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Design and Development of Electronic Document Archiving System

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Abstract: The study focused on the design and development of an Electronic Document Archiving System for the University of Rizal System. This document management system allows users to organize and access files in electronic format. This developed system was assessed by the teaching and non-teaching staff from the URS Binangonan campus. An adapted survey questionnaire checklist was used to determine the result of the performance of the developed system and administered via Google Form. The questionnaire checklist was based on the ISO 25010 or software product quality criteria, in terms of functional suitability, performance efficiency, usability, reliability, security, maintainability, and portability. On the design and development of the system, Rapid Application Development Software Development Life Cycle was utilized. On the assessment of the respondents on the developed Electronic Document Management System, it was found out that in terms of functional suitability, performance efficiency, usability, reliability, maintainability, and portability, which were obtained with a weighted mean of 3.35, 3.44, 3.34, 3.42, 3.38, 3.49, and 3.31 and verbally interpreted as acceptable. Based on the findings and conclusions of the study, it is recommended to modify the performance of the Electronic Document Management System as acceptable with respect to ISO 25010 – Software Quality Standards that were found weak by the IT experts, faculty, staff, and school administrators in terms of functional suitability, performance efficiency, usability, reliability, maintainability, security, and portability.

Keywords: Document management system, Information Systems, Electronic Document Archiving

1. Introduction

The global business environment has reached the point of making transactions easily done. Through information technology, various concepts and ideas have existed and are still being developed as to how they can be easily adopted in one particular design adaptable to the nature of the business organization. In today's modern world, gone are the days that distribution, safekeeping, and retrieval of documents are difficult. Modern technology has significant contributions to the handling of important papers.

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Establishing a computer program in an organization will be useful for financial reports, memoranda, personal profiles of employees, and other needed documents specifically intended for business reporting or evaluation. In fact, careful communication protocols, file systems, and other means of developing a local area network will be useful. One of the biggest problems facing the employees in the organization is how to use technology to manage documents. It is significant because the majority of important business processes in organizations are dependent upon or driven by document flows, and the majority of valuable information in organizations is found in the form of documents, such as business forms, reports, letters, memos, policy statements, contracts, agreements, *etc.*

By utilizing modern technologies for documents and document processing, Electronic Document Management (EDM) offers significant gains in productivity and performance [1]. To uplift the quality and status of educational institutions, universities and colleges continuously seek ways and means on how documents can be managed. Hence, the need to acquire documents and other pertinent information will always be crucial and time-consuming and resources such as papers, among others, will be important. Thus, this study aimed to design and develop an Electronic Document Archiving System (EDAS) that will help the organization to have a safe keep and retrieval of important documents needed for accreditation and other evaluation.

The primary goal of the study is to design and develop and Electronic Document Archiving System and to determine the result of the performance of the developed system using ISO 25010 in terms of functional suitability, performance efficiency, reliability, usability, portability, maintainability, and security.

2. Research Methodology

2.1 System Development Framework

A descriptive research design was employed in this study and utilized the Rapid Application Development (RAD) model as the Software Development Life Cycle (SDLC) framework.

The RAD model emphasizes the flow of information from input to output, focusing on achieving results in smaller, manageable segments. Larger projects are divided into smaller components, allowing for better management and faster completion. One of the defining features of the RAD model is its reliance on the reuse of templates, tools, processes, and code [2].

The RAD model follows a four-stage process, namely: planning, prototyping, construction, and deployment, as seen in Figure 1.

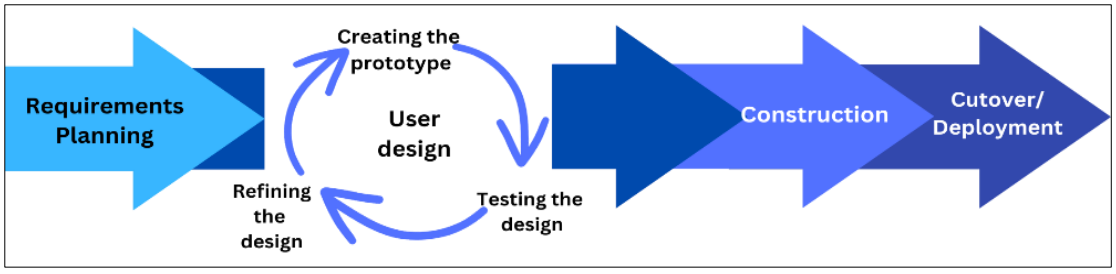

Figure 1. Rapid Application Development Software Development Model

In the planning stage, meetings were conducted to discuss the conceptual design of the system and gather essential requirements for its development.

During the prototype stage, an initial version of the Electronic Document Archiving System was created and presented to target end-users. Feedback was collected, and necessary revisions were made to ensure the system aligned with user requirements.

The construction stage involved developing a fully functional version of the Electronic Document Archiving System. The researcher built both the system and its corresponding database, ensuring they were interconnected. This stage also included reviews and feedback to identify and resolve any systematic issues.

In the deployment stage, the system was introduced in an operational environment, allowing users to simulate actual usage. This stage enabled further refinement and validation of the system's performance in a real-world context.

2.2 System Evaluation

For system evaluation, the researcher used an adapted questionnaire checklist based on the ISO 25010 Software Quality Standards. This assessment measured the system's acceptability within the University of Rizal System using seven key criteria: functional suitability, performance efficiency, usability, reliability, maintainability, security, and portability [3][4].

A total of 30 respondents participated in the evaluation, consisting of ten (10) teaching staff, five (5) non-teaching staff, and five (5) IT practitioners. The respondents were purposively selected to ensure a diverse range of perspectives on the system's performance and usability.

For the interpretation of data, a four-point scale was used with the verbal interpretation shown in Table 1.

Table 1. Four-point Likert Scale

Score	Range	Verbal Interpretation
3.50-4.00	4	Highly Accepted
2.50-3.49	3	Accepted
1.50-2.49	2	Moderately Accepted
1.00-1.49	1	Not Accepted

A weighted mean was used to describe the respondents' evaluation of the performance of the developed Electronic Document Archiving System.

3. Results and Discussion

The developed system provides an archiving system that lets the user organize and access files in an electronic format. The system provides user access levels and privileges, where users can upload files and select who can access the file. The system also provides an audit trail to monitor the user logs.

The following tables illustrate the evaluation of staff of the University of the Rizal System on the performance of the Electronic Document Archiving System.

Table 2 displays the respondents' evaluation of the performance of the developed system in terms of Functional Suitability.

Table 2. Respondents' Evaluation of the Performance of the EDAS in Terms of Functional Suitability

1. Functional Suitability	**Mean**	**Verbal interpretation**
1.1 **Functional completeness.** The developed system covers all the specified tasks and objectives of the end users	3.40	Acceptable
1.2 **Functional correctness.** The developed system provides the correct results with the needed degree of precision.	3.30	Acceptable
1.3 **Functional appropriateness.** The developed system facilitates the accomplishment of specified tasks and objectives of the end users	3.25	Acceptable
Average Weighted Mean	**3.32**	**Acceptable**

Table 2 reveals the performance of the developed system with regards to Functional completeness, Functional correctness, and Functional appropriateness, with a result of 3.40, 3.30 and 3.25 with a verbal interpretation of "Acceptable". Overall, the result shows that the developed system in terms of Functional Suitability attained the average of 3.32 with a verbal interpretation of "Acceptable". The result implies that the developed system provides the functions needed on the system; however, there are some functions needed to upgrade to attain all the user objectives.

Table 3 shows the evaluation of the staff on the performance of the developed system in terms of Performance Efficiency. It was found out that the respondents assessed the system as "Highly Acceptable" in regards to Time Behavior and Resource Utilization with an average weighted mean of 3.65 and 3.55. And lastly, the system was assessed as "Acceptable" in regards to Capacity with a weighted mean of 3.40.

Overall, the result shows that the developed system in terms of Performance Efficiency attained an average of 3.53 with a verbal interpretation of "Highly Acceptable".

With those results, this implied that the system shows that it performs in terms of response times, processing times, resource utilization, and its ability to handle the required workload.

Table 3. Respondents' Evaluation of the Performance of the EDAS in Terms of Performance Efficiency

2. Performance Efficiency	**Mean**	**Verbal interpretation**
2.1 **Time behavior.** The develop system meets the requirements on its response and processing times and throughput rates when performing its functions	3.65	Highly Acceptable
2.2 **Resource utilization.** The developed system efficiently used the required amounts and types of resources when performing its functions.	3.55	Highly Acceptable
2.3 **Capacity**. The develop system maximum limits meet requirements of the end user	3.40	Acceptable
Average Weighted Mean	**3.53**	**Highly Acceptable**

As per Performance Efficiency, it assesses characteristics that affect an application's response behavior and use of resources under stated conditions. Performance Efficiency affects customer satisfaction, workforce productivity, application scalability, response-time degradation, and inefficient use of processing or storage resources. The Performance Efficiency of an application lies in each individual component's performance, as well as in the effect of each component on the behavior of the chain of components comprising a transaction in which it participates [5].

Table 4. Respondents' Evaluation of the Performance of the EDAS In Terms of Usability

3. Usability	**Mean**	**Verbal interpretation**
3.1 Appropriateness recognizability. The developed system is appropriate for their needs of the end-user.	3.15	Acceptable
3.2 Operability. The developed system is easy to operate, control and appropriate to use.	3.45	Acceptable
3.3 User error protection. The developed system protects users against making errors.	3.60	Highly Acceptable
3. 4 User Interface (UI) aesthetics. The developed system user interface enables pleasing and satisfying interaction for the user.	3.40	Acceptable
Average Weighted Mean	**3.40**	**Acceptable**

As shown on Table 4, the data reveals that in regards to Appropriateness recognizability, Operability, and User Interface aesthetics, it obtained a weighted mean of 3.15, 3.40, and 3.45 with a verbal interpretation of "Acceptable", while the item User error protection obtained a weighted mean of 3.60 with a verbal interpretation of "Highly Acceptable". Overall, the result shows that the developed system in terms of Usability attained the average of 3.40 with a verbal interpretation of "Acceptable".

The results imply that the developed system is acceptable by the users and can maintain its level of performance under the specified conditions for a period of time [6]. However, the system needs to improve the user interface to be pleasing and satisfying for the end-users.

Table 5. Respondents' Evaluation of the Performance of the EDAS in Terms of Reliability

4. Reliability	**Mean**	**Verbal interpretation**
4.1 Maturity. The developed system meets needs for reliability under normal operation.	3.15	Acceptable
4.2 Availability. The developed system operational and accessible when required for use.	3.35	Acceptable
4.3 Fault tolerance. The developed system operates as intended despite the presence of hardware or software faults.	3.50	Highly Acceptable
4.4 Recoverability. The developed system can recover the data in the event of an interruption or a failure	3.10	Acceptable
Average Weighted Mean	**3.28**	**Acceptable**

As shown on Table 5, the data reveals that in regards to Maturity, Availability and Recoverability, it obtained a weighted mean of 3.15, 3.35, and 3.10 with a verbal interpretation of "Acceptable", while the item Fault Tolerance obtained a weighted mean of 3.50 with a verbal interpretation of "Highly Acceptable". Overall, the result shows that the developed system in terms of Reliability attained the average of 3.28 with a verbal interpretation of "Acceptable".

The results imply that the developed system can operate even if there is system failure; however, the system needs to recover data in the event of system failure [7][8].

As shown in Table 6, the data reveals that in regards to Non-repudiation, Accountability, and Authenticity, it obtained a weighted mean of 3.55, 3.45, and 3.50 with a verbal interpretation of "Highly Acceptable", while the item Confidentiality and Integrity obtained a weighted mean of 3.25 and 3.40 with a verbal interpretation of "Acceptable". Overall, the result shows that the developed system in terms of Security attained the average of 3.43 with a verbal interpretation of "Acceptable"

The results imply that the developed system provides a user-access level where users have a specified and limited access to the system. However, the system can have an additional feature to provide authentication for the users.

As per ISO 25010, security protects information and data so that persons or other products or systems have the degree of data access appropriate to their types and levels of authorization [5][9].

Table 6. Respondents' Evaluation of the Performance of the EDAS in Terms of Security

5. Security	**Mean**	**Verbal interpretation**
5.1 Confidentiality. The developed system ensures that data are accessible only to those authorized to have access.	3.25	Acceptable
5.2 Integrity. The developed system prevents unauthorized access or modification.	3.40	Acceptable
5.3 Non-repudiation. The developed System actions or events can be proven to have taken place, so that the events or actions cannot be repudiated later.	3.55	Highly Acceptable
5.4 Accountability. The developed system allows to traced the actions of an entity uniquely.	3.45	Highly Acceptable
5.5 Authenticity. The developed system allows the identity of a subject or resource can be proved to be the one claimed.	3.50	Highly Acceptable
Average Weighted Mean	**3.43**	**Acceptable**

As depicted in Table 7, the data reveals that in regards to Modularity and Modifiability, it obtained a weighted mean of 3.55 and 3.60 with a verbal interpretation of "Highly Acceptable". While the item Analyzability and Reusability obtained a weighted mean of 3.40 and 3.20 with a verbal interpretation of "Acceptable". Overall, the result shows that the developed system in terms of Maintainability attained the average of 3.44 with a verbal interpretation of "Acceptable",

The result confirms that the system possesses analyzability for diagnosing inefficiencies, changeability for modifications, and testability for validating the modified software [10].

Table 7. Respondents' Evaluation of the Performance of the EDAS in Terms of Maintainability

6. Maintainability	**Mean**	**Verbal interpretation**
6.1 Modularity. The developed system composed of discrete components such that a change to one component has minimal impact on other components.	3.55	Highly Acceptable
6.2 Reusability. The developed system asset can be used in more than one form.	3.20	Highly Acceptable
6.3 Analyzability. The developed system can efficiency change one or more of its parts in which it is possible to assess its impact on the system to diagnose the deficiencies of the parts to be modified.	3.40	Acceptable
6.4 Modifiability. The developed system can be effectively and efficiently modified without introducing defects or degrading existing system quality.	3.60	Acceptable
Average Weighted Mean	**3.44**	**Acceptable**

Table 8. Respondents' Evaluation of the Performance of the EDAS in Terms of Portability

7. Portability	**Mean**	**Verbal interpretation**
7.1 Adaptability. The developed system can effectively and efficiently be adapted for different or evolving software or other operational or usage environments.	3.55	Highly Acceptable
7.2 Installability. The developed system can be successfully installed and/or uninstalled in a specified environment.	3.58	Highly Acceptable
7.3 Replicability. The developed system can replace another specified software product for the same purpose in the same environment.	3.10	Acceptable
Average Weighted Mean	**3.41**	**Acceptable**

As depicted in Table 8, the data reveals that in regards to Adaptability and Installability, it obtained a weighted mean of 3.55 and 3.58 with a verbal interpretation of "Highly Acceptable". While the item Replicability obtained a weighted mean of 3.10 with a verbal interpretation of "Acceptable". Overall, the result shows that the developed system in terms of Portability attained the average of 3.41 with a verbal interpretation of "Acceptable". The results imply that the developed system can be installed or setup on any operating system.

Table 9. Composite Table on Respondents' Evaluation of the Performance of the EDAS for the University of Rizal System

	Item	Average Weighted Mean	Verbal Interpretation
1	Functional Suitability	3.32	Acceptable
2	Performance Efficiency	3.53	Highly Acceptable
3	Usability	3.40	Acceptable
4	Reliability	3.28	Acceptable
5	Security	3.43	Acceptable
6	Maintainability	3.44	Acceptable
7	Portability	3.41	Acceptable
	General Weighted Mean	**3.20**	**Acceptable**

Table 9 presents that the criteria declared in the ISO 25010 quality software have a general weighted mean, respectively: Functional Suitability 3.32, Performance Efficiency 4.86, Compatibility 4.85, Usability 4.84, Reliability 4.89, Security 4.86, Maintainability 4.85, and Portability 4.75. "Compatibility" attained the highest rank and has a verbal interpretation of "Highly Acceptable". Ranked next are "Performance Efficiency" and "Security", with a weighted mean of 4.86 and a verbal interpretation of "Highly Acceptable". Conversely, "Portability" ranked last, having an average weighted mean of 4.75 and a verbal interpretation of "Highly Acceptable".

In totality, the result of the user acceptance testing of the developed Electronic Document Archiving System for the University of Rizal System has a general weighted mean of 4.84 that has a verbal interpretation of "Highly Acceptable".

4. Conclusion and Recommendations

Based on the findings of the study, it was concluded that the Electronic Document Archiving System (EDAS) was deemed acceptable by respondents according to the ISO 25010 Software Quality Standards. The system was evaluated using seven essential criteria: functional suitability, performance efficiency, usability, reliability, maintainability, security, and portability. This assessment indicates that the system

satisfies the minimum quality benchmarks required for software systems and demonstrates adequate capability to perform its intended functions efficiently and effectively.

In view of the study's findings and conclusions, several recommendations are proposed. First, it is recommended that the EDAS be enhanced in areas where respondents identified weaknesses, specifically in terms of functional suitability, usability, reliability, maintainability, security, and portability. Addressing these areas will improve system performance, user experience, and overall software quality. Additionally, the University of Rizal System is encouraged to adopt the developed system for institutional use. Implementing the EDAS can streamline document archiving processes, boost operational efficiency, and facilitate better record management. Lastly, future researchers are advised to conduct follow-up studies to assess the system's effectiveness after implementation. Such studies may focus on evaluating its impact on user productivity, operational efficiency, and overall satisfaction, as well as identifying areas for further development and optimization.

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