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TOGAF ADM - BASED ENTERPRISE ARCHITECTURE FOR TANTAN DIGITAL VILLAGE

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Abstract— *The acceleration of digital transformation in rural governance requires an integrated information system to ensure efficient, transparent, and accountable public services. Yet, many villages including Tantan Village in Muaro Jambi Regency still operate with fragmented applications and redundant data. This study proposes a comprehensive enterprise architecture blueprint for Tantan Village using the TOGAF ADM framework, specifically adapted to the operational and institutional characteristics of rural public administration. Employing a qualitative case study approach, the research develops a four-layered architecture encompassing business, data, application, and technology domains. Theoretically, this study advances the understanding of how enterprise architecture can be localized for small-scale government entities; practically, it provides a replicable model that supports sustainable digital village transformation in Indonesia.*

Keywords*: Enterprise Architecture Blueprint, Rural e-Government, Smart Village Transformation, TOGAF ADM, Village Information System.*

Intisari— *Percepatan transformasi digital dalam tata kelola desa menuntut sistem informasi yang terintegrasi guna memastikan layanan publik yang efisien, transparan, dan akuntabel. Namun, banyak desa termasuk Desa Tantan di Kabupaten Muaro Jambi masih mengandalkan aplikasi yang terpisah dan data yang berulang. Penelitian ini mengusulkan cetak biru arsitektur enterprise komprehensif untuk Desa Tantan dengan menggunakan kerangka kerja TOGAF ADM, yang disesuaikan secara spesifik dengan karakteristik operasional dan kelembagaan pemerintahan desa. Melalui pendekatan studi kasus kualitatif, penelitian ini menghasilkan arsitektur empat lapisan yang mencakup domain bisnis, data, aplikasi, dan teknologi. Secara teoretis, penelitian ini memperluas pemahaman tentang bagaimana arsitektur enterprise dapat dilokalisasi untuk entitas pemerintahan berskala kecil; secara praktis, penelitian ini menawarkan model yang dapat direplikasi untuk mendukung transformasi desa digital berkelanjutan di Indonesia.*

Kata Kunci*: Cetak Biru Arsitektur Enterprise, e-Government Perdesaan, Transformasi Desa Cerdas, TOGAF ADM, Sistem Informasi Desa.*

INTRODUCTION

The rapid advancement of information and communication technology (ICT) in the digital era has transformed governance across all administrative levels. Digitalization is now widely recognized as a strategic enabler for improving the efficiency, transparency, and accessibility of public services [1].

In Indonesia, this transformation has gradually extended beyond urban and national institutions to the village level, where governments despite limited resources and infrastructure are increasingly adopting digital tools to enhance administrative responsiveness and citizen services [2]. This shift reflects a broader national commitment to e-Government and the *Smart Village* initiative, which aims to ensure that technological

progress benefits even the most localized levels of governance. Within this context, village information systems play a central role in enabling digital transformation, supporting critical functions such as civil registration, financial management, reporting, and community engagement. However, despite growing adoption, many villages, including those in Indonesia, continue to rely on fragmented, siloed applications that lack interoperability and data consistency [3]. This partial digitization results in redundant data entry, delayed service delivery, and weak data-driven decision-making capacity, undermining the potential benefits of digital governance.

Tantan Village, located in Sekernan Sub-district, Muaro Jambi Regency, exemplifies these challenges. Although it has implemented various standalone systems such as Siskeudes for finance, Prodeskel for profiling, and a basic village website these tools remain disconnected and functionally isolated [4]. The absence of an integrated architectural framework has led to inefficiencies, data redundancy, and limited accountability. This situation becomes particularly significant under Indonesia's Law No. 6 of 2014 on Villages [4], which grants local governments greater autonomy to manage resources and development priorities. While this policy opens opportunities for locally driven digital innovation, it also requires structured, future-oriented planning to ensure that technology investments are coherent, sustainable, and aligned with governance objectives [5].

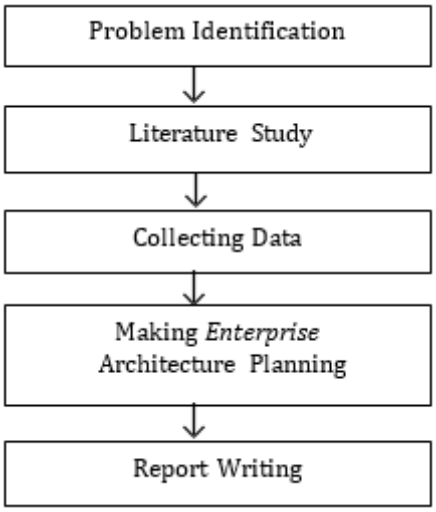
Enterprise Architecture (EA) provides a systematic means to address this need by aligning business processes, data flows, applications, and technology infrastructure in an integrated framework [6]. Among various methodologies, the TOGAF Architecture Development Method (ADM) offers a comprehensive, phase-based approach suitable for designing such architectures [7]. However, its application in rural, resource-constrained settings remains limited [8]. Therefore, this study develops a comprehensive Enterprise Architecture plan for Tantan Village Government using the TOGAF ADM framework. The resulting blueprint spanning business, data, application, and technology domains serves as a strategic guide for building an integrated, efficient, and sustainable village information system that supports Indonesia's broader *Smart Village* agenda [9][10].

MATERIALS AND METHODS

This study employed a **qualitative descriptive** design with a **single-case study** approach to obtain an in-depth understanding of the information system landscape within the Tantan Village Government, Sekernan Sub-district, Muaro Jambi Regency. The case study method was selected because it enables a detailed contextual exploration of how **Enterprise Architecture (EA)** principles can be adapted to the unique operational, technical, and institutional characteristics of rural governance.

Research Procedure

The research process followed five sequential stages problem identification, literature review, data collection, enterprise architecture development, and report compilation (see Figure 1). This structure guided the formulation of a comprehensive *Enterprise Architecture Blueprint* using the TOGAF ADM framework.



Source: (Research Results, 2025)

Figure 1. Research framework outlining the workflow from problem identification to enterprise architecture documentation.

1. Problem Identification
   The initial stage involved diagnosing challenges within Tantan Village's digital governance environment, including fragmented systems, redundant data, and limited interoperability. These findings led to the formulation of the main research question: How can an Enterprise Architecture plan be developed for Tantan Village Government using the TOGAF ADM framework?
2. Literature Review
   A comprehensive review of 35 relevant scholarly sources published between 2018 and 2025 was conducted. The review covered four core areas: (1) Enterprise Architecture theory, (2) TOGAF ADM methodology, (3) digital governance in rural settings, and (4) previous EA

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implementations in public institutions. This provided the theoretical foundation for developing a localized Enterprise Architecture framework for village-level administration.

3. Data Collection
   Primary data were gathered through direct observation and semi-structured interviews, complemented by document analysis, to ensure triangulation and data reliability. Data collection was conducted over a four-month period, from April to July 2025, at the Tantan Village Office.
   a. Direct Observation: Field observations were carried out to study daily administrative workflows, IT infrastructure (including hardware, local networks, and internet access), and utilization of existing digital systems such as *Siskeudes* (village finance), *Prodeskel* (village profiling), and the official village website.
   b. Semi-Structured Interviews: Two key informants were selected using purposive sampling, based on their involvement in the digital governance process and knowledge of information systems:
      1) *Village Head responsible for strategic decision-making, digital policy direction, and governance oversight.*
      2) *Head of Planning Section (Kaur Perencanaan) responsible for managing data systems, reporting processes, and planning integration.*

      Each interview lasted between 60–90 minutes, focusing on system integration challenges, governance priorities, and local readiness for digital transformation. Both participants provided informed consent and were involved in data verification during the member-checking phase.
   c. Document Analysis: A total of 14 official documents were reviewed, including annual financial reports, digital system user manuals, service logs, and local regulations related to information management. Documents were selected based on two criteria: (1) direct relevance to digital governance, and (2) official validation by the Tantan Village Government.

4. Enterprise Architecture Development
   The TOGAF Architecture Development Method (ADM) was implemented through five adapted phases:
   a. *Preliminary Phase: Defined research scope, stakeholders, and architectural principles*.
   b. Phase A (Architecture Vision): Identified strategic goals using value chain analysis.
   c. Phase B (Business Architecture): Modeled business processes using BPMN and performed gap analysis.
   d. Phase C (Information Systems Architecture): Designed integrated data and application models.
   e. *Phase D (Technology Architecture): Specified infrastructure, interoperability, and data security requirements.*
5. Report Compilation
   Findings were synthesized into a comprehensive EA blueprint, including architecture artifacts and implementation recommendations.

Data Validation

To ensure trustworthiness, the study applied methodological triangulation (observation, interviews, and document analysis) and member checking with both key informants the Village Head and Head of Planning Section to confirm accuracy and contextual validity. In addition, peer debriefing sessions were conducted with two academic advisors in information systems to review the methodological rigor and ensure interpretive consistency. The verified findings were synthesized into a structured *Enterprise Architecture Blueprint* as the primary output of this study, forming the foundation for an integrated and scalable village information system model.

RESULTS AND DISCUSSION

This section presents the research findings derived from observation, interview, and document analysis related to the implementation of the TOGAF ADM framework within the Tantan Village Government. The discussion is systematically organized according to the main TOGAF ADM phases: Preliminary Phase, Architecture Vision, Business Architecture, Information System Architecture, and Technology Architecture.

However, rather than merely describing each stage, this section critically interprets the gap between the existing and target conditions while linking empirical findings to relevant enterprise architecture literature. This analytical approach aims to highlight the conceptual contribution of the study within the rural governance context and demonstrate how the resulting architecture serves as a strategic foundation for achieving an integrated and sustainable digital transformation in village administration.

A. Results

1. Preliminary Phase: Setting the Foundation for Rural Enterprise Architecture

The Preliminary Phase of the TOGAF ADM establishes the governance, scope, and foundational principles that guide the entire architecture development process. In the context of Tantan Village a small scale, resource-constrained public institution this phase was critical not only for defining logistical parameters but also for adapting a traditionally corporate-oriented framework to a rural governance setting.

Tabel 1. Defining 5W+1H with business objects and descriptions

No.	Business Activity	Object and Description
1	*What*	Object: What is the scope of architecture Description: Planning the enterprise architecture of the information system to support the implementation of government functions, public services, and village administration in a digital and integrated manner.
2	*Who*	Objective: Who are the main actors involved in enterprise architecture planning? Description: Modeling was carried out by researchers, involving the Village Head, Village Secretary, Kaur, Kasi, Village IT Operator, and Hamlet Head as the main sources of information in identifying business needs and processes.
3	*Where*	Object: Where is the work location and organization Description: Tantan Village Government, Sekernan District, Muaro Jambi Regency.
4	*When*	Objective: When is the completion time of the research? Description: August 2025
5	*Why*	Objective: Why is architectural planning necessary Description: So that the Tantan Village Government has strategic documents and guidelines in the development, implementation, and integration of village information systems, so that all services can run efficiently, accountably, and sustainably.
6	*How*	Objective: How to develop an enterprise architecture. Description: Enterprise architecture development is carried out using the TOGAF framework with the Architecture Development Method (ADM) methodology approach tailored to the characteristics and needs of the village organization.

Source: (Research Results, 2025)

As summarized in Table 1, the 5W+1H framework was used to contextualize the architectural initiative:

a) The scope ("What") focuses on designing an integrated information system that supports core village functions public service delivery, financial management, and administrative reporting.
b) Stakeholder engagement ("Who") extended beyond technical staff to include strategic (Village Head), operational (Village Secretary, Kaur/Kasi), and community-level (Hamlet Heads) actors, ensuring multi-tier representation a practice aligned with participatory e-governance models (Juraida & Sensuse, 2024).
c) The location ("Where") and timeline ("When") anchor the study in a specific socio-technical context (Tantan Village, with completion targeted in August 2025).
d) The rationale ("Why") responds to a systemic gap: the absence of strategic IT governance in village digitalization efforts, which often leads to fragmented, unsustainable systems (Alhari & Fajrillah, 2022).
e) The methodological approach ("How") explicitly tailors TOGAF ADM to local capacity, prioritizing modularity, interoperability, and incremental implementation over complex, top-down redesign.

This adaptation addresses a notable scholarly gap: while TOGAF has been widely applied in urban and corporate environments, its operationalization in village-level public administration remains underexplored. The Tantan case demonstrates that even in low-resource settings, foundational EA activities such as stakeholder mapping and scope definition can be meaningfully executed to prevent digital fragmentation.

Following this scoping exercise, a set of architecture principles was formulated across four domains business, data, application, and technology (see Table 2). These principles were not derived abstractly but grounded in the village's current IT maturity. For instance:

a) The principle *"Data is an asset"* directly counters the prevailing practice of treating data as transient administrative byproducts.
b) *"Modularization of applications"* acknowledges limited technical capacity by favoring lightweight, interoperable components over monolithic systems.
c) *"Compliance with Law"* ties digital transformation to Indonesia's Village Law (No. 6/2014), ensuring alignment with national governance mandates.

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Collectively, these principles serve as guardrails for design decisions in subsequent ADM phases. More importantly, they reflect a context-sensitive interpretation of TOGAF's generic guidance, illustrating how EA frameworks can be localized without compromising structural integrity a contribution that advances the discourse on inclusive and scalable digital governance models for rural communities.

Table 2. Principle Catalog

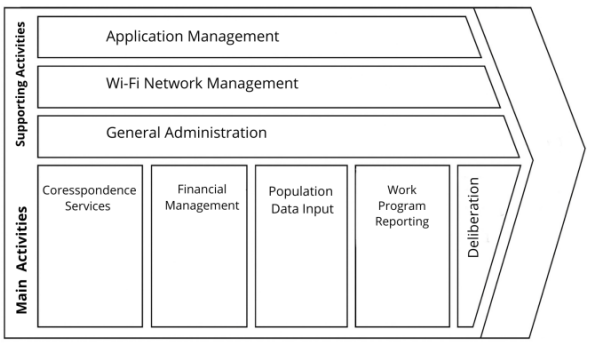
No.	Achitecture	Principle
1	Business	a) Information management is Everybody's Business b) Business continuity c) Compliance with Law
2	Data	a) Data is an asset b) Data can be shared c) Data can be trusted (Data Trustee)
3	Application	a) Tecnology Independence b) Modularization of the application c) Ease of Use
4	Tecnhology	a) IT assets available b) Responsive change management

Source: (Research Results, 2025)

Table 2. Adapted from The TOGAF Standard, Version 9.2 (The Open Group, 2018) and refined through empirical validation based on field observations and interviews with the Village Head and Head of Planning Section.

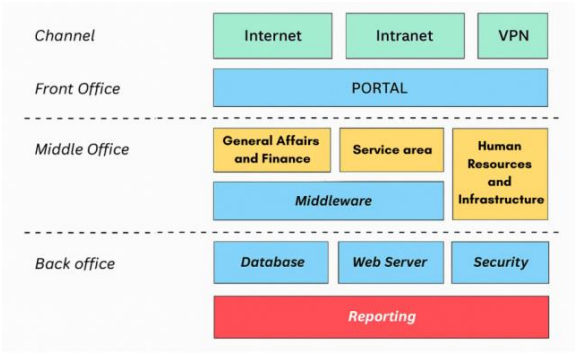
2. Phase A : *Architecture Vision*

To systematically and thoroughly identify business process activities, analysis tools such as value chains are needed to map the relationships between internal village activities. Through this approach, information system enterprise architecture planning can be organized logically and in accordance with the real workflow that takes place in the village.



Source: (Research Results, 2025)
Figure 2. Value Chain Analysis of Tantan Village Government Business Area

This value chain maps primary activities (e.g., population services, financial reporting) and supporting functions (IT, HR, infrastructure) within Tantan Village governance. It serves as the foundational input for Phase A (Architecture Vision) of TOGAF ADM by identifying high-impact service areas where digital integration can generate public value. The adaptation of Porter's corporate value chain to a rural public administration context demonstrates how strategic EA scoping can be localized for small-scale government units.



Source: (Research Results, 2025)
Figure 3. Conceptual Enterprise Architecture Solution for Tantan Village

This diagram illustrates the target-state enterprise architecture, integrating core village systems population administration, finance (Siskeudes), reporting (Prodeskel), and correspondence through a modular, interoperable design. Developed during the transition from Phase A to Phase B, it translates the architecture vision into a structural blueprint. The model advances scholarly discourse by showing how TOGAF's holistic EA approach can be simplified for resource-constrained villages without sacrificing integration or scalability.

3. Phase B : *Architecture Business*

To ensure the optimal achievement of the proposed business architecture design, a gap analysis approach is required as a systematic method to identify the differences between the current state of the business architecture and the desired future state. This process aims to uncover various issues that arise in business operations, particularly those related to the low utilization of information technology, vulnerabilities in data security, recurring operational obstacles, and the ineffectiveness and inefficiency in report preparation. Furthermore, the results of the gap analysis serve as a foundation for organizations to formulate more targeted and data driven business transformation strategies, enabling the

implementation of a new business architecture that enhances performance, competitiveness, and sustainable information technology governance.

Table 3. Gap analysis of business architecture

No.	Current Business Architecture Condition	Gap	Business Architecture Target
1	Village civil registration services such as KK and KIA are partially connected to the Dukcapil system, but not all documents can be processed online. Applications for birth or death certificates, as well as documents collection, still require residents to come directly to the village office.	Digital end-to-end services have not been implemented, e-signature features are not available, and there is no online document delivery system.	The entire population administration process can be done digitally and fully integrated with the Dukcapil web service for all population documents. In addition, e-signature features, automatic notifications, and delivery of document results to email or the Village Web portal.
2	The BPJS Village application facilitates registration, but the verification process is still manual and not directly integrated with the BPJS central system.	No digital status tracking, automatic verification, and online card delivery.	Full integration with the BPJS central system, automatic verification, real-time tracking of registration status, and digital e-card printing and delivery.
3	Village correspondence is still done manually or semi-digitally, without automatic numbering and a structured electronic filing system.	There is no automatic numbering, electronic disposition, and nodigital archive storage with metadata.	Development of a digital correspondence module in the Village Web with automatic numbering, recording of dispositions, digital archives complete with metadata, and QR-Codes for letter authentication.
4	Village activity and financial reports are still prepared manually using physical documents and Excel, which are prone to errors and delays.	There is no integrated and real-time reporting system. Reporting is not directly linked to Prodeskel and Siskeudes applications.	Development of an activity reporting dashboard on the Village Web and integration of report automation into Siskeudes using a standard format, as well as real-time visualization of achievements through the Village Web and Prodeskel.
5	Village administration is not yet digitally documented. Performance appraisals are not yet indicator-based, and the attendance system is still manual.	There is no personnel information system that contains complete data, attendance, performance appraisal, and tenure of village officials.	Implementation of SIMPEG Desa to document device data, work history, training, output-based evaluation, and reminder notifications for the term of office and leave.
6	The management of village assets and infrastructure is still done manually and has not been integrated with village financial or development reports.	There is no digital asset management system with information on location, condition, and transparency to the public.	Development of a digital asset management module integrated with Siskeudes and Prodeskel, accompanied by GIS location recording, asset status, and a public dashboard for transparency.

Source: (Research Results, 2025)

The business architecture gap analysis reveals that Tantan Village's administrative workflows are structurally inefficient due to continued reliance on manual procedures and fragmented digital tools. This fragmentation undermines transparency, accountability, and responsiveness, while the absence of standardized business processes and local IT governance further weakens coordination across services. As a result, the current model restricts both operational efficiency and data driven decision making, limiting the village's capacity for integrated governance.

To overcome these systemic barriers, transformation must proceed through phased process automation supported by targeted capacity building for administrative staff. Establishing clear operational standards, workflow governance, and accountability mechanisms will lay the groundwork for scalable digital services. This shift represents not merely a technical upgrade but a governance reform

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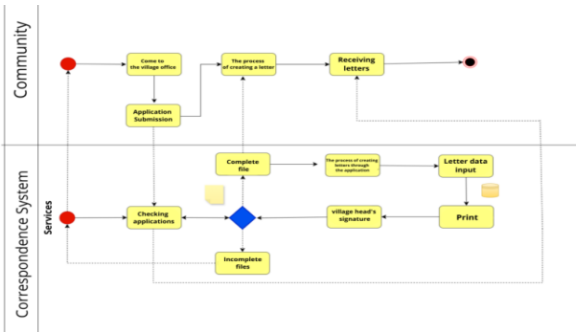
anchoring Tantan Village's transition toward efficient, transparent, and citizen-focused administration aligned with the Smart Village vision. The following is *Business Process Model and Notation* (BPMN) documentation.



Source: (Research Results, 2025)

Figure 4. Business Process Model and Notation (BPMN) of Tantan Village Government

This BPMN diagram details end-to-end workflows across key administrative functions, including civil registration, financial management, and public correspondence. Created in Phase B (Business Architecture), it operationalizes the value chain by exposing process inefficiencies (e.g., manual handoffs, redundant approvals) and defining standardized digital procedures. The model bridges organizational practice and system design, ensuring that subsequent data and application architectures align with actual governance workflows a critical step often overlooked in rural e-government initiatives.

4. Phase C : *Information System Architecture*

This phase consists of 2 (two) domains, namely *Data Architecture* and *Application Architecture*.

1 Data Architecture

In order for the results of the proposed data architecture to be achieved, it is necessary to take a gap analysis approach to find out the differences in the proposed data architecture planning so that the data structure can be created and processed properly.

Table 4. Gap analysis Data architecture

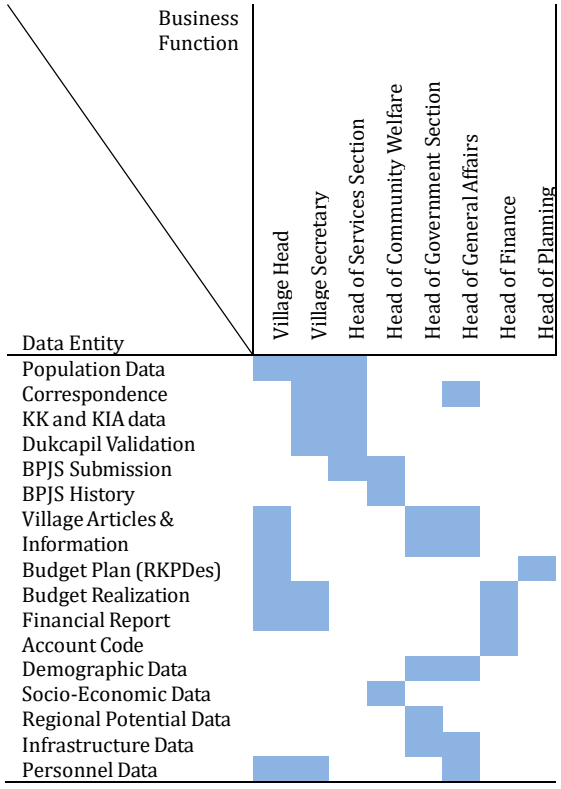
No.	Current Data Architecture Condition	Gap	Data Architecture Target
1	Population and correspondence data are available on the Village Web, but the data structure has not been formally documented and is not fully digitized.	No documentation of data schema; limited metadata; prone to inconsistencies.	All data entities are defined in a conceptual model (class diagram), with metadata and relational schema documented in a centralized repository.
2	BPJS application data is stored in the BPJS Desa application, but is not formally connected to the population data entity.	Relationships between entities are not logically clear; data structures do not support integration.	BPJS application, status, and history entities are integrated with the resident database in a validated structure.
3	KK and KIA data have been processed through the population application, but there is no relationship model between entities, and no separation of attributes for analytical purposes. Purposes.	No ERD or class diagram schema; no mapping between attributes.	Development of a complete population class diagram (KK, KIA, documents, validation) with clear relationships between entities and ready to export to the database model.
4	Village financial data (Siskeudes) is structured, but not documented as a data model, and there is no integration between reporting entities.	Data model not available; reporting based on application templates only.	The village finance data model was established based on integrated budget, realization, report, and account code entities.
5	Village profile data from Prodeskel is sent in Excel format, not yet structurally managed in the local village system.	There is no local data entity that stores demographic, social, and infrastructure information.	All village profile data (demographic, socioeconomic, potential, and infrastructure) is structured and managed in the local village information system.
6	There is no centralized repository documenting entity definitions, attributes, and data relationships from all village applications.	Documentation is scattered, not standardized, and cannot be used for cross-system integration.	Creation of a metadata repository and village data dictionary documenting all entities and attributes from all information systems.
7	No standardization of data attribute naming	Attribute inconsistencies cause integration	Implementation of naming convention and data format

No.	Current Data Architecture Condition	Gap	Data Architecture Target
	between applications (e.g. NIK, id_penduduk, nik_user are used differently).	barriers and cross-validation between systems.	standards for all entities to make synchronization and integration easier.

Source: (Research Results, 2025)

The data architecture analysis reveals institutional silos and the absence of metadata documentation, which limit data accuracy and integration. Beyond technical improvements, achieving the target model requires stronger data governance policies and clear role definitions for data stewardship. Without these institutional foundations, even well-designed data models may fail to ensure interoperability and reliability.

Table 5. Relationship between data entities and business functions of the organization (Data Entity/Business Function Matrix)



Source: (Research Results, 2025)

The relationship matrix shows that data utilization across business functions remains uneven, with overlapping responsibilities and inconsistent data flow among sections. This reflects weak coordination mechanisms within the organization. Strengthening inter-departmental data governance and promoting shared accountability will be crucial to realizing the integrated data environment envisioned in the target architecture.

2 System Architecture

To ensure that the proposed application architecture development can be implemented effectively and efficiently, it is necessary to conduct a gap analysis between the current condition (existing application architecture) and the expected condition (target application architecture).

Table 6. Gap analysis Application architecture

No	Current Application Architecture Condition	Gap	Target Application Architecture
1	Most village service business processes are still done manually.	Design and refine an integrated application according to the flow of business processes.	The availability of an integrated application system that supports all village administration processes.
2	The digital correspondence application is not yet available.	Develop a correspondence system that supports automatic numbering and digital archives.	Availability of a digital correspondence module with electronic disposition and QR-Code printing.
3	Population document submission is not yet directly connected to Dukcapil.	Build a system that can integrate population data online.	Availability of an online population service application connected to the Dukcapil API.
4	Reporting of village activities and finances is still using manual and physical Excel.	Develop a reporting system that accesses activity and budget realization data.	Availability of the activity reporting dashboard and integration with the financial system (Siskeudes).
5	Village asset data collection still uses the usual worksheet format.	Provide a web-based asset inventory system with tracking and maintenance features.	Availability of the village asset management application with maintenance reporting and geo-tagging of assets
6	Personnel data of village officials is still scattered and not well documented.	Design a village employment information system to support structured HR management.	Availability of SIMPEG Desa that records SK, performance, attendance, and tenure of village Officials.
7	Village BPJS applications are	Build a digital system for self-	The availability of the BPJS

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No	Current Application Architecture Condition	Gap	Target Application Architecture
	done manually by operators and cannot be monitored by residents.	submission and tracking of the BPJS application process.	service applications that can be accessed by residents for submission and status monitoring.

Source: (Research Results, 2025)

The application gap analysis highlights that integration between systems such as *Siskeudes*, *Prodeskel*, and local applications depends on API availability, vendor cooperation, and technical support. While modular design offers flexibility, sustainability will require ongoing user training, open-source adoption, and budget allocation for system maintenance to prevent regression into fragmented digital practices.

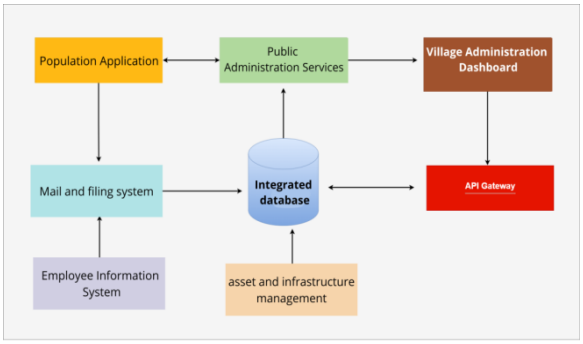
The proposed application architecture created a report and application mapping based on Application Portfolio Matrix analysis. A gap analysis is made to differentiate the baseline and target of the proposed application architecture.

Table 7. Application portfolio matrix

Strategic		High Potential	
a)	Dukcapil Integrated Population Service application	a)	Asset and Infrastructure Management Application
b)	SIMPEG Desa (Personnel	b)	Web-based Citizen
c)	Management Information System)		Complaint Service Application
d)	Village Activity and Finance Real-Time Reporting Dashboard	c)	Advanced Dukcapil Integration Application (for birth certificates,
		d)	death certificates, etc.)
Key Operational		**Support**	
a)	Integrated Digital Correspondence Application	a)	Digital Archive Application
b)	Village BPJS Submission & Monitoring Application	b)	SK, Leave, and Term of Office Notification Application
		c)	Automatic Letter In/Out Numbering

Source: (Research Results, 2025)

After analyzing and defining business architecture, data architecture, and application architecture, it is necessary to identify based on information needs, information exchange needs, and tool needs. This interaction model explains the integration of information system applications between business functions in the Tantan Village Government. The information system is connected to the data stated in the following figure 5:



Source: (Research Results, 2025)

Figure 5. Application Communication Diagram for Tantan Village Information System

Figure 5 illustrates the Application Communication Diagram of the Tantan Village Information System, depicting real-time data exchange and interaction among key application modules. These components namely the Population Service Application, Siskeudes (village finance), Prodeskel (village profiling), SIMPEG Desa (personnel management), and the Digital Correspondence Module are interconnected through a centralized database and communicate via RESTful API protocols.

During daily operations, data generated by the Population Service Application is automatically synchronized with the Siskeudes system to maintain consistency between demographic and financial records. The Prodeskel module retrieves population and infrastructure data for periodic reporting, while SIMPEG village and the Correspondence Module access the same central repository for verification, validation, and document management.

The integration framework adopts web service communication standards and JSON-based data exchange formats, supported by a MySQL relational database serving as the core repository. Application servers are connected through a Local Area Network (LAN) with cloud gateway access for synchronization and backup. System security is enforced using token-based authentication and Role-Based Access Control (RBAC), ensuring that only authorized users can perform cross-module transactions.

This architecture ensures real-time interoperability, minimizes redundant data entry, and establishes a single source of truth for all administrative functions. Through its modular, API-driven design, the system remains scalable allowing new applications or features to be added without major reconfiguration while remaining practical and sustainable within the technological and financial constraints of Tantan Village.

5. Phase D : *Technology Architecture*

For the results of the proposed planned technology architecture to be achieved, it is necessary to take a gap analysis approach to find out the differences in the proposed technology architecture planning.

Table 8. Gap analysis Technology architecture

No	Current state of Technology Architecture	Gap	Technology Architecture Target
1	The current network topology uses a star system; all devices are connected to one central point (standard Wi-Fi router).	Connections depend on one central node (single point of failure), and bandwidth per user has not been regulated.	Upgrade to a star network system based on manageable switches and enterprise routers with QoS and bandwidth control.
2	Some computer and laptop devices have low specifications and are limited in supporting online applications.	Not all service functions can be optimized digitally.	Procurement of minimum standard client-server computer/laptop devices in all village government work units.
3	Village information systems are not yet integrated; each application (Web Desa, BPJS, Siskeudes, Prodeskel) runs independently.	Data exchange between applications is still done manually and causes information redundancy.	Development of a modular-based integrated system, with a central database and API communication between applications.
4	There is no digital document storage server (file server); documents are still stored on local and physical computers.	High risk of data loss, difficult to retrieve, and inefficient document management.	Procure an internal village file server or local cloud with automatic backup and controlled access.
5	Network and data security are not optimal; there is no firewall or centralized authentication.	Vulnerable to attacks from outside networks and unauthorized access to important data.	Implementation of a firewall, a user authentication system, network segmentation, and the use of an integrated antivirus.

Source: (Research Results, 2025)

B. Discussion

This study demonstrates that the TOGAF ADM framework, though originally designed for complex organizations, can be effectively adapted to village-level governance through contextual simplification, modular design, and participatory engagement. The resulting enterprise architecture (EA) for Tantan Village improves data integration and process efficiency while aligning digital systems with governance mandates under Indonesia's Village Law No. 6/2014. The main challenges fragmented systems, redundant data, and poor interoperability mirror broader structural issues in rural digital governance (Alhari & Fajrillah, 2022; Trimanadi & Sensuse, 2025). These are less about technology scarcity than about the absence of architectural coordination across silos. By operationalizing TOGAF ADM as a lightweight, scalable EA model, this study demonstrates that structured planning can bridge these institutional gaps without extensive financial or technical resources.

Unlike earlier EA implementations in better-resourced districts (Supriadi & Istambul, 2024), the Tantan case highlights that interoperability can be achieved incrementally through open APIs and modular systems like *Siskeudes* and *Prodeskel*. This finding refines the assumption that EA maturity requires high investment, showing instead that a progressive, context-aware strategy can support inclusive digital transformation (Sari, Berawi, & Mario, 2025). A key insight from this study is the role of stakeholder participation. Involving the Village Head and Hamlet Leaders not only validated models but also built shared ownership of digital processes, reinforcing that EA success depends as much on governance readiness as technical design (Juraida & Sensuse, 2024). This socio-technical synergy transformed EA from a purely technical framework into a collaborative governance instrument, addressing a gap rarely discussed in rural EA literature.

While TOGAF's structure ensures methodological rigor, its documentation intensity can burden small institutions. Tantan's localized adaptation streamlining deliverables and emphasizing modularity illustrates how global frameworks can be pragmatically localized without losing analytical discipline (Alhari, Suryani, & Nadlifatin, 2025). Finally, the Tantan blueprint aligns with Indonesia's Smart Village agenda by providing a replicable governance model rather than a one-off system. Its focus on open standards, metadata documentation, and phased implementation offers a practical roadmap for other rural governments pursuing scalable digitalization.

In summary, this study contributes to EA scholarship by (1) extending TOGAF ADM's applicability to micro-governance contexts, and (2) framing EA as a socio-technical mechanism that

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integrates policy, process, and technology in resource-limited environments. Future research may explore comparative evaluations with lighter frameworks (e.g., FEAF or rural EA models) to test scalability and adoption efficiency.

CONCLUSION

This study demonstrates that the information systems within Tantan Village Government remain fragmented, with core administrative processes such as population services, correspondence, and financial reporting still relying on manual or disconnected applications. The existing IT infrastructure, although partially operational, lacks integration, centralized security, and scalability. By applying the TOGAF ADM framework in a context-sensitive manner, this research developed an Enterprise Architecture (EA) blueprint that integrates business, data, application, and technology domains. The proposed architecture promotes modularity, interoperability, and local adaptability, providing a structured roadmap for realizing Indonesia's Smart Village agenda.

However, implementation challenges are expected. Limited technical capacity, funding constraints, and inconsistent data governance remain significant barriers to operationalizing the proposed architecture. Addressing these requires institutional commitment, local capacity-building programs, and partnerships with regional or national IT agencies to ensure sustainable system maintenance. From a policy perspective, the findings highlight the need for stronger alignment between national digital village initiatives and local administrative realities. Policies should encourage interoperable standards, provide technical support frameworks for rural governments, and integrate EA-based planning into village development regulations.

In conclusion, the Tantan Village EA blueprint serves not only as a technical model but also as a policy-relevant governance framework that bridges digital strategy and local implementation. Its adoption could accelerate the shift toward integrated, citizen-centered digital governance, provided that implementation is accompanied by capacity development and supportive policy ecosystems.

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