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Android-Based Digitalization of SDGs Survey Data at Neighborhood Unit Level in Sumbermulyo

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Abstract

Paper-based Sustainable Development Goals (SDGs) surveys conducted at the neighborhood-unit level can delay data recapitulation, increase transcription risks, and complicate the maintenance of structured village records. This study developed an Android-based survey application to support the RT-level SDGs workflow in Sumbermulyo Village, Jogoroto, Jombang, Indonesia. A Research and Development approach with a Waterfall-oriented design was employed. System requirements were identified through direct observation of the existing survey workflow and a review of relevant regulations and literature. System behavior was modeled using Unified Modeling Language (UML), while the prototype was developed using Framework7 for the mobile interface, Laravel for the REST API, and MySQL for centralized data management. Functional verification was limited to assessing traceability among the observed requirements, design artifacts, and screen-level walkthroughs of the principal user flow. The resulting application provides authentication, dashboard access, RW and RT data management, survey-progress monitoring, structured questionnaire entry, validation support, and centralized data exchange. The available development evidence indicates that the application reduces repeated paper-to-digital recapitulation and provides a more structured mechanism for field data entry. However, the study did not conduct controlled measurements of processing time, error rates, usability, security, or scalability; therefore, the findings support functional feasibility rather than quantified effectiveness. This study contributes a context-specific implementation model that aligns mobile data collection with the local RW–RT administrative hierarchy. Future research should evaluate the application's usability, accuracy, synchronization reliability, security, and scalability through controlled testing.

Keywords: Android; Digital Data Collection; SDGs; Survey Information System; Village Governance

INTRODUCTION

The Sustainable Development Goals require reliable information that can be interpreted at multiple administrative levels. Localizing the SDGs is not only a matter of translating global targets into local programs; it also depends on the availability of timely, disaggregated, and usable data for planning, monitoring, and evaluation. Studies on SDG localization consistently emphasize that local governments need stronger data capacity and context-sensitive implementation mechanisms (Abidoye & Orlic, 2022; ElMassah & Mohieldin, 2020; Guarini et al., 2022; Krantz & Gustafsson, 2021; Perry et al., 2021). At the same time, the interdependence among SDG targets increases the value of coherent local datasets because progress in one area can reinforce or constrain progress in another (Pakkan et al., 2023; Pradhan et al., 2017; Sachs et al., 2019).

In Indonesia, village development policy explicitly incorporates the Village SDGs (SDGs Desa) within the general framework for village development and community empowerment (Kementerian Desa dan Transmigrasi Republik Indonesia, 2023). In the case studied here, the SDGs survey workflow at the Rukun Tetangga (RT), the neighborhood unit, was still conducted using paper forms. Direct observation in Sumbermulyo Village identified operational problems including slow recapitulation, the possibility of lost or outdated records, and repeated manual entry that increases the risk of transcription errors. These issues make the smallest survey unit a critical point for data-quality improvement.

At the neighborhood level, the quality of data management is shaped not only by what variables are collected but also by how records move from field collection to recapitulation and later use. A paper form may capture the required items, yet repeated transcription introduces additional handling stages in which records can be delayed, separated from their administrative context, or copied inconsistently. This operational perspective is important for Village SDGs implementation because local planning depends on information that can be associated with the administrative unit responsible for follow-up. The relevance of an RT-level application is therefore practical as well as technical: it should preserve the existing RW-RT hierarchy while making the status and location of collected records easier to identify. This emphasis is consistent with the broader localization literature, which treats local data capacity as a prerequisite for translating SDG commitments into planning, monitoring, and evaluation processes (Abidoye & Orlic, 2022; ElMassah & Mohieldin, 2020; Guarini et al., 2022).

Digitalization should therefore be understood as a redesign of the information workflow rather than a simple replacement of paper with a screen. Digital transformation research highlights changes in processes, information flows, organizational practices, and value creation (Gong & Ribiere, 2021; Mergel et al., 2019; Vial, 2019). In public-sector settings, digital systems create value when they improve service quality, administrative capacity, access to information, and decision support while remaining appropriate to the local context (Janowski, 2015; Twizeyimana & Andersson, 2019). For an RT-level SDGs survey, this implies that a useful application should make data entry more structured, preserve the RW-RT administrative hierarchy, support progress monitoring, and move records to a centralized backend without requiring repeated transcription.

Previous research demonstrates the practical potential of mobile electronic data collection. Smartphone-based and Open Data Kit studies report benefits such as structured forms, rapid transfer, centralized repositories, and reduced dependence on paper in rural, field, and low-resource settings (Campus et al., 2020; Daum et al., 2019; Ouma et al., 2019; Raza et al., 2017). Other studies also show that the data-collection mode can influence participation, completeness, accuracy, and operational reliability, meaning that digital systems still require careful design and evaluation (García et al., 2016; Greenleaf et al., 2017; Pariyo et al., 2023). Sustainable electronic data-capture systems must additionally consider infrastructure, maintainability, and resource constraints (Benda et al., 2024).

Electronic data collection, however, should not be assumed to improve quality automatically. Digital forms can standardize field structure and accelerate transfer, but they can also reproduce poor workflow design if validation rules, navigation, infrastructure, and user context are not considered. Previous studies have shown that survey modality and device-mediated interaction can influence participation, completeness, reliability, and accuracy (García et al., 2016; Greenleaf et al., 2017; Pariyo et al., 2023). Research in low-resource settings also indicates that sustainability depends on maintainable technical choices and adaptation to local infrastructure rather than on the presence of a mobile device alone (Benda et al., 2024; Daum et al., 2019). For this reason, the present study evaluates the prototype conservatively. The available evidence is used to establish whether the observed manual workflow has a corresponding digital function and whether the principal user flow can be traced from design artifacts to visible implementation. Claims about speed, error reduction, usability, security, or scalability are not treated as quantitatively established unless the source development record contains measurements supporting them.

Despite this evidence, the source study identified a more specific implementation gap: limited documentation of an Android workflow tailored to Village SDGs data collection at the RT level that combines RW-RT hierarchy management, questionnaire progress monitoring, structured form entry, and API-based centralized storage in a single case implementation. The novelty of this study is therefore contextual and integrative rather than algorithmic. It adapts established mobile data-collection and digital-government principles to the operational structure of an RT-level SDGs survey in Sumbermulyo.

The contribution of the study is consequently defined at the level of contextual system implementation. It does not introduce a new algorithm, statistical model, or general theory of digital government. Instead, it documents how established mobile data-collection principles can be organized around the specific administrative and questionnaire workflow of an RT-level Village SDGs survey. The contribution has three parts: preserving the RW-RT administrative structure in the interface, making questionnaire progress visible during field work, and connecting structured mobile entry to a centralized API-backed data store. By stating the contribution at this level, the study remains aligned with the evidence available from the prototype while providing a design pattern that can be subjected to stronger evaluation in subsequent research.

The study is grounded in two complementary perspectives: digital transformation as process and information-flow redesign, and mobile electronic data capture as a mechanism for structured field collection. Within that frame, the research focuses on how an Android application can translate the observed manual SDGs survey workflow into a structured digital process. The objective is to develop and describe an Android-based SDGs survey application for the RT level in Sumbermulyo Village and to assess, at the level supported by the available development evidence, whether the implemented functions address the principal weaknesses of the manual workflow.

METHODS

Type of Research and Research Design

This study used an applied Research and Development (R&D) approach because its primary output was a working software prototype designed to address an identified field problem. The software-development process followed a Waterfall-oriented sequence consisting of requirements analysis, system design, implementation, and functional verification. A sequential design was considered appropriate because the problem definition and core survey workflow were sufficiently stable to be documented before interface and backend implementation. This logic is consistent with structured software-engineering practice in which requirements are translated into design artifacts before coding and verification (Sommerville, 2016).

Participants and Sampling Technique

The study did not employ a probability-based respondent sample or an inferential human-subject design. The unit of analysis was the operational RT-level SDGs survey workflow, while the principal user role represented in the system was the surveyor or enumerator. Sumbermulyo Village, Jogoroto District, Jombang Regency, was used as a purposive case context because the observed manual workflow and its administrative hierarchy provided the concrete requirements for development. Consequently, the findings are interpreted as a case-based system-development result rather than as a statistically generalizable estimate.

Setting and Research Timeframe

Sumbermulyo Village in Jogoroto District, Jombang Regency, Indonesia, served as the setting for the case. The application requirements were derived from the RT-level survey workflow observed in this setting, including the need to navigate the RW-RT hierarchy, monitor questionnaire completion, and enter structured SDGs data. The available source manuscript and development record do not specify an exact start and end date for observation, design, implementation, and verification. No dates are therefore assigned retrospectively in this manuscript. This missing timeframe is reported transparently and should be completed by the authors from the original project documentation before submission if a verifiable research period is available.

Instruments and Data Collection Procedures

Requirements were collected through direct observation of the existing SDGs survey process and through a literature and document review covering Village SDGs policy, mobile data collection, digital-government concepts, and software-development practices. Observation focused on the sequence of survey activities, the points at which data were recorded or recapitulated, the RW-RT organizational structure, and the practical need for progress monitoring. The resulting requirements were translated into Unified Modeling Language (UML) artifacts. UML was used as a standard notation for expressing actors, system functions, and process flow (Group, 2017).

Trustworthiness, Functional Verification, and Ethical Considerations

Methodological trustworthiness was supported by cross-checking the observed workflow problems against the functions represented in the design artifacts and the implemented interfaces. Functional verification used screen-level walkthroughs of the principal user flow: authentication, dashboard access, RW and RT data access, survey-progress selection, and questionnaire entry. This approach verifies whether required functions are present and connected, but it does not substitute for a controlled usability experiment, load test, or quantitative accuracy benchmark. No personally identifiable household records are reproduced in this article; the figures present application interfaces and system-design diagrams.

Requirements Traceability and Functional Verification Procedure

Because the available development record did not include instrumented test logs or a standardized usability dataset, functional verification was performed as a requirements-to-evidence traceability review rather than as a performance experiment. The procedure used three evidence layers already present in the study record. First, the observed weaknesses of the manual process were converted into functional requirements, such as authenticated access, maintenance of the RW-RT hierarchy, questionnaire-progress visibility, structured field entry, and centralized data handling. Second, these requirements were checked against the UML artifacts to determine whether the intended actors, actions, and process flow had been represented during design. Third, the requirements were checked against the implemented interface screenshots and documented technology stack to determine whether visible prototype evidence existed for each core function. A function was interpreted as implemented at prototype level when its purpose could be traced consistently across the requirements description, design artifact, and available interface or architecture evidence. This criterion does not demonstrate task efficiency, usability quality, data accuracy, security, availability, or scalability; it only establishes functional correspondence within the evidence available for this case.

Data Analysis Technique

The analysis was descriptive and qualitative. Observed weaknesses in the manual workflow were mapped to digital features, and implementation evidence was organized into design results, interface results, and operational outcomes. The analysis examined whether each core requirement had a corresponding system function and whether the resulting workflow reduced the need for paper-based recapitulation. No inferential statistical analysis was performed because the available study record did not include a comparative sample, timing dataset, error-rate dataset, or standardized usability scores.

Analysis proceeded in four descriptive steps. The first step summarized the operational weaknesses identified in the paper-based workflow. The second mapped each weakness to the intended digital response represented in the UML design. The third organized the available implementation evidence into architecture, interface, and workflow categories. The fourth compared those categories to determine whether each principal requirement had visible or documented prototype support. Findings were then separated into implemented functionality, qualitative operational implications, and unresolved evaluation questions. This separation was used to prevent descriptive prototype evidence from being interpreted as a controlled effectiveness result. No statistical software or inferential test was used because the source record contains no comparative sample, standardized scale, timing series, or error-frequency dataset.

RESULTS

System Design Results

The first result was a structured representation of the RT-level survey workflow. Figure 1 shows the use-case model with the surveyor as the primary actor. The model includes access to RT-level SDGs survey data, demographic reports, survey results, and questionnaire forms, together with data-management functions such as adding, editing, deleting, searching, and printing. Authentication is connected to the protected management functions.

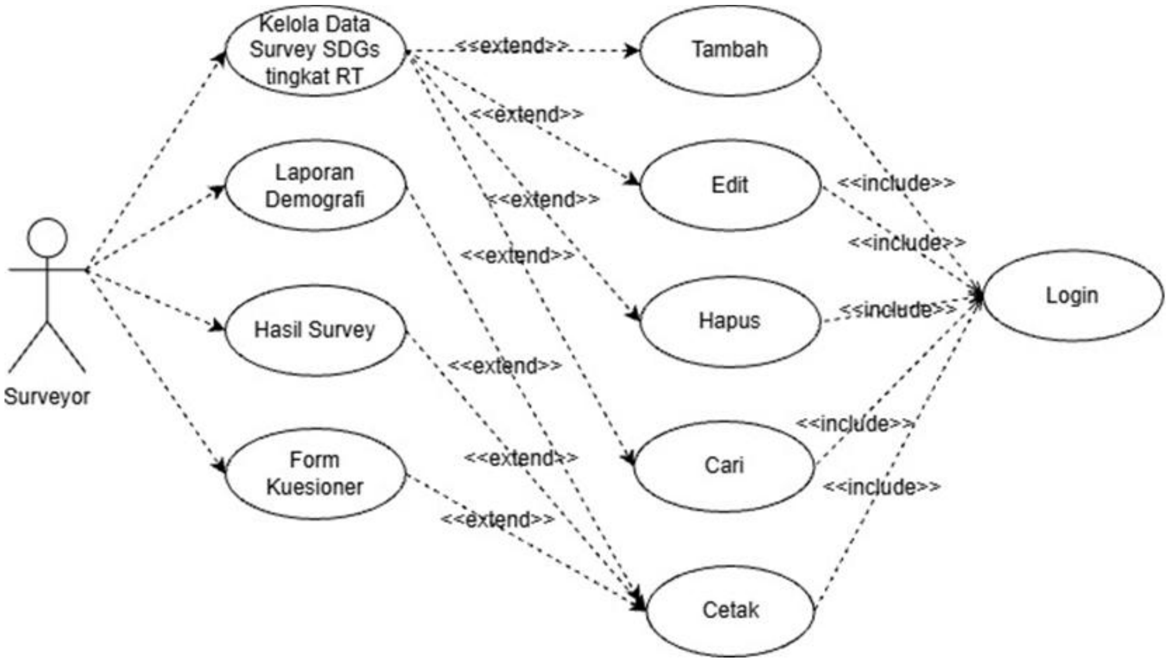

Figure 1. Use Case Diagram of the RT-Level SDGs Survey Application

Figure 2 presents the activity flow used to organize the operational process. The diagram translates the observed survey sequence into decision points and system actions, providing a bridge between field requirements and the implemented application flow. Together, Figures 1 and 2 define the functional scope that was subsequently implemented in the mobile interface and backend.

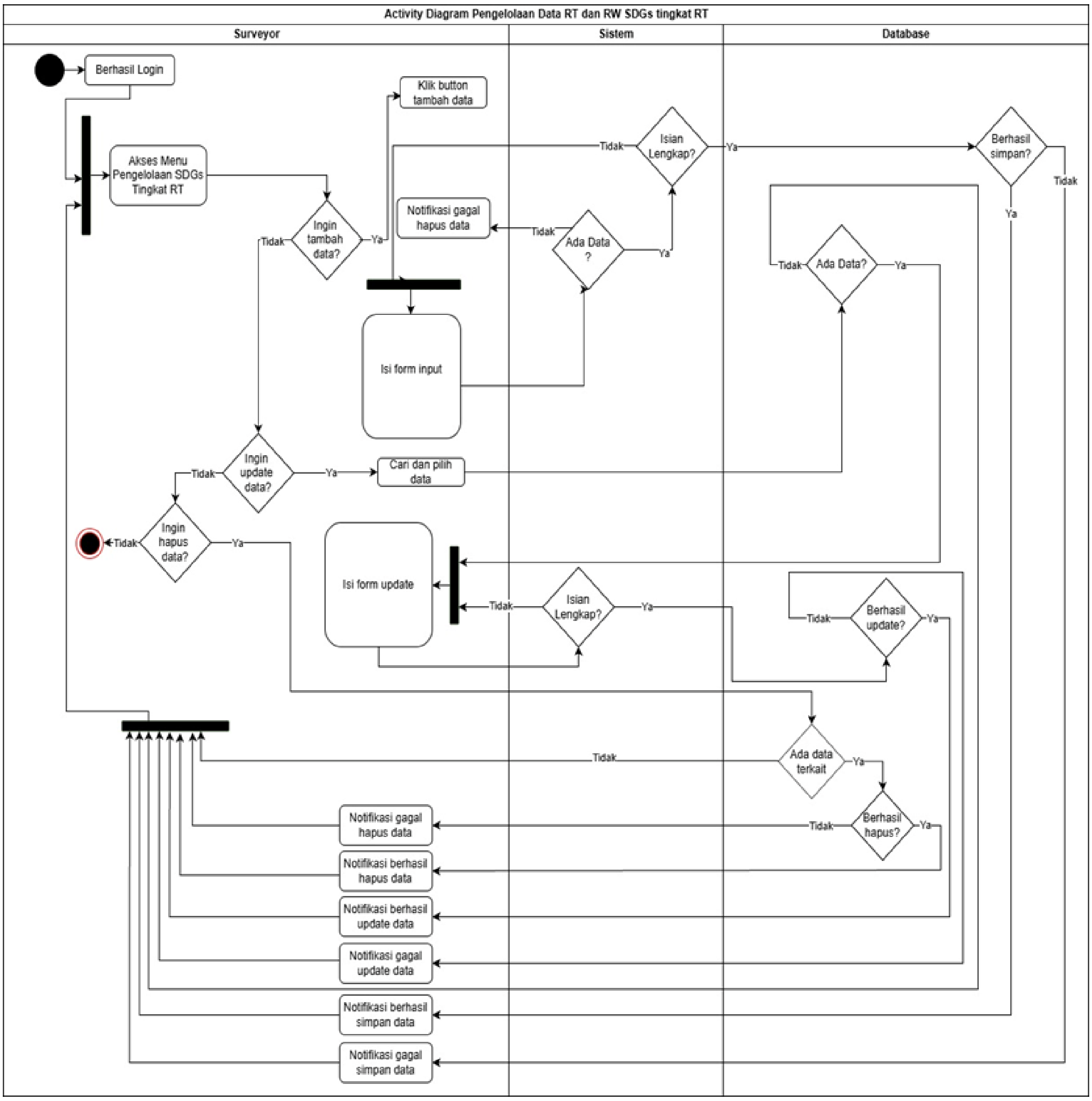

Figure 2. Activity Diagram of the SDGs Survey Workflow

Implemented Architecture and Core Functions

The prototype was implemented with Framework7 for the mobile-facing interface, Laravel for the REST API, and MySQL for centralized persistence. This separation allows the mobile interface to focus on field interaction while the API mediates data exchange with the database. Table 1 summarizes the technologies and their roles in the prototype.

Table 1. Technology Stack and System Roles

Component	Technology	Role
Mobile interface	Framework7	Provides the Android-oriented user interface and structured form interaction.
Backend API	Laravel REST API	Receives, processes, and returns survey data between the mobile interface and server.

Component	Technology	Role
Database	MySQL	Stores survey and administrative data in a centralized relational database.
System modeling	UML	Documents actors, functional scope, and activity flow before implementation.

Table 2 maps the principal requirements identified from the manual workflow to functions visible in the completed prototype. The mapping shows that the implementation did not focus only on questionnaire entry; it also included navigation, administrative hierarchy, progress visibility, and centralized processing support.

Table 2. Implemented Features and Their Operational Functions

Feature	Operational function
Login	Restricts access to the survey application through an authentication screen.
Dashboard	Provides an entry point and summary-oriented navigation after authentication.
RW management	Displays and manages surveyed community-unit (RW) records.
RT management	Displays and manages neighborhood-unit (RT) records within the survey workflow.
Survey progress	Shows questionnaire sections and their completion status for field monitoring.
Structured questionnaire	Provides a digital entry form for SDGs data, including the P2 survey format shown in the prototype.

Functional Verification Evidence

Functional verification was summarized as a traceability check rather than a quantitative test. Table 3 links each core requirement to the evidence available in the development record. The table distinguishes interface-level evidence from architectural documentation so that a visible screen is not treated as proof of backend performance. Authentication, navigation, hierarchy management, survey progress, and structured entry have direct interface evidence, while API-based persistence is documented through the declared architecture and implementation description. This distinction is important because the manuscript can establish that the prototype contains the required workflow components without claiming response-time, availability, synchronization, or security performance that was not measured.

Table 3. Functional Verification Evidence from the Available Development Record

Verification target	Available evidence	Interpretation
Authentication	Use-case login relation and Figure 3 login interface	Entry function represented at design and interface levels.
Dashboard navigation	Figure 4 dashboard interface	Direct interface evidence of post-login navigation.
RW management	Use-case management functions and Figure 5	Direct interface evidence of the RW administrative layer.
RT management	Use-case management functions and Figure 6	Direct interface evidence of the RT-level workflow.
Survey progress	Figure 7 progress interface	Direct interface evidence of questionnaire-progress monitoring.
Structured questionnaire	Figure 8 P2 questionnaire form	Direct interface evidence of structured entry and validation support.
API and centralized persistence	Framework7-Laravel-MySQL architecture in Table 1 and implementation description	Architecture documented; performance, reliability, and recovery were not measured.

The traceability review shows that the prototype covers the complete principal path documented in the source study: the user enters through authentication, reaches the dashboard, navigates from RW to RT records, views questionnaire progress, and opens structured questionnaire fields for data entry. This sequence is consistent with the use-case and activity models and demonstrates design-to-interface continuity. The evidence is strongest for the existence and organization of the functions because each stage is represented by either a visible interface or a documented architectural component. It is weaker for operational quality attributes. For example, the presence of a Laravel REST API and centralized MySQL database explains how data exchange was intended to be organized, but the available record contains no transaction logs, concurrency measurements, failure-recovery observations, or synchronization benchmarks. Accordingly, the result of the functional verification is a documented prototype workflow with traceable core functions, not a performance certification.

Interface Implementation

Figure 3 shows the login interface used as the entry point to the application. It separates authentication from survey functions and provides a simple field-oriented starting screen.

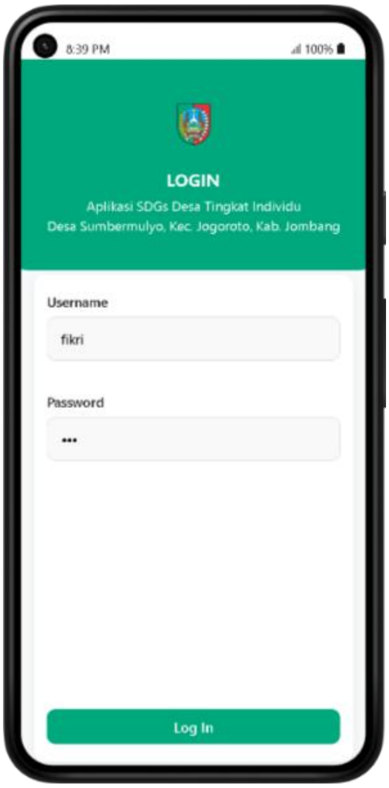

Figure 3. Login Interface

After authentication, the user reaches the dashboard shown in Figure 4. The dashboard consolidates access to the main survey process and user profile while presenting summary information in a compact mobile layout.

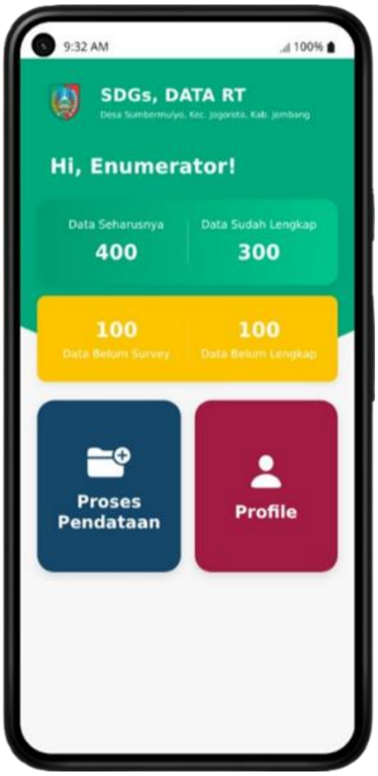

Figure 4. Application Dashboard

The administrative hierarchy is represented explicitly in the interface. Figure 5 shows the RW list, while Figure 6 shows the corresponding RT list. This structure is important because the survey is executed at RT level but remains situated within the wider RW organization.

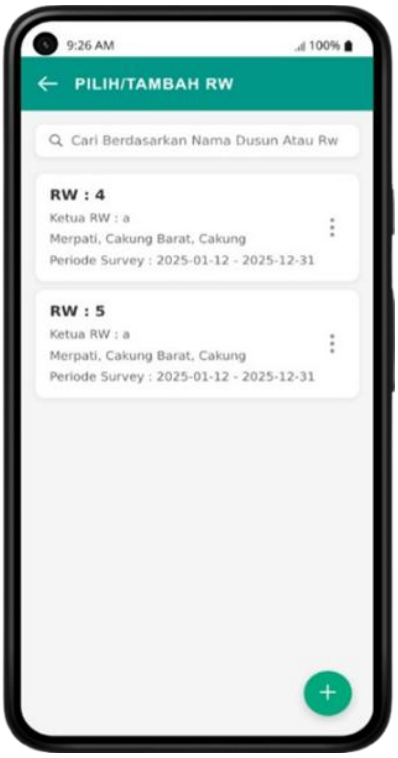

Figure 5. List of Surveyed RW Records

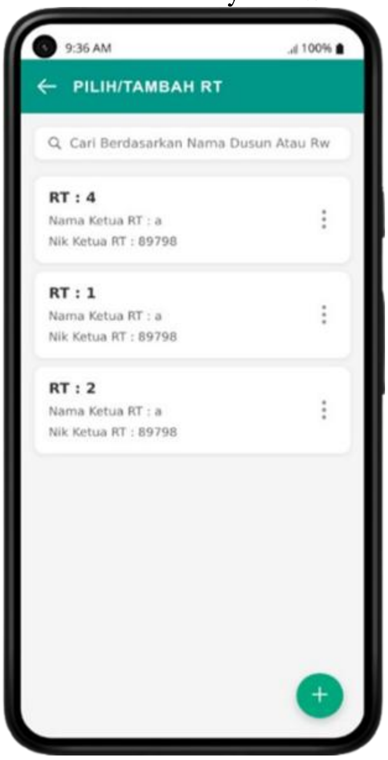

Figure 6. List of Surveyed RT Records

Figure 7 presents the survey-progress interface. Questionnaire sections are listed with visible progress information, allowing the enumerator to identify which sections remain incomplete before continuing field entry.

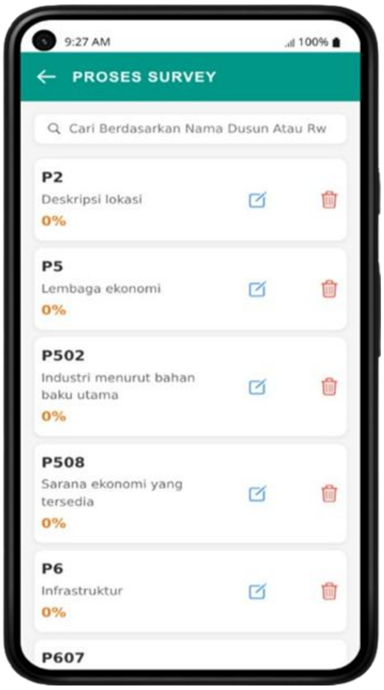

Figure 7. Survey Questionnaire Progress Interface

Figure 8 shows one of the structured data-entry screens, the P2 questionnaire form. Replacing free-form paper recapitulation with predefined fields provides a consistent input structure and enables application-level validation before data are sent to the backend.

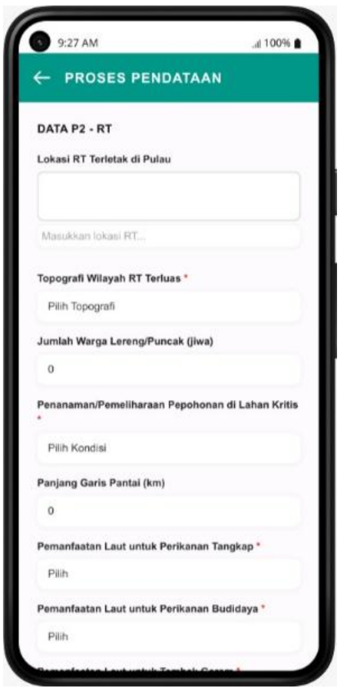

Figure 8. P2 Questionnaire Data-Entry Form

Implementation Outcomes and Remaining Issues

The implemented system addresses the principal process problems identified during observation. First, records are entered directly through the mobile interface, reducing the need to recopy paper results into another system. Second, structured fields and validation support reduce opportunities for format inconsistency and incomplete entry. Third, API-based data exchange and centralized MySQL storage make recapitulation available from a common data source rather than from dispersed paper forms. The source development report therefore indicates faster handling and fewer input mistakes relative to the previous workflow. These outcomes should be interpreted as qualitative development findings because no controlled before-and-after duration, error-rate, or statistical dataset was recorded.

No quantitative negative or anomalous dataset was reported in the available study record. Nevertheless, the development results identify areas that remain incomplete for a stronger production evaluation, including interface refinement, broader API integration, synchronization optimization, and testing under a wider range of field conditions. Reporting these limitations separately from the successful interface implementation prevents the functional result from being interpreted as evidence of fully validated operational performance.

DISCUSSION

Analysis and Interpretation of Findings

The principal finding is that the manual RT-level SDGs workflow can be translated into an integrated mobile information flow without changing the underlying administrative hierarchy. The application connects authentication, RW-RT navigation, survey progress, questionnaire entry, API communication, and centralized storage. From a digital transformation perspective, this matters because the improvement is located in the flow of information and the reduction of repeated handling, not merely in the appearance of a mobile form (Gong & Ribiere, 2021; Mergel et al., 2019; Vial, 2019). The resulting process also reflects digital-government arguments that technology should create public value by improving administrative capacity and usable information for decision making (Janowski, 2015; Twizeyimana & Andersson, 2019).

The RW-RT hierarchy and progress-monitoring functions are particularly relevant to the localization of the SDGs. Local SDG implementation requires data that can be connected to the institutional level at which programs are planned and monitored (Abidoye & Orlic, 2022; Guarini et al., 2022; Krantz & Gustafsson, 2021; Perry et al., 2021). By structuring survey records around the local administrative unit and maintaining completion visibility, the prototype provides a practical foundation for producing more organized local datasets. This does not by itself guarantee indicator quality, but it reduces avoidable process fragmentation at the point of data capture.

The requirements-to-evidence traceability also clarifies what kind of claim can be made from the present case. In software development research, a prototype may be valuable because it makes a proposed workflow concrete and inspectable, even when controlled effectiveness testing has not yet been performed. Here, consistency among observed problems, UML representations, interface states, and the documented architecture provides evidence that the design intent was carried through into implementation. This is a meaningful development result because the central problem was fragmentation of a paper-based process rather than the optimization of a novel computational algorithm. At the same time, traceability is not equivalent to external validation. It cannot determine whether enumerators complete tasks faster, whether users make fewer errors, or whether the system remains reliable under intermittent connectivity and concurrent use. The distinction between functional correspondence and measured effectiveness therefore defines the evidentiary boundary of the study.

Comparison with Previous Literature

The implementation is consistent with prior mobile data-collection research. ODK and smartphone studies have shown that digital forms can simplify field collection, accelerate transfer, and support centralized data management (Campus et al., 2020; Ouma et al., 2019; Raza et al., 2017). Work in rural and low-resource contexts likewise shows that mobile tools can be practical when the workflow and infrastructure are designed around the field environment (Benda et al., 2024; Daum et al., 2019). The current study extends those principles to a Village SDGs context by combining the administrative RW-RT hierarchy with progress-oriented questionnaire navigation rather than treating the survey as an isolated generic form.

At the same time, previous studies caution that digitization should not be equated with proven data quality. Survey modality, user behavior, device conditions, and interface design can influence participation, reliability, and accuracy (García et al., 2016; Greenleaf et al., 2017; Pariyo et al., 2023). This distinction is important here. The application contains structured input and validation mechanisms, but the current evidence does not include a controlled comparison of completion time, error frequency, or inter-user consistency. The study therefore supports functional feasibility more strongly than it supports a quantified effectiveness claim.

The comparison with previous electronic data-capture research further suggests that the value of the prototype lies in workflow organization rather than in mobile technology by itself. Studies using smartphones and ODK show that structured digital collection can shorten the path between field entry and centralized data availability, while also reducing dependence on later transcription (Campus et al., 2020; Ouma et al., 2019; Raza et al., 2017). The present implementation follows that pattern but adds an administrative layer that is specific to the Indonesian village context: survey records are navigated through RW and RT units and questionnaire completion is made visible before the enumerator continues. This adaptation is important because a generic form application would not necessarily preserve the organizational relationships through which village data are managed. In this sense, the study extends existing mobile data-capture principles by demonstrating how they can be configured around a locally meaningful hierarchy. Nevertheless, previous findings on mode effects and data reliability remain relevant warnings; a structured screen can reduce certain opportunities for inconsistency without proving that all data-quality problems have been removed (García et al., 2016; Greenleaf et al., 2017; Pariyo et al., 2023).

Research Implications

Practically, the application provides a reusable pattern for village-level digital survey administration: retain the local administrative structure, expose progress at the point of work, validate data before submission, and use an API-backed central repository for recapitulation. Such a pattern can support the broader objective of improving local data capacity for SDG implementation, which remains a recurrent challenge in localization research (ElMassah & Mohieldin, 2020). For system developers, the result also shows the value of separating the mobile interface, API layer, and database so that field interaction and data-management responsibilities can evolve independently.

From a practical governance perspective, the prototype suggests a staged route for digitalization. The first stage is to make the existing field workflow explicit, the second is to preserve the administrative relationships needed by users, and the third is to centralize records through an API-backed data store. Only after these foundations are stable should decision makers interpret improvements in speed, accuracy, or efficiency from measured evidence. This sequencing is consistent with digital-government literature that emphasizes organizational context and public value rather than technology adoption in isolation (Janowski, 2015; Twizeyimana & Andersson, 2019). For developers, the separation among the mobile interface, REST API, and database also creates a clearer basis for future maintenance and testing. Interface behavior can be refined without redefining persistence, while backend validation, authentication, synchronization, and access-control mechanisms can be evaluated as distinct technical concerns. Such separation does not guarantee scalability, but it makes the architecture more amenable to targeted verification than a monolithic field-entry process tied directly to local records.

Research Limitations and Directions for Future Research

This study has several limitations. It is a single-case development study, and the available record does not provide a participant sample suitable for statistical generalization. No standardized usability instrument, controlled before-and-after timing test, quantified error-rate comparison, offline synchronization stress test, security assessment, or scalability benchmark was documented. The evidence is therefore strongest for implemented functionality and workflow fit. Future research should evaluate the system across multiple villages, measure task completion time and data-entry error rates, assess usability with a standardized instrument, test intermittent connectivity and synchronization recovery, evaluate privacy and access control, and examine whether the architecture remains reliable as the number of survey records and concurrent enumerators increases.

The study's boundary conditions should therefore be kept explicit when considering transfer to other villages. The case reflects one observed workflow and one prototype configuration, and the screenshots demonstrate selected user states rather than continuous field operation. Differences in questionnaire versions, network quality, device capability, enumerator experience, administrative procedures, or backend deployment could change the usability and reliability of the same design pattern. Future validation should combine functional test cases with measured task-completion time, error frequency, usability scoring, synchronization recovery under unstable connectivity, access-control and privacy testing, and load tests representing realistic numbers of concurrent enumerators. Multi-site replication would then show whether the RW-RT-oriented workflow is robust beyond Sumbermulyo or whether substantial local adaptation is required.

CONCLUSION

This study developed an Android-based application that converts the observed paper-based RT-level SDGs survey workflow in Sumbermulyo Village into a structured digital process. The implemented prototype integrates authentication, dashboard navigation, RW and RT data management, questionnaire-progress monitoring, structured data entry, a Laravel REST API, and centralized MySQL storage. These functions directly address the main operational problems identified in the manual process: repeated recapitulation, fragmented records, and avoidable input inconsistency. The study contributes an implementation pattern for local SDGs data collection in which mobile electronic capture is aligned with the existing neighborhood administrative hierarchy. Because the available evidence is functional and descriptive rather than experimental, future work should validate the application with quantitative time and error measurements, standardized usability testing, multi-village deployment, synchronization and security testing, and scalability evaluation before broader operational adoption.

Declarations

Funding

This research received no external funding.

Competing Interests

The authors declare that they have no competing interests.

Data Availability

The survey data used in this study are not publicly available due to data confidentiality and privacy considerations.

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