ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue VII July 2025

Development of Document Tracking and Archiving System for Procurement Management Office's Purchase Request in Apayao State College

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DOI: https://doi.org/10.51244/IJRSI.2025.120700132

Received: 23 June 2025; Accepted: 05 July 2025; Published: 07 August 2025

ABSTRACT

The Document Tracking and Archiving System (DTAS) implemented in Apayao State College- Procurement Office aims to enhance document management efficiency by automating and optimizing key processes. This study explores the development, and implementation of DTS to address challenges associated with manual document handling, including inefficiencies, lack of centralized control, and security concerns. Key features of the system include document upload, version control, access control, robust search functionality, automatic notifications, audit trails, and workflow automation.

Evaluation based on established software quality standards highlights the system's compliance with usability, reliability, and maintainability criteria. The implementation of DTS has led to significant improvements in document retrieval times, accuracy of document versions, and overall productivity within the organization. The system provides a scalable and adaptable solution, poised to support future organizational growth and increased document volumes.

Recommendations include ongoing user training, system integration with other organizational platforms, regular updates and maintenance to ensure security and functionality, enhanced security measures such as multi-factor authentication, and continuous feedback mechanisms for system refinement. The findings demonstrate that DTS represents a robust tool for modern document management, offering tangible benefits in efficiency, security, and operational transparency.

INTRODUCTION

The development of an efficient Document Tracking and Archiving system for the Procurement Management Office's Purchase Request in Apayao State College is of utmost importance in enhancing the procurement processes and ensuring compliance with ISO standards. This study aims to address the existing gaps in document tracking and archiving practices by designing and implementing an automated system tailored to the specific needs of the procurement office. The proposed system aims to streamline the document handling procedures, improve transparency, and enhance overall efficiency in the procurement management process.

The research methodology employed a systematic approach, including requirements analysis, system design, prototyping, and user feedback. Through in-depth interviews with key personnel from the procurement office, the current document tracking and archiving processes were assessed, and specific requirements were identified. The gathered information served as the foundation for the system design, which encompassed database architecture, user interface design, and workflow integration.

The verification process involved rigorous testing, including test case development, test execution, defect identification, resolution, and regression testing. The researchers ensured that the system met the functional requirements outlined in the system design phase. User acceptance testing was conducted, involving end-users who provided valuable feedback on usability, system performance, and alignment with their specific needs.

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The results of the study demonstrated the significance and potential benefits of implementing the proposed Document Tracking and Archiving system. The system's automation of document tracking, archiving, and retrieval processes improved the efficiency and transparency of the procurement management office. By streamlining workflows, reducing manual effort, and providing real-time status updates, the system facilitated better decision-making and resource allocation.

The findings from this study contribute to the body of knowledge in document management systems, specifically tailored to the procurement processes in higher education institutions. The developed system provides a practical solution for Apayao State College and serves as a reference for other institutions facing similar challenges in their procurement management.

Overall, the study emphasizes the importance of a Document Tracking and Archiving system in streamlining procurement processes, improving compliance with ISO standards, and enhancing overall efficiency. The successful implementation of the system at Apayao State College showcases its potential to transform document management practices and serves as a foundation for further research and development in the field.

Conceptual Framework

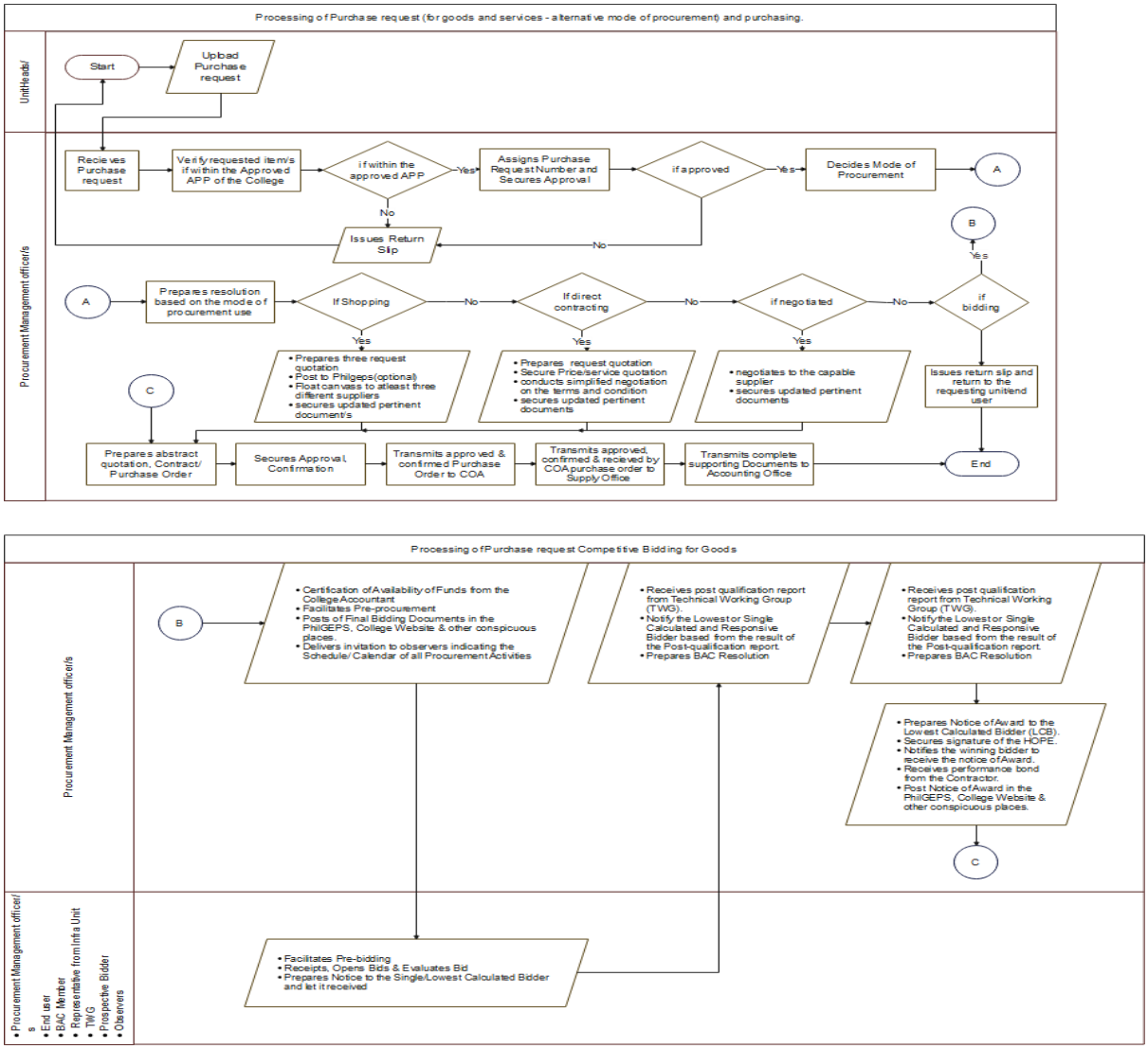

Figure 1: Conceptual Framework (Procedural Manual)

Objectives Of The Study/Statement Of The Problem

This study aims to develop a Document Tracking and Archiving system for the procurement office of Apayao State College to facilitate the processing of Purchase Requests for goods and services and its purchasing. Specifically, it seeks to address the following objectives:

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- To identify the document processing procurement activities for goods essential in the achievement of targets by the different users of the College under competitive bidding.

- To identify the document processing of purchase Requests for goods and services for alternative mode of procurement and its purchasing.

- and archiving needs and requirements of the procurement office in Apayao State College.

- To design and develop a Document Tracking and Archiving system tailored specifically for the procurement office of Apayao State College.

To achieve these objectives, the study aims to answer the following research questions:

- What are the current document tracking and archiving practices of the procurement office of Apayao State College?

- What are the requirements related to document tracking and archiving that the procurement office needs to adhere to?

What are the features and functionalities needed for a Document tracking and Archiving system tailored to the procurement office's needs?

REVIEW OF LITERATURE

History

In 1898, Edwin Grenville Seibels devised the vertical file system, in which paper documents are organized in drawers contained in stacked cabinets (Saunders, 2021). This system persists to this day, but has notable issues. The physical presence of file cabinets occupies substantial space, posing a challenge for businesses operating within confined office environments. Moreover, the arduous task of sifting through stacks of paper to locate specific documents demands considerable time and effort, as does manually completing fields on physical forms. These activities frequently divert employees, managers, and business owners from their vital duties. Adding to the predicament, paper documents are commonly misplaced and are susceptible to theft or destruction due to calamities such as fires and floods (Amiras, 2021).

The landscape of document management underwent a significant transformation in the 1980s, largely due to the increasing accessibility of computer technology. The advent of servers enabled organizations to electronically store documents in centralized mainframes, marking the beginnings of electronic document management systems (EDMS). The invention of scanners facilitated the conversion of paper documents into digital formats. The proliferation of personal computers (PCs) empowered businesses to create and store documents directly on office computers.

These advancements collectively spurred a shift from physical to digital document management. However, the distribution and implementation of PCs lacked a structured approach. Network deficiencies led to challenges in version control, audit trails, and security, highlighting the need for improved document management systems.

Initially, managing an EDMS in the 1980s required the assistance of a word processing center operator. However, in the early 1990s, the development of more user-friendly systems allowed knowledge workers to operate document management systems (DMS) independently.

The implementation of search engine technology soon revolutionized document retrieval, as full-text searching enabled knowledge workers to search within a DMS just as a user would search for information or media on platforms like Google (Saunders, 2021).

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Purpose

Document Tracking and Archiving System (DTAS) provides a big opportunity to optimize the daily operation of a business by speeding up the process of filing as well as providing the end-users with key data about their business (Kuligowski 2020). In addition to this, DTAS have the following benefits:

1. Security – Tracking and saving your documents provides security, especially if your business frequently deals with important or confidential information. You will have complete control over: who accesses a document and can see exactly who has viewed it; who has made changes and when those changes were made; and whether the document was sent to anyone.

2. Productivity - Tracking your documents allows you to see edits, which can help you keep your team on track and on the same page.

3. Audit Trails - Document tracking makes it incredibly easy for your company to create an audit trail by automatically keeping track of all changes made to each document, complete with timestamps.

4. Accessibility - Many document tracking systems enable access to your documents from anywhere and from any device, allowing you and your employees to make changes anytime.

5. Low environmental footprint - A document tracking system helps your company go paperless, which benefits both you and the environment by eliminating your mounds of hard copies.

6. Third-party integrations - A document tracking service enables you to integrate with other productivity-boosting applications, such as your CRM, accounting software or calendar. This enables a seamless transfer of information across all facets of your organization.

Furthermore, an electronic document tracking with archiving system not only helps the user to store and find information quickly, but also categorizes that information to make sure the right people can access specific documents at the right time (Monday, 2021). Along with the tendencies of many document workers in losing track of document paths, it is vital that these systems are able to trace the movement of documents from origin to destination/s (UP Information Technology Development Center, 2022).

Impact

United Nations' Sustainable Development Goals (SDGs) are a set of 17 goals as part of the 2030 Agenda for Sustainable Development. These goals aim to end poverty, protect the planet, and ensure all people enjoy peace and prosperity by 2030. The SDGs cover various issues such as poverty, hunger, health, education, gender equality, clean water, energy, economic growth, and climate change. Organizations, including complex engineering organizations, can use the SDGs as a guide to attain sustainable development in the 21st century (United Nations Department of Economic and Social Affairs Sustainable Development, n.d.).

According to Kuligowski (2020), document tracking is an essential feature of a document management system (DMS) that automates the process of searching, accessing, and editing of electronic documents or files. Various SDGs were being impacted through this vital component of DMS that underscores the increase of productivity and efficiency of an organization through automating manual processes, which supports the goal of decent work and economic growth (SDG 8) (Nanganong, 2023). Provision of responsible consumption and production (SDG 12) is manifested through lesser consumption of paper-based monitoring tools or physical storage.

Furthermore, secure application or system promotes data security of documents that supports the goal of peace, justice, and strong institutions (SDG 16). The efficient way of tracking document contributes to a strong partnership with the stakeholders and external entities (SDG 17).

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Challenges

A range of concerns can be impacted by document management challenges. These challenges encompass issues such as disorganized digital file management, lengthy document processing cycles, lack of document traceability, the risk of losing critical documents, and difficulties in maintaining version control. These challenges are encountered by organizations of all sizes as they carry out their day-to-day operations. Despite the presence of document management systems designed to streamline document-centric activities, some businesses still heavily rely on paper documents, resulting in inefficiencies (Malak 2023).

In the study of Al-khafaji et.al (2020), they found out that locating files in an exact time is considered one of the greatest problems and the tedious process in universities nowadays. This problem becomes greater when the university has a large number of departments and transactions and when the documents are moving from one department to another. In particular, developing countries that have many problems and unstable environment experiences related dilemmas, which may lead to lost or damaged essential documents that influences decision making.

Furthermore, Dizon et.al (2017) observed the challenges faced by the Faculty of Medicine and Surgery at the Pontifical and Royal University of Santo Tomas. The faculty encountered difficulties in effectively managing the inflow and outflow of documents within their office, as their document processing was primarily conducted manually using pen and paper. This manual process proved to have several shortcomings. There was a risk of documents being lost or misplaced, and the accumulation of paper documents occupied a significant amount of space within the office; thereby, impacting the efficiency of the individuals working in that environment.

Available DTAS applied in other agencies or organizations

Foreign Systems

In 2019, Usman studied a tracking system for file management using Radio Frequency Identification. The Radio Frequency Tracking System provides the functionalities of the overall system such as displaying unique' identifier of the staff, registering Unique Identifier of the staff, deleting Unique Identifier of the staff - generating location history of the staff files and other minor related matters for the Yobe State University. The RFID tracking System was validated using Information System Success Model (ISSM) to measure the effectiveness of the system developed.

The e-file Tracking System was utilized in universities as a solution to traditional file management system and improved document management (Al-khafaji et.al, 2020). Moreover, centralized data storage and sharing system within specific servers assist university departments to access information with ease in efficient and effective manner, and provides the important documents a secure storage and retrieval place. Electronic FTS gives vital assistance in monitoring documents, processes of tracking the completion of transactions, and keeping files required in decision-making.

In a study of Banday, et.al (2015), it was found out that the emergence of e-Governance in the tracking of recorded files brings forth electronic files, which replace physical files. The study noted that the File Tracking System (FTS) requires minimum hardware/software resources, some trained human resource, and no radical change is required for implementing it in an organization. FTS paved a way to a step in the direction of realizing the concept of paperless office.

Williams et al. in 2014 highlighted the ongoing challenge of document monitoring despite the growing recognition of information technology. This challenge stems from the complexities associated with learning numerous applications, which are hindered by issues such as security, lack of user-friendliness, and high costs. Thus, they came up with a system that properly utilized the advantage of a user-friendly interface and paved a way for the "administrator" to ensure adequate security without bothering about the generation of barcodes for documents.

Additionally, in a separate study conducted by Bala et al. in 2020, an analysis was performed on the file movement system within the same institution. The findings revealed numerous issues, including delays in

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retrieving and updating files, as well as instances of record duplication. Consequently, they proposed for the creation of a file-tracking system that would enhance the management's ability to make prompt decisions, track the location and history of files, and facilitate efficient file updates.

Furthermore, Omoregbe et.al (2014) developed a web application that is capable in managing the creation and movement of files from desk to desk of personnel. Their paper aimed to improve productivity amongst Core administrative personnel. The developed application was evaluated by comparing the proposed system to other tracking systems. It was determined that their suggested system exhibits distinct characteristics in comparison to other systems. These include the ability to track both digital and hardcopy files through messaging, the presence of an activity log, platform independence, and cost-effectiveness in implementation.

Local Systems

The University of the Philippines (UP) came up with a Document Tracking System that can track the paper trail of documents created within UP offices. The DTS includes information on the originating and receiving office and personnel, as well as the time elapsed between offices/units/departments. In this information system, document attachments, revisions, updates, and remarks are also supported (UP Information Technology Development Center, 2022).

A web-based document tracking system was developed by Rellon et. al (2020) that eased the tracking of the location status of the documents at Southern Philippines Agri-Business and Marine and Aquatic School of Technology (SPAMAST) Office of Records. The application used a barcode technology with SMS notification, and was capable in managing documents regardless of their document type.

Constantino et.al (2020) worked on a web-based application dubbed “Electronic Documents Location Tracking System” that facilitates the monitoring and tracking of documents location and movement within different offices in Isabela State University, Echague Campus. The evaluation of the system's functionality and usability demonstrated that it is highly effective in simplifying various tasks. This includes streamlining the document tracking process, recording document locations, and facilitating the transfer of documents to other offices. Moreover, the system was regarded as highly usable and user-friendly, and an ensuring tool for a positive experience for end-users.

In a study of Lingaya (2019), a system was created to enable the institution in facilitating the management of documents in state universities. Also, this provided a way to monitor, record and track the location of in-process documents that was created. A group of evaluators composing of forty (40) office personnel and five (5) IT experts have thoroughly judged the software in terms of user interface, functionality, database design and security. The result shows that the system’s visual, functional, and navigational elements and the manner it requests information help the user operate the document tracker. Also, the system can control users and produce integral records.

A study by Dizon et.al (2017) found out that the usage of a document management system in which document tracking is part of its components contributes in the 33% increase in efficiency of University of Santo Tomas Faculty of Medicine and Surgery Office current operational process.

PROCEDURE/METHODOLOGY

The study will make use of systems development and descriptive research design. The waterfall software development framework was used to show the researcher’s way of implementing the Application. The model covers the process in the making of the study. This includes gathering and collecting information needed, designing technical architecture, and testing and deployment of the application.

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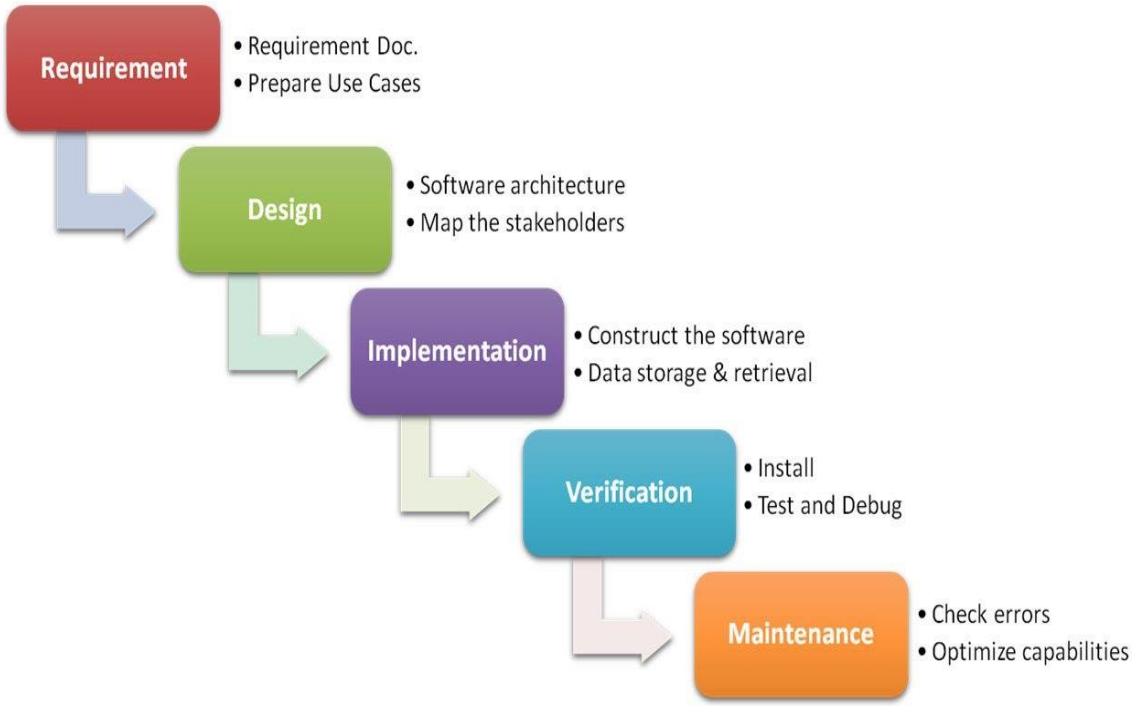

Figure 2:Waterfall Model

Requirement Gathering and Analysis. All possible requirements of the system to be developed are captured in this phase and documented in a requirement specification document.

First the proponents discussed on what are the problems encountered in ASC Luna Campus that can be solve using a computerized system. Of course there are many on their list but after thorough investigations. They have come up with the problems regarding on the facilitating of purchases requests process for goods and services.

Hence, the proponents proposed a system to make the tracking more easier and faster. After the approval of the proposal system. Series of interviews are conducted in order for the researchers to determine the current steps in facilitating Purchase request status and how to address the identified problems particularly with the Tracking of Purchase requests.

The officer in charge gave information that is of great help in the system requirement such as the different procedure manuals, how are the records are compiled and how they keep track of this information's after it has been recorded.

System Design. The requirement specifications from first phase are studied in this phase and the system design is prepared. This system design helps in specifying hardware and system requirements and helps in defining the overall system architecture.

Based on the gathered requirements, the researchers designed a detailed system blueprint. They created architectural diagrams, database designs, and user interface designs. To ensure accuracy and alignment with Procurement Management Officers expectations, the researchers developed interactive prototypes using google Apps Sheet and presented them to the procurement office staff for feedback and validation. The system design phase also involved mapping out the document workflow and defining the necessary tracking and archiving functionalities.

Implementation. It is during the implementation phase when all of the actual code is written. This phase belongs to the programmers in the Waterfall method, as they take the project requirements and specifications, and code the applications.

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The proponent will create a concept for a system that will meet the needs of the institution. The proponent will also include document printing, which will readily meet the needs of the staffs. The programmer begins developing the system when the design and functionality have been decided.

Verification. The verification phase was originally planned by Royce to ensure that the project is meeting all the customer expectations. However, under real-world analysis and design, this stage is often ignored. The project is rolled out to the customer then the Maintenance phase begins.

Throughout the verification process, the researchers will be maintaining thorough documentation. Will be recording test cases, test results, defect reports, creating a comprehensive reference.

Through a rigorous verification process, the researcher will ensure that the system meet the specific needs of the procurement management office and aligned with their requirements.

Maintenance. After developing the software system based from the request of the client, it will be implemented to the Procurement Management office in Apayao State College Luna Campus.

In this phase, the researcher will be maintaining and ensuring the smooth operation and ongoing effectiveness of the Document Tracking and Archiving System. Focusing on Defect resolution, system enhancements, regular updates, and documentation ensuring the system's reliability, security, and alignment with the evolving needs of the procurement management office.

Research Instruments

The following were used to gather pertinent data and information for the study:

A.) Survey Form - The researcher used digital modality of floating the questionnaire through Google Form. This method enabled the researcher to observe and analyze the current system in order to gain more information and find common issues, transactions, and queries, and to have a better understanding of how to create and improve the needed system requirements.

B.) Interview - The researcher asked questions that are relevant to the study. The researcher used this approach to further clarify all vital details for the development of the model needed for the creation of the system.

Testing of the efficiency of the E-DTS

The Wilcoxon Signed Rank Test is the non-parametric version of the paired t-test (Bobbitt, 2020). It is used to test whether there is a significant difference between two population means. Since the data being assessed is in ordinal level of measurement, this test is being used instead of paired t-test. Thus, this was used to determine whether there is a significant difference between manual tracking and the developed DTAS.

In the study of Dizon et.al (2017), they have utilized the usage of a time sampling method to get the efficiency of their proposed process to the document workflow of the University of Santo Tomas Faculty of Medicine and Surgery Office. Time sampling is a data collection method during which a researcher records behaviors that occur during a time interval (Nahass, 2016). With this method, they have taken time garnered in the existing process and compared it to the cycle time in the proposed system.

ISO 25010 Software Quality Standards for testing compliance of software

A product quality evaluation system relies on the quality model as its foundation. The quality model plays a pivotal role in determining the specific quality attributes that will be considered when assessing the characteristics of a software product.

The quality of a system is measured by the extent to which it fulfills the explicit and implicit requirements of its diverse stakeholders, ultimately delivering value. The quality model precisely captures the needs of these

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stakeholders, including aspects such as functional suitability, performance efficiency, compatibility, usability, reliability, portability, security, and maintainability. It organizes the evaluation of product quality by categorizing it into characteristics and sub-characteristics (International Organization for Standardization, 2011).

ISO/IEC 25010 evaluation model is composed of two dimensions such as the software product quality and the software quality in use (QinU) dimensions. Software product quality is related to properties of the products while software quality in use is related to the user interaction with the software (Atoum, 2018).

As seen in the international and local related systems and studies being presented, document management dilemmas especially in the area of document tracking were experienced by various organizations in the world. It can also be inferred that the creation of DTAS lay down the key for organizations to be better coped with the effect of the traditional and paper-based document management.

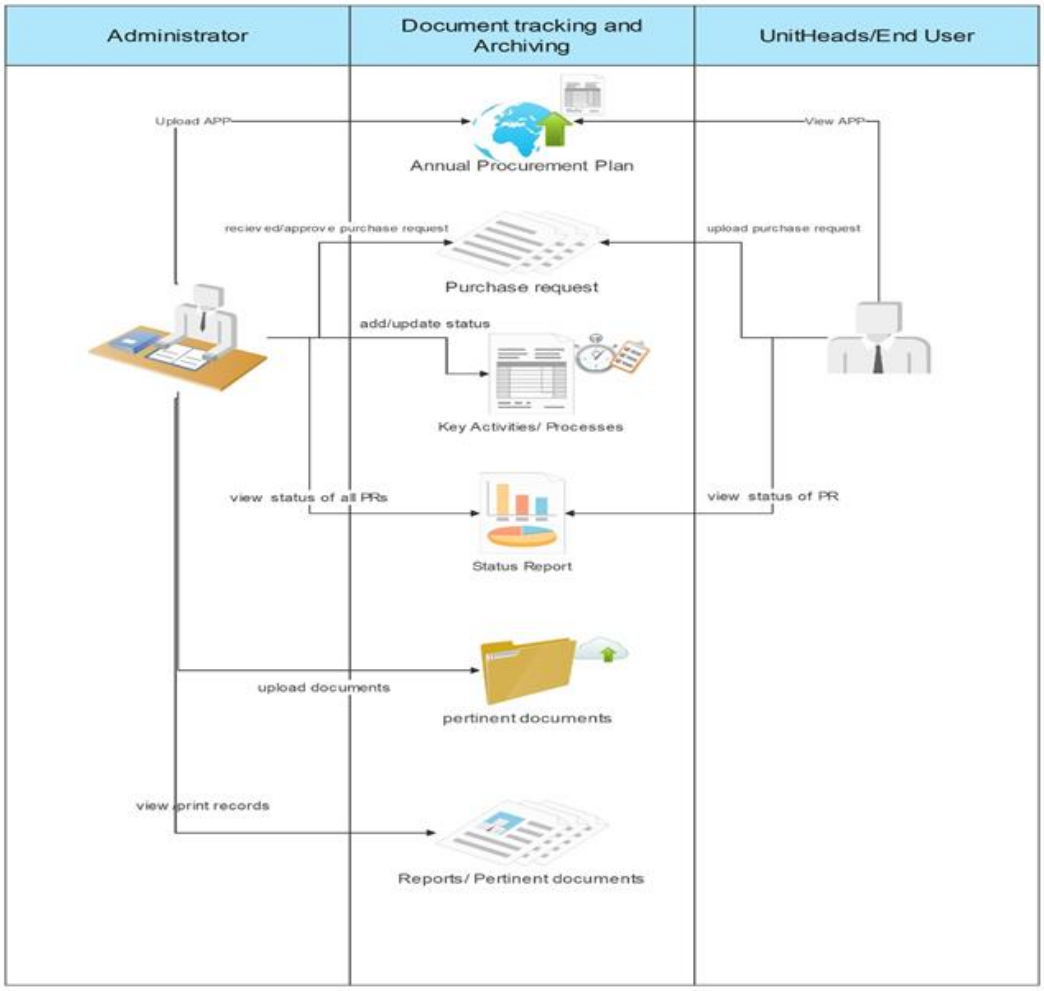

Figure 3:Use Case Diagram (To be process)

To Be Process

RESULTS AND DISCUSSIONS

Login Form

Upon launching the system, users are presented with a secure login interface that requires valid credentials—specifically a username and password—to gain access to the system's features. The login mechanism includes a built-in security measure that automatically terminates the session after three consecutive failed login attempts. This security feature is designed to prevent unauthorized access and protect sensitive procurement data. To continue, users must relaunch the application after such an event.

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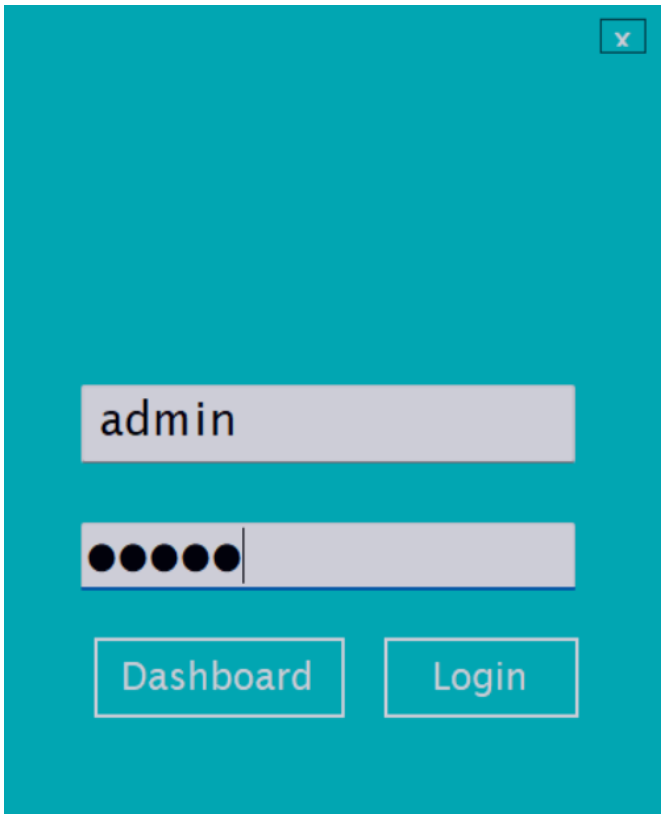

Figure 4:Login Form

Dashboard

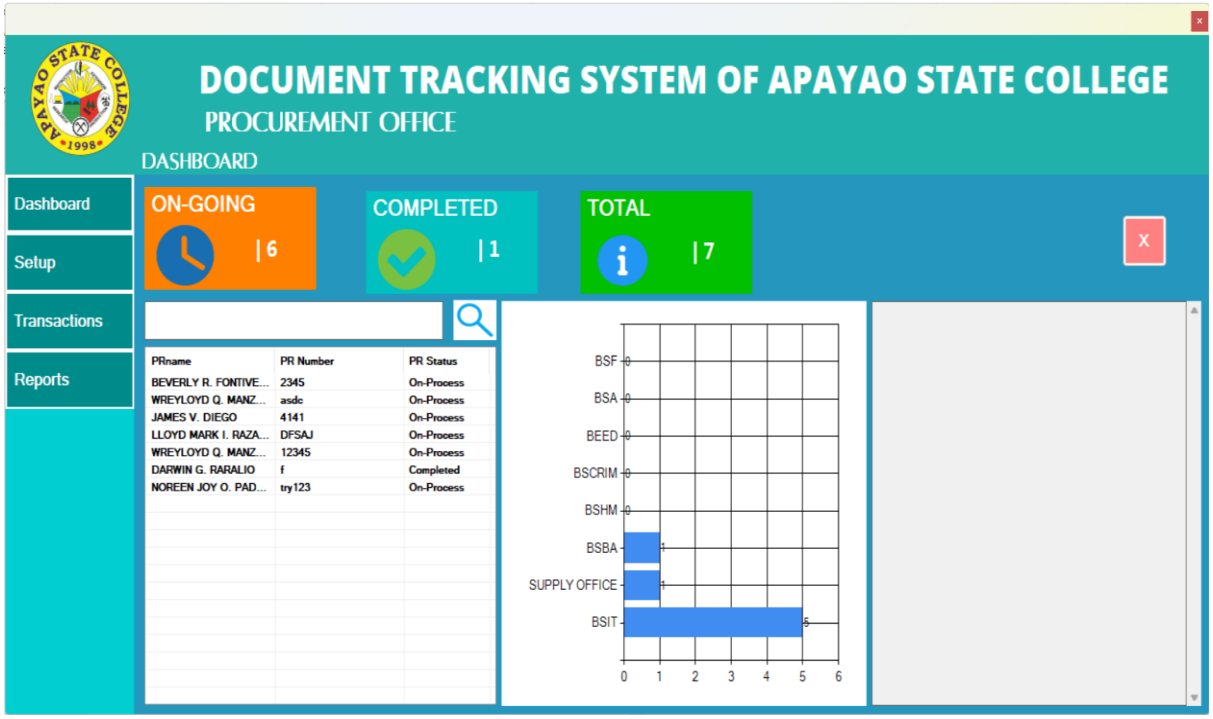

Figure 5:Dashboard Form

The Dashboard provides a centralized summary of key procurement activities within the system. It displays real-time counts of ongoing, completed, and total Purchase Requests (PRs), giving users a quick overview of transaction statuses. The interface also categorizes PRs by office, allowing users to track requests based on their source. Interactive elements enable users to click on specific PR categories to view detailed transaction histories and current progress.

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Employee Setup Form

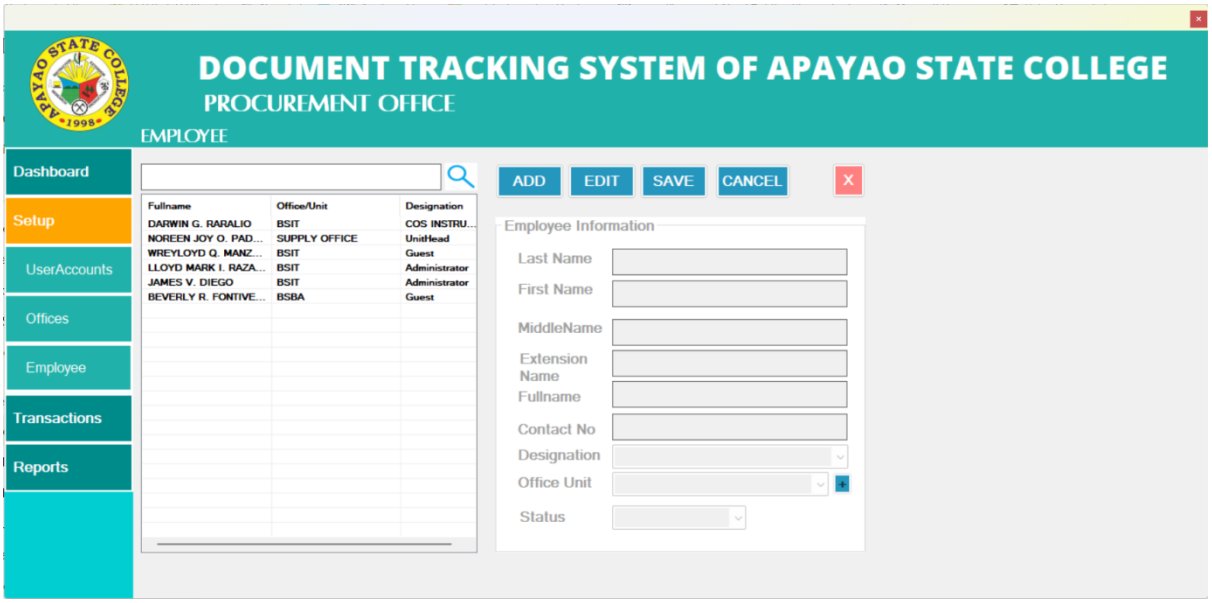

Figure 5:Employee Setup Form

Employee Setup Form is designed to manage and store essential personnel information required for processing procurement transactions. This module allows for the structured input and maintenance of employee data, ensuring that individuals involved in various stages of Purchase Request workflows are properly identified and linked to their respective roles. Accurate employee records contribute to improved accountability, traceability, and system-generated reports.

Purchase Request Form

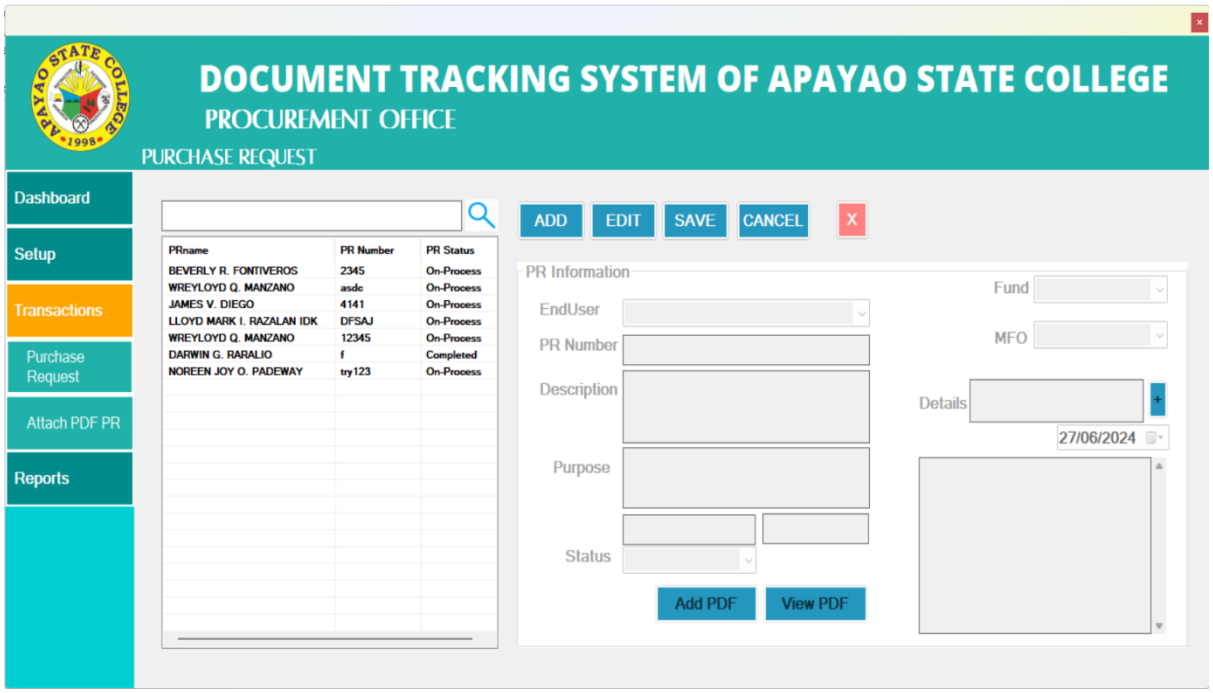

Figure 6:Purchase Request Form

The Purchase Request Form enables users to record approved Purchase Requests (PRs) into the system. It supports the attachment of related documents in PDF format, such as the original PR file and other relevant approvals. This form also functions as a digital log, automatically capturing real-time status updates as the PR progresses through various stages of the procurement workflow. This feature enhances transparency and facilitates efficient tracking of each request.

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Purchase Request Attachments Form

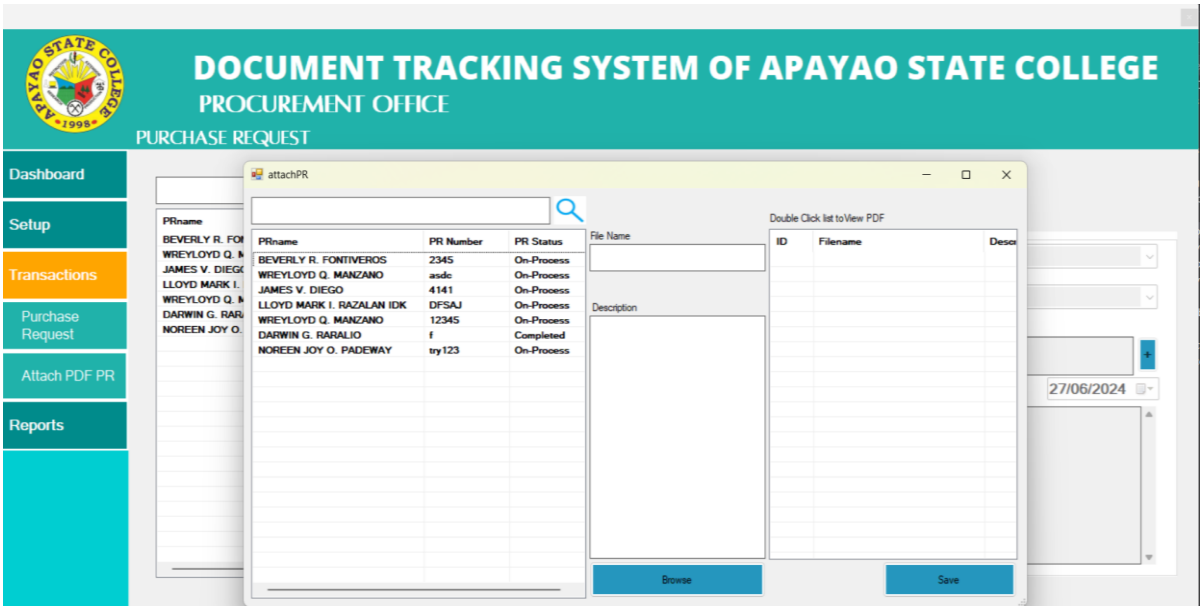

Figure 7:Purchase Request's Attachment Form

The Purchase Request Attachments Form allows users to upload and organize supplementary documents related to each Purchase Request, including Memoranda of Agreement (MOA), supplier quotations, and other supporting evidence. This module functions as a centralized digital repository, ensuring that all attachments are securely stored and easily retrievable. It supports efficient record-keeping and improves document accessibility during validation, auditing, or compliance checks.

PR List Form

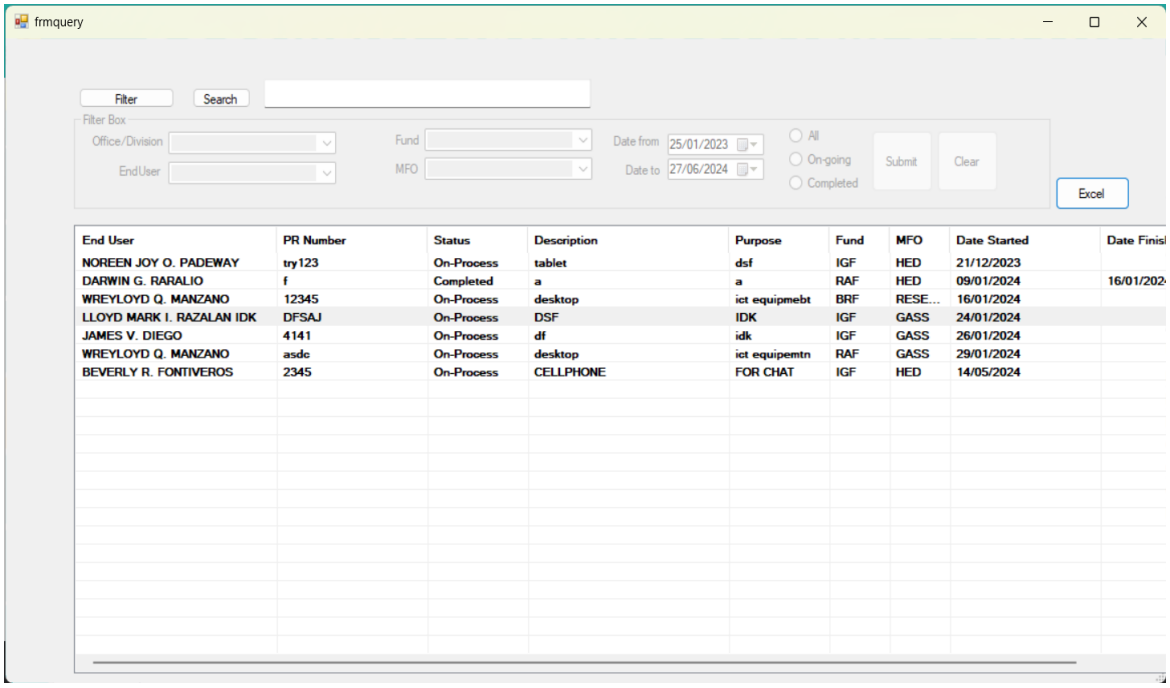

Figure 8:Purchase Request's List Form

The PR List Form displays a comprehensive record of all Purchase Requests (PRs) created within the system. It allows users to view, search, and filter PRs based on various parameters such as status, date, or originating office. To support documentation and reporting needs, the module includes an export-to-Excel feature, enabling users to generate structured reports for monitoring, evaluation, or audit purposes.

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Assessment Of The Manual Document Tracking System And E-Dts

Table 1: Wilcoxon Signed-Rank Test for Paired Samples

Groups	Count	Mean Rank	z-score	p-norm	p-value
Manual Tracking	31	4.00	4.7727*	0.0000	0.0000
DTAS	31	2.00			

*-significant at $\alpha = 0.05$

The foregoing result shows that manual tracking is significantly different than DTAS in terms of the assessment on the challenges at 95% confidence level since p-value (0.000) is less than margin of error (0.05). Hence, by the mean ranks, employees assessed and significantly agreed that manual tracking has more challenges than DTAS in terms of duration in processing documents, utilization of logbooks, time consumed, and in the generation and monitoring of reports.

According to the document processors, since the recording of their document details are done manually, thus, this consumed a lot of their time most especially they manage to update several monitoring tools in the form of logbook to track documents. In addition, during the utilization of manual transaction the formulation of the PR number consumed a lot of time because they need to search for the code of a specific file classification, transaction type, and document type through the distributed reference copy of the Records Section. Consequently, the last part of the PR which is the document number is being composed manually which led to inconsistencies of numbering especially to those offices with multiple document processors.

In some instances, the document processors' logbooks went missing led to challenging retrieval of document details, thus delaying the generation of their report. Also, same scenario happens when their monitoring tools in the form of Microsoft Office Excel experience corruption due to transferring of files from their endpoint to the file server or to their removable disks. Due to the missing scenarios of the monitoring tools, the repetition of the laborious and time-consuming procedures was manifested.

Determine the challenges in using the manual tracking and DTAS

Table 2: Frequency and Percentage of challenges faced using the Manual Tracking

Challenges	Frequency	Percentage	Rank
Took time to check and monitor status of document	22	44%	1
Hard to know the whereabouts of the document	7	14%	2
Misinputting of document details to logbooks	4	8%	3
Misplacement of Logbook	3	6%	4
Logbook is prone to damage	3	6%	4
Loss of document and no feedback	3	6%	4
Management of multiple logbooks	3	6%	4
Took time to generate PR no and chance of PR no duplication	2	4%	5
Cannot multi-task	1	2%	6

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Hard time in generating needed reports	1	2%	6
Additional supplies needed	1	2%	6
TOTAL	50	100%	

Table 2 shows that the top three (3) biggest challenges during the utilization of Logbook are the time in checking and monitoring of the status of document, difficulty of knowing the whereabouts of the document, and incorrect inputting of document details into the logbooks.

The respondents conveyed their hardship in checking the status of their respective documents. According to them, they need to call offices to follow up the status of a request or other documents which is in process leading to additional time involved for their document monitoring process. Consequently, the document processors have trouble of knowing the whereabouts of the document this is due to outdated series of events of the document trail. Furthermore, due to voluminous number of documents, manual inputting of document details without proper validation leads to having unintended input. In relation to this, if document tracking processes or tasks are not properly managed, this will become a problem (Estrera, 2017).

On the other hand, the least of the challenges are cannot multi-task, hard time in generating needed reports and additional supplies needed. According to the respondents, they need to multi-task most especially those who handle more than one section. They need to extend more time just to do usual monitoring and generation of needed reports. Also, other document processors manually do the checking of data needed to be inputted on their excel template, which is prone to error leading to repetitive tasks. Also, the more the documents the greater number of logbooks are needed to be purchased as well as to be safekept and monitored.

Table 3 Frequency and Percentage of challenges faced using the DTAS

Challenges	**Frequency**	**Percentage**	**Rank**
Intermittent Internet Connection	7	54%	1
Power Interruption	4	31%	2
Training for new end-user	2	15%	3
TOTAL	13	100%	

During the implementation of the DTAS there were uncontrollable events that were experienced which affected the usage of the system. The end-users experienced intermittent connection due to Internet Service Provider (ISP) issues; power interruption due to maintenance; and training for new end-user due to employee reassignment and resignation.

Overall, as presented in Tables 2 and 3 manual tracking poses more challenges than DTAS.

Extent of Compliance to ISO 25010

Table 4 The Extent of Compliance of the DTAS with ISO 25010 in terms of Functional Suitability Standards.

Mean Indicators	**Mean**	**Descriptive Interpretation**
Functional Completeness	4.81	Very Great Extent
Functional Correctness	4.68	Very Great Extent
Functional Appropriateness	4.74	Very Great Extent
Category Mean	4.74	Very Great Extent

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue VII July 2025

It can be seen in the table above that the functional completeness has the highest numerical value with a mean of 4.81 and a descriptive interpretation of "Very Great Extent". This result is followed by functional appropriateness with a mean of 4.74 and a descriptive interpretation of "Very Great Extent", while the functional correctness has the least mean (4.68) with a descriptive interpretation of "Very Great Extent".

The overall weighted mean on the extent of compliance of the developed system with ISO 25010 on functional sustainability is 4.74 with a descriptive interpretation of "Very Great Extent". Thus, the tasks needed to be accomplished by the system were attained.

Table 5: The Extent of Compliance of the DTAS with ISO 25010 in terms of Performance Efficiency Standards.

Mean Indicators	**Mean**	**Descriptive Interpretation**
Time Behaviour	4.61	Very Great Extent
Resource Utilization	4.65	Very Great Extent
Capacity	4.74	Very Great Extent
Category Mean	4.67	Very Great Extent

In terms of the extent of DTAS' compliance with ISO 25010, the foregoing table shows that its capacity has the highest numerical value with a mean of 4.74 and a descriptive interpretation of "Very Great Extent". This is followed by the Resource Utilization with a mean of 4.65 and a descriptive interpretation of "Very Great Extent", while Time Behavior has the least mean (4.61) with a descriptive interpretation of "Very Great Extent".

The overall mean on the extent of compliance of the developed system with ISO 25010 on performance efficiency is 4.67 with a descriptive interpretation of "Very Great Extent". This proves that the DTAS conforms to the required system parameters.

Table 6. The Extent of Compliance of the DTASwith ISO 25010 in terms of Compatibility Standards.

Mean Indicators	**Mean**	**Descriptive Interpretation**
Co-existence	4.68	Very Great Extent
Interoperability	4.68	Very Great Extent
Category Mean	4.68	Very Great Extent

As presented in Table 6, the system's co-existence and interoperability have a mean of 4.68 and a descriptive interpretation of "Very Great Extent".

The overall category mean on the extent of compliance of the system with ISO 25010 in terms of compatibility is 4.68 with a descriptive interpretation of "Very Great Extent". This denotes that the DTAS performed the required functions as to the sharing of the same hardware or software environment.

Table 7: The Extent of Compliance of the DTAS to ISO 25010 in terms of Usability Standards.

Mean Indicators	**Mean**	**Descriptive Interpretation**
Appropriateness Recognizability	4.68	Very Great Extent

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Learnability	4.84	Very Great Extent
Operability	4.81	Very Great Extent
User Error Protection	4.65	Very Great Extent
User Interface Aesthetics	4.81	Very Great Extent
Accessibility	4.81	Very Great Extent
Category Mean	4.76	Very Great Extent

Table 7 shows that in terms of usability standards, the system's learnability has the highest numerical value with a mean of 4.84 and a descriptive interpretation of "Very Great Extent", which is followed by operability, user interface aesthetics, and accessibility with a mean of 4.81 and a descriptive interpretation of "Very Great Extent".

On the other hand, the system's user error protection has the lowest mean (4.65) with descriptive interpretation of "Very Great Extent". Overall, the category mean on the extent of compliance of the developed system with ISO 25010 on usability is 4.76 with a descriptive interpretation of "Very Great Extent". This signifies that the DTAS specific objectives were achieved with effectiveness, efficiency, and satisfaction.

Table 8: The Extent of Compliance of the DTAS to ISO 25010 in terms of Reliability Standards.

Mean Indicators	**Mean**	**Descriptive Interpretation**
Maturity	4.81	Very Great Extent
Availability	4.77	Very Great Extent
Fault Tolerance	4.77	Very Great Extent
Recoverability	4.74	Very Great Extent
Category Mean	4.77	Very Great Extent

It can be seen in the table above that in terms of the system's compliance with reliability standards, its maturity has the highest numerical value with a mean of 4.81 and a descriptive interpretation of "Very Great Extent", which is followed by availability and fault tolerance with a mean of 4.77 and descriptive interpretation of "Very Great Extent". Recoverability has the lowest mean (4.74) with a descriptive interpretation of "Very Great Extent".

The overall category mean on the extent of the system's compliance with ISO 25010 on reliability standards is 4.77 with a descriptive interpretation of "Very Great Extent". This result signifies that the DTAS performs well to specified functions under specified conditions.

Table 9: The Extent of Compliance of the DTAS to ISO 25010 in terms of Security Standards.

Mean Indicators	**Mean**	**Descriptive Interpretation**
Confidentiality	4.74	Very Great Extent
Integrity	4.77	Very Great Extent
Non-repudiation	4.74	Very Great Extent

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Authenticity	4.84	Very Great Extent
Accountability	4.81	Very Great Extent
Category Mean	4.78	Very Great Extent

It can be seen on the above table that authenticity has the highest numerical value with a mean of 4.84 and a descriptive interpretation of "Very Great Extent". It is followed by accountability with a mean of 4.81, integrity with a mean of 4.77, confidentiality and non-repudiation with a mean of 4.74 and descriptive interpretation of "Very Great Extent". The overall category mean on the extent of compliance of the developed system to ISO 25010 on security is 4.78 with a descriptive interpretation of "Very Great Extent". This means that DTAS protects information and data security vulnerabilities.

Table 10: The Extent of Compliance of the DTAS with ISO 25010 in terms of Maintainability Standards.

Mean Indicators	**Mean**	**Descriptive Interpretation**
Modularity	4.71	Very Great Extent
Reusability	4.68	Very Great Extent
Analysability	4.74	Very Great Extent
Modifiability	4.71	Very Great Extent
Testability	4.74	Very Great Extent
Category Mean	4.72	Very Great Extent

With respect of the system's extent of compliance with ISO 25010 in terms of maintainability standards, Table 4.12 provides that analysability and testability have the highest numerical value with a mean of 4.74 and a descriptive interpretation of "Very Great Extent", which is followed by modularity and modifiability with a mean of 4.71 and descriptive interpretation of "Very Great Extent". Contrary wise, reusability has the lowest mean (4.68) with a descriptive interpretation of "Very Great Extent".

The overall category mean on the extent of compliance of the system with ISO 25010 in terms of maintainability is 4.72 with a descriptive interpretation of "Very Great Extent", which signifies that the DTAS is open for improvement and enhancement.

Table 11: The Extent of Compliance of the DTAS to ISO 25010 in terms of Portability Standards.

Mean Indicators	**Mean**	**Descriptive Interpretation**
Adaptability	4.68	Very Great Extent
Instability	4.68	Very Great Extent
Replaceability	4.45	Very Great Extent
Category Mean	4.60	Very Great Extent

As regards to the extent of the system's compliance in terms of portability standards, its adaptability and instability have the highest numerical value with a mean of 4.68 and a descriptive interpretation of "Very Great Extent, while system's replaceability has the lowest mean (4.45) with a descriptive interpretation of "Very Great Extent".

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The overall category mean on the extent of compliance of the system with ISO 25010 in terms of portability is 4.60 with a descriptive interpretation of "Very Great Extent". This signifies that the DTAS can perform with a minimum required hardware and software, and can be accessed through any web browser because of its conformity to browser compatibility.

Table 12: The Extent of Compliance of the DTAS to ISO 25010 Standards.

Mean Indicators	**Mean**	**Descriptive Interpretation**
Functionality Suitability	4.74	Very Great Extent
Performance Efficiency	4.67	Very Great Extent
Compatibility	4.68	Very Great Extent
Usability	4.76	Very Great Extent
Reliability	4.77	Very Great Extent
Security	4.78	Very Great Extent
Maintainability	4.72	Very Great Extent
Portability	4.60	Very Great Extent
Category Mean	4.72	Very Great Extent

The overall weighted mean of 4.72 or the results presented in the foregoing table indicates that the DTAS was found to be compliant to a very great extent to ISO 25010 or the Software Quality Standards, and to the technical needs of the users.

In particular, the security of the system has the highest weighted mean of 4.78, which denotes that information and data are protected against security vulnerabilities. This is manifested through the vulnerability assessment that the system had undergone. On the other note, the portability standard has the lowest weighted mean with 4.60. This is due to intermittent internet connection of the end-users.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The implementation of the Document Tracking and Archiving System has significantly improved document management within the organization by addressing inefficiencies associated with manual processes. Key features such as document upload, version control, access control, and robust search capabilities have streamlined operations and enhanced productivity. The system's adherence to usability, reliability, and maintainability standards underscores its effectiveness in meeting organizational needs for efficient and secure document handling.

Recommendations

To sustain these benefits and further enhance system performance, several recommendations are proposed. Firstly, provide ongoing user training and support to ensure all staff effectively utilize the system's features. Secondly, consider expanding the system's functionalities by integrating it with other organizational systems for seamless data exchange. Regular updates and maintenance should be scheduled to uphold system security and reliability. Implement advanced security measures like multi-factor authentication and encryption to safeguard sensitive documents. Establish a feedback mechanism for continuous improvement based on user feedback. Lastly, assess the system's scalability to accommodate future growth in document volume and user needs.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue VII July 2025

Implementing these recommendations will ensure the Document Tracking and Archiving System continues to optimize document management processes, supporting organizational efficiency and data security.

ACKNOWLEDGEMENT

The authors would like to express their gratitude to Apayao State College – Luna Procurement Office, Information Technology Department of Luna campus, Chief Executive office and Campus Administrator office of Luna Campus and Apayao State College administration for providing them the support, approval of the conduct of the research.

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