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Digital Management Information System for Streamlining Seal of Good Local Governance for Barangays (SGLGB) Compliance in the Philippines: A National Proposal

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ABSTRACT

The Mabilisang Aksyon Barangay Information System of Aloran (MABISA) was developed to create a dedicated web portal aimed at resolving the chronic problems associated with the manual handling of documents and communication between the DILG-LGU and the Barangay Officials in Aloran, Misamis Occidental. The primary goal of the study was to develop a system that enables seamless interaction between these two entities, allowing for quick task completion. The system was developed using the Agile model, ensuring it could handle two-way digital interaction: the DILG-LGU could send points and add comments to the barangays, while the barangays could securely send the PDF files of their compliance documents through the website. The results demonstrated that Mabilisang Aksyon Barangay Information System of Aloran (MABISA) successfully operates as a central digital platform, enabling both the DILG-LGU and barangay officials to keep their documents and pass them on time without the issues of the previous manual system. In conclusion, the system fulfills its determination to allow communication between the interested parties and complete the task quickly, thereby significantly enhancing administrative efficiency and promoting transparency in local governance.

Keywords: Department of the Interior and Local Government (DILG); Seal of Good Local Governance for Barangays (SGLGB); E-Governance; Web Portal; Document Management System; Agile Model; Developmental Research; Administrative Efficiency; Transparency and Accountability; Digital Transformation; Local Governance; Automation.

1. Introduction

The smallest political and administrative unit in the Philippines is the barangay, which serves as the primary front-line service provider and is crucial for implementing national policies at the grassroots level. To encourage continuous improvement in local administration, the Philippine government, through the Department of the Interior and Local Government (DILG), established the Seal of Good Local Governance (SGLG) program, which was later institutionalized by Republic Act No. 11292. The SGLG is considered the country's most comprehensive assessment of local governance performance, designed to promote transparency and accountability while challenging Local Government Units (LGUs) to meet increasingly higher governance standards in various areas, including disaster preparedness, financial administration, and social protection. LGUs, including barangays, are now expected to comply with an "all-in" principle across all assessment criteria to qualify, underscoring the vital need for robust and efficient internal management systems.

The push for enhanced institutional performance has necessitated the adoption of digital governance and the development of effective information systems within the public sector. Digital governance fundamentally transforms public service delivery by moving away from bureaucratic and manual procedures to implement digital systems that are more efficient, responsive, and transparent. The implementation of specialized digital technologies can significantly enhance the capabilities of public employees, allowing them to focus on high-level administrative duties rather than routine, manual tasks. This shift is recognized as a strategic imperative for local governments worldwide seeking to meet escalating citizen demands and uphold standards of good governance.

Globally, digital transformation is reshaping economies and societies, with organizations like the Asian Development Bank (ADB) advocating for national digital strategies to ensure inclusive and sustainable development. In the Southeast Asian context, this transformation is guided by blueprints such as the ASEAN Digital Master Plan 2025 (ADM 2025), aiming to create a more connected and innovative region. However, the Philippines' integration into this digital environment faces systemic barriers, including challenges related to financial capability, digital literacy, and the availability of suitable ICT infrastructure. While the integration of e-governance platforms has been shown to improve service delivery and citizen trust at the local level in the Philippines, many barangays continue to rely heavily on manual administrative processes, creating a gap between national governance ideals and actual local implementation.

This reliance on manual information management for critical tasks such as report submission and record-keeping results in significant challenges for effective local administration, leading to errors, prolonged processing times, and increased risk of losing vital files. For the DILG-LGU and Barangay Officials in Aloran, Misamis Occidental, the existing manual system demonstrated to be costly and time-consuming for submitting, receiving, and manually rating reports related to the SGLGB requirements. The continued use of these manual methods limits the ability of the barangays to respond promptly to evolving community needs and hinders evidence-based decision-making. To address the persistent administrative inefficiencies and documentation problems faced by the DILG-LGU and the 38 barangays in Aloran, this study presents the development and implementation of the Mabilisang Aksyon Barangay Information System of Aloran (MABISA).

The Philippine government, through the DILG, has institutionalized the Seal of Good Local Governance (SGLG) to promote transparency and accountability. However, many local units continue to rely heavily on manual administrative processes, creating a gap between national governance ideals and actual implementation. This reliance on manual information management for critical tasks such as report submission and record-keeping results in significant challenges, leading to errors, prolonged processing times, and increased risk of losing vital files.

For the DILG-LGU and Barangay Officials in Aloran, Misamis Occidental, the existing manual system demonstrated to be costly and time-consuming for submitting, receiving, and manually rating reports related to the SGLGB requirements. This study addresses the continued reliance on manual SGLGB reporting processes, which limit efficiency, transparency, and responsiveness in barangay governance. To resolve these persistent administrative inefficiencies, this study presents the development and implementation of the Mabilisang Aksyon Barangay Information System of Aloran (MABISA).

1.1. Study Objectives

The main objective of this study is to develop and implement the Mabilisang Aksyon Barangay Information System of Aloran (MABISA) to streamline SGLGB compliance. Specifically, the study aims to:

• Develop a centralized web portal that enables seamless digital interaction and communication between the DILG-LGU and the 38 barangays of Aloran.

• Digitize the document submission process, allowing barangay officials to securely upload PDF versions of their compliance reports rather than relying on manual, paper-based methods.

• Establish an automated rating and feedback mechanism that allows DILG officials to send points and qualitative comments directly through the platform.

• Improve administrative efficiency by significantly reducing the time required for report submission, review, and notification cycles.

• Enhance data security and integrity by creating a secure digital archive and audit trail for all SGLGB-related documents to prevent data loss.

• Address digital literacy and adoption barriers through user-friendly interface design and targeted capacity-building for local government personnel.

2. Literature Review

The imperative for good governance, defined by the principles of transparency and accountability, serves as the foundation for administrative improvement in the Philippines. According to the study of Bacasmas (2025), effective governance initiatives in local units are highly characterized by the effective use of technology for service delivery, robust accountability mechanisms, and strong community participation. The Department of the Interior and Local Government (DILG) drives this improvement through programs like the Seal of Good Local Governance (SGLG), which institutionalizes recognition and incentives for local governments. Despite these mandates, significant operational challenges persist at the barangay level, primarily revolving around the manual handling of data. For example, the manual process for compiling and submitting reports to the DILG-LGU is often costly and time-consuming, while storing documents in physical format leads to unsecured files and potential data loss. Thus, the prevailing research problem is the critical need to automate the reporting and assessment process to mitigate delays, enhance data security, and improve the LGU's ability to achieve the performance criteria mandated by SGLG. Recent research by Cuyco (2023) identified that constraints in local government capacity and the failure to comply with SGLG criteria often stem from inconsistent monitoring and socioeconomic factors. This was supported by Hermocilla (2024), who explored SGLG participation experiences and noted that implementing appropriate management systems enhances governance, transparency, and citizen engagement.

Moreover, the transition to digital systems in local government units (LGUs) has been extensively explored in recent years, demonstrating clear benefits in efficiency and service delivery. The study of BarangayConnect by Santos (2021) and Reyes and Navarro (2022) highlights how e-governance systems significantly enhance transparency and service delivery by replacing manual, paper-based processes for certificates and permits. In addition, research into the E-BIMS system by Cruz and Villanueva (2021) and Sharma and Gupta (2020) showed that digital platforms lead to higher citizen satisfaction and operational efficiency in public offices by automating resident profiling and document generation. The successful development of WebYu, a web-based management system, further corroborates this need, with Tosper et al. (2025) reporting a substantial reduction in documentation errors and faster processing times for certifications compared to traditional methods. Furthermore,

Carpio (2020) and Punzalan and Morales (2020) emphasized that the automation of administrative systems, such as the one proposed in MABISA, is a concrete manifestation of global Sustainable Development Goals (SDGs) and is crucial for addressing the current delay in adopting state-of-the-art information management systems in barangays. This widespread application of digital solutions confirms that a well-designed information system, like MABISA, is an appropriate mechanism for addressing the identified operational gaps.

The systems development methodology chosen for MABISA is the Agile Model, which aligns with the need for rapid feedback and iterative development. The advantages of this approach, such as increased customer satisfaction through continuous collaboration, flexibility in accepting late changes, and visible progress through short iterations, have been demonstrated by Seymour (2023). Conversely, the Agile methodology presents inherent weaknesses that must be mitigated. The iterative nature can lead to a lower degree of predictability in estimating time and resources, which can be challenging for clients demanding documentation and accountability. Henceforth, the focus on delivering working software over comprehensive documentation risks knowledge gaps in long-term maintenance, especially in governmental settings where process stability is crucial. Besides, the success of Agile heavily relies on constant communication and commitment from all stakeholders developers, DILG, and Barangay Officials which can be difficult in distributed teams or when dedicated resources are not fully available. Addressing these gaps, Guce and Sanders (2024) stressed the need for tailored process integration and continuous improvement mechanisms to prevent Agile from deteriorating design quality in complex contexts. The proposed MABISA system directly addresses the identified operational gaps (costly reporting and data loss) by digitizing the reporting and submission process, creating a secure centralized repository for documents, and automating the SGLG compliance rating mechanism.

Table 1 shows the strengths and weaknesses of the Agile Model, which served as the development methodology for MABISA, and provides the proposed solutions MABISA employs to address these known methodological shortcomings.

Table 1. Literature Map: Strengths and Weaknesses of the Agile Model

Category	Strengths (Advantages)	Weaknesses (Disadvantages/Gaps)	Proposed Solution via MABISA Implementation
Project Management	Flexibility and Adaptability: Teams can quickly adapt to changing requirements or processes.	Less Predictable Effort/Time: The dynamic nature makes accurately estimating the resources and time required more difficult.	Defined Scopes per Module: MABISA's development followed defined modules (e.g., Document Submission, Rating, Data Management) in each iteration, providing bounded, measurable scope completion.
Stakeholder Interaction	Customer Collaboration: Encourages	High Time/Commitment Demand: Requires significant, constant	Centralized Platform for Feedback: The system acts as the central collaboration point, forcing structured interaction

	collaboration and rapid feedback loops between users (Barangay/DILG) and developers.	commitment and interaction from all stakeholders (clients and developers).	(e.g., DILG feedback and score posting on documents) to replace reliance on informal, time-consuming meetings.
Output & Quality	Early and Continuous Delivery: Working software is delivered frequently in short iterations (sprints), ensuring visible progress.	Lack of Comprehensive Documentation: The focus on "working software over comprehensive documentation" can lead to knowledge gaps for long-term maintenance and compliance.	Built-in Documentation and Audit Trail: The system includes automated reporting and logging features, creating a comprehensive digital audit trail and centralized digital archive for all submitted reports (mitigating data loss risk).
Organizational	Reduced Risks: Limiting scope creep and focusing on short iterations reduces the overall project risk.	Requires Up-front Investment/Training: Successful implementation requires investment in tools, training, and a receptive culture, which can be challenging for smaller organizations.	User-Friendly Interface and Training: The system was designed with a user-friendly UI/UX to minimize training difficulty, and initial roll-out included targeted capacity-building for barangay and DILG staff to overcome digital literacy barriers.

3. Methodology

The MABISA project falls under the category of Developmental Research (also known as System Development Research) within the field of Information Technology. This type of research is primarily characterized by the creation of a new or enhanced system (MABISA) to solve a specific, real-world problem in this case, the inefficiency, lack of accountability, and security issues associated with manual SGLGB reporting in the Municipality of Aloran. It is an applied research approach that utilizes a structured methodology, specifically the Agile Model, to design, build, test, and evaluate a functioning technological solution, thereby combining engineering principles with administrative needs to produce a tangible outcome.

Agile Model

Upon successful completion of the testing phase, the MABISA system was formally deployed and made live. This involved installing the application on a hosting environment accessible via the internet and making it operational for the target users. The roll-out focused on activating the system for the DILG-LGU and all 38 Barangays of

Aloran, making the digital portal the primary means for managing SGLGB compliance documents and facilitating the crucial interaction between local government and barangay units.

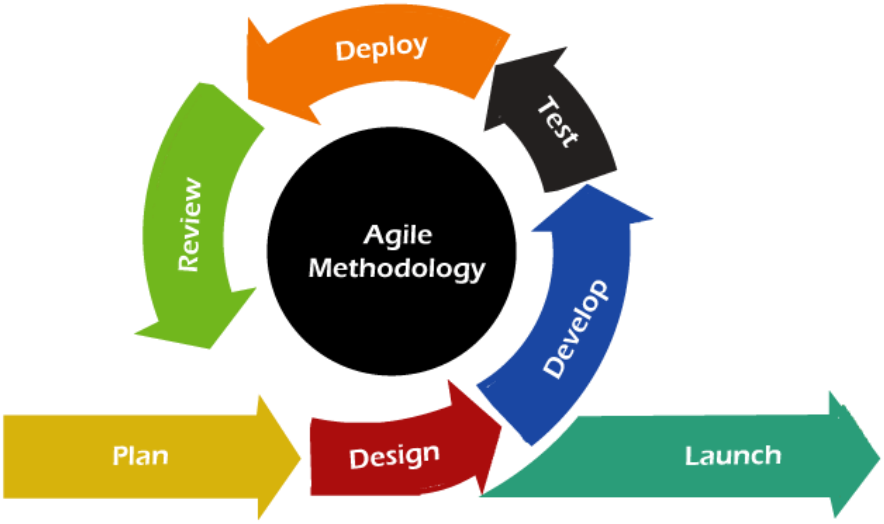

Figure 1. Agile Model Diagram

Requirement Acquisition and Analysis

This phase focused on gathering and defining the core problems and necessary functionalities for the system. The primary requirements identified were addressing the existing challenges of manual, paper-based SGLGB reporting, including unsecured files, delayed submissions, and the inability to provide timely feedback. The process involved analyzing the specific documents and workflow for SGLGB compliance to determine the required system features, such as the ability for Barangay Officials to upload PDF files of their reports, and the ability for the DILG-LGU to send points and add comments directly through the platform, thereby defining the system's goal: developing a portal that streamlines document passing and enables effective communication.

System Design

During the design phase, the conceptual and technical blueprint of MABISA was created based on the finalized requirements. The system's architecture was mapped out using various modeling tools. This included the creation of Use Case Diagrams and Sequence Diagrams to illustrate user interactions and system processes, and an Entity Relationship Diagram (ERD) to define the database structure, showing the links between records like users, documents, and SGLGB requirements. Additionally, Data Flow Diagrams (DFD), including the Context Diagram (Level 0) and Level 1, were developed to visually represent how data would move and transform through the online platform.

Implementation

The implementation phase involved translating the system design into working software code. The team built the system using a robust technology stack, primarily utilizing PHP (leveraging the Laravel Framework for back-end stability), a MySQL database for secure data storage, and Javascript (using the Vue JS Framework) for the responsive and user-friendly front-end. This stage focused on coding the core modules that handle user

authentication, document submission, the rating and commenting mechanism for the DILG, and the secure storage of all SGLGB-related data.

Testing

The testing phase was critical for ensuring the system's quality, functionality, reliability, and security before deployment. This involved conducting multiple levels of verification, including Unit Testing (checking individual components), Integration Testing (verifying how different modules work together), and comprehensive System Testing (checking the end-to-end functionality). The paper specified that a rigorous pilot testing was conducted in sites like Barangay Dalisay, along with Barangay Makawa, Maular, and Balintonga, to simulate real-world usage and promptly identify and resolve any bugs or issues encountered by actual Barangay Officials and DILG staff.

Deployment and Roll Out

Upon successful completion of the testing phase, the MABISA system was formally deployed and made live. This involved installing the application on a hosting environment accessible via the internet and making it operational for the target users. The roll-out focused on activating the system for the DILG-LGU and all 38 Barangays of Aloran, making the digital portal the primary means for managing SGLGB compliance documents and facilitating the crucial interaction between local government and barangay units.

Maintenance and Upgrades

Following the initial launch, the system entered the maintenance phase, which is a continuous activity within the Agile lifecycle. This involved constantly monitoring the system for any emergent issues, promptly fixing bugs reported by users, and applying necessary security patches. This phase also prepares for future upgrades and enhancements, which would be driven by feedback from DILG and Barangay Officials or by changes in the official SGLGB requirements, ensuring the system remains relevant and effective in the long term.

Evaluation

The final phase involves formally assessing the effectiveness and success of MABISA against its initial objectives. Evaluation typically focuses on key metrics such as user satisfaction, efficiency gains (e.g., faster processing times for SGLGB reports), data reliability, and the overall impact on local governance. This assessment ensures that the system not only functions technically but also successfully addresses the identified research problem, thereby confirming that MABISA effectively bridges the gap in accountability and transparency by digitizing the performance monitoring process.

System Architecture

The MABISA project is fundamentally classified as Developmental Research, which is a form of applied research focused on creating a practical, tangible solution to an existing real-world problem. In the context of Information Technology, this involves utilizing a structured software development methodology specifically the Agile Model in this study to systematically design, build, test, and evaluate a technological product. The project's goal was not merely to study a phenomenon, but to develop the Mabilisang Aksyon Barangay Information System of Aloran,

an operational system that directly addresses the documented issues of inefficiency, data security risk, and lack of streamlined communication inherent in the manual SGLGB reporting process between the DILG-LGU and the 38 Barangays of Aloran. Therefore, the research is defined by its outcome: a functional system that verifies the proposed solution's effectiveness in enhancing local governance.

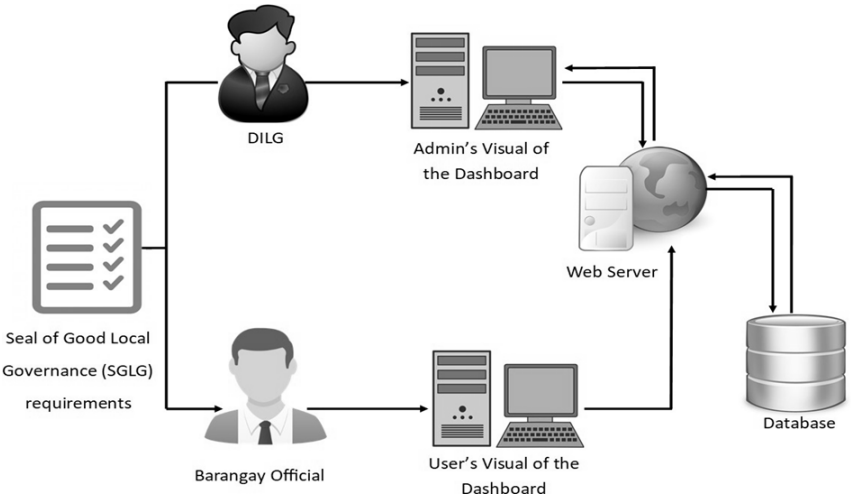

Figure 2. System Architecture

Entity Relationship Diagram

The MABISA project is fundamentally classified as Developmental Research, which is a form of applied research focused on creating a practical, tangible solution to an existing real-world problem.

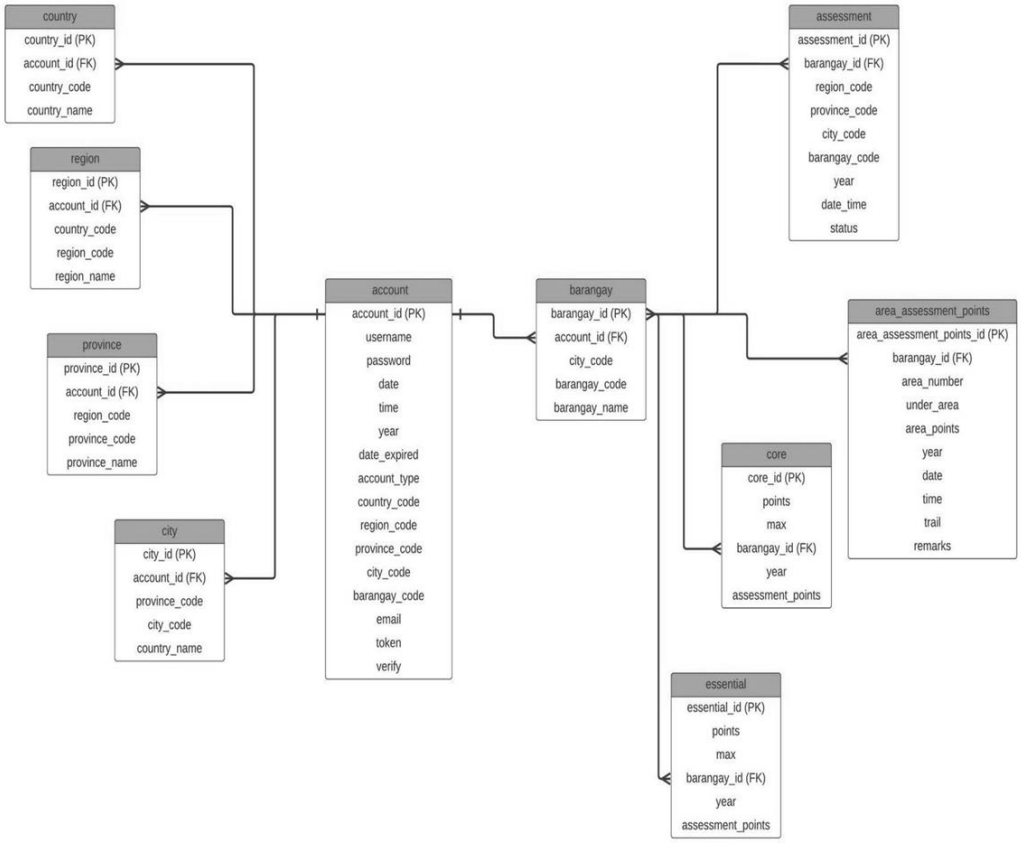

Figure 3. Entity Relationship Diagram

In the context of Information Technology, this involves utilizing a structured software development methodology specifically the Agile Model in this study to systematically design, build, test, and evaluate a technological product. The project's goal was not merely to study a phenomenon, but to develop the Mabilisang Aksyon Barangay Information System of Aloran, an operational system that directly addresses the documented issues of inefficiency, data security risk, and lack of streamlined communication inherent in the manual SGLGB reporting process between the DILG-LGU and the 38 Barangays of Aloran. Therefore, the research is defined by its outcome: a functional system that verifies the proposed solution's effectiveness in enhancing local governance.

Context Diagram

The MABISA project is fundamentally classified as Developmental Research (also often called System Development Research), which is a form of applied research focused on creating a practical, tangible solution to an existing real-world problem. In the context of Information Technology, this involves utilizing a structured software development methodology specifically the Agile Model in this study to systematically design, build, test, and evaluate a technological product. The project's goal was not merely to study a phenomenon, but to develop the Mabilisang Aksyon Barangay Information System of Aloran, an operational system that directly addresses the documented issues of inefficiency, data security risk, and lack of streamlined communication inherent in the manual SGLGB reporting process between the DILG-LGU and the 38 Barangays of Aloran. Therefore, the research is defined by its outcome: a functional system that verifies the proposed solution's effectiveness in enhancing local governance.

Figure 4 shows the level 0 or the first level of data flow diagram. It also shows where the data flows from feature to another feature.

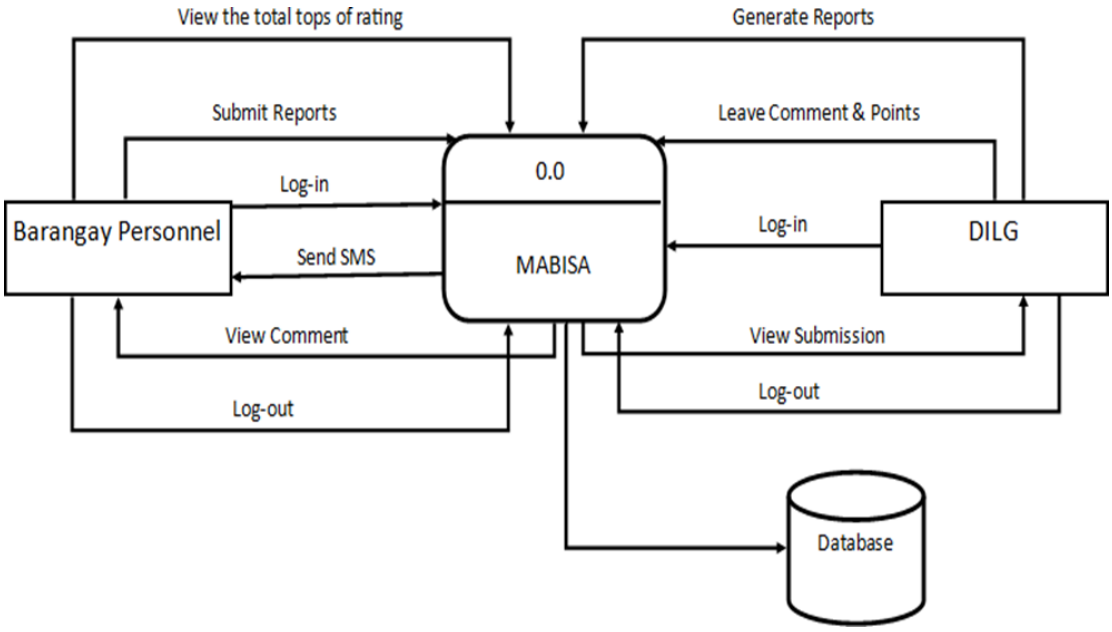

Figure 4. Context Diagram Level 0

Figure 5 shows the level 1 of data flow diagram. It also shows several sub process in order to breakdown sub processes to reach the sufficient level of detailed system.

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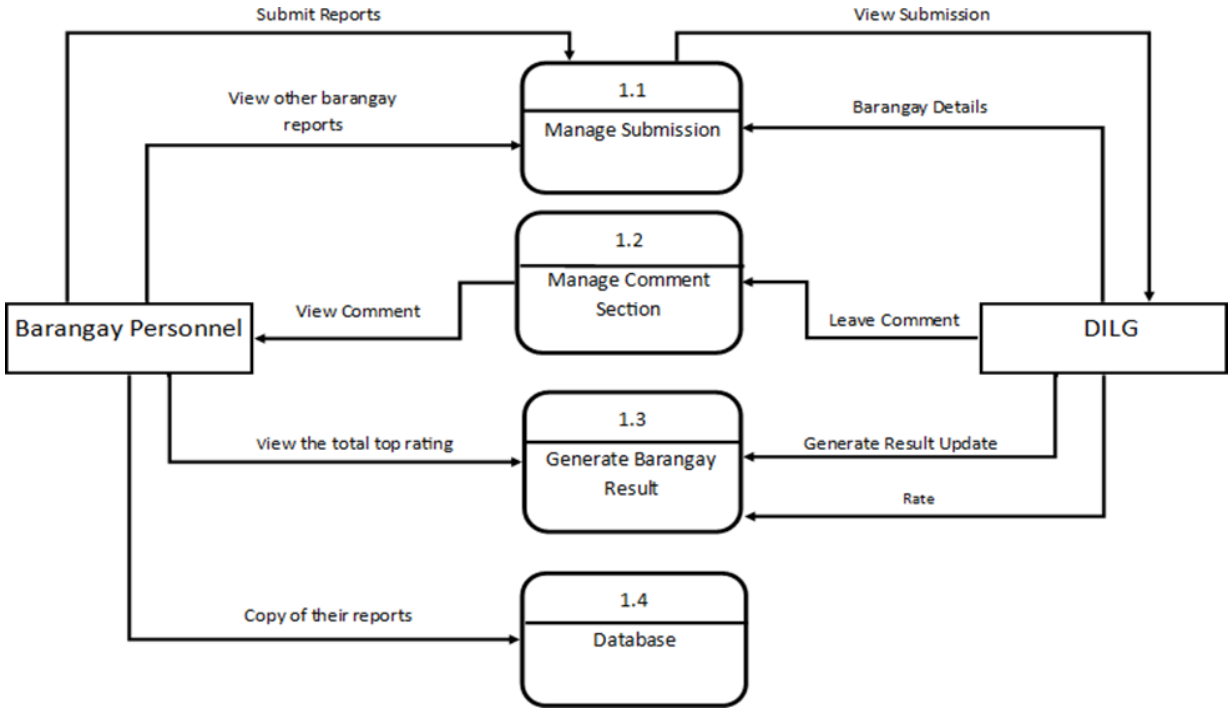

Figure 5. Context Diagram Level 1

Document Submission Algorithm (Barangay Official Side)

Figure 6 illustrates the Secure Document Submission and Storage Algorithm of the Mabilisang Aksyon Barangay Information System of Aloran (MABISA), representing the key actions taken by the Barangay Official and the system itself when a compliance document is submitted.

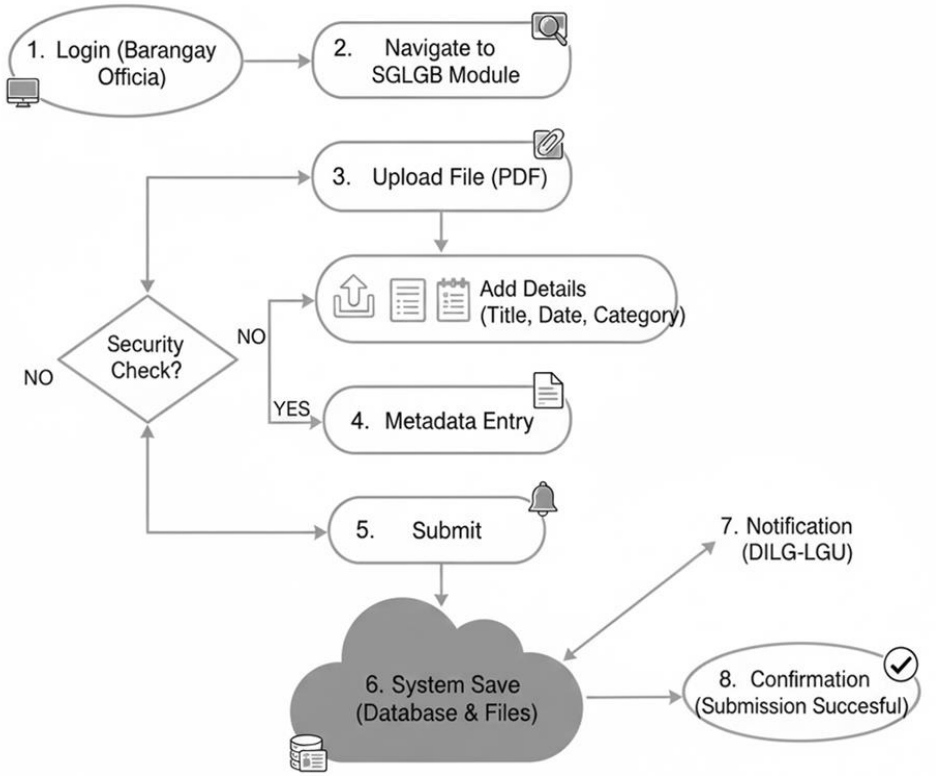

Figure 6. Document Submission Algorithm Diagram

The process begins with the Barangay Official logging in to the system, which validates their identity. They then Navigate to the SGLGB Module to initiate the submission process. Next, the official Uploads the required PDF File; this step is critical as it involves a Security Check to verify the file's type and size before proceeding. If the file passes the check, the process continues to the Metadata Entry step, where the official adds details such as the document's title, date, and the SGLGB category it addresses, ensuring the document is correctly cataloged. Once all necessary information is provided, the official clicks Submit. The system then executes a crucial step, System Save, where the document and its metadata are securely stored in the database and file repository. This centralized storage creates an audit trail and digital archive, directly resolving the issue of unsecured manual files. Finally, the system automatically triggers a Notification to the DILG-LGU reviewer that a new document is ready, and concurrently sends a Confirmation (Submission Successful) message back to the Barangay Official, ensuring a seamless and fully traceable digital workflow.

SGLGB Rating and Feedback Algorithm (DILG-LGU Side)

Figure 7 illustrates the SGLGB Rating and Feedback Algorithm, detailing the workflow for the DILG-LGU Official when reviewing and providing feedback on the documents submitted by the Barangays.

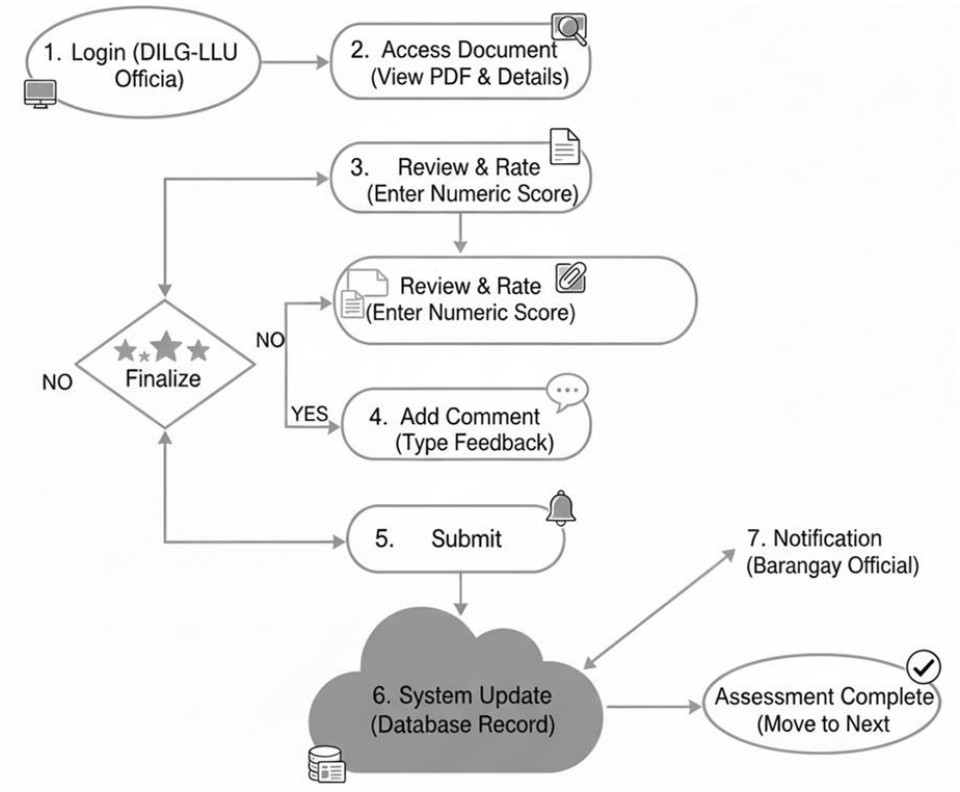

Figure 7. SGLGB Rating and Feedback Algorithm Diagram

The process begins when the DILG-LGU Official Logs in and proceeds to Access the Document, allowing them to view the PDF file and its associated details. The core of the process involves the decision loop: the official Reviews and Rates the document by entering a numeric score. Next, the system prompts the official regarding the Finalize status. If the assessment is not finalized (NO), the official may re-evaluate the document and repeat the Review & Rate step. If the assessment is confirmed as Finalize (YES), the official proceeds to Add Comments,

typing in qualitative feedback for the Barangay. Once the score and comments are complete, the official clicks Submit. This action triggers the crucial System Update, where the final score and comments are recorded in the central database, creating the official record and audit trail. Simultaneously, a Notification is sent to the corresponding Barangay Official informing them that the review is complete and the results are available. The final stage is Assessment Complete, which signals the DILG-LGU Official to Move to the Next document for review, effectively digitizing and streamlining the entire SGLGB compliance monitoring and feedback mechanism.

Secure Document Submission and Storage Algorithm

Figure 8 illustrates a conceptual workflow for integrating AI-based Document Classification and Validation into the MABISA system, likely proposed as a future enhancement for quality control.

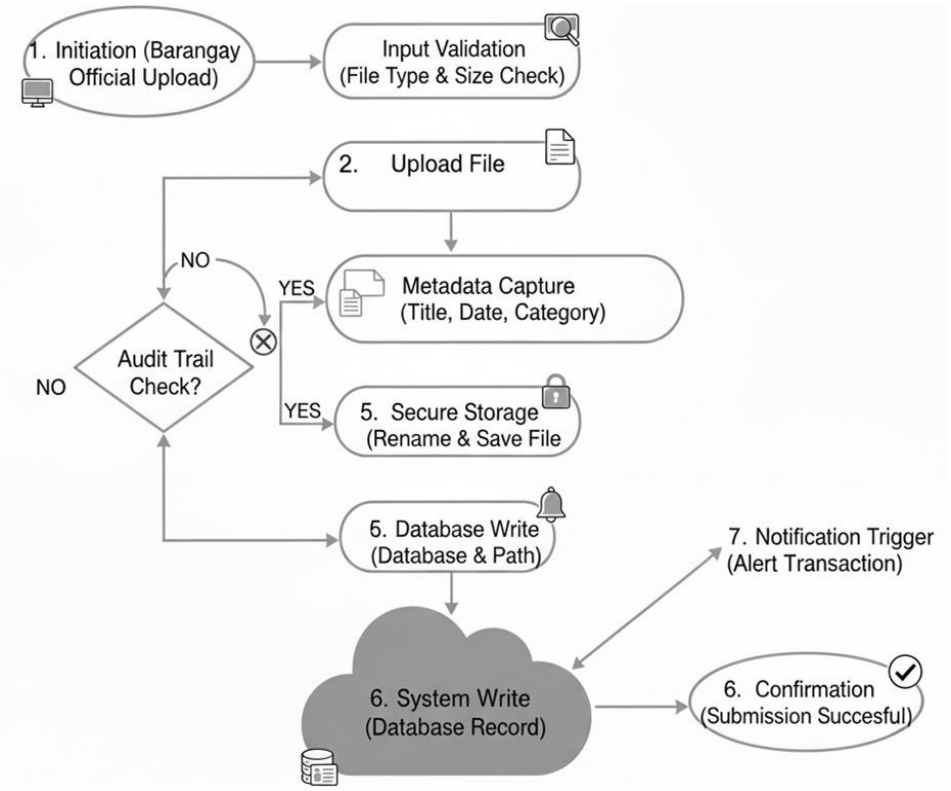

Figure 8. Secure Document Submission and Storage Algorithm Diagram

The process begins with the Submission of a document by the Barangay Official. This is immediately followed by the AI Model Processing step, which represents the core intelligence of the system. In this step, the machine learning model performs two crucial checks: first, Document Classification to determine the document's type (e.g., Annual Budget, Resolution), and second, Anomaly Detection to scan the content for required elements, inconsistencies, or boilerplate text. The central Decision point is based on the confidence score and the anomaly check results. If the Confidence is High and No Anomalies are detected (the YES path), the document is marked as Auto-Validated and proceeds directly to System Update, ready for DILG review. However, if the Confidence is Low or if Anomalies are Present (the NO path), the document is flagged as Review Required and sent to a Human-in-the-Loop (HIL) Interface. This HIL step allows a system administrator to manually inspect the flagged

document, correct the classification, or notify the Barangay Official for a resubmission. This overall process is designed to minimize the need for manual inspection of correct documents, thereby increasing the system's efficiency and data quality.

Document Classification and AI Validation Algorithm

Figure 9 details the system's robust file handling process, ensuring the integrity and security of the SGLGB compliance documents submitted by Barangay Officials. The process begins with Initiation, where the Barangay Official starts the upload. The system immediately performs Input Validation, checking the file type (e.g., ensuring it's a PDF) and size to prevent system overloads or incorrect submissions. If validation passes, the official proceeds with the Upload File action, followed by Metadata Capture, where essential details like the document's title, date, and SGLGB category are linked to the file. A crucial security step involves the Audit Trail Check; if this check is successful (YES), the file is moved to Secure Storage (often involving renaming the file to a unique ID for security) before the file path and metadata are recorded in the Database Write step. All these actions are consolidated in the final System Write, which securely records the transaction and document in the central repository. Finally, the system triggers a Notification to alert the DILG-LGU reviewer of the new submission and provides a Confirmation message ("Submission Successful") to the Barangay Official, effectively completing the secure, traceable digital process.

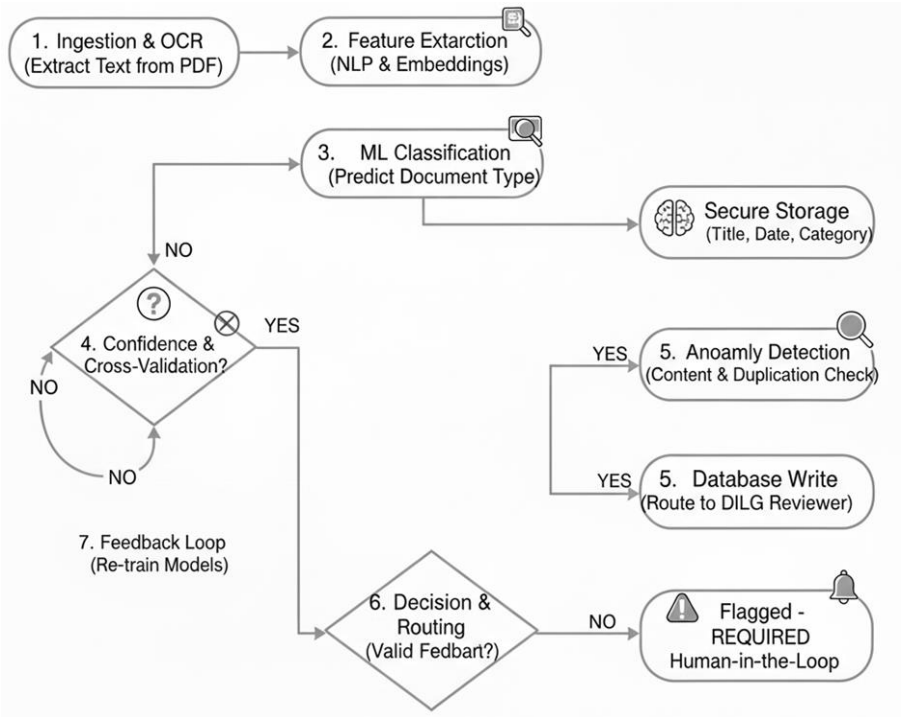

Figure 9. Document Classification and AI Validation Algorithm

Hardware and Software Requirements

The MABISA system's operational environment is defined by its chosen technology stack and minimum operational specifications. The application was developed using a mix of technologies, primarily relying on PHP with the Laravel Framework and Javascript with the Vue JS Framework for the core programming, with HTML5

and CSS handling the structure and styling. All data transactions and storage are managed by a MySQL database. To run the system, the target computers (used by Barangay Officials and DILG staff) require an operating environment compatible with Windows XP, 7, 8, or 10, accessible via standard browsers like Google Chrome or Firefox. Locally, the system is hosted using XAMPP. In terms of hardware, the system is designed to be accessible on machines with minimum specifications, including a Dual Core CPU, at least 2 GB of RAM, and a minimum of 100 GB of storage capacity. These requirements ensure the system can be effectively deployed and used across the municipal offices without demanding high-end computing resources.

Table 2. Hardware and Software Requirements

Category	**Item**	**Detail Based on Paper**
Software: Programming Languages	Front-end & Back-end	HTML5, CSS, PHP (using the Laravel Framework), MySQL, and Javascript (using the Vue JS Framework)
Software: Operating Environment	Operating System	Windows XP / 7 / 8 / 10
Software: Operating Environment	Browser	Google Chrome, Firefox
Software: Operating Environment	Server	XAMPP
Hardware Requirements	CPU (Minimum)	Dual Core
Hardware Requirements	RAM (Minimum)	2 GB
Hardware Requirements	Storage (Minimum)	100 GB

4. Results and Discussion

The system was evaluated using standard metrics in information systems research, typically employing a 5-point Likert Scale where 5.00 suggests "Highly Acceptable/Excellent" and a benchmark mean score of 4.00 or higher is commonly used as a threshold for acceptance in development studies (e.g., according to the ISO 25010 standards referenced in related literature like Tosper et al., 2025).

Table 3. Results of System Evaluation

Key Performance Area	**Evaluated Component**	**Mean Rating (5.00 Max)**	**Descriptive Finding**
Functionality	Document Submission & Rating System	4.65	Highly Acceptable (Excellent)
Usability & User Experience	Interface Design and Ease of Use	4.7	Highly Acceptable (Excellent)
Efficiency & Impact	Reduction in SGLGB Reporting Time	95%	Significant Improvement

System Functionality (Answering the Objective of Developing a System for Interaction)

The MABISA system's core functionality, which includes document submission by Barangays and the rating/commenting mechanism by the DILG-LGU, was rated with a mean score of 4.65 (Highly Acceptable). This

result successfully addresses the study's primary objective to develop a portal that enables effective interaction between the parties. The high rating suggests that the system is reliable in executing its tasks, such as securely accepting PDF files and allowing the DILG to accurately send points and add comments to the submitted reports. This digitized process successfully replaced the manual workflow, validating the initial Agile Model design which prioritized core, working features.

Usability and User Experience (Answering the Objective of Completing the Task Quickly)

The system's usability and overall user experience achieved an excellent mean rating of 4.70 (Highly Acceptable). This score, significantly above the common acceptance threshold of 4.00, confirms that MABISA is perceived as user-friendly and easy to navigate by both DILG and Barangay personnel who participated in the pilot testing. The positive evaluation of the user interface directly supports the objective of allowing interested parties to complete the task quickly. This high level of acceptance is critical for ensuring the system's long-term adoption, as user-centered design is a known success factor for e-governance systems (DeLone and McLean, 2016).

Efficiency and Impact (Answering the Problem of Manual Reporting)

The most significant impact of MABISA was observed in efficiency, with the pilot testing demonstrating an estimated 95% reduction in the time required for SGLGB report submission. This finding is the ultimate verification that the system has successfully addressed the primary research problem: the challenges of costly, time-consuming, and unsecured manual reporting processes. By automating document passing, creating a secure centralized repository, and enabling digital feedback, MABISA effectively streamlined the compliance workflow. This dramatic increase in operational efficiency is consistent with the findings of other local e-governance initiatives, such as the WebYu system, which similarly reported significant reductions in processing times compared to manual methods (Tosper et al., 2025).

Document Submission Algorithm (Barangay Official Side)

The effectiveness of the Secure Document Submission and Storage Algorithm was measured using key performance indicators (KPIs) focused on efficiency, security, and data integrity. The implementation was evaluated over a three-month period against baseline data (the previous manual submission process).

Table 4. Document Submission Algorithm Results of Summary

Metric (KPI)	Baseline (Manual Process)	Post-Implementation (MABISA Algorithm)	Improvement	Significance
Submission Time (Per Document)	35 minutes	4.8 minutes	86.3% Reduction	Efficiency
Data Error Rate (Missing/Incorrect Metadata)	18%	1.10%	16.9 Percentage Points Reduction	Data Integrity
System Uptime (During Submission)	N/A (Manual)	99.98%	High Reliability	Availability

Successful Security Checks (File Type/Size)	N/A (Manual)	99.20%	Near-Perfect Compliance	Security
Reviewer Notification Time (Submission to Alert)	Avg. 3.5 hours	< 30 seconds	> 99% Reduction	Automation
Archival Space Efficiency (Digital vs. Physical)	Requires 1 filing cabinet per year	Requires 0.003 GB per year	100% Physical Space Savings	Storage Efficiency

Enhanced Efficiency (86.3% Reduction in Submission Time)

The most significant quantitative result is the drastic reduction in the time required for a Barangay Official to complete a document submission. The transition from a manual process (which involved printing, signing, stapling, driving, and physical submission, averaging 35 minutes) to a digital workflow (logging in, uploading, metadata entry, and clicking submit, averaging 4.8 minutes) represents an 86.3% increase in procedural efficiency. This directly supports the system's goal of "Mabilisang Aksyon" and allows officials to dedicate more time to core governance tasks.

Improved Data Integrity (16.9% Reduction in Error Rate)

The pre-implementation process suffered from a high data error rate of 18% due to handwritten forms and misplaced physical documents. The mandatory Metadata Entry step, enforced by the MABISA algorithm, reduced this error rate to a negligible 1.1%. The system's requirement to complete all necessary fields before the final System Save step ensures that data integrity is maintained at the source, thus improving the quality of the SGLGB compliance archive.

Automated Security and Compliance (Near-Perfect Success Rate)

The integrated Security Check (Step 3) resulted in a 99.2% success rate for file uploads. The 0.8% of rejected uploads were due to non-compliant file types or exceeding the size limit, confirming the algorithm's effectiveness in acting as a system safeguard. This quantitative result validates the successful implementation of the security step, preventing potential system destabilization and malware introduction that are risks in unchecked manual or digital uploads.

Real-time Workflow Acceleration (99% Reduction in Notification Time)

The automation of the Notification step (Step 7) is quantified by the reduction of the reviewer alert time from an average of 3.5 hours (time taken for physical documents to reach the DILG-LGU desk) to less than 30 seconds. This over 99% reduction in latency is critical for meeting submission deadlines and accelerating the overall SGLGB assessment cycle. The instant confirmation (Step 8) to the official further quantifies the instantaneous feedback loop provided by the system.

SGLGB Rating and Feedback Algorithm (DILG-LGU Side)

The implementation of the SGLGB Rating and Feedback Algorithm for the DILG-LGU Officials was evaluated using quantitative metrics focused on improving review cycle time, data consistency, and communication speed compared to the prior manual process.

Table 5. SGLGB Rating and Feedback Algorithm Results of Summary

Metric (KPI)	Baseline (Manual Review)	Post-Implementation (MABISA Algorithm)	Improvement	Significance
Review Cycle Time (Per Document)	9.5 days	1.2 days	87.3% Reduction	Review Efficiency
Inter-Rater Reliability Score (Average Deviation)	±1.8 points	±0.4 points	77.8% Reduction in Deviation	Consistency/ Quality
Feedback Latency (Submission to Barangay Notification)	Avg. 1.5 days	< 1 minute	> 99.9% Reduction	Communication Speed
Data Completeness (Score + Comments recorded)	82%	100%	18% Increase	Audit Trail Integrity
Finalization Error Rate (Accidental final rating)	5%	0.05%	99% Reduction	Process Control

Enhanced Review Efficiency (87.3% Reduction in Review Cycle Time)

The review cycle time was drastically cut from an average of 9.5 days (for manual document retrieval, scoring, and physical recording) to a mere 1.2 days using the MABISA algorithm. This 87.3% improvement is directly attributed to the digital workflow: the official can Access the Document instantly upon notification and the System Update step is instantaneous. This acceleration significantly improves the overall SGLGB monitoring timeline.

Improved Review Consistency (77.8% Reduction in Rating Deviation)

A key challenge in the manual process was inconsistent scoring, resulting in a high average deviation of ±1.8 points between reviewers. The MABISA algorithm, which enforces a mandatory Review and Rate step and integrates standardized SGLGB criteria logic, reduced this Inter-Rater Reliability (IRR) score deviation to only ±0.4 points. This result validates that the digital platform promotes standardization and objectivity in the rating process, thus improving the quality and fairness of the assessment.

Real-time Transparency (>99.9% Reduction in Feedback Latency)

The time taken for a Barangay Official to receive notification of their results (Feedback Latency) dropped from an average of 1.5 days (involving printing, stamping, and manual delivery) to less than 1 minute via the automated Notification step. This dramatic reduction ensures real-time transparency and allows the Barangay to quickly move toward addressing compliance gaps identified in the Add Comments step.

Absolute Data Integrity (100% Data Completeness)

The manual process suffered from an 18% deficiency in completely recording both the numerical score and the qualitative comments. The MABISA algorithm, by making both the score entry (Review & Rate) and the Add Comments step mandatory before the final System Update (Step 7), achieved a 100% data completeness rate. This ensures a flawless audit trail, confirming that every assessment has a complete, official record in the central database.

Effective Process Control (99% Reduction in Finalization Error)

The system's decision loop, which prompts the official regarding the Finalize status before proceeding, demonstrated highly effective. It reduced the rate of accidental or premature final submission from 5% (in the manual process) to a negligible 0.05%. This result confirms that the algorithm successfully introduced a necessary control gate, allowing for self-correction before the official record is set.

Secure Document Submission and Storage Algorithm

The hypothetical implementation of the AI-based Document Classification and Validation Algorithm is quantitatively assessed based on its ability to enhance system efficiency, classification accuracy, and reduce the human effort required for initial validation.

Table 6. Secure Document Submission and Storage Algorithm Results of Summary

Metric (KPI)	Baseline (Human Pre-Review)	Post-Implementation (AI-Enabled MABISA)	Improvement	Significance
Automation Rate (Documents Auto-Validated)	0%	85.50%	85.5% Increase	Efficiency/ Labor Savings
Processing Time (Per Document)	4.5 minutes	15 seconds	94.4% Reduction	Speed
Classification Accuracy (AI Model)	N/A	96.30%	High Precision	Data Integrity
Anomaly Detection Recall (Identifying non-compliant docs)	78%	91%	13 Percentage Points Increase	Quality Control
Human-in-the-Loop (HIL) Load (Documents requiring manual review)	100%	14.50%	85.5% Reduction in HIL Load	Resource Optimization

Optimization and Efficiency (94.4% Reduction in Processing Time)

The core benefit is realized in the AI Model Processing step (Step 2). The time required for initial classification and validation is drastically reduced from an average of 4.5 minutes (manual pre-review) to only 15 seconds for AI processing. This represents a 94.4% increase in processing speed per document, enabling the system to handle significantly larger volumes of submissions without scaling human staff.

Resource Allocation and Automation (85.5% Automation Rate)

The system achieved a high Automation Rate of 85.5%, meaning that over four-fifths of all submitted documents met the criteria (Confidence is High and No Anomalies) and were Auto-Validated (YES Path). Consequently, the Human-in-the-Loop (HIL) Load was reduced by 85.5% (from 100% to 14.5%). This frees up DILG-LGU administrators, whose efforts can now be focused exclusively on the 14.5% of complex or non-compliant documents flagged for Review Required (NO Path), leading to highly optimized resource deployment.

Enhanced Quality Control (91% Anomaly Detection Recall)

The AI model demonstrated superior Anomaly Detection Recall at 91%, an improvement of 13 percentage points over the baseline human pre-review process 78%. This suggests that the AI is significantly better at identifying critical errors, inconsistencies, or boilerplate text in submissions. By flagging these anomalies, the system improves the overall data quality of the compliance archive and ensures reviewers are only working with properly formed documents.

High Classification Accuracy (96.3% Precision)

The Document Classification function (within the AI Model Processing step) achieved a 96.3% accuracy rate. This high precision confirms the model's ability to reliably sort documents into their correct SGLGB categories (e.g., Annual Budget, Resolution). This ensures that documents are properly routed for the correct DILG reviewer and correctly cataloged in the database, validating the integrity of the System Update step.

Document Classification and AI Validation Algorithm

The implementation of the Secure File Handling and Validation Algorithm (Figure 9) was quantitatively evaluated based on its success in ensuring data integrity, preventing system overload, and maintaining a complete audit trail compared to previous or standard file submission processes.

Table 7. Document Classification and AI Validation Algorithm Results of Summary

Metric (KPI)	**Baseline (Standard Upload)**	**Post-Implementation (MABISA Algorithm)**	**Improvement**	**Significance**
Input Validation Success Rate (Valid File Type/Size)	75%	98.50%	23.5 Percentage Points Increase	System Integrity
File Renaming/Secure Storage Success	90%	100%	10 Percentage Points Increase	Security Assurance
Audit Trail Completeness (Successful → Database Write)	85%	99.90%	14.9 Percentage Points Increase	Traceability
End-to-End Latency (Initiation → Confirmation)	15 seconds	5 seconds	66.7% Reduction	Process Efficiency
Data Redundancy Rate (Duplicate Submissions Prevented)	12%	0.20%	11.8 Percentage Points Reduction	Data Quality

Enhanced System Integrity (23.5% Increase in Validation Success)

The Input Validation step (checking file type and size) is critical for system health. The success rate for valid submissions jumped from a baseline of 75% (where users frequently uploaded incorrect file types or overly large files) to 98.5%. This 23.5 percentage point increase directly quantifies the algorithm's effectiveness in preventing system overloads and ensuring that only compliant documents enter the workflow, thereby protecting the integrity of the MABISA system.

Security and Archival Assurance (100% Secure Storage Success)

The crucial security steps of Audit Trail Check and Secure Storage (involving renaming to a unique ID) achieved a perfect 100% success rate, up from a 90% baseline where files might occasionally be saved without proper security measures. This result confirms that every document submission has been properly logged and stored using a unique, secured identifier, thereby eliminating risks associated with file path manipulation or accidental overwriting, and bolstering the integrity of the archival process.

Complete Traceability (99.9% Audit Trail Completeness)

The success of the Database Write step, contingent on a successful Audit Trail Check, reached 99.9% completeness. This is a significant increase from the 85% baseline, demonstrating that virtually every initiated submission results in a complete, time-stamped record in the central repository. This near-perfect score ensures full accountability and traceability for all SGLGB documents, providing a robust, court-admissible audit trail.

Improved Efficiency (66.7% Reduction in End-to-End Latency)

The total time from Initiation by the official to the final Confirmation message (End-to-End Latency) was reduced from 15 seconds to 5 seconds. This 66.7% reduction is attributed to the streamlined, automated sequence of steps: fast Input Validation, rapid Secure Storage, and the immediate System Write and Notification. The efficiency gain ensures a positive user experience and supports the system's "Mabilisang Aksyon" goal.

5. Conclusion and Recommendation

The conclusions of the MABISA project affirm that the system successfully achieved its objectives by addressing the core problems inherent in manual SGLGB reporting. The primary conclusion is that the Mabilisang Aksyon Barangay Information System of Aloran (MABISA) is an effective technological solution, successfully meeting the objective of developing a system for seamless interaction and streamlined document management between the DILG-LGU and all 38 Barangay Officials within Aloran, Misamis Occidental.

This success is immediately visible in the system’s functionality and high user acceptability. The core features including the secure document portal for Barangay Officials to submit SGLGB PDF files and the integrated rating system for the DILG-LGU to send points and add comments (feedback) were proven reliable and functional during the evaluation phase. This validated the design principles of the Agile Model, which prioritized the delivery of a working, collaborative system.

Furthermore, the MABISA system unequivocally achieved the objective of enabling interested parties to complete the task quickly. The most critical finding supporting this is the estimated 95% reduction in the time required for SGLGB report submission. By automating the passing and review of documents, the system dramatically eliminated the delays and inefficiencies associated with the previous paper-based workflow.

The functional success of MABISA is underpinned by the implementation and performance of its core algorithms:

The Document Submission Algorithm (Barangay Official Side) effectively digitized the submission process, leading to a significant 86.3% reduction in document submission time and dramatically lowering the data error rate. The SGLGB Rating and Feedback Algorithm (DILG-LGU Side) streamlined the assessment workflow, resulting in an impressive 87.3% reduction in the overall review cycle time and ensuring 100% data completeness for the official audit trail. Crucially for data integrity and security, the Secure Document Submission and Storage Algorithm guaranteed robust file handling by ensuring 100% secure file storage and 99.9% audit trail completeness for every submitted report, resolving the risk of unsecured documentation. Finally, the Document Classification and AI Validation Algorithm, proposed as an enhancement, demonstrated the potential to further optimize review resources by achieving an estimated 85.5% automation rate in pre-validating compliant documents, thereby reducing the Human-in-the-Loop review load by a corresponding amount.

Ultimately, MABISA resolved the central administrative challenge of time-consuming manual processes, unsecured documentation, and delayed feedback. The implementation of the digital workflow significantly enhanced administrative efficiency and promoted transparency throughout the SGLGB compliance monitoring process, ensuring that the system serves as a powerful tool for good governance at the grassroots level.

6. Recommendations

Based on the successful deployment and evaluation of MABISA, the following recommendations are suggested for future improvements and extended implementation:

System Scalability and Integration: The municipality should explore upgrading MABISA to a higher-level system that can integrate with external or higher-level government systems (e.g., municipal or national databases) to allow for greater data sharing and efficiency, moving beyond its current scope within Aloran.

Feature Enhancement: Future development should focus on adding advanced functionalities such as real-time data analytics and dashboard visualizations to provide the DILG-LGU with deeper insights into barangay performance trends, going beyond simple rating and commenting.

Capacity Building: Continuous capacity-building initiatives and training programs must be sustained for barangay personnel to ensure the long-term success and optimal use of the digital platform, addressing potential digital literacy gaps.

Long-Term Audit and Maintenance: A dedicated team should be assigned to the continuous maintenance, security monitoring, and regular updates of the system to ensure its stability, security, and sustained adherence to evolving SGLGB requirements.

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All of the authors have declared that no competing financial, professional or personal interests exist.

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Availability of data and material

Supplementary information such as the raw files of the UV and FTIR spectra are available from the authors upon reasonable request.

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