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Enhancing Office Efficiency: A Comprehensive Analysis of The Internetwork E-Office Transaction Management System

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Abstract – This paper assesses the effectiveness of the Internetwork E-Office Transaction Management System in modern office operations based on ISO/IEC 25010 quality standards. The system improves functionality, usability, and maintainability through centralized office tasks and automated processes with high scores. The research is quantitative-descriptive-evaluative in nature. It highlights areas of strength, such as reliability and security, and weaknesses in performance efficiency and non-repudiation in security. Data was visualized through heatmaps, bar charts, and radar charts using tools such as Python. Overall, the study puts emphasis on how the system has the potential to increase efficiency in operation and offers actionable insights that will be used to correct the identified weaknesses for continued excellence in managing transactions in an e-office.

Keywords – Internetwork, Quality Attributes, Software Quality, Document Management, ISO/IEC 25010

I. Introduction

Efficiency in office operations has become a core success factor in organizational performance in the age of digital transformation. The agile and effective workflows adopted for modern offices should adapt easily to evolutionary technologies and facilitate smooth transactions with proper efficiency. A key innovation that addresses such needs is the Internetwork E-Office Transaction Management System. By centralizing and automating the various office tasks, it reduces manual effort and increases precision and enhances productivity many-fold, setting standards beyond any operational excellence.

One of the main features of an electronic transaction management system is the robustness of its document management capabilities. Such functionality allows the user to efficiently store, organize, retrieve, and monitor digital documents in order to keep all critical information available and well maintained [4]-[6]. Documents are some of the most important assets for any organization since their content is the foundation for daily operations, informs strategic decisions, and provides regulatory compliance [12]. Effective document management not only stores a document but forms a structured system that makes work easier by facilitating access and increasing security [14],[15],[16]. More importantly, traceability is improved, and any organization can account for the histories of documents through this means; hence, this will ensure proper record-keeping for audit and legal purposes. A well-structured paper trail ensures streamlined workflows and minimizes error occurrences, bringing accountability to the organization. The organization, then, is made to work efficiently in a relatively smooth and ordered manner, lessening inefficiency and ensuring smoother collaboration. With state-of-the-art document management features included, an electronic transaction management system allows organizations to operate with much greater precision, reliability, and security, eventually driving overall productivity and success [7].

According to [1],[2],[3],[5] technology enables us to make use of the benefits and the limitless opportunities that the digital age offers. It also makes our lives easier and more pleasant than before. He addressed the six ways that technology enables you to move beyond paper, emphasizing how it improves data processing, organizational efficiency, and accessibility of data from any location at any time, while also enhancing productivity and minimizing expenses.

This paper aims to present an in-depth analysis on the performance, usability, security, and general effectiveness of the Internetwork E-Office Transaction Management System in modern office operations. An assessment of quality software characteristics will be conducted considering ISO/IEC 25010 quality standards. The ISO/IEC 25010 standard is part of the SQuaRE (Systems and software Quality Requirements and Evaluation) series, which aims to provide comprehensive quality measurement and evaluation for software products [8],[9],[10],[11],[13]. And through a comprehensive analysis of the strengths and weaknesses of the E-Office Transaction Management System, this paper aims to reveal those strengths and opportunities while pointing out the weaknesses and threats. Using the Python tool to generate such visualizations as heatmaps, bar charts, and radar graphs, it further presents a clear overview of how the system's performance will be exposed to different ISO/IEC 25010 quality dimensions.

Objectives of the Study

Generally, this study aimed to analyze the performance of the Internetwork E-Office Transaction Management System. Specifically, it aims:

- To evaluate the performance of the system in terms of functionality suitability, reliability, usability, performance efficiency, security, compatibility and maintainability.

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- To Assess the quality attributes based on ISO/IEC 25010 standards.
- To analyze the key strengths and weaknesses of the E-Office Transaction Management System.

II. Methodology

Research Design

This article employs the quantitative-descriptive-evaluative research design to evaluate the multi-attribute performance of the system under review with reference to ISO/IEC 25010. The quantitative approach facilitates objective measurement based on each attribute with standardized metrics and on such a basis ensures precise, data-driven evaluation. The descriptive-evaluative research design should reasonably allow strength and weaknesses analysis of the system from preconceived standard points of reference.

Sampling and Data Collection

The data for this study was requested from a targeted sample of stakeholders who assessed system performance based on several quality attributes set standards by the system users, administrators, and developers. A survey was conducted in San Juan, Southern Leyte, with a mix of respondents: 18 barangay personnel consisting of two secretaries and one treasurer as end-users, 4 LGU municipal officers, and 5 IT experts. A set of structured questionnaires and surveys, designed according to the quality standards of ISO/IEC 25010, were distributed in order to collect quantitative ratings for each sub attribute. The number of samples to be collected was calculated using the expected rating variance with the aim of being able to statistically guarantee reliability in the outcomes.

ISO/IEC 25010 Quality Attribute Metrics

For all the quality attributes, there was an assessment using predetermined metrics from the ISO/IEC 25010 standards:

- The functionality of the system was judged by the metrics of appropriateness, correctness, and completeness to ensure that it would function in such a way that the proposed functions are correctly and fully achieved.
- Reliability metrics that should encompass recoverability, fault tolerance, availability and maturity: It ensured that the dependability and resilience of the system were captured.
- Usability covered the assessment of Accessibility, User Interface Aesthetics, Use Error Protection, Operability, Learnability and Appropriateness Recognizability, all which define usability and the simplicity with which interacting with the system can be done.
- The performance measures were mainly for the operative conditions that comprised measures for both capacity and resource utilization, as well as time behavior, towards the productivity assessment.
- Security concerns deal with matters to do with Authenticity, Accountability, Non-Repudiation, Integrity, and Confidentiality in that data and system integrity should be assured.
- Compatibility explained Interoperability and Co-existence, which analyze how the system can interact with any other applications.
- Maintenance metrics included Testability, Modifiability, Analyzability, Reusability, and Modularity that can be quantified to measure how easy it is for one to change and update the system.

Data Analysis and Visualization Techniques

For the interpretation of the collected data, statistical and visualization techniques appropriate use was done to explain the performance of the system over each of the quality attributes covered under ISO/IEC 25010.

Weighted Mean Calculations

In computing the aggregate scores for every sub-attribute, Weighted Mean Calculations provided a quantifiable assessment within each of the main categories. These are the results that would be very significant in finding out areas of strength and weaknesses of the system.

Bar Charts

Bar Charts have been prepared to represent the weighted average scores for every sub-attribute under each major quality attribute category. Each chart includes a column representing the main category that entails Compatibility Performance, Functionality Performance, Maintainability Performance, and so on.

Heatmaps

Heatmaps were created to indicate performance variation across all quality attributes in order to compare the system results fast and intuitively against each attribute standard.

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Radar Charts

Radar Charts were used for comparison across the ratings of the significant quality attributes to present an overview of the performance profile of the system.

Using data visualization methods, bar graphs, heatmaps, and radar chart. The study can give an in-depth graphical analysis of the quality attributes of the E-Office Transaction Management System. Each method offers distinct insights as stakeholders understand how the system performs based on the ISO/IEC 25010 Quality standards.

Tools and Software Used

Calculations, visualizations, and all the analysis were done using the powerful tool called Python. All the libraries used are Pandas and NumPy for handling data, and bar charts, heatmaps and radar charts were done using both Matplotlib and Seaborn. Visualization tools have allowed easy graphical expression of the data, so it therefore becomes easier to interpret and gain insights out of it.

Internetwork E-Office Transaction Management System Users

Figure 1 illustrates a web-based, centralized, hierarchical information system in which the data described below is administered via an Admin-related Web Server, connecting Admin, Barangay, and Municipal Users. Centralized Data Administration Any user who wants general system administration, including setting up authorization, checking data, and monitoring must log in as an Admin User. Meanwhile, Barangay Users enter localized data and conduct local data administration while Municipal Users pool and monitor regional-level data aggregation. The information system is efficient in information exchange, highly secure, and scalable with an access hierarchy for effective governance.

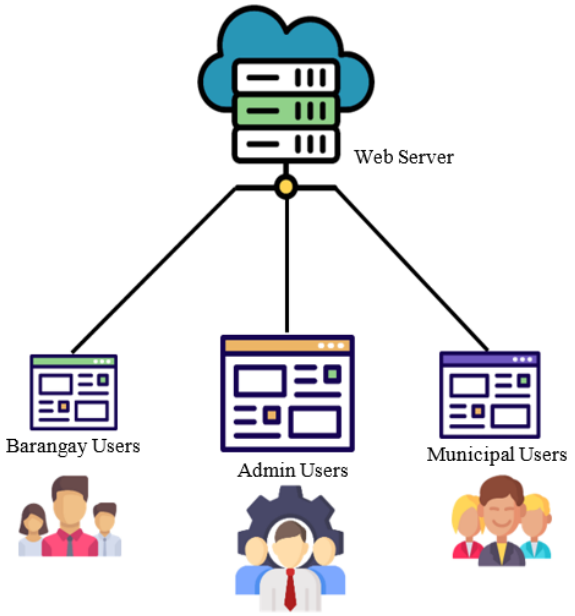

Figure 1.User Access Architecture for Internetwork E-Office Transaction Management System

III. Results and Discussion

Comparison with Existing Systems

In the current operational landscape of many barangays, particularly in San Juan, Southern Leyte, there is a noticeable absence of a formalized electronic transaction or document management system. Barangay-level offices primarily rely on manual, paper-based processes for managing records, issuing certifications, tracking transactions, and communicating with municipal-level units. This traditional approach often leads to inefficiencies, including delays in document retrieval, vulnerability to physical document loss or damage, redundant entries, and a lack of centralized data tracking or security. This research highlights the absence of a digital system as a critical gap in barangay administrative operations. Compared to the status quo, the proposed Internetwork E-Office Transaction Management System (IEOTMS) introduces a robust, web-based infrastructure with centralized data access, user-level permissions, and automated workflows. It significantly improves document traceability, data security, and interconnectivity between barangays and municipal offices.

When benchmarked against existing systems implemented in larger municipalities or private institutions, such as the FEDesk Document Management System at the University of Santo Tomas [7] or government-focused document systems discussed in [2]

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and [5], the IEOTMS shows comparable capabilities in document organization, data security, and multi-user support. However, unlike these systems that cater to larger organizational structures or academic environments, IEOTMS is tailored for grassroots governance units, with a simplified interface and resource-conscious performance suited for barangay-level deployment.

Furthermore, while existing systems like Malaysia's Digital Document Management Guidelines [6] emphasize extensive policy compliance and system integration at national levels, IEOTMS focuses on scalability from the bottom-up, enabling small administrative units to gradually modernize without overwhelming infrastructure or budget demands.

This comparison underscores the necessity of adopting such a system in barangay settings, not only to catch up with technological standards but also to enhance transparency, governance, and service delivery at the grassroots level.

Actual Internetwork E-Office Transaction Management System

Figure 2 illustrates the interface for the Transaction Management System that has been well designed so that it is user-friendly and easy to use. The Barangays Management view enables the administrators to add, edit, and delete records for barangay on one screen so that all information is directly reflected in a table format. The directory tree feature of the Document Repository interface makes handling of documents easier by allowing navigation to carry records.

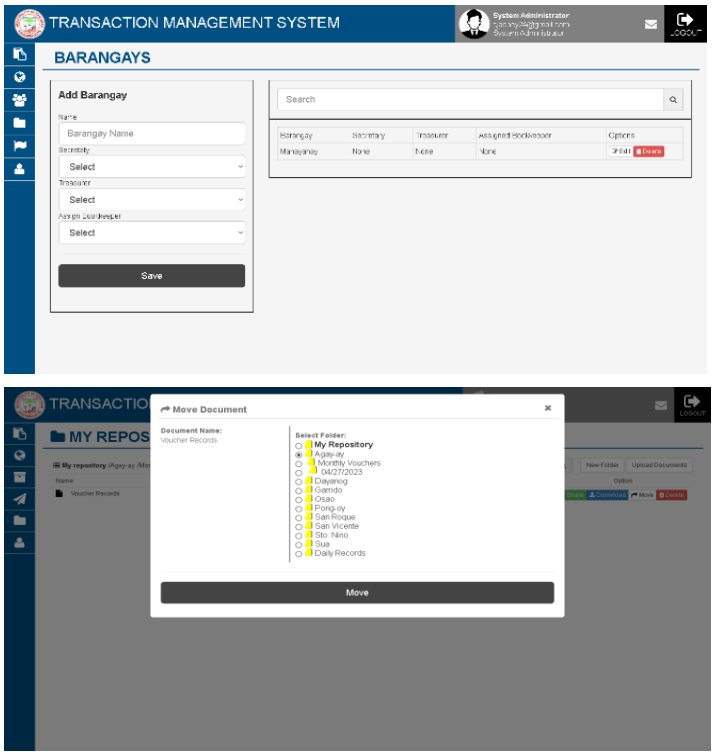

Figure 2. Sample Actual System Interface

Performance of the Internetwork E. Office Transactional Management System.

Figure 3 shows that the E-Office Transaction Management System is very good according to its quality evaluation level using the standards of ISO/IEC 25010. With respect to some high scores in Usability, Reliability, and Security, this system, with stress on accessibility, availability, and data confidentiality, is quite user-friendly and reliable. Within Functionality, high scores in Appropriateness and Completeness indicated that the system generally succeeds in fulfilling the intended purposes, though a slightly lower score in Correctness indicates that there are minor aspects of errors or inaccuracies in function performance. Performance Efficiency resulted in good Time Behavior with respect to response time but can improve resource utilization. Security-specific properties like Confidentiality and Integrity are quite well supported, which keeps the data under protection; non-repudiation can be further improved to make transaction verification more hardened. Maintainability scores are really high on Testability and Analyzability, which indicate that it can be easily tested for bugs and problems; however, a bit lower on Modifiability and Reusability, which provides room for improvement in adaptability as well as code reuse. All in all, it appears that a chart exhibits a balanced system closely aligned with the standards of ISO/IEC 25010 and identifies a few specific areas for focused improvement that would make the system even more optimally performative and functional.

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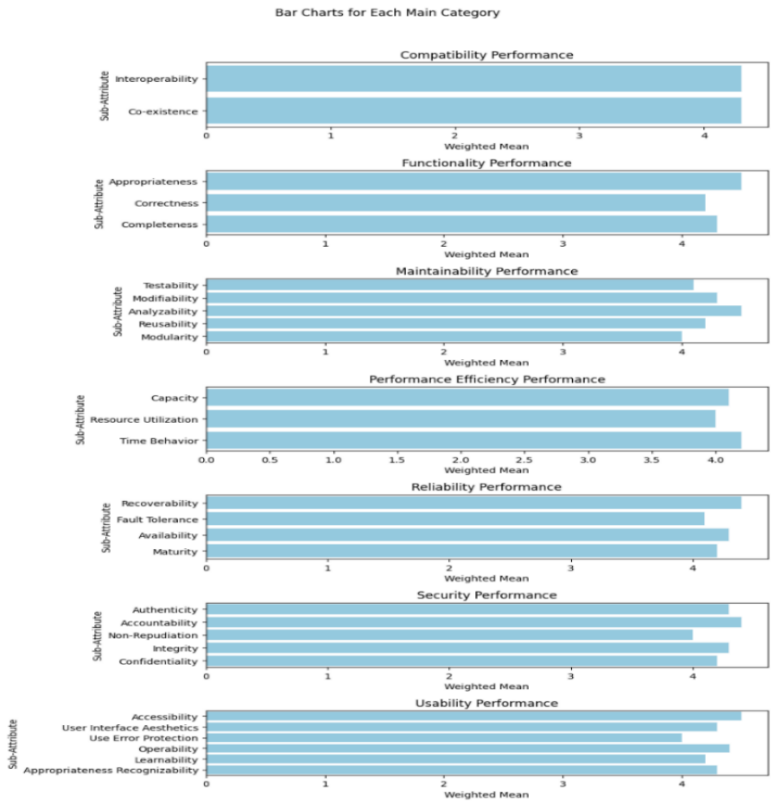

Figure 3. An Analysis of Weighted Mean Scores for Software Quality Attributes Across Different Performance Categories

Assessment of the quality attributes based on ISO/IEC 25010 standards.

Figure 4 shows the summary average quality ratings on the Internetwork E-Office Transaction Management System through a five-point scale. Attributes that scored the highest were Functionality, Usability, and Maintainability at 4.5, each of which shows functional efficiency, ease of use and ease of maintenance. Succeeding next at 4.4 are Reliability, Security, and Compatibility, showing dependable performance but are yet to be fully maximized. Performance Efficiency ranked the lowest with a score of 4.3 indicating some minor problems with performance in terms of speed and resource utilization with high transaction loads. Generally, the heatmap above indicates that the system has performed well in all the quality attributes to concur to ISO/IEC 25010 standards and will, therefore, support its effectiveness in office transaction management.

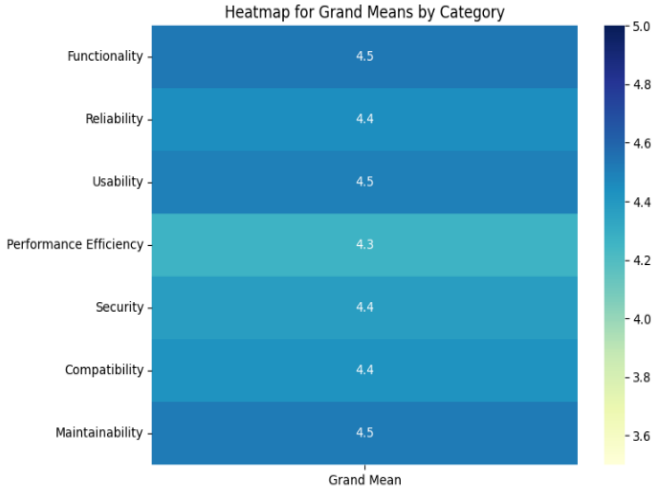

Figure 4. Heatmap for Grand Means by Category

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Strengths and weaknesses of the E-Office Transaction Management System

Figure 5 brings into view the performance of the Internetwork E-Office Transaction Management System in consideration of quality attributes by referencing ISO/IEC 25010 standards. The radar chart gives a sense of strength in the Usability and Reliability factors, indicating that the system is both friendly and reliable. Therefore, users are likely to find it easy to use with consistent performance. Such attributes boost excellent operations and user-friendly experience. But at the same time, it does show an area that needs to be improved-upon its Performance Efficiency and Security. Lower scores there indicate that there are probably problems involving slow processing speed and resource usage issues, which will affect system responsiveness, as well as its ability to run large volumes of transactions. The low score in Security indicates that the system may be vulnerable to cyber threats and, therefore, requires maximum enhancing measures for protection against sensitive data, and robust performance against attacks. Maintainability and Compatibility are rated moderately, meaning some forms of adaptability and manageability can be optimized further. In summary, this radar chart will give a more holistic view of system strength and weaknesses areas to guide the efforts of prioritizing improvement in efficiency, security, and compatibility toward the industry quality standard.

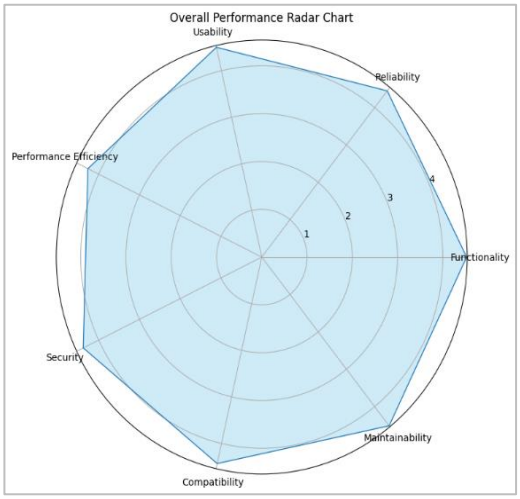

Figure 5. Overall Performance Radar Chart

IV. Conclusion

The Internetwork E-Office Transaction Management System is mostly compliant with the ISO/IEC 25010 quality standards, and its usability, functionality, and maintainability are quite strong. Though the system ensures effective transaction management, minor inadequacies in performance efficiency and some security features, such as non-repudiation, limit its complete potential. Its reliability and user-friendliness can be confirmed quantitatively. It is robust for the modern office. Gaps identified would be filled up for further solidifying its effectiveness and adaptability.

V. Recommendation

Resource utilization and response time should be optimized to maximize the performance efficiency of the system, especially at high transaction loads. Security must be enhanced by focusing on aspects such as non-repudiation and ensuring strong protection against potential cyber-attacks to ensure the integrity of the data and increase user confidence. Periodic review and updates following the changes in ISO/IEC standards would ensure the continuous effectiveness and dynamism of the system in dynamic office environments.

References

1. Livshits, I. I., Golovina, E. Yu., Lontsikh, N. P., Lontsikh, P. A., & Karaseva, V. A. (2023, December 15). Assessment of the Electronic Document Management System Availability based on In-House IT-Infrastructure. IEEE Explore; IEEE. https://doi.org/10.1109/ITQMTIS58985.2023.10346516
2. Adam, N. L., Akmal Hakim Che Mansor, M., Pauzi, M. F., & Cik Soh, S. (2022, May 1). Document and Event Record Management System: A Prototype. IEEE Xplore. https://doi.org/10.1109/ISCAIE54458.2022.9794525
3. Prebreza, B., Gotseva, D., & Nakov, P. (2021, October 1). A Study of Documents Management System Based on Web, Case Study: University. IEEE Xplore. https://doi.org/10.1109/%E2%84%A1ECOM53156.2021.9659663
4. Sagum, J. K. A. (2021, November 1). Web-Based Document Management System for PEP Squad Events and Marketing Services. IEEE Xplore. https://doi.org/10.1109/HNICEM54116.2021.9732033

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VII, July 2025

5. Ziemba, E., Papaj, T., & Descours, D. (2022). Critical Success Factors for Adopting Electronic Document Management Systems in Government Units. Computer Science and Information Systems (FedCSIS), 2019 Federated Conference On. https://doi.org/10.15439/2022f227
6. Ab Aziz, A., Mohammad Yusof, Z., Mokhtar, U. A., & Jambari, D. I. (2020). The Implementation Guidelines of Digital Document Management System for Malaysia Public Sector: Expert Review. International Journal on Advanced Science, Engineering and Information Technology, 10(1), 198. https://doi.org/10.18517/ijaseit.10.1.10443
7. Freo, G., Neil, C., Vincent, R., Jhynne, S., & Noel Espinola Estrella. (2023). FEDesk: A Web and Mobile Document Management System for the University of Santo Tomas Office for Faculty Evaluation and Development. https://doi.org/10.1145/3634814.3634823
8. N. A. Hasanah, S. Rochimah, and L. Atikah, "Functional Suitability Measurement Based on ISO/IEC 25010 for e-Commerce Website," Sep. 2020, pp. 70–75. doi: 10.1109/icitacee50144.2020.9239194
9. H. Nakai, N. Tsuda, K. Honda, H. Washizaki, and Y. Fukazawa, "Initial Framework for Software Quality Evaluation Based on ISO/IEC 25022 and ISO/IEC 25023," in 2016 IEEE International Conference on Software Quality, Reliability and Security Companion (QRS-C), Aug. 2016. doi: https://doi.org/10.1109/qrs-c.2016.66
10. "ISO/IEC/IEEE International Standard - Systems and software engineering--Content management for product life cycle, user and service management information for users," Mar. 2023, doi: https://doi.org/10.1109/ieeestd.2023.10085732
11. G. C. Falcon, R. Y. Saligue, and E. T. Saligue, "Optimizing User Interaction and Notification Efficiency in Smart Coin-Operated Printing Kiosk with Real-Time SMS Notifications and Interactive Features," International Journal of Latest Technology in Engineering Management & Applied Science, vol. 13, no. 7, pp. 181–189, Aug. 2024, doi: https://doi.org/10.51583/ijltemas.2024.130722
12. E. Rodríguez Torres, V. Sánchez Castillo, and C. A. Gómez Cano, "Management information systems and their impact on business decision making," Data and Metadata, vol. 1, p. 21, Dec. 2022, doi: 10.56294/dm202221
13. E. T. Saligue, R. Y. Saligue, and J. C. Agoylo, "Semi-Dynamic Mobile-Based Virtual Reality System for University," International Journal of Latest Technology in Engineering Management & Applied Science, vol. 13, no. 7, pp. 34–42, Jul. 2024, doi: https://doi.org/10.51583/ijltemas.2024.130705
14. E. R. Torres, C. Alberto, and V. S. Castillo, "Management information systems and their impact on business decision making," Data & Metadata, vol. 1, pp. 21–21, Dec. 2022, doi: https://doi.org/10.56294/dm202221
15. N. L. Adam, M. Akmal Hakim Che Mansor, M. F. Pauzi, and S. Cik Soh, "Document and Event Record Management System: A Prototype," IEEE Xplore, May 01, 2022. https://ieeexplore.ieee.org/document/9794525
16. Balansay, J. B. Bano, M. A. Bernales, M. G. Luchavez, and J. C. Agoylo Jr., "Development and Implementation of Automated Notarial Data Management System," SAR Journal - Science and Research, pp. 232–240, Sep. 2024, doi: https://doi.org/10.18421/sar73-09.