, and interview. The system design was performed based on combining the centralized and decentralized the static, active, and in-active records. Many obstacles were found, such as the insufficient places of archive storage, and lack of employees' knowledge about archiving.

In [15], Muhammad Darwis et al. examined the effectiveness of using system of archive management based on descriptive qualitative where data collection, observation documentation, and interview techniques were used. The examination process of the archive system at the Office of the Education Quality Assurance Institution/Lembaga Penjaminan Mutu Pendidikan (LPMP) of South Sulawesi Province showed based on several indicators that the system was effective in delivering internal, and external archive, archive shrinkage, and archive maintenance.

While in [16], Muh. Darwis et al. implemented a descriptive study based on qualitative measurements for five informants' people (3 staff, head of the office, and admin). Many techniques of data collections were used such as documentation, interviews, and observation methods, while data presentation, analysis, and verification were used as data analysis techniques. The results showed that the archive management performed receiving, and creating archives well, letters distributing process is carried out well, while the process of borrowing archives is not good due to the borrowing rules.

Suharti et al. in [17] implemented a descriptive study to examine the implementation process of record management in a secondary school. Five informants (indicators) were found in the implementation process namely, destruction of records, archive description, archive maintenance and security, storage, and archive receipt. Many techniques of data collection were used such as documentation, interview, and observation, while data reduction, presentation, and conclusion were utilized as data analysis techniques. The results of this study indicated that the implementation process of record management still simple, and not in accordance with the newly archive systems development due to the lack of the infrastructure required to implement archive system.

Muh. Nasrullah et al. in [18] examined the effectiveness of archive management system based on qualitative study. The techniques of data collection are documentation, interview, and observation while three informants in the archive section. The results showed that the indicators are effective due to that the incoming files are checked first, while alphabet of number is used thoroughly. Archive indexing is considered effective due the check and store process based on keywords and words. Archive sorting is considered effective due to the files classification process in performed based on keywords, while archive storage is performed well accordingly.

3. PROBLEM STATEMENT

Based on interview, documentation, and observation performed in the college of computer science and information technology, the employee responsible for creating a file for an employee or lecturer sometimes faces difficulty in finding a specific file (a letter of thanks, holding a workshop, participating in a specific course, etc.) in the file of one of the employees or lecturers, or updating it, which may take a long time, and the effort that falls on him to manage statistics that are urgently requested from him, and archiving these files and distributing them among the folders increases the burden that falls on him, in addition to the fact that the loss of the files or the loss of a file from an employee's file may expose him to legal accountability, in addition to the damage that may occur to the paper supplies. And do not forget the financial sums spent on the necessary supplies to establish the folder.

Therefore, creating an archive management system to track a university employee's file facilitates the responsible employee's search and modification process and increases speed and accuracy in creating statistics and archiving and distributing files. The proposed designed system is a web application using HTML, CSS (Bootstrap 4.0), PHP, and JavaScript, connected to a MySQL database. As a first step, the Waterfall model is chosen because it aligns with the system design methodology. The Waterfall model, also known as the sequential linear life cycle model, is the first model introduced. This model is characterized by its simplicity and ease of use. Progressing to the next stage begins only after the previous stage is fully completed [19], [20]. This type of model is typically used in small projects that do not require uncertain requirements. At the end of each phase, a review is done to determine whether the project is on track and whether or not to continue the project.

a.   Stages of the Waterfall Model: There are several stages in the Waterfall Model as shown in Figure 1. They are explained briefly below:

1.   Requirements Definition: The purpose of this stage is to identify and understand the system requirements and user needs.

2.   System and Software Design: At this stage, preparations are made to select the appropriate system architecture and interface design.

3.   Implementation and Unit Testing: At this stage, the program implementation, testing, and development begin.

4.   Integration and System Testing: In this stage, the software undergoes testing to ensure it functions correctly and integrates seamlessly with other systems. Various functionalities are tested, and any errors are corrected before final deployment.

5.   Operation and maintenance: In this stage, the system is deployed and installed in the real working environment, and the system is also maintained and updated when needed.
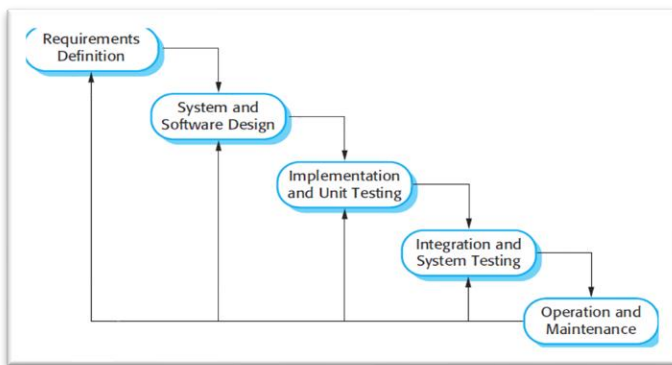

Figure 1: Framework design flow

b.   System Analysis: Use Case diagram is used to analyses the system. The use case includes the interactions between the user and the system. The users of the system and the pages (cases) that can be used are shown in the following diagram in Figure 2:

Figure 2: Use case diagram

c.   Users: mainly, there are two users for the proposed archive management system, namely admin and user. The admin (the administrator) is responsible for the system (an employee assigned by the organization using the application), who has absolute access to all application pages. They can register information, view profiles, modify them, search for files, upload documents, change user permissions, and generate requested statistics. While the user (the user) is an employee or lecturer who is allowed to register, view, and modify their information.

d.   Cases (pages): there are six pages implemented as cases as follow:

1. Register: It is a registration page for users, including personal information, qualifications, academic titles, username, and password, which both the admin and the user can use.

2. Profile: It is the profile page for both the admin and the user and includes two cases, which are displaying and modifying all the information that the user has entered. as for their own files, they can only view them and cannot modify them.

3. Upload Files: This is a page used to upload files (PDF, Word, PowerPoint, Excel, etc.) and specify the upload date and details about the files and type for any user, and it is for the admin only.

4. View Files: This is a page used to display and search for uploaded files (PDF, Word, PowerPoint, Excel, etc.) and the upload date, and it is for the admin only.

5. Privilege: This is the permissions page that enables the system administrator to change the user's permissions, as the permissions include 3 types (administrator, regular user, and account deactivation).

6. Statistics: This is the statistics page that displays to the admin statistics related to professors in terms of departments, university numbers, statistics for types of employees, statistics according to qualifications or academic titles, or according to the date of appointment.

e.   Database Design: after finishing the use case design, the next step is constructing the database according to the gathered data. Based on this, six tables designed and connected them through relationships to cover and store all information related to employees or lecturers and their files. as shown in Figure 3, which presents the database schema. To reduce storage size and facilitate data querying, we used what is known as "metadata" to describe some fields where inputs are selected from dropdown lists referenced by numbers. This type of design also helps maintain data consistency and prevents errors resulting from human intervention, making it easier to specify allowed values and prevent the entry of incorrect data. For example, the field for scientific title, which is entered in the web application through a dropdown list, references "None" with the number 0, typically given to employees without an scientific title. The value "Assistant Professor" is represented by the number 1, assigned to lecturers holding scientific titles, and so on.
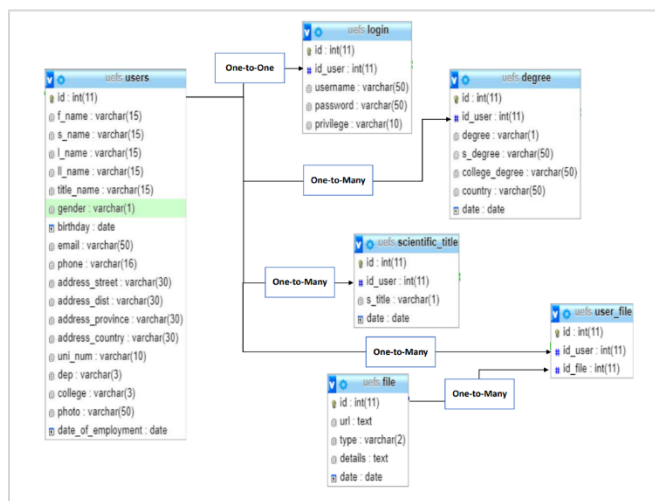

Figure 3: Database schema

Here is a simplified explanation of the tables:

•   Users table: This table is the primary table that is connected to the rest of the tables through database relationships. It contains primary key, information about employees or lecturers such as full name, last

name, gender, date of birth, email, phone number, address, university ID, college, department, profile picture, and date of appointment or confirmation.

•   Login table: The user table is linked to this table through the field (id) in the user table and the field (id_user) in this table in a one-to-one relationship. This table contains a primary key, username, password, and its associated privilege.

•   Degree table: The user table is linked to this table through the field (id) in the user table and the field (id_user) in this table in a one-to-many relationship. This table contains a primary key, scientific degree, specialization, university, country, and the date they obtained the degree.

•   Scientific Titles table: The user table is linked to this table through the field (id) in the user table and the field (id_user) in this table in a one-to-one relationship. This table contains a primary key, scientific title, and the date it was obtained.

•   File table: The user table is linked to this table through the field (id) in the user table and the field (id_user) in this table in a one-to-many relationship. This table contains a primary key, file location, file type, details, and date.

•   User File Table: Used to link the file table to the user's table.

f.   Designing System Interfaces: the basic structure of the application is designed using wireframes, which are known for their simplicity and ease of use [21]. Wireframes typically lack aesthetic details such as colors, images, and detailed text, focusing instead on identifying the placement of elements like buttons, navigation bars, content areas, and other functional components of the application.

•   The first page of the application is the login page, which includes the name of the organization using the application and the application's name. It has two input fields for username and password, along with buttons for logging in and registering in the application if not already registered, as shown in Figure 4.
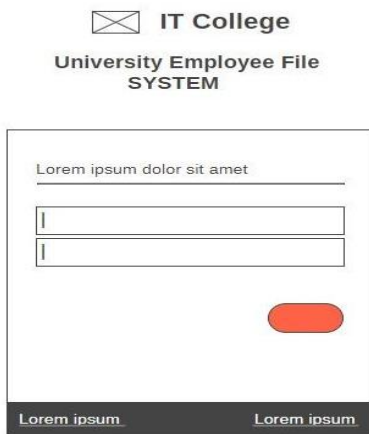
Figure 4: Login page

•   When clicking on the registration button from the login page, you will be directed to the information registration page. This page contains a form with several fields including the employee's full name, surname, date of birth, and other employee details such as scientific title and scientific degree. as shown in Figure 5.
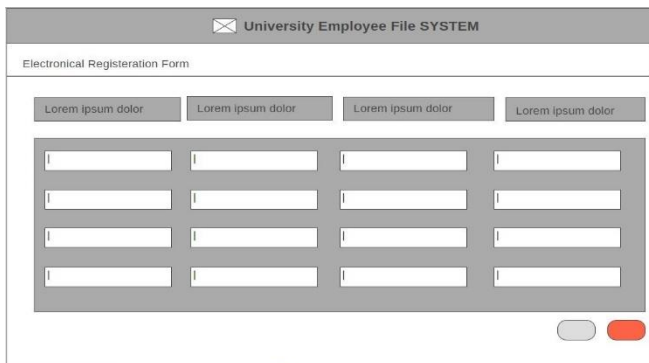

Figure 5: Information registration page for users

•   After completing the registration process and entering the username and password on the login page, you will be directed to the application's home page. The home interface typically includes a sidebar menu with options such as Home, Profile, and others. By default, the Home page is active page, displaying an image representing the organization and the names of the application developers. as shown in Figure 6.
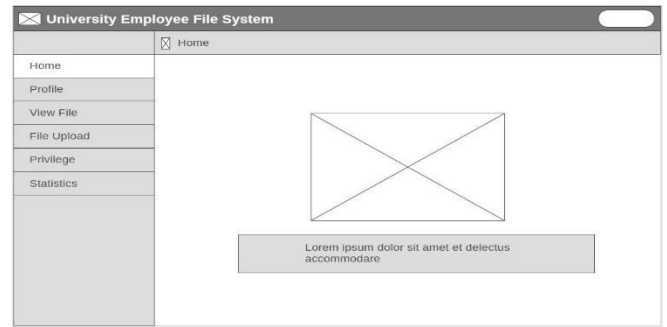

Figure **6**: Home page

•   The next page is the profile page, where the user can view the information, they have entered, including their profile picture, and have the ability to edit it. Additionally, they can view the files they have uploaded on the file upload page, but as a regular user, they do not have editing capabilities for these files. as shown in Figure 7.
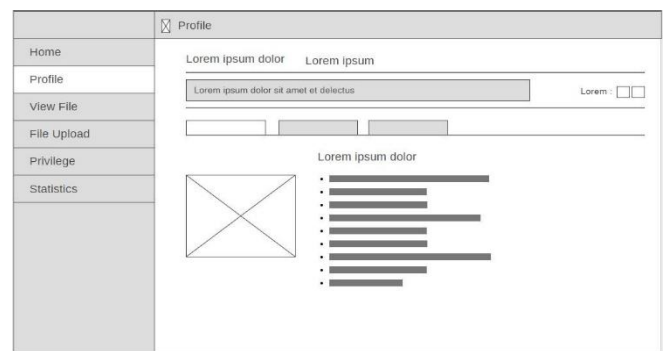

Figure 7: Profile page

•   When an admin uploads a file, the file is stored in the employee's personal profile. It can be searched for on the "View File" page, which includes a menu to search for a specific file and retrieve all associated information such as the file's owner, type, upload date, and more. as shown in Figure 8.
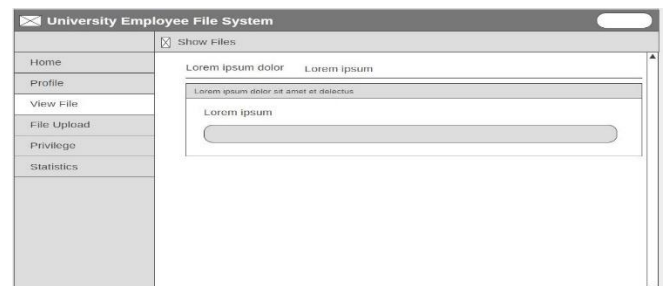

Figure **8**: View file page

•   The file upload page is used to upload files of various types such as images, Word documents, Excel spreadsheets, PDFs, and others. This page includes a list to select employees mentioned in the file, such as

acknowledgment letters, and other fields for uploading the file itself, specifying its type, providing details, and entering the date. as shown in Figure 9.
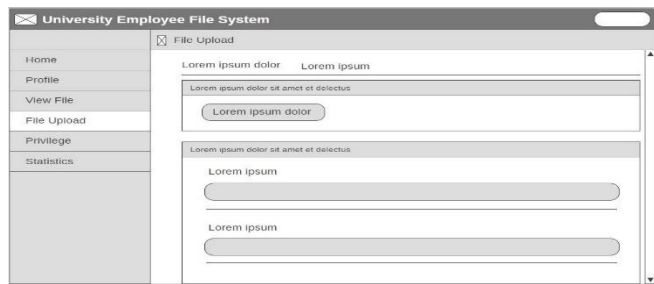

Figure **9**: File upload page

• The Privilege page allows the admin to change user privilege. It includes a table displaying usernames, universities, departments, current privilege (admin or user), and a field to modify or change privilege. as shown in Figure 10.
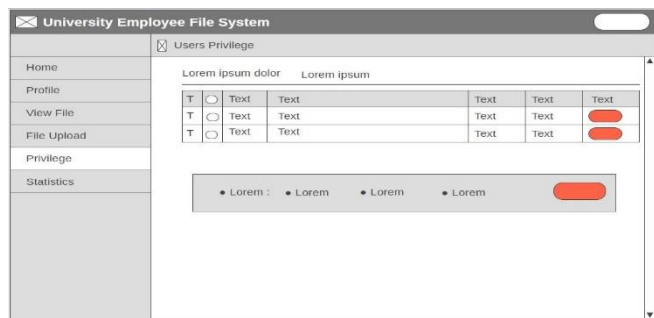

Figure **10**: Privilege page

• The last page of the application is the Statistics page, which allows the admin to perform various statistical analyses upon request. This includes counting the number of employees in a specific department, employees holding a master's degree, employees with the scientific title "Professor", employees specializing in a specific field, employees without an academic title, and more. as shown in Figure 11.
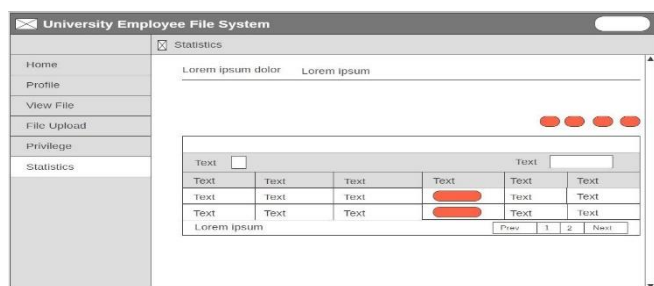

Figure **1**1: Statistics page

Based on these wireframes, we have started designing the application. However, it's important to note that creating the project exactly as depicted in the

wireframes is not necessary. There may be differences in colors and other aesthetic elements. These wireframes are solely intended to outline our project requirements and guide its development.

g. Evaluation Process: Evaluation is the process of gathering evidence to determine whether a system meets its intended goals. It involves assessing the system's performance and functionality to ensure its effectiveness. The evaluation process is important to reassure managers and stakeholders that the system has been developed and implemented successfully. In some cases, evaluation can be straightforward, such as meeting certain standards or regulations set by insurance companies or government agencies. However, in more complex situations, where multiple stakeholders have conflicting interests, evaluation becomes more challenging. For example, when a smart card seller seeks certification from a government agency to sell their product to a bank, which aims to mitigate fraud risks. Evaluation is often conducted through various testing methods, including partial or complete tests, user feedback, and security assessments. This helps identify any errors or vulnerabilities in the system and allows for improvements to be made. Overall, evaluation plays a crucial role in ensuring that a system meets its intended goals and satisfies the needs of its users and stakeholders.

4. CONCLUSION AND FUTURE WORKS

In addition to the idea of the project that can be used and developed more and more until it is ready to be used on the scale of the University of Basrah or more than one university, it provides a great addition to the way and method of dealing with the university employee, his information, and all the reports and statistics required from the secretariat and the department's rapporteur, which come urgently. By the university presidency and the ministry. The program also provides a good display of all university employee records, the dates of obtaining their certificates, acknowledgement letters, and all other belongings pertaining to the university employee. The system can facilitate many processes for the university employee, the administrative body, and the college dean. The system also works to improve the work of each course in the college, and thus improve the quality of information and statistics requested by the university presidency. The system achieves the required goals. In order to implement this project, there are many challenges and restrictions that have been faced to work on the project, such as time and group communication, that have been overcame by using the Git system to

work on the project together at the same time. Among the future works that we can add to the original project are:

•   Providing a page for each teacher for the purpose of uploading lectures and links to programs related to the curricula.

•   Providing students with easy-to-access pages and an easy way to display advertisements, download lectures, and all matters that have been uploaded by the teacher.

•   Students can communicate with professors and discuss research or topic by creating a conversation between students and professors.

•   Creating a mobile application (iPhone and Android) to facilitate work and facilitate access.

•   Providing an interface to measure the rate of teaching development annually in terms of holding courses and publishing scientific research.

•   Providing an interface to identify deficiencies in the teaching files by specifying what are the optional and compulsory files within the university employee's file.

REFERENCES

[1] S. Hasyim, S. Sofyang, K. K. Syurkati, and S. Sumarni, "Dissemination Program in Improving Information Services to the Community in Bone District," Jurnal Office, vol. 7, no. 2, 2021, doi: 10.26858/jo.v7i2.24671.

[2] S. H. M, H. Tahir, H. Akib, and M. Rusdi, "Innovation of Electronic Licensing Information System at the Office of Investment and One Stop Integrated Services (DPMPTSP) of Bone Regency," Jurnal Office, vol. 7, no. 1, 2021, doi: 10.26858/jo.v7i1.23803.

[3] R. Niswaty, M. AMIN, H. Akib, and J. Jamaluddin, "Records Management at PT. Bank Sulselbar Jeneponto Branch," Jurnal Office: Jurnal Pemikiran Ilmiah Dan Pendidikan Administrasi Perkantoran, vol. 6, no. 2, pp. 143–152, 2020.

[4] M. Darwis, Y. Claresta, J. Jamaluddin, N. H, and Muh. Nasrullah, "Effectiveness of Archive Management at the Office of the Education Quality Assurance Agency of South Sulawesi Province," Jurnal Office, vol. 8, no. 1, 2022, doi: 10.26858/jo.v8i1.33060.

[5] F. N. B. Zulkipli, N. Hussain, S. F. M. Yatin, M. S. Bin Mostakim, and T. N. Z. B. T. Hisham, "Archive Records Management System (ARMS): Functional Requirement," 2021. doi: 10.20473/rlj.v7i1.111.

[6] A. Sobandi, A. Adman, and E. Suryadi, "Effectiveness Of Archive Management by Digitizing Documents," Jurnal MANAJERIAL, vol. 19, no. 2, 2020, doi: 10.17509/manajerial.v19i2.23649.

[7] B. C. Las Johansen, "Development of electronic document archive management system (edams): a case study of a university registrar in the Philippines," International Journal of Digital Information and Wireless Communications (IJDIWC), vol. 7, no. 2, pp. 106–117, 2017.

[8] Y. Zhao and W. Du, "Construction and Optimization of Distributed Electronic Archives System Merging Control Messages," Math Probl Eng, vol. 2022, 2022, doi: 10.1155/2022/8403720.

[9] H. Benmakhlouf and A. Chouaou, "Electronic document, information, and archive management systems in economic institutions: A descriptive study of the onbase system," International Journal of Professional Business Review: Int. J. Prof. Bus. Rev., vol. 9, no. 6, p. 11, 2024.

[10] O. Voskoboinikova-Huzieva, "DIGITAL HUMANITIES IN HIGHER EDUCATION SYSTEM OF CANADA," Continuing Professional Education: Theory and Practice, no. 2, 2019, doi: 10.28925/1609-8595.2019.2.5862.

[11] M. K. I. Kassab, S. S. Abu Naser, and M. J. Al Shobaki, "An Analytical Study of the Reality of Electronic Documents and Electronic Archiving in the Management of Electronic Documents in the Palestinian Pension Agency (PPA)," Eur Acad Res, vol. 6, no. 12, 2017.

[12] Sutanto and E. Nuryani, "Management of the Electronic Archives for Optimizing Services at Banten Jaya University," 2020. doi: 10.2991/assehr.k.200303.021.

[13] H. Li and J. Yin, "Optimization of University Archives Management under the Application of Blockchain Technology in the Digital Age," Mobile Information Systems, vol. 2022, 2022, doi: 10.1155/2022/6256859.

[14] S. Sumarni, A. R. Syam, and P. Sir, "Analysis of archives management in the administration section in elementary schools," AL-ASASIYYA: Journal Of Basic Education, vol. 5, no. 1, 2020, doi: 10.24269/ajbe.v5i1.2628.

[15] M. Darwis, Y. Claresta, J. Jamaluddin, N. H, and Muh. Nasrullah, "Effectiveness of Archive Management at the Office of the Education Quality Assurance Agency of South Sulawesi Province," Jurnal Office, vol. 8, no. 1, 2022, doi: 10.26858/jo.v8i1.33060.

[16] M. Darwis, P. E. Yusup, and S. H. Arhas, "Dynamic Records Management in the General Section of the PD Office Makassar Raya Parking," International Journal of Administration and Education (IJAE), pp. 1–9, 2024.

[17] H. Akib and K. Thukiman, "Archive Management Analysis in Secondary School : A Case Study in Indonesia," International Journal of Educational Administration, Management, and Leadership, vol. 1, no. 1, 2020.

[18] M. Nasrullah, D. Suci Amalia, and S. H. Arhas, "Effectiveness of Archive Arrangement in the Barru Regency Regent's Office," Pinisi Journal of Education and Management, vol. 2, no. 3, 2023, doi: 10.26858/pjoem.v2i3.56183.

[19] K. Petersen, C. Wohlin, and D. Baca, "The waterfall model in large-scale development," in Product-Focused Software Process Improvement: 10th International Conference, PROFES 2009, Oulu, Finland, June 15-17, 2009. Proceedings 10, 2009, pp. 386–400.

[20] W. Model, "Waterfall model," Luettavissa: http://www. waterfall-model. com/. Luettu, vol. 3, 2015.

[21] O. D. Alao, E. A. Priscilla, R. C. Amanze, S. O.Kuyoro, and A. O. Adebayo, "User-Centered/User Experience Uc/Ux Design Thinking Approach for Designing a University Information Management System," Ingenierie des Systemes d'Information, vol. 27, no. 4, 2022, doi: 10.18280/isi.270407.