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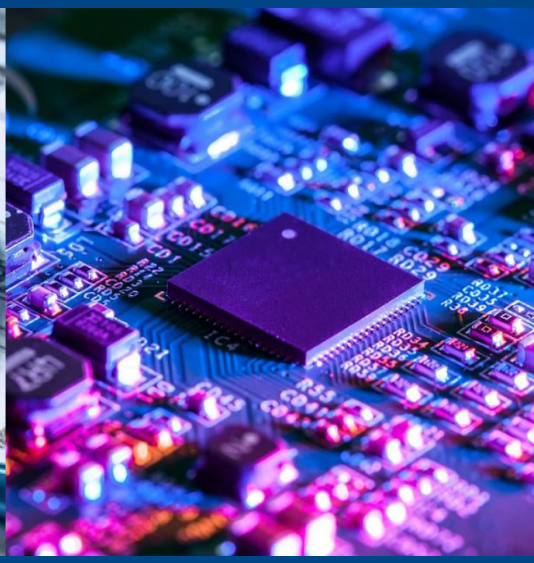

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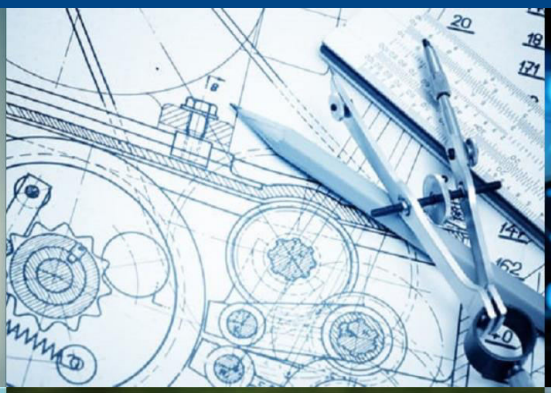

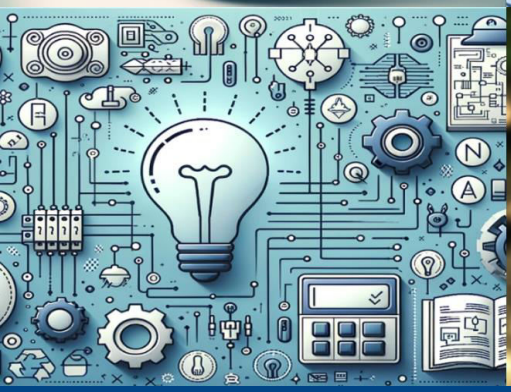

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E-SK PORTAL: A Progressive Web App for SK Profiling

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ABSTRACT: The E-SK PORTAL: A Progressive Web App for SK Profiling was developed to address the critical inefficiencies of the Sangguniang Kabataan (SK) in managing youth information, records, and project data, which historically relied on slow, manual, and paper-based procedures. This capstone project introduced a comprehensive digital solution, featuring a centralized database and SMS notifications, to automate administrative processes and enhance communication. The system's successful deployment transformed traditional SK operations, resulting in improved data accuracy, faster information dissemination, and more responsive engagement between SK officials and their constituents. Evaluated under ISO 25010, the E-SK Portal received an "Excellent" overall mean acceptability score of 4.72 from both end users and IT experts, confirming its viability as the digital backbone for modern, transparent, and efficient youth governance.

KEYWORDS: SK Profiling (Sangguniang Kabataan), Progressive Web App, Administrative Streamlining (or Centralized Youth Profiling)

I. INTRODUCTION

The E-SK Portal is a hybrid web and mobile platform. It is designed to modernize Sangguniang Kabataan (SK) operations across 14 barangays in Madrid, Surigao del Sur. The portal centralizes youth profiling, project monitoring, and record management into one system. It replaces inefficient manual processes, such as handwritten reports and printed proposals, with a streamlined digital workflow. Integrated SMS notifications ensure timely communication and bridge the gap between SK officials and youth members.

Digitizing these processes is essential for transparency, and data-driven governance research by Villanueva and Santos (2021) [5] advocates for centralized record-keeping. Anggoto et al. (2025) [1] highlight that the absence of organized databases often hinders SK decision-making. The E-SK Portal addresses these gaps by providing real-time data analytics and an achievement-tracking system. This ensures youth governance is both accountable and audit-ready.

Ultimately, the E-SK Portal transforms traditional operations into a participatory digital ecosystem. The system reduces paper waste and enhances accessibility. It empowers youth councils to manage programs more effectively. This shift from outdated methods to a Progressive Web App (PWA) fosters responsive leadership. It also encourages active youth participation in local governance.

II. LITERATURE REVIEW

A critical assessment of the work on youth governance systems has been conducted to demonstrate the relationship between the current study and prior research. In recent years, numerous local organizations have migrated to digital platforms due to greater operational and economic issues. However, for local youth councils, information security and data management efficiency remain primary concerns. Consequently, for these councils, the best alternative is to utilize

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a managed digital service that provides a comprehensive package, including centralized databases and automated notifications. While researchers have presented findings on real-world scenarios, it is important to note that, despite extensive research on e-governance, only a fraction of these findings have contributed to the wealth of knowledge in local youth administrative sectors. Although digital transformation has been a presence for years, it has not been fully adopted by everyone. Overall, there have been numerous works in this field; however, there remains significant room for improvement that future research must address.

Anggoto et al. [1] presented a model for the "Kabataan-Konek" barangay web-based system in 2025. They split the entire management process into several parts: a) Analyzing youth information by taking into consideration the lack of organized databases. b) A data analytics method for real-time decision-making to reduce the gap between planning and implementation. c) A monitoring system for youth engagement that captured participation metrics.
The proposed method by Ayado et al**.** for digital profiling and communication addresses issues related to the assembly of community records. To resolve these, they used a centralized database and automated SMS notifications. This work by Ayado et al**.** is practical in current research as it incorporates these elements into a user-friendly interface that specifically meets the needs of local SK administrators and youth constituents.

Erlina et al. (2023) [2] revealed a significant gap in perceptions between barangay officials and youth participants regarding SK performance. Their study found a disconnect between expectations and actual outcomes, and recommended transparency and active engagement to bridge the gap. The system developed by Ayado et al. specifically includes community feedback mechanisms that allow youth members to share suggestions and concerns directly with officials. By facilitating this trackable communication channel, Ayado et al. address the disconnect identified by Erlina et al. and foster a more transparent relationship between the council and its constituents.

Flores et al. [3] discussed the necessity of professionalism and accountability among young leaders in their 2021 study. They emphasized that transparent, data-driven platforms are essential for informed decision-making. This system did not negatively affect the council's goals as it was directly embedded with local administrative needs. It starts functioning during the user registration phase and preserves member details, including their achievements. The inclusion of a robust audit log and project tracking system was proposed by Ayado et al. to ensure accountability. User data was protected through secure login protocols and data encryption. This aided the council by maintaining the confidentiality of sensitive information. This research by Ayado et al. supports current efforts by providing a verifiable digital trail of all administrative actions.

Perez et al. [4] introduced a 2022 technique for the barangay governance domain that focused on ICT-based systems. The authors discussed how digital tools facilitate administrative observations and examined how digital records improve accuracy. Also, feasible solutions were presented that could reduce manual workloads through automation.
In the research paper by Ayado et al., the authors introduced a feasible solution for practicing SK operations in a digital environment. This work is a crucial stage, as it leads to appropriate data collection and presentation that can aid SK officials. The approach taken by Ayado et al. extends these ICT benefits by specifically tailoring features like KK Profiling and SMS updates for the youth sector.

Villanueva and Santos [5] initially proposed a centralized digital platform to enhance transparency and professionalism in youth governance by moving away from traditional physical documentation. Building on this need for modernization, Ayado et al. developed a model that integrates youth profiling with an SMS notification system powered by a Progressive Web App architecture. This system allows SK officials to track projects and generate reports automatically, creating a streamlined digital database of community activities and member engagement. Ultimately, these automated logs enable administrators to derive actionable insights that support the council’s decision-making and strategic planning.

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Table 1. Summary of Relevant Literature

No.	Paper Title	Author Name	Key Points	Remark
1	Kabataan-Konek System	Anggoto et al., 2025	Proposed digitizing processes to improve transparency and manage records	Focuses on transitioning from manual to digital systems to improve accountability.
2	SK Performance Evaluation	Erlina et al., 2023	Identified perception gaps between officials and youth, urging transparency	Confirms the need for feedback tools to bridge leadership-constituent gaps.
3	Youth Leadership Reform	Flores et al., 2021	Underscored professionalism and accountability through transparent platforms.	Ensures data-driven management for young leaders.
4	ICT in Barangay Governance	Perez et al., 2022	Demonstrated efficiency gains and manual workload reduction through ICT.	Validates the benefits of automating local government records.
5	Centralized SK Governance	Villanueva & Santos, 2021	Proposed digitizing processes to improve transparency and manage records.	Focuses on transitioning from manual to digital systems to improve accountability.

In summary, the work presented in this paper is built on previous research to explore how the security and accessibility of data stored on the E-SK Portal relate to the community's trust. While earlier work focused on general governance impacts, the authors Ayado et al. concentrate on its effects on the widespread acceptance and effectiveness of the Sangguniang Kabataan in the digital age.

III. METHODOLOGY

Research Design

The study employed a Descriptive Developmental Research Design to create and validate the E-SK Portal: A Progressive Web App for SK Profiling. This systematic approach focused on developing a digital platform to enhance Sangguniang Kabataan (SK) operations, using a mixed-methods approach. The design specifically included usability testing and continuous feedback collection to refine the platform's features and confirm that it effectively met user needs.

Instruments

The system was evaluated using a survey instrument based on the ISO/IEC 25010 Software Quality Model to measure its effectiveness in SK profiling across 14 barangays in Madrid. Data collection used a four-point Likert scale ranging from 1 (Strongly Disagree) to 4 (Strongly Agree) to ensure consistent performance assessment. This evaluation focused on eight core dimensions: functional suitability, performance efficiency, usability, compatibility, reliability, security, maintainability, and portability.

Data Collection and Participants

A total of 150 participants from the Municipality of Madrid, Surigao del Sur, were selected to evaluate the system, including 70 youth members, 70 SK officials, and 10 IT practitioners. This diverse group of end users and technical experts participated voluntarily, receiving a comprehensive system demonstration beforehand to facilitate an informed assessment of its cross-platform capabilities. Data collection was conducted following these demonstrations to ensure that all respondents possessed a clear understanding of the software's functionality.

Data Analysis

The quantitative and qualitative data gathered from the evaluation of the E-SK Portal were analyzed using the following statistical and technical treatments to ensure the system met the required standards:

1. Weighted Mean Used to calculate the average rating for each ISO/IEC 25010 characteristic. This numerical value represents the collective feedback from IT experts and end users on the portal's quality.

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2. Verbal Interpretation Calculated means were mapped to a qualitative scale. For instance, a score of 4.72 was interpreted as "Excellent," providing a clear descriptor of the system's performance and stakeholder satisfaction.
3. Performance Efficiency Testing Analysis focused on the PWA's responsiveness and synchronization speed. This validated the system's ability to maintain high performance across various mobile and desktop devices.
4. Security & Audit Validation Assessed Firebase Authentication and system Audit Logs to ensure data integrity. This verified that all youth records and project updates are securely tracked with verifiable timestamps for accountability.
5. Communication Impact Analysis Compared manual processes according to the IPROG SMS API integration. The analysis measured improvements in communication speed and youth engagement levels following the implementation of automated alerts.

IV. RESULTS AND DISCUSSION

System Features

The E-SK Portal: A Progressive Web App for SK Profiling successfully digitized the youth profiling and administrative processes for the Sangguniang Kabataan. Key modules include the Youth Member Module for online profile submission and project tracking, the Admin Module for centralized data management and activity logging, and the SMS Notification Integration for automated, real-time communication with the youth constituency.

Performance Evaluation

The system achieved an "Excellent" rating across all ISO/IEC 25010 metrics. The overall average mean score was 4.72. The highest-rated characteristic was Maintainability and Security, while the lowest (though still in the Excellent range) was Performance Efficiency.

Table	Quality Characteristic	Mean	Verbal Interpretation
1	Functional Suitability	4.67	Excellent
2	Performance Efficiency	4.60	Excellent
3	Usability	4.70	Excellent
4	Compatibility	4.75	Excellent
5	Reliability	4.72	Excellent
6	Security	4.78	Excellent
7	Maintainability	4.80	Excellent
8	Portability	4.73	Excellent
	Overall Mean	4.72	Excellent

V. CONCLUSION

The development and implementation of the E-SK Portal represent a significant milestone in the digital transformation of local youth governance in Madrid, Surigao del Sur. This study demonstrates that transitioning from manual, paper-based profiling to a centralized Progressive Web App (PWA) effectively mitigates data loss and administrative delays. By integrating a robust digital audit log and automated SMS alerts, the system overcomes the specific logistical barriers of intermittent connectivity and physical document degradation. The "Excellent" evaluation scores based on the ISO/IEC 25010 standard—covering functional suitability, usability, and security—underscore the system's readiness for real-world deployment. This proves a strong local appetite for technological solutions that simplify complex governance tasks while ensuring high-level data integrity and cross-platform accessibility.

Beyond technical efficiency, the E-SK Portal serves as a catalyst for a more transparent and accountable political culture within the Sangguniang Kabataan. By providing SK officials with a powerful tool to monitor youth development and project implementation in real time, the portal ensures that every administrative action leaves a verifiable digital trail. This is particularly crucial for the continuity of governance; as leadership changes, the centralized database prevents the "institutional amnesia" that often occurs with physical record turnover. Ultimately, this digital infrastructure empowers the youth council to make data-driven decisions, ensuring that community

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resources are managed with a level of precision and transparency that sets a new benchmark for local governance in the region.

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