

Web-based Record Management System with Data Visualization using Google Data Studio and Zapier Automation for Sangguniang Kabataan (SK)

Aljon C. Fernando

Department of Information Technology, College of Computing and Information Sciences, Caraga State University

Joko J. Saco

Department of Information Technology, College of Computing and Information Sciences, Caraga State University

Kent Lawrence Almar G. Samson

Department of Information Technology, College of Computing and Information Sciences, Caraga State University

Elbert S. Moyon

Department of Information Technology, College of Computing and Information Sciences, Caraga State University

他

<https://doi.org/10.5109/7395691>

出版情報 : Proceedings of International Exchange and Innovation Conference on Engineering & Sciences (IEICES). 11, pp.1388-1394, 2025-10-30. International Exchange and Innovation Conference on Engineering & Sciences

バージョン :

権利関係 : Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International



Web-based Record Management System with Data Visualization using Google Data Studio and Zapier Automation for Sangguniang Kabataan (SK)

Aljon C. Fernando¹, Joko J. Saco², Kent Lawrence Almar G. Samson³, Elbert S. Moyon⁴, Jayson C. Dollete⁵
Department of Information Technology, College of Computing and Information Sciences, Caraga State University,
Butuan City, Philippines.

aljon.fernando@carsu.edu.ph; joko.saco@carsu.edu.ph; kentlawrencealmar.samson@carsu.edu.ph;
esmoyon@carsu.edu.ph; jcdollete@carsu.edu.ph;

Abstract: *This study presents a web-based record management system designed to modernize youth governance operations in Barangay Cabcabon's Sangguniang Kabataan (SK). The system addresses inefficiencies in manual recordkeeping by implementing centralized digital tracking of youth profiles and project proposals. Key features include role-based access, real-time data visualization via Looker Studio, and automation of Google Forms submissions through Zapier. The backend uses Laravel with a React.js frontend and MySQL database. SMS alerts are integrated using IPROG SMS API. The System Usability Scale (SUS) score of 79.375 indicates a positive user experience. This system serves as a model for scalable youth governance solutions at the barangay level.*

Keywords: Record Management; Youth Profiling; Data Visualization; Zapier; Google Data Studio

1. INTRODUCTION

In grassroots governance, effective youth engagement is anchored on well-maintained and accessible records that inform program planning, resource allocation, and community responsiveness. In Barangay Cabcabon, however, the Sangguniang Kabataan (SK) still relies on paper-based systems such as handwritten logs and physical files. These outdated methods hinder transparency, data reliability, and administrative efficiency. Palangdao [1] noted that traditional recordkeeping methods are prone to human error, misplacement, and inconsistencies, making it difficult to preserve accurate and up-to-date youth information. Consequently, gaps often occur in tracking project progression, evaluating outcomes, and aligning initiatives with actual community needs.

The Philippine Statistics Authority[2] emphasized that manual tracking systems frequently fail to reflect real-time changes in youth demographics, such as migration or changes in educational status. This leads to reactive rather than proactive planning—where scholarships may be allocated to oversubscribed programs, even as a greater need exists for vocational or skills development training. Jacobe [3], [4] and Villones [11] further highlight the negative effects of fragmented data systems during leadership transitions, which can disrupt continuity in program delivery and data management.

Several studies support the integration of digital systems in local governance. For example, Korea's transition from U-city to smart city in Songdo highlights how infrastructure-centric projects must evolve into service-driven, citizen-responsive platforms to sustain innovation and governance impact [22]. Antonio[5] [2] demonstrated how a web-based crime monitoring module improved documentation and transparency in barangay justice systems. Alegado et al. [3] validated the effectiveness of centralized record systems in institutional environments through a counseling management system. These findings align with Villacis' [15] work on the benefits of web-based access in

Ecuador, which showcased enhanced youth engagement, information-sharing, and decision-making in local governance contexts.

In response to these challenges, this study proposes the development of a web-based Record Management System (RMS) tailored for the operations of SK Cabcabon. The system is designed to digitize and centralize youth profiles and project records, thereby enhancing the accessibility, accuracy, and responsiveness of the SK's data management practices. The system incorporates automation using Zapier, which facilitates seamless data flow from Google Forms to Google Sheets. This eliminates redundant tasks and ensures real-time updates. Brown [4] and Brückmann [18] observed that automation tools like Zapier significantly improve workflow efficiency and system integration, while Usmani [5] and Machado [19] confirmed similar benefits in educational and prototyping settings.

In addition to automation, the RMS integrates Google Data Studio to visualize project and demographic data through interactive dashboards. Lindquist [16] and Zhiveng [8] emphasized the role of visual data in enhancing transparency, accountability, and participatory governance. Snipes [6] and Apriani [7] noted the platform's capability to handle multi-source datasets and improve decision-making at the local level. Azis et al. [1] also applied Google Data Studio to tourism data analysis, demonstrating its value in identifying trends and informing policy — a methodology adapted for the SK RMS.

Furthermore, the system incorporates SMS-based notifications through the IPROG API to inform users about the status of their submissions, profile updates, and project feedback. This fosters transparency and real-time engagement with constituents. Rellon, Ekhsan, and Osman [12][13][14] validated the use of SMS technologies in academic and monitoring systems, citing improved communication and user satisfaction.

This project builds upon the substantial body of literature that advocates for digital transformation in local government operations. As shown by Azis et al. [1] and Alegado et al. [3], web-based platforms contribute to administrative productivity, participatory governance, and long-term strategic planning. By combining record digitization, automation, data visualization, and SMS alerts, the proposed RMS offers a replicable and scalable solution that can serve not only SK Cabcabon but other youth organizations aiming to modernize their governance frameworks.

2. METHODOLOGY

The system's design is based on a prototype form approach, utilizing stakeholder input collected through interviews. This project's backend is built on Laravel, while React.js is used for the frontend, and MySQL serves for data storage. Additionally, it connects with Google Forms and Zapier for data automation, Looker Studio for data visualization, and IPROG SMS API for real-time text messages. To evaluate the system's functionality, efficiency and user friendliness, the System Usability Scale (SUS) was administered—measuring overall effectiveness.

2.1 Research Design

This study utilizes a developmental research design within the context of constructing and assessing a specific web-based system intended for the Sangguniang Kabataan's operational needs. The design phase starts with gathering the user and system requirements, creating a working prototype, and iterating through system enhancements based on feedback. The outcome not only responds directly but addresses the relevant gaps within the SK's record management and communication system responsive design.

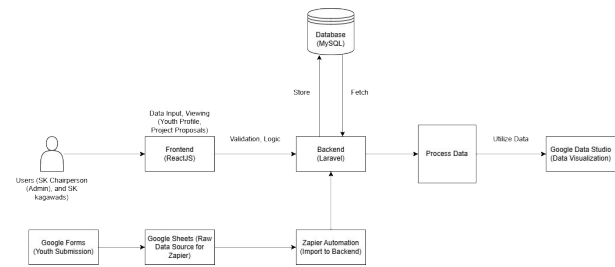


Fig. 1. Conceptual Framework

The figure illustrates a concept flow of the system. The Record Management System (RMS) is equipped with a frontend that allows SK officials and other relevant personnel to login and manage their data. In addition, information submitted by the youths is brought over using Google Forms and Zapier. As part of the data processing workflow, the system receives incoming data, validates it, and subsequently stores it in the database. The data is then processed and utilized in Google Data Studio to create interactive dashboards which SK officials can use to monitor programs, thereby improving information flow within the organization and fostering transparency.

2.2 Workflow Automation with Zapier

Zapier was used to automate workflows—specifically, importing data from Google Sheets and Google Forms into the system. This eliminated the need for manual data entry and reduced errors. Two Zapier “Zaps” were configured: one for bulk uploading records from spreadsheets, and another for real-time updates from submitted Google Forms. Data was validated during the automation process to ensure integrity.

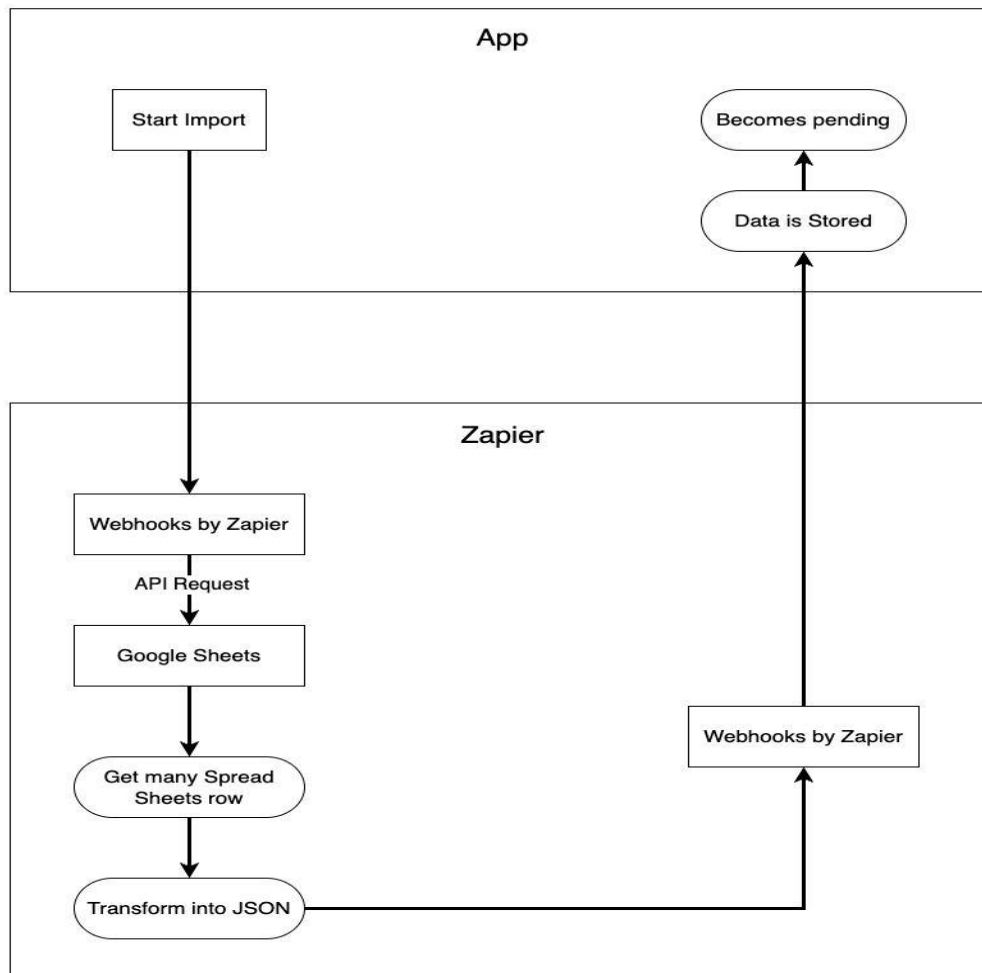


Fig. 2. Import of Existing Records using Zapier

This process flow shows how an admin can bulk import youth records from Google Sheets into the system using the "Import" button. A webhook triggers Zapier to fetch and convert the data into JSON, which is then stored in the system and marked as "pending" for review. This simplifies the import of large datasets without requiring technical expertise.

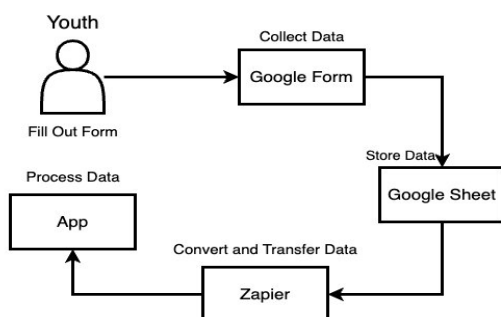


Fig. 3. Youth-Submitted Data Zapier Integration

This process flow describes the automation of youth-submitted information from Google Forms into the Record Management System. Youth participants fill out a Google Form designed to collect essential data. Their responses are automatically stored in a connected Google Sheet. Zapier monitors the Google Sheet for new entries, processes the newly added rows, and transfers the data into the system's database.

2.3 Data Visualization using Google Data Studio

Visualization was another core component. SQL views have been used to construct dashboards on Looker Studio (formerly Google Data Studio). These dashboards provided SK officials with visuals on performance metrics, displaying analytics such as youth demographics and project statuses.

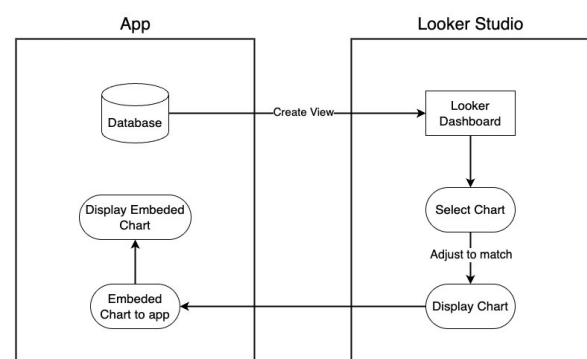


Fig. 4. Looker Studio Integration

The integration of the Record Management System with Looker Studio provides SK officials loaded views of real-time data visualizations within the application environment. Bespoke data source is mapped to Looker Studio where custom-defined charts and graphs are tailored based on SK reporting specifications. These components are then reinserted into the system, permitting users to operate on dashboards which offer data on youth profiles, project proposals and budget expenditures. This configuration fosters enhanced

transparency and facilitates more data-driven and evidence-based decisions.

2.4 User Interface and Modeling

All interface layout and flow considerations were refined based on comprehensive user behavioral studies and feedback from various stakeholders. For better user experience and access refinement from both an administrative and a general user perspective, several internal review sessions and informal walkthroughs with SK officials were held, helping address accessibility issues for all users. These sessions identified several concerns dealing with the placement of information, the flow of navigation, and button reachability. Thus, enhancements were made during the design phase to better facilitate interaction.

To design the structural database and user interactions with system features, Entity Relationship Diagrams (ERDs) alongside UML Use Case diagrams were generated. These visual models were indispensable in describing system processes while associating illogical data relationships, including interactions between youth profiles, proposals, and user roles within the system. They also validated that all functionalities of the system were in alignment with the actual workflows of the SK officials.



Fig. 5. Use Case Diagram of the System

The admin (SK Chairperson) can log in securely and access the main dashboard, which serves as the central hub for system functions. Admins can add, update, view, and delete youth profiles, ensuring accurate and up-to-date records. They can also create, review, approve, reject, or revise project proposals. Additionally, admins manage user accounts by creating users, assigning roles, resetting passwords, and deactivating accounts when needed. Admins have full access to Looker Studio dashboards embedded in the system and can initiate bulk data import via Zapier, pulling youth data from Google Sheets to support automated visual reporting and reduce manual work.

Regular users, such as SK Kagawads, the SK Secretary, and the SK Treasurer, can log in and access a simplified

dashboard. They are allowed to add and view youth profiles and submit project proposals for admin review. While they cannot manage other users or data, they can view selected Looker Studio charts. Some users, particularly youth participants, may also submit their data via Google Forms, which is later imported by the admin using Zapier.

2.5 System Usability Testing

System usability was evaluated using the System Usability Scale (SUS), to assess real-world user satisfaction and experience—validating its relevance in usability testing of grassroots-oriented systems like the one developed for SK [23]. A standardized 10-question tool designed to measure perceived ease of use and user satisfaction. Eight participants from the SK composed of the chairperson and kagawads were asked to interact with the system and then respond to the SUS questionnaire. The results were averaged in order to compute the overall usability score which is a quantitative metric from the users' point of view, measuring how usable and accessible the system is.

With regards to this particular case study, the system design methodology used guaranteed that not only was the system technically functional, but that it also aligned with the real-life working conditions and the system's users from SK. Addressing usability needs along with automation and enhancing the system's data responsiveness results in a solution aimed at overcoming the local youth governance problem.

Table 1. Descriptive Range of System Usability Scale

SUS Score	Grade	Adjective Rating
>80.3	A	Excellent
68 - 80.3	B	Good
68	C	Okay
51 - 68	D	Poor
<51	F	Awful

Table 1 shows the descriptive range used to interpret System Usability Scale (SUS) scores. It averages scores into qualitative ratings like "Poor," "OK," "Good," and "Excellent" which assists in benchmarking evaluating user satisfaction and system usability. This scale assists in contextualizing the system's overall SUS score and evaluating effectiveness from the user's perspective.

3. RESULTS AND DISCUSSION

This section summarizes the major results and insights derived from the application of the web-based record management system. Improvements to be discussed are user-experience related interfaces, automation related efficiencies, data visualization systems, communication systems, and overall usability. All results mentioned in this section were accompanied by relevant figures and tables for a better understanding.

3.1 System Features & Functionalities

The system as implemented encompasses four elements or components which are user interface design, automation, data visualization and communication features, thereby improving the overall workflow of SK record management.

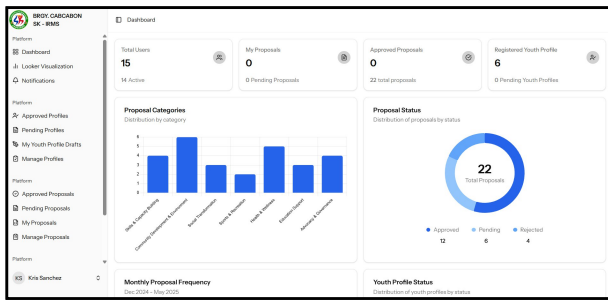


Fig. 6. Dashboard of the System

In addition, the user interface integrates secure login with role-based dashboards. Youth profiles can be managed and project proposals reviewed by the administrators while SK officials are permitted to submit and monitor their data. The interface is designed to be clear, responsive, and user-friendly for both technical and non-technical users.

The form is titled "SK CABABON KK PROFILING" and includes the following sections:

- Header:** SK CABABON KK PROFILING, SK BARANGAY CABABON KATIPUNAN NG KABATAAN PROFILING.
- Introduction:** Youth profiling as prescribed by Section 8 (j) of the Rules and Regulations Implementing the Republic Act No. 10754 is being implemented before April 2025. This profiling primarily aims to identify all youth ages (15) but not more than thirty (30) years old in our barangay and primary details that would serve as basis in crafting relevant programs and policies.
- Consent:** I, (Name), hereby consent to the collection and use of my personal information for the purpose of youth profiling.
- Informing Consent:** Title of Research - Katipunan ng Kabataan Profiling (KK Profiling), Consulting Agency - National Youth Commission (NYC), Quezon City, Philippines.
- 1. Purpose of study:** The Profiling aims to gather the information and data of the

Fig. 7. Google Form connected to Zapier

Manual data encoding has been minimized through the automation of Zapier. Administrative processes through Google Forms and Sheets are undergone through a systematic approach where data is imported, validated, and marked as "Pending" status awaiting administrative intervention. Such workflows streamline operations that curb human error, minimize redundancy, and ensure staff are unburdened from tactical work.

The screen shows the "Zapier Integration Settings" for the "Zapier Webhook" app. It includes fields for "Your System Webhook URL" and "Zapier Webhook URL". A green "Start Import" button is visible at the bottom.

Fig. 8. Zapier Automation Integration

For effective planning, aside from data integration, additional support has been provided through the system integration of Looker Studio dashboards. Highlighted on these dashboards are core metrics such as demographic shifts, project counts, and overall participation metrics. These dashboards are constructed with SQL views and therefore allow SK officials to filter them for more granular, prompt insights.

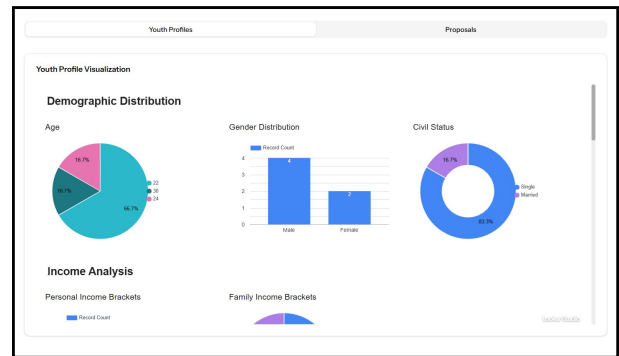


Fig. 9. Looker Studio Visualization

Finally, users are issued SMS notifications concerning profile approvals, project updates, and confirmation messages which are sent using the IPROG SMS API. It promotes transparency and user participation while ensuring community members are updated in real-time.

The messages are as follows:

- Message 1:** Hello Saco, Joko, Congratulations! Your youth registration has been approved. You are now officially part of our barangay youth community. We are excited to have you join us in making a positive impact in our community. To learn more about upcoming programs and activities, please visit our barangay office. Our youth coordinator will be happy to assist you. Together, we can create meaningful changes and build a stronger barangay community! Thank you for your interest in being part of our barangay youth community.
- Message 2:** Hello Saco, Joko! A new program has been approved that matches your interests: Title: Scholarship Assistance Program, Category: Education Support, Description: Provide financial aid for deserving but underprivileged students from the barangay. Location: Barangay Doongan, Butuan City, Period: 2025-06-01 to 2026-03-31. This program aligns with your interests. We encourage you to get involved! Thank you for your continued engagement with our youth programs!

Fig. 10. SMS Notification

3.2 System Usability Evaluation

This subsection presents the results of the System Usability Scale (SUS) evaluation which was conducted to assess the usability of the web-based record management system designed during this study. A total of eight (8) respondents—comprising the SK chairperson, six (6) SK kagawads, and the SK treasurer—answered the standardized 10-item test after interacting with the system. The SUS metrics were computed to assess total satisfaction, system evaluation, effectiveness, and overall ease of use. These results will help in enhancing some of the functions and features of the system's interface in relation to the users' operations and practical needs.

Table 2. Results of the System Usability Scale

Item Number	Raw Average Score	Adjusted Score
Q1	4.25	3.25
Q2	2.00	3.00
Q3	4.25	3.25
Q4	2.00	3.00
Q5	4.00	3.00
Q6	2.13	2.87
Q7	4.50	3.50
Q8	1.88	3.12
Q9	4.38	3.38
Q10	1.63	3.37

SUS Score = 79.375 (Sum of Adjusted Score x 2.5)

System usability was assessed using the standard 10-question SUS tool. After guided system interactions, eight SK participants completed the SUS questionnaire. The resulting average score of 79.375 falls within the “Good” usability category. The results suggest that users found the system clear, efficient, and easy to use. Although still having some place to improve, feedback indicates that the user experience surrounding the system is overwhelmingly positive.

4. CONCLUSION AND RECOMMENDATIONS

The implementation of a Web-Based Record Management System for the Sangguniang Kabataan (SK) of Barangay Cabcabon has completely resolved the problems of manual process documentation and siloed data storage. This project utilized Laravel, React.js, MySQL, Google Data Studio, and Zapier, which enhanced the encoding, monitoring, and communication workflow within the SK office. With automation, the system not only minimized administrative burdens and errors, but enhanced data-driven decision-making through visualization.

Furthermore, the constituents were better informed about the pending actions on their profiles and proposals which improved overall transparency and system responsiveness because the SMS notification system was integrated. The system's usability is corroborated by the results of the System Usability Scale (SUS) where an average score of 79.375 was obtained which indicates that the system is effective, accessible, and meets users' requirements. In general, this project supports the concept of the increasing use of information technology at the barangay level to enhance active participation of the youth in governance and to improve the efficiency of operations.

In order to further refine the system and expand its utility, it is suggested that role-based access be granted to include youth volunteers and technical support staff to enable more flexible operations. To improve system evaluation, performance metrics, and ascertain community needs from participants and other stakeholders, a feedback or suggestion module should be integrated. In addition to these measures, enabling Reports to be exported as PDF and Excel files will facilitate access to documentation and compliance reporting for public systems, thereby improving offline utility. To safeguard sensitive information regarding youth and proposals, multi-factor authentication (MFA) is suggested for enhanced system security. To empower SK members, platform navigation, and dashboard analysis skill, ongoing training should be integrated and conducted on a regular basis.

These improvements will help preserve the system's intended functionality while ensuring that subsequent users will find it easy to use and fostering consistency in recordkeeping during transitions of leadership in the SK.

5. ACKNOWLEDGEMENT

Firstly, the authors wish to express their deepest gratitude to God for providing wisdom, strength, and guidance throughout the course of this project. The authors also wish to extend their sincere appreciation to the Sangguniang Kabataan (SK) of Cabcabon, Butuan City for their constructive support, their insights, and engagement during the entire process of system development and evaluation. Special gratitude is given

to Mr. Elbert S. Moyon for his advising role on the software project; his direction and supervision were invaluable. Finally, strong appreciation is reserved for family and friends for the enduring supportive presence that was available throughout the undertaking.

REFERENCES

- [1] C. D. S. Palangdao, H. M. C. Dumpayan, G. K. Perez, A. S. L. Aquino, and C. A. Ramos, “YOUTH GOVERNANCE IN THE SELECTED BARANGAYS OF BAGUIO CITY,” *Diversitas Journal*, vol. 8, no. 4, Oct. 2023, doi: 10.48017/DJ.V8I4.2674.
- [2] “2020 Census of Population | Philippine Statistics Authority.” Accessed: May 30, 2025. [Online]. Available: <https://rssol1.psa.gov.ph/2020-census-population>
- [3] B. Jacobe, C. Aquino, and W. T. W. A. of R. in S. and Engineering, “Barangay Profiling System with Analytics,” *International Journal of Advanced Trends in Computer Science and Engineering*, vol. 10, no. 4, pp. 2697–2700, Jan. 2021, doi:10.30534/IJATCSE/2021/071042021.
- [4] T. T. Villones, “International Journal of Computer Science and Mobile Computing BARANGAY CONSTITUENTS’ INFORMATION and SERVICES MANAGEMENT SYSTEM,” *International Journal of Computer Science and Mobile Computing*, vol. 10, pp. 63–66, 2021, doi: 10.47760/ijcsmc.2021.v10i04.009.
- [5] L. Antonio, “Enhancing Barangay Justice System Through the Development of a Web-Based Crime Monitoring Module,” *SSRN Electronic Journal*, Jul. 2020, doi:10.2139/SSRN.3642023.
- [6] Azis, N., et al. (2022). Visualization Of Tourist Visit Time Series Data Using Google Data Studio. *Jurnal Mantik*, 6(2), 2153–2159.
- [7] Antonio, L. (2020). Enhancing Barangay Justice System Through the Development of a Web-Based Crime Monitoring Module. *EngRN: Computer Engineering*.
- [8] Alegado, R.T., et al. (2021). Guidance and Counseling Record Management System. *Int. J. of Advanced Trends in Computer Science and Engineering*.
- [9] Brown, B. (2018). Save Time and Increase Accuracy with Zapier.
- [10] Usmani, Z.A., Khan, S., Kazi, M., Bhatkar, A., & Shaikh, S. (2017). ZAIMUS: A department automation system using data mining and web technology. 2017 International Conference on Nascent Technologies in Engineering (ICNTE), 1-6.
- [11] Snipes, G. (2018). Google Data Studio. *Journal of Librarianship and Scholarly Communication*, 6.
- [12] Apriani, D., Aan, M., & Saputra, W.E. (2022). Data Visualization Using Google Data Studio. *International Journal of Cyber and IT Service Management*.

- [13] Zhifeng, B. (2021). Research on Visualization Method and Application of Government Statistical Data.
- [14] Philippine Statistics Authority (PSA). (2020). Census of Population and Housing (2020).
- [15] Rellon, S.J., Diolata, A.J., & Sobejana, N.P. (2020). Web-Based Document Tracking System Using Barcode Technology with SMS Notification. Social Science Research Network.
- [16] Ekhsan, H.M., Hamid, J.N., & Mazlan, N.S. (2020). Integrating Primary School Notification System with SMS Technology. Journal of Computing Research and Innovation.
- [17] Osman, M. N., Sedek, K. A., Maghribi, M., & Mohd Faisal, N. H. (2018). ANotify: A Fingerprint Biometric-Based and Attendance Web-Based Management System with SMS Notification for Industrial Sector. Journal of Computing Research and Innovation, 3(1), 36–45.
- [18] Villacis, M.Á., & Zaquinaula, N.L. (2018). Análisis, Diseño, Desarrollo e implementación de un sistema web para el padrón de usuarios del sistema de riego comunitario en el cantón Cayambe y Pedro Moncayo.
- [19] Lindquist, E.A. (2018). Visualization Practice and Government: Strategic Investments for More Democratic Governance.
- [20] Brückmann, T., Gruhn, V., Koop, W., Ollesch, J., Pradel, L., Wessling, F., & Benner-Wickner, M. (2017). Codeless Engineering of Service Mashups - An Experience Report. 2017 IEEE International Conference on Services Computing (SCC), 402-409.
- [21] Machado, C., & Campos, J.C. (2021). Towards the integration of user interface prototyping and model-based development. 2021 International Conference on Graphics and Interaction (ICGI), 1-8.
- [22] Kim, M. H. (2019). Transition of initiative from ubiquitous city to sustainable smart city by Korea: Focusing on the case of Songdo City. *Proceedings of the International Exchange and Innovation Conference on Engineering & Sciences (IEICES)*, 5, 111–115. <https://doi.org/10.15017/2552955>
- [23] Roslan, M. A. A., & Haron, H. (2024). Smart Shopping Cart Mobile Application (SmartCart): A collaborative shopping cart system across multiple devices. *Proceedings of the International Exchange and Innovation Conference on Engineering & Sciences (IEICES)*, 10, 1–10. <https://doi.org/10.5109/7323235>