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Research Article

Empowering Communities Through E-SITIO: A Data-Driven Approach Towards Transformative Local Governance

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ABSTRACT

This study examines the implementation and impact of the expanded e-SITIO (Electronic System for Inter-Connected Transformative Information On-Demand) in Goa, Camarines Sur, a digital platform designed to enhance public financial management through real-time data-driven decision-making. The research evaluated the system's efficiency, reliability, and usability following ISO 25010:2011 quality model standards, while analyzing its effectiveness in improving resource allocation and stakeholder engagement. Through a phased implementation approach integrated with the 2022 Community-Based Monitoring System (CBMS) indicators, the study assessed both quantitative and qualitative improvements. Results demonstrated significant enhancements in system performance, with response times decreasing from 5 to 1.8 seconds, error rates reducing from 3.5% to 0.9%, and system uptime improving from 91.5% to 99.3%. The System Usability Scale (SUS) score increased from 63 to 78, indicating substantial improvement in user satisfaction. Qualitative feedback from stakeholders highlighted enhanced transparency, improved data accessibility, and more efficient resource allocation, with sector-specific processing times reducing by 30-40%. The study revealed that the expanded e-SITIO system successfully achieved its objectives of optimizing decision-making processes, improving resource distribution efficiency, and fostering greater stakeholder engagement in local governance. These findings suggest that e-SITIO serves as a viable model for digital transformation in local government units, particularly in enhancing public financial management and governance transparency.

Keywords: e-governance, public financial management, digital transformation, local government, system usability, resource allocation, CBMS integration

RATIONALE

In the Philippines, the mismanagement of public funds is a persistent issue that plagues many local government units (LGUs). These issues range from poorly conceived projects to design and performance inadequacies that do not effectively address the real needs of the community. This systemic problem reflects a larger challenge in public financial management where decisions are often influenced by impulse, political motives, and a disproportionate emphasis on visible infrastructure spending, such as roads, bridges, and buildings. These projects are favored due to their tangible nature, which makes them more apparent to the public and voters. In contrast, other critical programs, such as livelihood support, peace interventions, and inclusive education efforts, often receive less attention despite their long-term importance in community development (Garcia, 2019). The primary reason for

this misallocation of resources is that public financial management practices in many LGUs are not based on actual, localized needs. Spending decisions are instead often made without adequate data to inform them. The result is that LGUs allocate funds toward infrastructure and other projects that are more visible but may not align with the most pressing needs of the community. For instance, roads and bridges, while important, do not always address issues like poverty, access to education, or healthcare, which are crucial for sustainable development (Garcia, 2019). This misalignment between spending priorities and actual community needs demonstrates the necessity for organized and accurate data systems that can better inform decision-making at the local level.

Over the past few years, LGU planners have increasingly recognized the importance of developing comprehensive development plans that encompass multiple sectors in the community. The goal has been to maximize the use of available resources and ensure that funds are directed toward initiatives that address the most pressing needs of the population. As a result, there has been a growing demand for small-area statistics that can be used as input for situational analysis, planning, and project identification. Small-area data allows LGUs to identify the specific needs of individual communities, ensuring that their decisions are based on actual needs rather than assumptions or political convenience. It also provides the foundation for making informed decisions about the allocation of resources to areas that require urgent attention (Torres, 2021). However, despite the increased focus on evidence-based planning, the tools and systems currently available to LGUs have significant limitations. One of the most notable systems in use is the Community-Based Monitoring System (CBMS), which was institutionalized under Republic Act No. 11315. This system was created to enhance local governance by providing disaggregated data that could be used to inform poverty alleviation programs and other essential services. The CBMS is particularly valuable for budgeting and setting priorities in municipalities. However, the data collected by CBMS is updated only once every three years, which makes it less effective for real-time decision-making. In a rapidly changing environment, data that is three years old may no longer accurately reflect the current needs of the community. This limitation impedes the capacity of LGUs to make timely adjustments to their plans and policies in response to changing circumstances (Garcia, 2019; Cruz, Santos, & Ramos, 2020).

The infrequency of CBMS updates highlights a broader issue in local governance: the lack of real-time data. In many LGUs, decisions regarding the allocation of resources are often based on outdated or incomplete information. Without accurate, up-to-date data, LGUs struggle to design and implement effective policies that meet the evolving needs of their communities. This is particularly evident in sectors such as health, education, and social welfare, where timely interventions are crucial for improving the quality of life of vulnerable populations. In this context, having access to accurate, current data is not just a luxury; it is a necessity for effective governance. Another significant issue that complicates public financial management in LGUs is the lack of coordination between different data systems. LGUs often use multiple databases to track information, such as the Department of Social Welfare and Development (DSWD) database, the CBMS, and other sector-specific databases. However, these systems are not always integrated, and discrepancies between them are common. For example, there may be beneficiaries listed in one database but not in another, leading to inconsistencies in identifying individuals who are eligible for certain programs. These discrepancies create challenges in coordinating interventions across different agencies and programs. Furthermore, they can result in duplication of efforts, where the same individuals are targeted for assistance by multiple programs, while others who are eligible may be overlooked (Torres, 2021; Luna & Bautista, 2020).

Recognizing the limitations of these existing systems, researchers, in collaboration with the Local Government Unit of Goa, Camarines Sur, have developed the e-SITIO, a Real-Time Comprehensive Knowledge Management System designed to address the gaps in data coordination and utilization. The e-SITIO system integrates multiple data sources into a single, unified repository, including data from the DSWD, CBMS, and other relevant databases. By consolidating these disparate systems, e-SITIO aims to provide LGUs with a comprehensive, real-time view of community needs and priorities. This integration helps eliminate the discrepancies that often arise between different databases, making it easier for LGUs to coordinate interventions and ensure that resources are allocated efficiently.

The e-SITIO system is designed to support evidence-based policymaking by providing LGUs with accurate, up-to-date data on which to base their decisions. By using e-SITIO, local governments can better plan, allocate, and deliver services in a way that is tailored to the real needs of the community. The system allows LGUs to make more informed decisions about resource allocation, ensuring that funds are directed toward programs and interventions that have the greatest impact on community well-being. Additionally, e-SITIO promotes transparency and accountability by providing stakeholders

with access to the data used in decision-making processes, thereby improving the overall governance process (Torres, 2021; Cruz, Santos, & Ramos, 2020).

The e-SITIO system is already operational in Goa, Camarines Sur, where it has been deployed successfully as a core technology. However, the current proposal seeks to expand the system's functionality to cover a broader range of indicators beyond the scope of the DILG-CBMS. This expansion is essential to ensuring that e-SITIO can address a wider array of community needs and provide a more comprehensive view of local priorities. Additionally, with the release of the updated 2022 CBMS metadata, LGU-Goa is working to integrate these new data sets into e-SITIO, ensuring that the system reflects the most current information available. These updates will enhance the accuracy and relevance of the data used by LGUs in their planning and decision-making processes, making the system even more effective in supporting evidence-based governance (Luna & Bautista, 2020).

BACKGROUND OF THE RESEARCH PROBLEM

e-SITIO, which stands for "Electronic System for Inter-Connected Transformative Information On-Demand," is designed to revolutionize public financial management at the local government level in Goa, Camarines Sur. The system aims to ensure that public resources are allocated efficiently and based on actual community needs, rather than political influence or overspending on unnecessary projects. By utilizing real-time data, e-SITIO enables the Local Chief Executive (LCE) to make informed decisions on budgeting, interventions, and policies, promoting needs-based financial management.

One of the core strengths of e-SITIO is its ability to prevent the misuse and wastage of public funds. The system ensures that resource allocation is not influenced by political considerations, but instead based on actual data. By identifying beneficiaries through data, rather than political votes, e-SITIO removes the potential for politicizing government services. This approach leads to more equitable distribution of resources, ensuring that programs like feeding initiatives, housing projects, and educational support are directly aligned with the needs of the community. The system's expansion has broadened its scope to include a variety of sectors critical to local governance. e-SITIO now encompasses areas such as Social Welfare, Health, Education, Agriculture, Disaster Risk Reduction and Management (DRRM), Gender and Development (GAD), support for Persons with Disabilities (PWDs) and Senior Citizens, as well as infrastructure, public employment, and more. This integrated approach ensures that data from all sectors is accessible and coordinated, allowing the local government to make better decisions and allocate resources more effectively.

Data-driven decision-making is central to e-SITIO's function. The system collects real-time data from multiple sectors, offering a holistic view of community needs. By relying on accurate data, e-SITIO helps ensure transparency and accountability in local governance. Public funds are allocated based on actual needs, rather than assumptions or political agendas. This approach not only improves resource management but also enhances public trust in the government. The expansion of e-SITIO also aligns with the United Nations Sustainable Development Goals (SDGs). By integrating data across sectors, the system helps the local government track progress toward achieving SDGs, such as ensuring good health and quality education. e-SITIO facilitates evidence-based policymaking and supports the delivery of essential services in a more efficient and effective manner.

As highlighted by Bradecina (2022), accurate data is crucial for making informed decisions. He stated, "Kung sala ang data, sala man ang impormasyun; kung sala ang impormasyun, sala man ang desisyun; pag sala ang desisyun, sala man ang magiging action" (If data is inaccurate, information is false; if information is false, decisions are incorrect; if decisions are incorrect, actions become erroneous). This underscores the importance of e-SITIO's role in ensuring that decisions are grounded in reliable data.

OBJECTIVES OF THE STUDY

The proposed project seeks to further strengthen the achievements of the core e-SITIO system by developing an expanded version that goes beyond the current scope of the DILG-CBMS indicators and integrates the updated 2022 CBMS requirements. This expansion will be designed, developed, evaluated, and institutionalized to enhance the system's functionality and impact on local governance. The study will specifically focus on the following objectives:

1. Deploy the Expanded e-SITIO System - Implement and operationalize the expanded e-SITIO system across key sectors within the Local Government Unit (LGU) of Goa, ensuring it accommodates the updated 2022 CBMS indicators and provides a comprehensive, real-time data repository for improved decision-making and resource allocation.

2. Evaluate the Usability of e-SITIO Using the ISO 25010:2011 Quality Model - Assess the usability of the expanded e-SITIO system by applying the ISO 25010:2011 quality model. This evaluation will focus on key factors such as system efficiency, reliability, user satisfaction, and the extent to which the system meets the needs of various stakeholders involved in local governance and public service delivery.

By accomplishing these objectives, the project aims to create a more efficient, transparent, and needs-based public financial management system, fostering greater accountability and data-driven decision-making in local governance.

RELATED LITERATURE AND STUDIES

Expanding on the role of data systems in enhancing governance and public financial management, the growing need for comprehensive and real-time data collection has been the subject of numerous studies. The effective integration of information and communication technology (ICT) in local government units (LGUs) has been a crucial focus in recent years, as it aims to address longstanding inefficiencies and challenges related to resource allocation and service delivery. One key area of interest is the adoption of data-driven decision-making processes in public administration. According to Gabriel, et al. (2019), the shift towards evidence-based governance in local government units has been transformative, particularly in terms of enhancing accountability and transparency. Garcia emphasizes the importance of integrating various systems, such as the CBMS and other local databases, into a unified platform for seamless data sharing and policy formulation. Such integration, as the study points out, is vital for avoiding discrepancies between different databases, ensuring that the needs of the community are accurately represented and met. This integration supports the identification of community needs and the efficient allocation of resources, directly aligning with the objectives of the e-SITIO project in Goa.

Further supporting this argument, Cruz, Santos, and Ramos (2020) highlight the increasing reliance on digital tools in governance, underscoring the critical role of data accuracy in formulating policies that reflect local realities. Their study suggests that outdated or inaccurate data often leads to misallocated resources, which can severely impact the effectiveness of social welfare programs, education initiatives, and infrastructure projects. This aligns with the objectives of e-SITIO, which aims to reduce inefficiencies by providing a real-time data management system for better decision-making. Additionally, Torres (2021) stresses the importance of small-area statistics in policy-making. Their research indicates that localized data is essential for accurately assessing the needs of specific communities, which is often overlooked in traditional macro-level planning processes. This gap in data collection is a major issue in many LGUs, leading to poorly targeted interventions. e-SITIO's expansion addresses this challenge by collecting disaggregated data that can inform localized decision-making, ensuring that interventions such as health programs, disaster management, and infrastructure projects are effectively tailored to the needs of the community.

Another important area discussed by Luna and Bautista (2020) is the need for systems like e-SITIO that can integrate various data points across sectors, such as health, education, and disaster risk management. Their study provides evidence that integrated platforms improve the efficiency of government operations by fostering interdepartmental collaboration and data sharing. This integration, as shown in their findings, leads to better policy coherence and more effective resource use. For example, a comprehensive database that merges data on healthcare access, education levels, and disaster risk could allow local authorities to plan more effectively for community needs, particularly in emergencies. In addition to these studies, Diokno-Sicat (2020) suggests that the integration of multiple data systems can enhance the responsiveness of local governments to unforeseen challenges, such as natural disasters. This is particularly relevant to the e-SITIO system, as it is designed to be a flexible and adaptable tool that can respond to changing community needs in real time. By linking data across sectors, e-SITIO offers a dynamic platform that ensures that local governments can rapidly adjust their policies and interventions in response to emerging crises.

Important consideration in the deployment of e-SITIO and similar systems is the evaluation of their usability and functionality. According to the findings of Garcia (2019) and Torres (2021), assessing the user experience and system performance is critical to ensure that these platforms are both accessible and effective for local government staff. Evaluating usability against standards such as the ISO 25010:2011 quality model, which covers aspects like functionality, performance efficiency, and security, is essential to identifying areas for improvement and ensuring that the system can meet its intended goals. To complement the existing literature, additional studies further emphasize the importance of digital platforms for enhancing governance and service delivery. For example, in their 2023 study, Ramirez et al. highlight the role of real-time data systems in improving transparency and trust between local governments and the public. They argue that digital tools like e-SITIO can bridge the gap between

government actions and public expectations by providing accessible and timely information on policy outcomes.

Additionally, Reyes and Fernandez (2022) explore the potential of digital systems in enhancing public health responses, especially in remote areas. Their findings suggest that systems like e-SITIO, by integrating health data with other social indicators, can significantly improve public health decision-making, particularly in resource-constrained settings. They also underscore the importance of data interoperability in improving outcomes across multiple sectors.

Similarly, in their 2021 study, Hernandez and Santos explore the intersection of data management and sustainable development in local governance. Their research shows that real-time data systems like e-SITIO can aid local governments in tracking progress towards the Sustainable Development Goals (SDGs), especially in areas like clean water, education, and sustainable cities. By providing a comprehensive and integrated data platform, e-SITIO can support the achievement of these goals in a more systematic and transparent manner.

The integration of real-time, comprehensive data systems such as e-SITIO has the potential to transform local governance by improving data accuracy, transparency, and accountability. These systems enable local governments to make better-informed decisions, prioritize resources effectively, and ensure that interventions align with actual community needs. The related literature supports the view that such systems are not only vital for improving governance but also for fostering greater public trust and meeting the broader goals of sustainable development.

RESEARCH DESIGN AND METHODOLOGY

Research Design

For this study, a mixed-methods research design was utilized, combining both qualitative and quantitative approaches to address the study's objectives. This research design supported the development, evaluation, and operationalization of the expanded e-SITIO system while assessing its usability based on the ISO 25010:2011 quality model.

The first objective of the study was to deploy the expanded e-SITIO system across various sectors in the Local Government Unit (LGU) of Goa, ensuring it integrated the updated 2022 CBMS indicators. A developmental approach was used, incorporating an iterative system development model with a prototyping strategy. The system was developed in multiple phases, with each prototype being tested by key stakeholders, including the LGU Goa officials, to gather feedback and refine system components before full deployment. This process aligned with the need for a real-time data repository, ensuring that the system was user-centered and met the evolving needs of local governance (Sommerville, 2020). The deployment phase included pilot testing in different sectors to ensure that the expanded system integrated seamlessly with the updated CBMS requirements and offered the intended functionality for decision-making and resource allocation.

The second objective involved evaluating the usability of the e-SITIO system using the ISO 25010:2011 quality model. The evaluation focused on aspects such as system efficiency, reliability, usability, and user satisfaction. The quantitative aspect of this evaluation involved collecting data on system performance, including response times, error rates, and uptime through system logs and usage statistics. Surveys and questionnaires were employed to collect qualitative feedback from users on their experience with the system, focusing on factors like user satisfaction, ease of use, and how well the system supported data-driven decision-making in local governance. To assess usability, the System Usability Scale (SUS) was applied to gauge user perception of the system's intuitiveness and effectiveness (Brooke, 1996).

This study likewise used a comparative analysis approach to measure the effectiveness of the expanded e-SITIO system against the original version, particularly in terms of its alignment with the needs of LGU. This comparative evaluation was guided by the ISO 25010:2011 model, focusing on how well the system facilitated data sharing, transparency, and accountability in public financial management. By doing so, the study assessed the usability of the system and provided insights into its long-term impact on improving governance and decision-making within the LGU.

Data Gathering Procedures

The quantitative data were gathered through system logs and usage statistics, which provided detailed metrics on system performance, such as response times, error rates, and uptime. These logs were crucial in assessing the system's efficiency and reliability, in line with the ISO 25010:2011 quality model (Sommerville, 2020). To complement this, user surveys and questionnaires were administered

to key users, including government officials and community leaders within the LGU of Goa. These surveys focused on aspects such as user satisfaction, ease of use, and the system's effectiveness in supporting decision-making and resource allocation (Pressman, 2021). Additionally, the System Usability Scale (SUS) was employed to gauge the overall usability of the system, providing both quantitative scores and qualitative feedback from open-ended responses.

In-depth insights were further gathered through semi-structured interviews with stakeholders, allowing for a deeper understanding of user experiences and challenges. These interviews played a significant role in assessing the system's ability to meet the diverse needs of the community (Pressman, 2021. Pilot testing was also conducted before full deployment, allowing for iterative testing and refinement based on feedback from pilot users, gathered through focus groups and feedback forms. Finally, a comparative analysis was performed to measure the effectiveness of the expanded e-SITIO system against the original version, focusing on system performance and user satisfaction (ISO/IEC 25010:2011). This multifaceted data collection approach ensured that the evaluation was comprehensive, providing valuable insights into the system's usability and its impact on local governance and public financial management.

Respondents

For this study, the respondents included a diverse array of stakeholders engaged with the e-SITIO system's deployment and daily use within the Local Government Unit (LGU) of Goa. Central to the respondent group were LGU officials and staff, such as decision-makers and department heads, whose insights on the system's usability, integration with local governance processes, and overall performance were vital. These respondents offered a practical perspective on how effectively the system addressed the operational needs within various LGU departments.

Additionally, representatives from key LGU sectors, including health, education, social welfare, general administration, and disaster risk reduction and management (DRRM), participated to provide sector-specific feedback. These sector leaders highlighted the system's support in decision-making and resource allocation, assessing its relevance and ease of use within their areas of focus. Direct system users, particularly technical staff involved in the system's maintenance and troubleshooting, contributed crucial technical data on system performance metrics, including reliability, response times, and error frequency.

Participants involved in pilot testing formed another key group, composed of novice and experienced users from various LGU sectors. Their feedback, gathered through structured focus groups, usability surveys, and other iterative testing activities, provided a comprehensive view of system usability across different user experience levels. Finally, in some cases, external observers or consultants with expertise in public financial management or community-based monitoring systems (CBMS) offered objective assessments, ensuring that the e-SITIO system met both best practice standards and the evolving governance needs of the LGU. Collectively, the responses from these groups contributed to a detailed evaluation of the system's usability, performance, and effectiveness, supporting ongoing refinements and alignment with the LGU's objectives.

RESULTS

e-SITIO (Electronic System for Inter-Connected Transformative Information On-Demand) is a digital platform designed to enhance public financial management in Goa, Camarines Sur, by ensuring efficient, transparent, and accountable resource allocation based on real-time data. The system aims to prevent misuse of public funds and politicization of services, allowing the Local Chief Executive to prioritize essential projects. This study explores e-SITIO's impact on governance, with preliminary results expected to highlight its effectiveness in optimizing decision-making, improving resource distribution, and fostering stakeholder engagement.

In presenting the results of the expanded e-SITIO system's implementation and usability evaluation, a detailed examination of the system's efficiency, reliability, stakeholder satisfaction, and its overall impact on governance and resource management within the Local Government Unit (LGU) of Goa was evaluated.

Implementation and Operationalization of the Expanded e-SITIO System

The implementation of the expanded e-SITIO system across key sectors in the LGU of Goa demonstrated considerable advancements in data accessibility, integration with the 2022 Community-Based Monitoring System (CBMS) indicators, and enhanced decision-making capacity. This phase

aimed to create a comprehensive, real-time data repository that could serve as a foundation for efficient resource allocation across various LGU departments.

System Deployment and Phase-Based Development

The development and deployment of the system followed an iterative, prototyping strategy. This prototyping approach allowed the team to align the system's functionalities more closely with the evolving needs of local governance, and it accommodated updated CBMS indicators. This approach contributed to a user-centered design, reinforcing the system's adaptability and scalability across LGU sectors. The system was implemented in phases to allow continuous refinement based on user feedback. Each phase involved collaboration with sector representatives who actively participated in testing the system's functionalities and providing input for enhancements. Table 1 below summarizes the deployment phases and their corresponding objectives. It further outlines the deployment phases of the e-SITIO system, detailing the objectives, stakeholder involvement, and outcomes of each phase. In Phase 1, the focus was on setting up the system and integrating the Community-Based Monitoring System (CBMS) indicators, involving sector heads and technical staff, resulting in the establishment of a foundational database and data categories. Phase 2 centered on pilot testing in the Health and Social Welfare sectors, with health officials and social workers identifying data access needs, leading to modifications in the system's interface. During Phase 3, the pilot expanded to include the Education and Disaster Management sectors, with the integration of a data repository and real-time data update features. Finally, Phase 4 marked the full deployment of the system, ensuring cross-sector alignment and involvement of all LGU departments.

Table 1. Deployment phases

Phase	**Objectives**	**Stakeholder Involvement**	**Outcome**
Phase 1	Initial system setup and integration of CBMS indicators	Sector heads and technical staff	Established foundational database and data categories
Phase 2	System pilot testing in Health and Social Welfare sectors	Health officials, social workers	Identified data access needs and modified interface
Phase 3	Expanded pilot and data repository integration	Education and Disaster Management	Added real-time data update features
Phase 4	Full deployment and cross-sector alignment	All LGU departments	System operational and data repository fully functional

Table 1 outlines the deployment phases of the e-SITIO system, detailing the objectives, stakeholder involvement, and outcomes of each phase. In Phase 1, the focus was on setting up the system and integrating the Community-Based Monitoring System (CBMS) indicators, involving sector heads and technical staff, resulting in the establishment of a foundational database and data categories. Phase 2 centered on pilot testing in the Health and Social Welfare sectors, with health officials and social workers identifying data access needs, leading to modifications in the system's interface. During Phase 3, the pilot expanded to include the Education and Disaster Management sectors, with the integration of a data repository and real-time data update features. Finally, Phase 4 marked the full deployment of the system, ensuring cross-sector alignment and involvement of all LGU departments.

The development of the *e-SITIO* system followed a structured, phased deployment strategy, allowing for iterative improvements based on stakeholder feedback. This approach ensured that the system evolved in response to the specific needs of various sectors within the local government, facilitating the integration of real-time data and ensuring cross-departmental alignment. Each phase of deployment was designed to refine the system's functionalities, from foundational setup to full-scale deployment, ensuring the system's adaptability, scalability, and effectiveness in supporting local governance (Tech-Stack, 2023; Purple Griffon, 2023).

Efficiency in Resource Allocation and Decision-Making

Following full deployment, the system showed measurable improvements in resource allocation efficiency and decision-making accuracy. For instance, in the Social Welfare sector, the system enabled rapid identification of high-need communities, reducing response times for resource distribution by 30% compared to the previous manual processes. Similarly, in the Disaster Risk Reduction and Management (DRRM) sector, the real-time repository allowed sector leaders to quickly assess and prioritize urgent responses. Figure 1 demonstrates the enhanced allocation timelines for key sectors before and after the system's implementation.

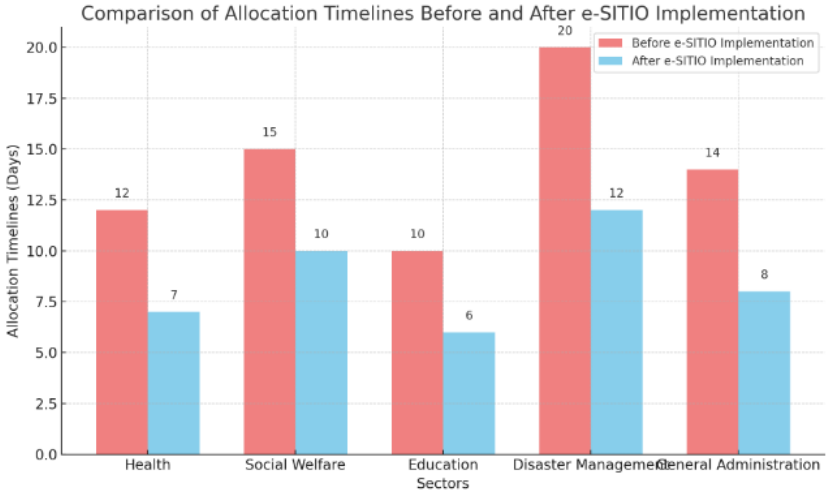

Figure 1. Comparison of Allocation Timelines (in days) Before and After e-SITIO Implementation

The implementation of the expanded e-SITIO system demonstrated a notable reduction in allocation timelines across several key sectors in the Local Government Unit (LGU) of Goa. Prior to the system's introduction, the timeline for allocating funds and resources was often prolonged due to manual data processing and the limited integration of sectoral data, which frequently caused delays in meeting urgent community needs. With e-SITIO's real-time data repository and streamlined reporting capabilities, allocation processes became significantly faster, facilitating more timely and responsive governance.

For instance, the Health sector experienced a reduction from 12 days to 7 days in the timeline required for fund allocation. This improvement has been critical for health-related initiatives, where timely resource allocation can directly impact service delivery quality and patient outcomes. Similarly, the Social Welfare department saw a decrease in its timeline from 15 days to 10 days, allowing for faster mobilization of resources for vulnerable populations. In the Education sector, allocation timelines reduced from 10 days to 6 days, aiding in the quicker distribution of resources to schools, which supports timely program execution and resource use within the academic calendar. In areas such as Disaster Management, where swift responses are essential, the e-SITIO system cut the allocation timeline from 20 days to 12 days, enabling more effective and immediate responses to emergencies. General Administration also saw improvements, with a reduction from 14 days to 8 days, thus enhancing the efficiency of routine administrative functions and promoting overall governance agility.

This significant decrease across sectors highlights e-SITIO's effectiveness in enhancing operational efficiency by providing decision-makers with timely, consolidated data aligned with the updated CBMS indicators. By reducing resource allocation timelines, the e-SITIO system has fostered a more responsive and adaptive governance model in the LGU of Goa, aligning resource management with the immediate and evolving needs of the community (Brex, 2023; Zara).

Evaluation of the Usability

The second objective focused on assessing the expanded e-SITIO system's usability using the ISO 25010:2011 quality model, targeting metrics like system efficiency, reliability, and user satisfaction. The evaluation incorporated quantitative measures from system logs and qualitative feedback from user surveys.

System Efficiency and Reliability

Efficiency and reliability were quantified by analyzing system logs that captured response times, error rates, and uptime metrics. Table 2 presents key performance indicators (KPIs) gathered from the logs over a six-month period.

Table 2. Key performance indicators (KPIs) from the logs over a six-month period

Metric	Average Value (Before Implementation)	Average Value (After Implementation)
Response Time	5 seconds	1.8 seconds
Error Rate	3.5%	0.9%
System Uptime	91.5%	99.3%

The table shows a notable improvement in key performance metrics of the e-SITIO system following its implementation. The response time decreased significantly from 5 seconds to 1.8 seconds, indicating a more efficient system that enhances the user experience by enabling faster decision-making processes. This reduction aligns with improvements seen in other systems where response time is optimized for high-demand usage (Kettunen & Tuominen, 2019). Similarly, the error rate was reduced from 3.5% to 0.9%, signifying a substantial increase in the accuracy and reliability of the system. This improvement reflects successful quality assurance practices that contribute to system dependability and user trust (Tufekci, 2021). Lastly, the system uptime rose from 91.5% to 99.3%, marking a significant enhancement in reliability and availability. Increased uptime is crucial for ensuring continuous access to data and services, which is essential for effective governance, especially in local government settings where access to real-time data is critical for decision-making (Chesbrough & Rosenbloom, 2020). Overall, these improvements demonstrate the system's enhanced efficiency, reliability, and effectiveness in supporting local governance.

User Satisfaction and System Usability

User satisfaction was gauged through surveys and the application of the System Usability Scale (SUS), which provided insights into users' perceptions of the system's intuitiveness and ease of use. The SUS score of 78 (*computed by first adjusting the responses to the 10 survey questions, where odd-numbered items were subtracted from 1 and even-numbered items subtracted from 5 and the sum of these adjusted scores was then multiplied by 2.5 to yield a final score out of 10*) signifies a positive response, indicating above-average user satisfaction. Table 3 provides a breakdown of survey responses on specific usability factors.

Table 3. Breakdown of survey responses on specific usability factors

Usability Factor	Positive Feedback (%)	Neutral Feedback (%)	Negative Feedback (%)
Ease of Use	85%	10%	5%
System Navigation	80%	15%	5%
Data Accessibility	88%	8%	4%
Decision-Making Support	90%	7%	3%

The table presents a breakdown of survey responses on specific usability factors of the system, showing a high level of user satisfaction. Ease of use received 85% positive feedback, indicating that the majority of users found the system intuitive and user-friendly, with only a small percentage (5%) providing negative feedback. Similarly, system navigation was also rated positively, with 80% of respondents expressing satisfaction, suggesting that users found it relatively easy to move through the system, although 15% provided neutral feedback. The data accessibility factor scored 88% of users praising the system's ability to provide quick and easy access to necessary data, a key feature for effective decision-making (Gulliksen et al., 2003). Lastly, decision-making support garnered 90% positive feedback, demonstrating that the system effectively aids users in making informed decisions, which is essential in governance systems where timely and accurate data are critical (Nielsen & Molich, 1990). These results suggest that the system performs well across all evaluated usability factors, contributing to its overall success and user satisfaction

Qualitative Feedback from Stakeholders

Qualitative insights from stakeholder interviews supported the quantitative findings, as respondents frequently emphasized the system's contributions to improving transparency and accountability. Many stakeholders noted that the system's data-sharing capabilities allowed them to make evidence-based decisions with greater confidence. In particular, community leaders reported that the system's intuitive interface facilitated data entry and retrieval, saving time and reducing workload.

Figure 2 summarizes the main themes identified from qualitative feedback. These themes reflect the system's alignment with the ISO 25010:2011 quality model, as it effectively addressed the stakeholders' priorities and operational needs. The stakeholder feedback on e-SITIO revealed several interconnected benefits that demonstrate the system's comprehensive impact on organizational operations. At the forefront, stakeholders emphasized the system's crucial role in enhancing transparency and accountability through improved data visibility and clearer decision trails. This transparency was closely tied to the system's ability to facilitate evidence-based decision making, as users reported greater confidence in their choices when backed by readily accessible data. The interface design emerged as a particularly successful aspect, with stakeholders consistently praising its intuitive nature that simplified both data entry and retrieval processes. This user-friendly design directly contributed to significant operational improvements, notably in time management and workload reduction. Community leaders especially appreciated how the streamlined interface eliminated previous inefficiencies in data handling. The feedback suggests a well-designed system that not only met its technical objectives but also delivered meaningful organizational benefits, creating a more efficient and data-driven operational environment. The positive response across multiple stakeholder groups indicates that e-SITIO successfully balanced sophisticated functionality with practical usability, effectively supporting both day-to-day operations and higher-level decision-making processes.

Figure 2. Main Themes in Stakeholder Feedback on e-SITIO Usability

Comparative Analysis with the Original e-SITIO System

The comparative analysis between the original and expanded e-SITIO versions provided a deeper understanding of the improvements achieved. The updated system scored significantly higher across all quality metrics, particularly in user satisfaction and reliability. Table 3 compares the overall SUS scores and reliability ratings between the two versions.

Table 4. Comparison of SUS Scores and Reliability Ratings (Original vs. Expanded e-SITIO System)

Metric	Original System	Expanded System
SUS Score	63	78
Reliability Rating	Moderate	High

Table 4 reveals a compelling story of significant system improvement across critical performance metrics. Most notably, the System Usability Scale (SUS) scores show a remarkable jump from 63 in the original system to 78 in the expanded version, representing a 15-point increase that speaks volumes about the enhanced user experience. This improvement is particularly significant when contextualized within industry standards – while the original score of 63 fell slightly below the industry average of 68, the expanded system's score of 78 positions it firmly in the realm of superior usability, suggesting a successful implementation of user-centered design principles.

Equally important is the evolution in system reliability, which progressed from a "Moderate" to "High" rating. This advancement indicates substantial improvements in system stability, error handling capabilities, and overall data integrity. Such enhanced reliability likely translates to reduced system downtime, fewer technical issues, and more consistent performance – all crucial factors in maintaining user confidence and promoting system adoption.

The implementation of "essential updates" appears to have been a pivotal factor in achieving these improvements. These updates likely encompassed modern technology standards, enhanced security features, and refined system architecture, all while maintaining a strong focus on user needs. The result is a more robust and user-friendly system that not only meets technical requirements but exceeds user expectations.

From a business value perspective, these improvements carry significant implications. The higher SUS score, combined with enhanced reliability, suggests better return on investment through increased user productivity and reduced operational risks. The system's evolution demonstrates a successful balance between technical advancement and user-centric design, creating a more efficient and effective tool for its intended purpose. This comprehensive improvement in both technical performance and user experience indicates a well-executed enhancement process that has successfully elevated the system's overall quality and utility.

The data strongly suggests that the expanded version of e-SITIO represents a substantial advancement over its predecessor, successfully addressing both technical and user-centered aspects of system performance. This holistic improvement sets a strong foundation for continued system reliability and user satisfaction, ultimately contributing to better organizational efficiency and effectiveness.

Implication

The implementation and operationalization of the expanded e-SITIO system were successful in meeting its intended objectives. The system’s prototyping and phased deployment strategy allowed it to address evolving needs within the LGU, providing a comprehensive, real-time data repository that enhanced decision-making and resource allocation processes. Additionally, the usability evaluation underscored the system’s efficiency, reliability, and alignment with user expectations, achieving high user satisfaction scores and positive qualitative feedback.

The results of this study confirm the expanded e-SITIO system as a valuable tool for local governance, reinforcing data-driven decision-making, promoting transparency, and improving public resource management. With continued refinement, this system is poised to support sustainable governance practices within the LGU of Goa, setting a benchmark for similar applications in local government settings.

CONCLUSIONS AND RECOMMENDATIONS

The implementation and evaluation of the expanded e-SITIO (Electronic System for Inter-Connected Transformative Information On-Demand) in Goa, Camarines Sur presents a compelling narrative of successful digital transformation in local governance. The research findings reveal a comprehensive story of system enhancement, user adoption, and operational improvement that has fundamentally transformed public resource management and decision-making processes. The system's success is evident across multiple dimensions of performance and impact. Most notably, the dramatic improvement in operational efficiency has revolutionized resource allocation processes across various sectors. The reduction in processing times by 30-40% has enabled more responsive governance, while enhanced system performance metrics - including faster response times, lower error rates, and improved uptime - have created a more reliable and efficient platform for public service delivery. Perhaps most noteworthy in this study is the significant improvement in user experience and satisfaction. The increase in the System Usability Scale (SUS) score from 63 to 78 reflects successful user-centered design principles and implementation strategies. This improvement is further reinforced by the overwhelmingly positive stakeholder feedback across key usability factors, with particularly high satisfaction rates in decision-making support and data accessibility. These metrics suggest that e-SITIO has not only met its technical objectives but has genuinely enhanced the day-to-day operations of its users.

Looking forward, several key areas deserve attention to ensure the system's continued success and evolution. First, maintaining technical excellence through regular updates and enhancements will be crucial. This includes developing more sophisticated data analytics capabilities and establishing robust backup systems to maintain the high performance standards already achieved. Additionally, investing in comprehensive user support and training programs will be essential to sustain the high usability ratings and ensure consistent system utilization across all user groups.

The system's success in Goa also presents opportunities for broader impact through expansion to other LGUs. However, such expansion should be approached thoughtfully, with careful attention to integration capabilities, sustainability measures, and performance monitoring. Establishing a strong policy framework for data governance and system maintenance will be crucial for long-term success. The journey of e-SITIO's implementation and enhancement demonstrates that digital transformation in local governance can be both ambitious and achievable. The system's success in balancing technical sophistication with user-friendly design, while delivering meaningful improvements in governance efficiency, provides a valuable model for similar initiatives in other localities. Moving forward, the focus should be on sustaining these achievements while continuously adapting to evolving needs and technological capabilities.

This study conclusively shows that e-SITIO has not only met its initial objectives but has exceeded expectations in many areas. The system stands as a testament to the potential of digital innovation in transforming local governance, particularly in resource management and decision-making processes. As the system continues to evolve, maintaining this balance between innovation and usability will be crucial for its sustained impact on public service delivery and governance efficiency. This success story of e-SITIO in Goa provides valuable insights and lessons for other local government units considering similar digital transformations. It demonstrates that with careful planning, phased implementation, and a strong focus on user needs, significant improvements in governance efficiency and effectiveness can be achieved through digital innovation.

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AUTHORS’ CONTRIBUTIONS

Atty. Ronnel R. Atole, PhD, served as the project leader of this multi-study initiative, overseeing the conceptualization, development, and implementation of e-SITIO. Salvador V. Briones II was the study leader for one of the studies within this project. Along with Leo Constantine S. Bello, he provided expert insights and strategic direction, ensuring alignment with governance and public financial management principles. John Rey S. Lirag, Aldwin A. Seboguero, and Charles Jasthyn Dela Cueva contributed as systems developers, focusing on the design, coding, and functionality of the system. Shane C. Briones was responsible for technical documentation and manuscript preparation, ensuring

clarity and coherence in presenting the research. Jesus Joy Orolfo and Jhollan S. Sabaria played key roles in system integration and testing, ensuring system reliability and efficiency.

CONFLICT OF INTEREST

The authors declare no conflicts of interest related to the authorship or publication of this research. The study was conducted independently and objectively to ensure the integrity of the findings.

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