2nd INNOVEX 2026 - International Conference
Website:
ISBN: **-**

DEVELOPMENT AND IMPLEMENTATION OF AN AUTOMATED VEHICLE REGISTRATION AND GOVERNMENT PROPERTY INSURANCE MANAGEMENT SYSTEM FOR THE GENERAL SERVICES OFFICE OF OCCIDENTAL MINDORO

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ABSTRACT

The Automated Vehicle Registration and Government Property Insurance Management System was developed and implemented for the General Services Office of the Provincial Government of Occidental Mindoro to address inefficiencies in the manual management of government vehicles and properties. The existing process relied on spreadsheets and paper-based records, which often resulted in errors, delayed compliance, and challenges in monitoring vehicle registrations and insurance renewals. This study aimed to develop and implement a centralized system that would improve the management, monitoring, and processing of vehicle and property records. The study utilized a developmental research design that focused on the design and implementation of the Automated Vehicle Registration and Government Property Insurance Management System. This approach enabled the development of a system that addressed challenges in the existing manual process, improved data accuracy, enhanced record management, and streamlined the registration and monitoring of government-owned vehicles and insured properties. The developed system includes modules for vehicle and property management, document uploading, data importation, analysis functions, notifications, and report generation. The results indicated that the system demonstrated high performance across software quality characteristics based on the evaluation of respondents. The implementation of the system improved operational efficiency by reducing human errors, enhancing transparency, ensuring timely compliance, and providing real-time monitoring of records. The findings suggest that the system serves as a reliable and sustainable solution for automating vehicle registration and government property insurance management and may support future system enhancements and integrations.

Keywords*: Automated Vehicle Registration, Government Property Insurance, Information Management System, Record Monitoring, General Services Office*

1. INTRODUCTION

The Provincial Government of Occidental Mindoro, through its General Services Office (GSO), is responsible for maintaining and monitoring records related to vehicle registration and government property insurance. At present, the office relies on paper-based records and spreadsheet applications to document and monitor registration and insurance renewals. Although these methods have been used for record management, the increasing number of government-owned vehicles and properties has made the process more challenging. The existing manual process often leads to misplaced or duplicated records, data entry errors, formula-related spreadsheet errors, time-consuming document retrieval, and delays in monitoring renewal schedules. These challenges may affect operational efficiency and increase the risk of

non-compliance with government requirements.

This study is anchored on the principles of information systems and automation theory, which emphasize the use of technology to improve efficiency, accuracy, and accessibility in organizational processes. Information systems provide a structured framework for collecting, storing, processing, and managing information, while automation reduces repetitive tasks and minimizes the possibility of human error. Applying these concepts to government asset management can improve monitoring processes and support more efficient decision-making.

To address these challenges, this study proposes the development and implementation of an Automated Vehicle Registration and Government Property Insurance Management System for the General Services Office of the Provincial Government of Occidental Mindoro. The proposed system serves as a centralized platform for managing vehicle and property records while ensuring that information is securely stored and accessible only to authorized personnel. The system incorporates functionalities such as automated notifications for expiring registrations and insurance coverage, dashboard monitoring, document management, reporting tools, predictive analysis functions, data validation mechanisms, and enhanced search capabilities to improve accessibility and efficiency.

The primary objective of this study is to develop and implement an automated system that improves the management, monitoring, and processing of vehicle registration and government property insurance records. Specifically, the study aims to improve data accuracy, minimize human errors, streamline monitoring and reporting processes, support timely compliance with government requirements, and enhance operational efficiency. Through the implementation of the proposed system, the study seeks to provide a reliable and sustainable solution that strengthens transparency, accountability, and effective management of government-owned assets.

2. METHOD

The researchers employed a quantitative research approach to gather data relevant to the development and evaluation of the proposed Automated Vehicle Registration and Government Property Insurance Management System for the General Services Office (GSO) of the Provincial Government of Occidental Mindoro. Data were collected through a structured survey questionnaire administered to the authorized personnel of the GSO, who are directly involved in vehicle registration and government property insurance management.

The survey utilized a five-point Likert scale to evaluate the system in terms of usability, efficiency, accuracy, reliability, and user satisfaction. The responses gathered served as the primary data in determining whether the proposed system meets the requirements and expectations of the end-users.

The primary data of the study were obtained from the personnel of the General Services Office (GSO), while secondary data were gathered from existing documents, records, and workflow processes related to vehicle registration and property insurance management.

The study employed purposive sampling in selecting the respondents. A total of eleven (11) personnel from the GSO were chosen based on their involvement in the process. The respondents included both direct users and non-direct users of the system to ensure comprehensive evaluation.

The data collected were analyzed using descriptive statistical methods such as frequency distribution, percentage, weighted mean, and standard deviation to interpret the evaluation results of the system.

This expresses the proportion of respondents selecting a particular response relative to the total number of respondents.

The percentage was computed using the formula:

$$\text{Percentage} = \frac{f}{n} \times 100$$

Where:
f = frequency of the response
n = total number of respondents

The weighted mean summarizes the overall rating of survey items by assigning weights to each response category (Strongly Agree = 5, Agree = 4, Neutral = 3, Disagree = 2, Strongly Disagree = 1) and computing their average.

The weighted mean was computed using the formula:

$$WM = \frac{\sum(f \times w)}{n}$$

Where: f = frequency of each response category w = weight assigned to each category n = total number of respondents

Standard deviation is used to measure the variability or dispersion of respondents' answers from the mean. It indicates how closely the responses are clustered around the average value. A lower standard deviation signifies more consistent responses, while a higher value indicates greater variability.

The standard deviation was computed using the formula:

$$SD = \sqrt{\frac{\sum f(x - \bar{x})^2}{n}}$$

Where:
f = frequency of each response
x = numerical value of each response (1–5 scale)
x̄ = weighted mean
n = total number of responses

By using these statistical measures, the researchers were able to objectively interpret the survey results, determine the effectiveness and usability of the system, and assess whether it meets the expectations and requirements of the GSO personnel.

The following scale was used to interpret the computed standard deviation values:

Standard Deviation	Interpretation
0.00 - 0.50	Very Consistent
0.51 - 1.00	Consistent
Above 1.00	Not Consistent

Table 1. Standard Deviation Basis of Interpretation

The survey will utilize a 5-point Likert scale to measure user feedback, with the following interpretation:

Scale	Range	Interpretation
5	4.50 - 5.00	Strongly Agree
4	3.50 - 4.49	Agree
3	2.50 – 3.49	Neutral
2	1.50 – 2.49	Disagree
1	1.00 – 1.49	Strongly Disagree

Table 2. Likert Scale for System Evaluation

This presented the methodology used in the study, including the data collection techniques, data sources, sampling technique, and data analysis methods. It also discussed the statistical treatment of data and the interpretation of results using descriptive statistics such as frequency, percentage, weighted mean, and standard deviation. These methods ensured that the evaluation of the proposed system was conducted in a systematic, objective, and quantitative manner.

3. RESULT AND DISCUSSION

Criteria	Mean	Interpretation
Functional Stability	4.73	Strongly Agree
Performance Efficiency	4.82	Strongly Agree
Compatibility	4.51	Strongly Agree
Interaction Capability	4.78	Strongly Agree
Reliability	4.75	Strongly Agree
Security	4.66	Strongly Agree
Maintainability	4.78	Strongly Agree
Flexibility	4.82	Strongly Agree
Safety	4.76	Strongly Agree

Table 3. Summary Questionnaire Results Per Criteria - Table

The survey results demonstrate that the developed system was highly rated by the respondents across all software quality characteristics based on the ISO/IEC 25010 model. All criteria received an overall mean above 4.5, with Strongly Agree as the interpretation. This indicates that the system is functional, efficient, compatible, user-friendly, reliable, secure, maintainable, flexible, and safe.

The respondents from the GSO department confirmed that the system effectively supports their operations while ensuring stability, security, and adaptability. These results validate the system's quality and suitability for deployment within the organization.

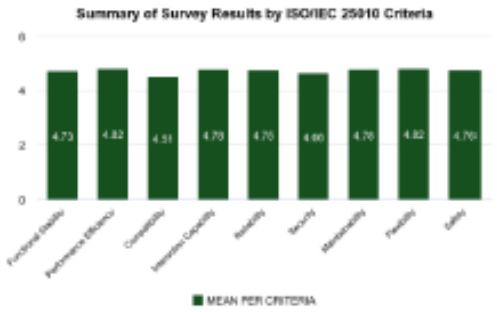


Figure 1. Summary Questionnaire Results Per Criteria - Bar Graph

This figure shows the summary results per criteria from the survey. This shows that the system is highly qualified to be deployed and used by the department.

To determine the consistency of the respondents' evaluations, the standard deviation was computed for each software quality criterion.

Criteria	Mean	Interpretation
Functional Stability	0.45	Very Consistent
Performance Efficiency	0.39	Very Consistent
Compatibility	0.66	Consistent
Interaction Capability	0.42	Very Consistent
Reliability	0.44	Very Consistent
Security	0.52	Consistent
Maintainability	0.42	Very Consistent
Flexibility	0.39	Very Consistent
Safety	0.43	Strongly Agree

Table 4. Standard Deviation Results Per Criteria

As shown in the table, the standard deviation values range from 0.39 to 0.66, indicating that the responses are closely clustered around the mean. Most of the criteria fall under the "Very Consistent" category, while Compatibility and Security are classified as "Consistent," suggesting minimal variation among responses. This implies that the respondents have similar perceptions regarding the system's performance and overall quality.

4. CONCLUSION

Based on the study's findings, the Automated Vehicle Registration and Government Property Insurance Management System successfully addressed the inefficiencies of the previous manual process. The system's centralized database ensures organized and accurate records for all government-owned vehicles and insured properties, while automated notifications prevent lapses in registration and insurance renewals.

The system incorporates several AI-assisted features, including import data validation to detect missing, duplicate, or invalid entries, a predictive module to forecast upcoming renewals and potential compliance issues, a chatbot for natural language navigation, voice search for hands-free queries, and a smart fuzzy search to retrieve relevant records even with typos or semantically related terms.

Survey feedback confirmed that the system meets high standards of software quality, being reliable, secure, maintainable, and user-friendly. Additionally, transparency and accountability are enhanced through secure user access and activity logs. Overall, the implementation of this system has improved operational efficiency, minimized human error, and provided a sustainable, AI-enhanced solution for the GSO in managing government vehicles and property insurance records.

Acknowledgements

The researchers would like to express their deepest gratitude to everyone who contributed to the successful completion of this capstone project.

First and foremost, the researchers thank the Lord for the strength, wisdom, and guidance that made this study possible.

The researchers would like to extend their sincere appreciation to their Capstone Adviser, Mr. Jerick M. Quintua, for his guidance, encouragement, and constructive suggestions throughout the development of this project. His expertise and continuous support greatly helped in the completion of this study.

Special thanks are also extended to Engr. Mar Christopher R. Pascua and the personnel of the General Services Office (GSO) of the Provincial Government of Occidental Mindoro for their cooperation, time, and assistance in providing the necessary information for the development and evaluation of the system.

The researchers would also like to acknowledge the panel members for their valuable comments, recommendations, and feedback, which significantly improved the quality of this capstone project.

Gratitude is also given to the professors who shared their knowledge and expertise, which greatly contributed to the researchers' academic development and ability to accomplish this project.

Lastly, the researchers would like to express their heartfelt appreciation to their families for their unwavering support, encouragement, and motivation throughout the completion of this capstone project.

To everyone who contributed in one way or another to the success of this study, the researchers extend their deepest gratitude.

References

[1] L. Benarous, B. Kadri, A. Bouridane, and E. Benkhelifa, "Blockchain-based forgery resilient vehicle registration system," Transactions on Emerging Telecommunications Technologies, vol. 32, no. 5, e4237, 2021. https://doi.org/10.1002/ett.4237

[2] X. Chen and Y. Zhang, "Digital platforms for government property insurance management," Government Information Quarterly, vol. 37, no. 4, 101513, 2020. https://doi.org/10.1016/j.giq.2020.101513

[3] Government Service Insurance System, "GSIS launches new digital tool to enhance government property management," 2024. https://www.gsis.gov.ph/2024/05/20/gsis-launches-new-digital-tool-to-enhance-government-property-management/

[4] J. J. Juliano, R. P. Santos, and A. L. Cruz, "Automated vehicle access control system utilizing computer vision-based license plate recognition," International Journal of Multidisciplinary Applied Business and Engineering Research, 2025. https://doi.org/10.11594/ijmaber.06.04.27

[5] A. Kadams and A. Adejumo, "The impact of automated online vehicle registration system on vehicle documentation and tax compliance in Taraba State of Nigeria," International Journal of Digital Management, 2024. https://ijdm.org.ng/index.php/Journals/article/view/11

[6] F. Khan and Y. Li, "Information systems for property and asset management: A systematic review," International Journal of Information Management, vol. 58, 102335, 2021. https://doi.org/10.1016/j.ijinfomgt.2021.102335

[7] I. Nurfi, Y. S. J. Nasution, and N. F. A. Hasibuan, "Analysis of regional asset management information system application for Medan City Library assets and archive services," Ilomata International Journal of Management, vol. 5, no. 4, pp. 1100–1121, 2024. https://www.ilomata.org/index.php/ijjm/article/download/1260/690/

[8] M. Oloyede, T. Adewale, and S. Bello, "Design of a web-based vehicle registration system using QR code," International Journal of Information Science and Technology, 2024. https://journals.ui.edu.ng/index.php/uijslictr/article/view/1359

[9] J. F. C. Saldaña et al., "Vehicle license plate recognition system with artificial intelligence for the detection of alerted vehicles at the National University of Ucayali," Data and Metadata, vol. 3, p. 293, 2024. https://dm.ageditor.ar/index.php/dm/article/view/307

[10] S. J. M. R. Schulz, V. A. Montalbo III, A. C. Dua Jr., and R. S. Pangantihon Jr., "Automated parking management and monitoring system through plate number detection using image processing," International Journal of Advanced Trends in Computer Science and Engineering, vol. 9, no. 5, 2020. https://www.warse.org/IJATCSE/static/pdf/file/ijatcse318952020.pdf

[11] M. Thammarak, S. Chaiyawan, and P. Phunphakdee, "Automated data digitization system for vehicle registration certificates using Google Cloud Vision API," Civil Engineering Journal, vol. 8, no. 11, pp. 3778–3787, 2022. https://www.civilejournal.org/index.php/cej/article/view/3778

[12] A. S. Yadav et al., "Blockchain-based secure privacy-preserving vehicle accident and insurance registration," Expert Systems with Applications, 120651, 2023. https://doi.org/10.1016/j.eswa.2023.120651

[13] ISO/IEC 25010:2011, Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — System and software quality models, International Organization for Standardization, 2011. https://www.iso.org/standard/35733.htm