

Enterprise Architecture for E-Government Development Using TOGAF ADM 9.2 in Simpang Pasir Village

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Abstract: Effective information technology governance is essential for improving public service delivery and administrative efficiency at the village government level. This research focuses on Simpang Pasir Village in Palaran District, Samarinda City, East Kalimantan Province, aiming to establish a foundation for an electronic-based government system (e-government). By employing the TOGAF Architecture Development Method (ADM) version 9.2, this study systematically designs an enterprise architecture encompassing business, data, application, and technology domains. The process spans from the preliminary phase to migration planning, with gap analysis conducted to align baseline and target architectures. Key outputs include the development of integrated systems for administrative tasks and digital public services, supported by cloud server technology to ensure scalability and efficiency. Validation of the design using the Enterprise Architecture Scorecard yielded a score of 82.27%, indicating strong alignment with Simpang Pasir Village's objectives and readiness for implementation. This initiative addresses critical challenges, including data integration, transparent governance, and improved public services. The research outcomes provide a comprehensive roadmap for transitioning to e-government, supporting the village's mission to advance IT-based governance while fostering self-reliance and community empowerment. The findings contribute valuable insights for digitally transforming rural governments, positioning Simpang Pasir Village as a model for innovation and modernization.

Index Terms: Enterprise Architecture, E-Government, Enterprise Architecture Scorecard, Sub-district Government, TOGAF ADM

1. Introduction

In the current era of information technology (IT) progress, all areas of life are always associated with information technology, including government sectors such as sub-district government. The village government acts as the organiser of government affairs and the interests of the local community [1,2]. The very important task of the village government certainly requires information technology to make the work more effective and efficient in serving the community. The use of information technology, to facilitate, efficiency, and automate the interaction between the government and citizens, the business world, and other governments is known as e-government. E-government or electronic-based government information system is the implementation of government operations in providing services to citizens or the community by utilising the use of information technology [3,4]. The evolution of e-government is increasingly diverse and inventive, starting from the city government website to various other facilities, but must align with the vision and goals of the country [5,6].

Governments around the world are constantly changing the delivery of public services, increasing citizen-government interaction, streamlining two-way communication, increasing the effectiveness of public institutions, and reducing tax costs by using e-government systems. Based on the release of EGDI (E-Government Development Index) by the United Nations in 2018, Indonesia ranked 107th out of 193 countries in the world and below a number of ASEAN countries such as Malaysia, Philippines, to Brunei Darussalam [7,8]. Related to this, the Ministry of PAN-RB was appointed as an index rater of electronic-based government systems, which functioned as a value for the maturity level of the implementation of electronic-based government systems in every government agency, for the development of the implementation of an electronic-based government system in Indonesia [9,10]. As a basis for supporting the formation of a good e-government or electronic-based information system, an enterprise architecture design is needed which will then be used as a guideline in the information system to support organisational goals, because the utilisation of information system facilities will bring many benefits in helping daily business processes [11,12].

An approach called enterprise architecture provides a framework to maximise information in business processes by supporting the company's business strategy. Enterprise architecture refers to organisational structure, business processes, information systems and infrastructure as well as the coherence of ideas, methodologies, and models used in design. Enterprise architecture is the process of developing an abstract business perspective that allows agencies to make better planning and choices. Strategic planning, which serves as the main support of the organisation, and business planning which is the most important resource, are both added to the enterprise architecture, which also includes technology planning [13,14]. Enterprise architecture is very important in improving information systems and developing new systems to maximise the company's mission which includes business and technical conditions and includes transition plans from the basic environment to the target environment.

With various advantages, the enterprise architecture can help the creation of designing and planning an e-government or an electronic-based government system, especially a village government, therefore research will be carried out on "an enterprise architecture design using the open group architecture framework architecture development method 9.2" which will be carried out in the government of Simpang Pasir Village, Palaran District, Samarinda City, East Kalimantan Province. Simpang Pasir Village was chosen as a case study because one of its missions is to improve village governance in the field of information technology to improve public services, which is also in line with the purpose of Samarinda City to improve the culture of work, authority, cleanliness, and good governance, as well as to improve basic public services and quality of life for the community. It is hoped that the findings of this research will assist the government agencies of Simpang Pasir Village in taking the initial steps toward establishing an electronic-based governance system (e-government). This initiative aims to optimize the village's service management system, enhancing efficiency and effectiveness, while supporting the mission of Simpang Pasir Village. Ultimately, these efforts are expected to contribute to the transformation of Simpang Pasir Village into a self-reliant and independent community.

An enterprise architecture framework is required to make it easier to plan and design enterprise architecture. Enterprise architecture framework provides best practises, guidelines, tools, processes, and patterns to help create enterprise architecture with various purposes [15-17]. In this study, the TOGAF ADM 9.2 framework is used to design enterprise architecture, because TOGAF is an Enterprise architecture framework that is widely used with the advantages of TOGAF compared to other AE frameworks such as Zachman Framework, which is the existence of additional aspects such as gap analysis, governance management, change management, and the basis of needs that are not available in Zachman, so that the use of TOGAF can provide greater benefits in designing enterprise architecture [18,19].

The method given by TOGAF is a detailed procedure for developing, managing, and implementing enterprise architecture and information systems called architecture development method (ADM) [20,21]. The generic approach called TOGAF ADM consists of a number of activities used for the design of enterprise architecture. TOGAF ADM outlines the development, transition, and management of architectural frameworks. These stages are repeated so that the organisation can continue to make adjustments to achieve its goals [22,23]. In making an enterprise architecture design in this research using the sarchi tool with ArchiMate notation. The ArchiMate modelling language called ArchiMate framework describes a three-layer organisation system that is interrelated. Business layer describes business processes,

such as services provided by businesses, application layer describes application services that help businesses achieve its goals, and technology layer describes technology services, such as processing, storage and communication requirements that are needed in running technology and related communication to hardware and software to realise the service [24]. Using enterprise architecture scorecard for testing on the design of enterprise architecture that has been made. Enterprise architecture (EA) scorecard is a methodology to measure the quality of enterprise architecture design in this research. The method developed by Jaap Schekkerman contains six abstract levels of four enterprise components (business, information, information system, and technological infrastructure) [25,26]. EA Scorecard testing related to business areas, data, applications, and technology in accordance with enterprise architecture components [27,28].

A comparative analysis with other studies on enterprise architecture in public governance and education sectors highlights different success metrics. Various studies emphasize that the adoption of enterprise architecture plays a crucial role in improving governance efficiency, streamlining administrative processes, and enhancing the quality of digital public services. Previous research underscores the significance of aligning enterprise architecture frameworks with organizational strategies to ensure sustainable digital transformation. Furthermore, best practices from different governmental implementations suggest that a well-structured enterprise architecture can facilitate better interoperability, data integration, and service delivery. The implementation in Simpang Pasir Village demonstrates a strong alignment with these global standards, reinforcing its potential to serve as a model for digital governance transformation in rural administration

2. Research Methodology

The Information System Research Framework put forward by Hevner was used in the design of this research methodology. Information system research must be relevant to the environment (environment) and in accordance with the existing knowledge base (rigour) [29,30].

2.1 Environment

The environmental section is a stake holder involved in this research such as the organisation, namely the Government of Simpang Pasir Village, Palaran District, Samarinda City, East Kalimantan Province, then the data, namely the organisational structure, vision and mission of the Government of Simpang Pasir Village, the supporting infrastructure used to the technology infrastructure that is expected in the future. Government of Simpang Pasir Village is a research subject that will be interviewed and observed to obtain data to support the formation of enterprise architecture design in Simpang Pasir Village in this research.

2.2 Information System Research

Various stages are carried out in this research, namely as follows:

1. Literature Studies

These stages aim to better understand the enterprise architecture design to be implemented. Literature study can be through references in books, journals to internet media.

2. Data Collection

The necessary data collection in this study was carried out to the research object, namely the Government of Simpang Pasir Village, with the key informants of the Village Head, the Village Secretary, the Head of Affairs and the Head of Section. A successful e-government system requires active participation from key stakeholders, including government officials, IT administrators, and citizens. Stakeholder engagement should be integrated into all phases of implementation, from requirement gathering to system deployment. Regular consultations, feedback loops, and pilot testing can ensure that the system meets the needs of all users while addressing potential resistance to adoption.

3. Enterprise Architecture Planning

Enterprise Architecture Design is carried out using the TOGAF ADM 9.2 framework starting from the preparation stage (preliminary), to the migration planning stage. With the result of an enterprise architecture design for the Government of Simpang Pasir Village which is used as a blueprint in supporting an electronic-based government system.

4. Testing Stage

Enterprise architecture testing was carried out to find out whether the design rights that were made were appropriate and could be implemented by the Government of Simpang Pasir Village.

2.3 Knowledge Base

Enterprise architecture serves as a foundational framework for optimizing business processes and aligning them with an organization's strategic objectives. Various methodologies exist for enterprise architecture development, including TOGAF ADM 9.2, the Zachman Framework, and FEAF. TOGAF is one of the most widely adopted

frameworks due to its structured approach, incorporating gap analysis, governance management, and change management.

While TOGAF ADM 9.2 provides a systematic methodology for enterprise architecture development, alternative frameworks offer distinct advantages. For example, FEAF is commonly used in government IT governance, emphasizing regulatory compliance and standardization. In contrast, the Zachman Framework functions as a classification schema for defining architectural components but lacks a step-by-step implementation methodology. Research has demonstrated the effectiveness of TOGAF in specific contexts. For instance, its application in Indonesian university information systems exhibited strong alignment with institutional goals but required additional governance mechanisms for scalability [31]. Similarly, European digital governance frameworks emphasize interoperability and citizen-centric service design, providing valuable benchmarks for improving enterprise architecture strategies in various domains [32].

This study explores e-government, enterprise architecture, TOGAF ADM 9.2, and ArchiMate as foundational theories. The research methodology involves interviews, observations, and documentation, followed by enterprise architecture design using the TOGAF ADM 9.2 framework. The Archi and Draw.io tools are utilized for the modeling process.

2.4 Research Location

The location of this research is Simpang Pasir Village, Palaran District, Samarinda City, East Kalimantan Province which uses the TOGAF ADM 9.2 framework. Interviews, documentation, observations are also carried out to ensure that the data obtained is comprehensive, accurate, and reliable so that the purpose of this research can be achieved. The following is the research framework in this study that uses the IS Research framework from Hevner in Fig. 1.

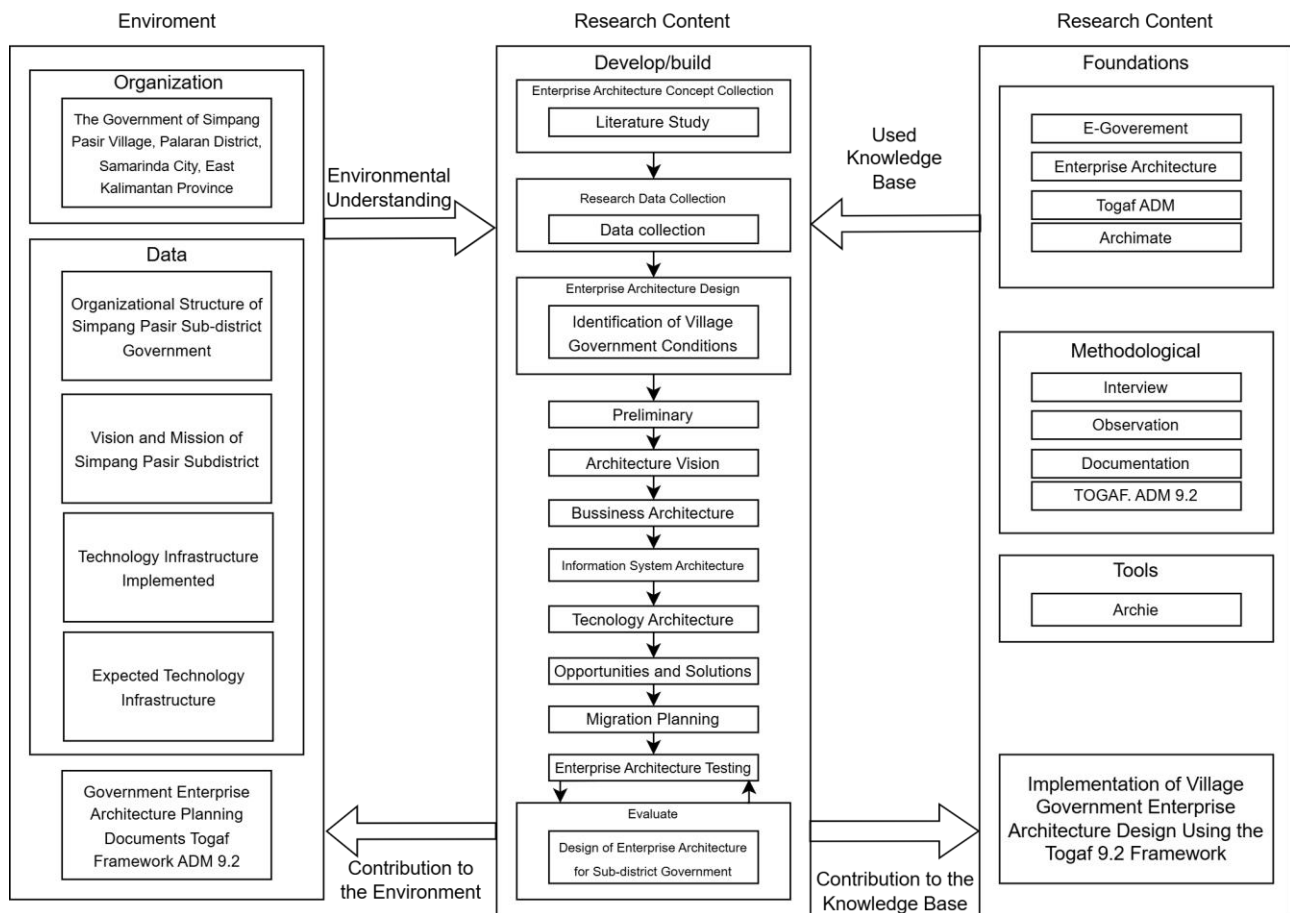


Fig. 1. Research Framework

3. Results and Discussion

3.1 Preliminary Phase

This stage is a preparation stage to design the enterprise architecture of the Government of Simpang Pasir Village. The main aspects that are considered are defining the instance, identifying the driver and the main components of the instance, defining the architecture requirement, determining the architectural framework used and defining the architectural principle.

3.2 Architecture Vision Phase

The purpose of this stage is to be the beginning of planning and developing enterprise architecture. This stage is intended as an explanation of each phase of the framework and methodology in every architecture tools implementation plan, along with all enterprise architecture principles. Furthermore, this stage serves as a foundation to ensure alignment between organizational goals and IT strategies. By detailing the processes, stakeholders, and system interdependencies, it enables a systematic approach to the identification and resolution of potential challenges. Additionally, this phase highlights the importance of governance, documentation standards, and integration methods that guide the successful execution of the enterprise architecture framework. This phase produces artifacts of 1 matrix and the following 2 diagrams in table 1.

Table 1. Analysis of Architectural Vision with Architectural Principles in the Government of Simpang Pasir Village

Architectural vision to be suggested	Conformity of architectural principles
Integrating all parts in the Government of Simpang Pasir Village structure to provide services to the community	The proposed architectural vision is service-oriented in the principles of business architecture
Forming a single data system that is integrated with each other for all parts of the Government of Simpang Pasir Village and ensuring good data security	The proposed architectural vision is in accordance with the principles of data architecture, namely where data represents a set of
Developing effective and efficient administrative services, prioritizing a transparent system to the community and developing a good system in the management of Village funds.	The proposed architectural vision is service-oriented in the principles of business architecture and technology architecture
All sections in the Government of Simpang Pasir Village have independent applications that are integrated with each other	Suggested architectural vision in accordance with application architecture principles

3.3 Business Architecture Phase

The purpose of the business architecture stage in the development of a company or agency is to design a business architecture target that can help the agency achieve its goals. Based on the gap findings in the gap analysis, a business architecture roadmap was made. There are 4 matrices, 9 catalogues, and 11 diagrams at the stage of designing the business architecture phase of the Government of Simpang Pasir Village which has the potential to be used as a guide for service development for the community.

1. Driver/Goal/Objective Catalogue

Mapping the drivers, goals and objectives of the government service functions of Simpang Pasir Village to the community. Driver is a condition that can be used as an opportunity to be able to develop services. Goal is the goal that will be achieved, while objective is the step of an institution/institution to achieve its goal. The following is the driver/goal/objective catalogue of the Government of Simpang Pasir Village in table 2.

Table 2. Driver/Goal/Objective Catalogue Government of Simpang Pasir Village

Driver	Goal	Objective
Community Aspirations	Improving services to the Village Community	Respond to the aspirations of the community well and quickly
The need for information technology infrastructure in Village services	Improvement of information technology in Simpang Pasir Village	Development and improvement of information technology infrastructure in Simpang Pasir Village
The need for superior human resources and be able to compete with other villages	Improvement of human resources	Conducting coaching and training for the community and institutions in Simpang Pasir Village
Village Planning	Improvement of Village infrastructure	Carrying out development in the context of improving the infrastructure of the Village
Community Reports	Evaluation of the village government in providing services to the community	Improving village government services

2. Business Model Diagram

The use of models in this diagram is used to create and provide business value. Business model canvas is used to describe the business model diagram of Government of Simpang Pasir Village. The business model canvas modelling consists of 9 blocks as shown in Table. 3.

Table 3. Business Model Canvas Simpang Pasir Village

Key Partners	Key Activities	Value Propositions	Customer Relationships	Customer Segments
1. Internet Provider 2. Simpang Pasir Sub-district Government 3. Palaran Sub-district Government	1. Good service to the community 2. Implementation of Simpang Pasir Village Government 3. Conducting system maintenance 4. Updating data on the system	1. Creating harmony between business and technology 2. Integrated data between sections in the Village Government 3. Information is always updated 4. Data and Information are easily accessible	1. Socialization and training to the community 2. Improving services through information technology 3. Online services for Simpang Pasir Village 4. Direct services effectively and efficiently	1. Simpang Pasir Urban Village Community 2. Institutions or Organizations in Simpang Pasir Urban Village 3. Outside communities who have interests in Simpang Pasir Urban Village
Key Resources			Channels	
1. Simpang Pasir Sub-district Government Employees 2. Information technology devices 3. Community service system 4. Population data 5. Simpang Pasir Sub-district Government Finance			1. Online Information Portal 2. One-stop integrated service	

3. Organization Map

This artefact depicts the relationship between the main entities in the Company or agency with stakeholders from each organisational unit. The following is the organisation map of the Government of Simpang Pasir Village in Fig. 2.

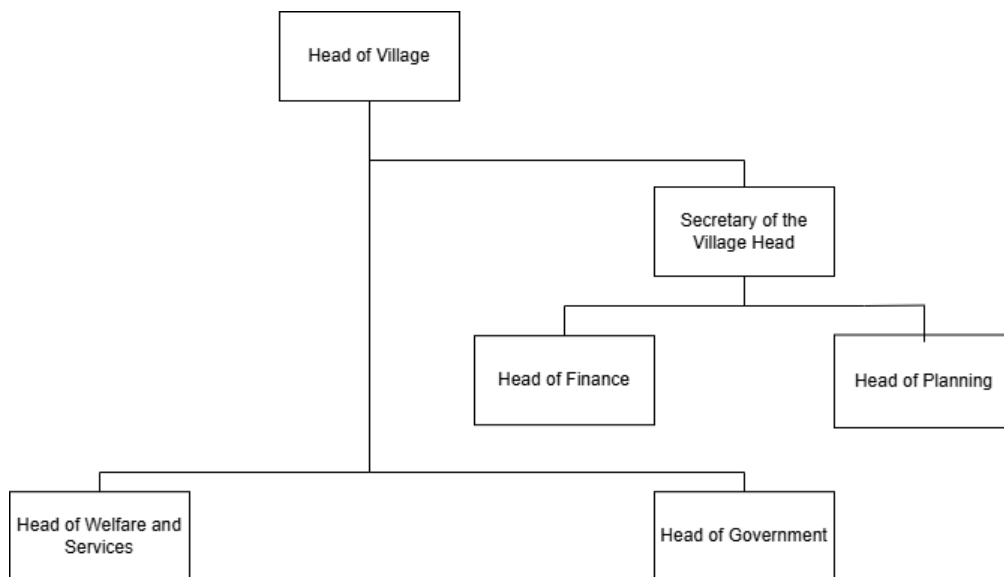


Fig. 2. Organization Map of Government of Simpang Pasir Village

4. Business Architecture Gap Analysis

Gap analysis was carried out on business architecture by comparing the current condition of business architecture and the target of Government of Simpang Pasir Village. The results of the gap analysis, there is a gap in population services with the target of developing population services managed by the Head of Government and the Welfare and Service Committee can provide services to the community online with the system or directly at the Government of Simpang Pasir Village

3.4 Data Architecture Phase

This stage describes the current condition architecture and targets in the Government of Simpang Pasir Village data architecture. In this phase, there are artifacts in the form of 1 catalogue, 1 matrix and 2 diagrams.

1. Conceptual Data Diagram

This diagram illustrates the relationship of data entities in the Government of Simpang Pasir Village in carrying out daily operations from conducting operations to processing letters to Simpang Pasir Village. The following is the relationship of data entities in the Government of Simpang Pasir Village in Fig. 3.

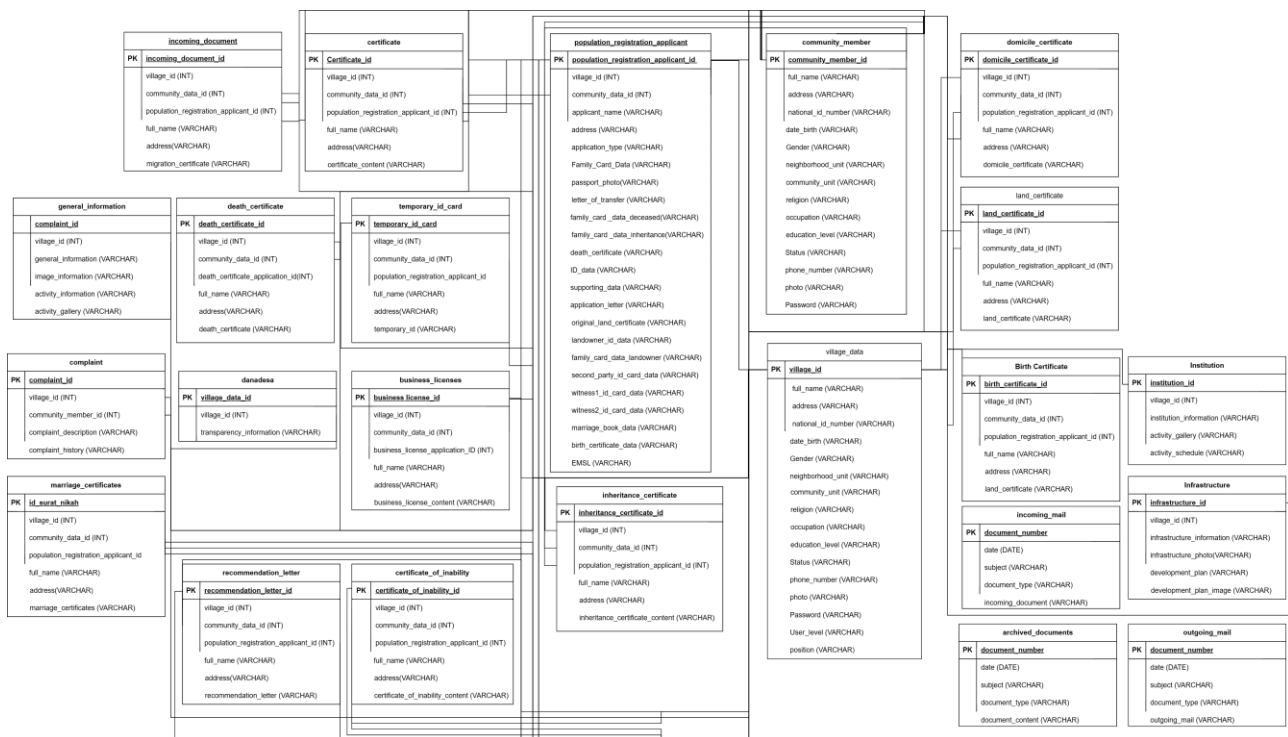


Fig. 3. Conceptual Data Diagram of Government of Simpang Pasir Village

2. Data Architecture Gap Analysis

Table 4. Data Architecture Gap Analysis Phase

Target (X) Baseline (Y)	Simpang Pasir Village Administration	Population Services	Defence Services	Village Government Organizer	Population Services	Village Development	Community Development	Community Development	Emergency	Village Government Work Plan	Financial Management of Village Government
Simpang Pasir Village Administration											
Population Services											
Defence Services											
Village Government Organizer											
Population Services											
Village Development											
Community Development											
Community Development											
Emergency											
Village Government Work Plan											
Financial Management of Village Government											

Information table 4

= No changes
 = Target

A data architecture gap analysis was carried out by comparing the current data architecture condition and the target data architecture of the Government of Simpang Pasir Village. The following is the development mapping of all data entities needed to support application architecture based on existing business sub-functions in the Government of Simpang Pasir Village in table 4.

1. There is additional data needed in the sub-function of community development, namely education data entities, health data, entrepreneurial data and agricultural data.
2. There is additional data required for the emergency sub-function, namely the disaster response data entity.

3.5 Application Architecture Phase

In this phase, we will identify the applications in the Government of Simpang Pasir Village as well as the applications that are the target of the Government of Simpang Pasir Village and describe an architectural target that is in accordance with business architecture and vision architecture. At this stage, 8 artifacts are produced consisting of catalogues, matrices, and diagrams and each design consists of baselines and targets.

1. Application Portfolio Catalogue

This catalogue describes the entire system used by the Government of Simpang Pasir Village. There are 6 information systems used by the Government of Simpang Pasir Village. The following is the application portfolio catalogue in table 5.

Table 5. Application Portfolio Catalog of the Government of Simpang Pasir Village

No	Application/Information System	Description
1.	Village Financial Information System	The information system is used to manage the finances of Simpang Pasir Village, such as financial planning, budgeting and administration
2.	Village Apparatus Data Collection Information System	The information system used to record the devices or apparatus of Simpang Pasir Village
3.	Village Asset Management Information System	Information System used to manage and use assets ranging from planning to procurement at the Government of Simpang Pasir Village
4.	Village Information System	Information system used to record the population, institutions, and the state of Simpang Pasir Village
5.	Village Development Evaluation Information System	The information system used for the evaluation of Simpang Pasir Village, from the community, government and the territory of the Village
6.	Village Development Index	The information system used for the calculation of the index of the building village, as an indicator to determine whether Simpang Pasir Village can be classified as a very backward village, a developing village, a developed village or an independent village. Economic resilience index, environmental resilience index and social resilience index as calculation indicators

2. Application Communication Diagram Target

This diagram shows all models in interconnected applications and how these applications communicate to form a cohesive system. It illustrates the data flow and integration between components to ensure efficient operations. The Government of Simpang Pasir Village aims to enhance administrative and public services through two main targets. The first is an Information System for Village Letter Management to simplify and expedite the process of creating official letters, making it easier for the Village Secretary to manage documentation. The target applications are shown in Fig. 4 for the Village Letter Management System.

The Application Communication Diagram for the Target Digital-Based Public Service Information System is illustrated, depicting the planned features and communication flow within the system. It covers services such as population administration, educational material information, village entrepreneurship, infrastructure information, disaster response, and public complaint services, aiming to provide faster and more efficient public service access to the community, as shown in Fig. 5.

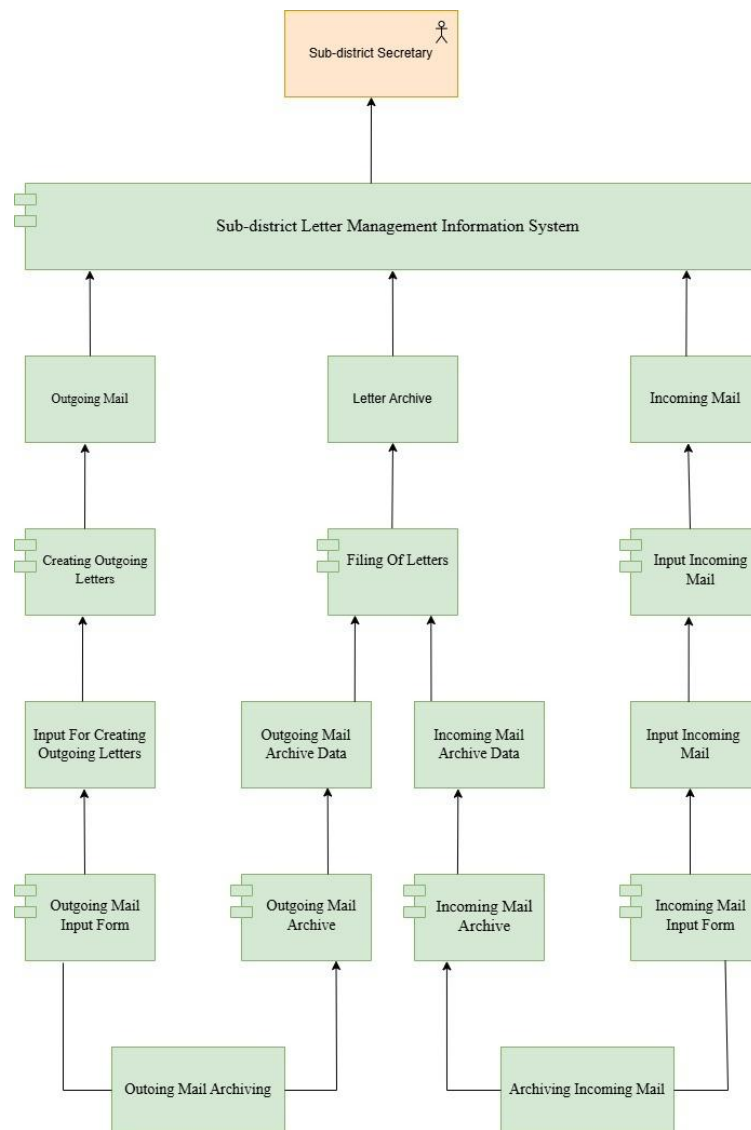


Fig. 4. Application Communication Diagram Target Information System for Village Letter Management

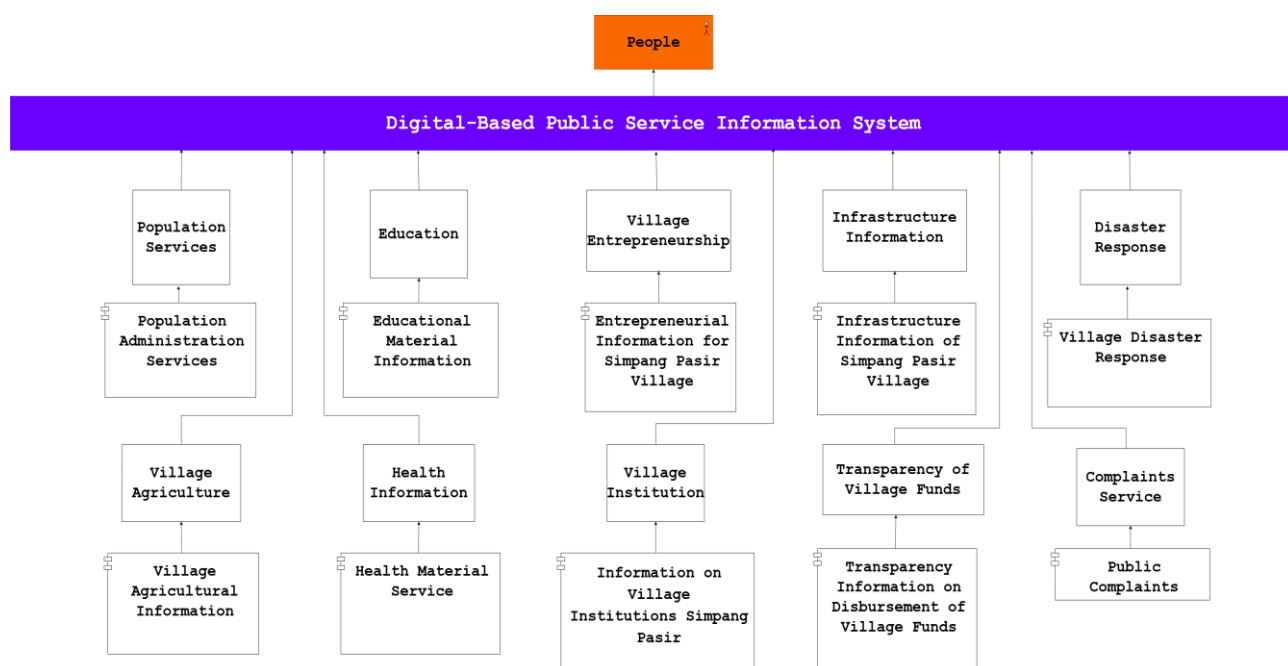


Fig. 5. Application Communication Diagram Target Digital-Based Public Service Information System

3. Architecture Application Gap Analysis

An analysis of the architectural application gap was carried out by comparing the current architectural condition of the application and the target architectural application of the Government of Simpang Pasir Village. Government of Simpang Pasir Village has used several applications or information systems that are used and those applications are derived from the district government and from the ministry. The applications/information systems used so far are the village financial information system, the village apparatus data collection information system, the village asset management information system, the village information system, the village development evaluation information system and the village building index. The Government of Simpang Pasir Village has a target to create a village letter management information system to make it easier to carry out work in terms of mail administration and digital-based public service information system as a step to facilitate services to the local community in obtaining services from the Government of Simpang Pasir Village.

3.6 Technology Architecture Phase

To support the necessary business integration, this technological architecture stage describes the relationship between application components and supporting components such as software (software) and software (hardware) in the Government of Simpang Pasir Village. Five artifacts are produced consisting of catalogues and diagrams at this stage.

1. Technology Standards Catalogue

This catalogue defines the technology used by the current Government of Simpang Pasir Village. The following is the Technology Standards Catalogue of the Government of Simpang Pasir Village in table 6.

Table 6. Technology Standard Catalogue of the Government of Simpang Pasir Village

No	Technology	Standard
1	Operating System (OS)	Windows 10
2	Network	Network Equipment Router: Zte ZXHN F660 Network Connection Application Connection: Internet
3	Provider	PT. XL Axiata Tbk

2. Environment and Location Diagram

This diagram depicts the location of a technology used by the Government of Simpang Pasir Village. This diagram explains the use of technology as a support for the Simpang Pasir Village device in operating 6 information systems or derivative applications from ministries to provincial and district governments. The following is the Environment and Location Diagram of Government of Simpang Pasir Village in Fig. 6.

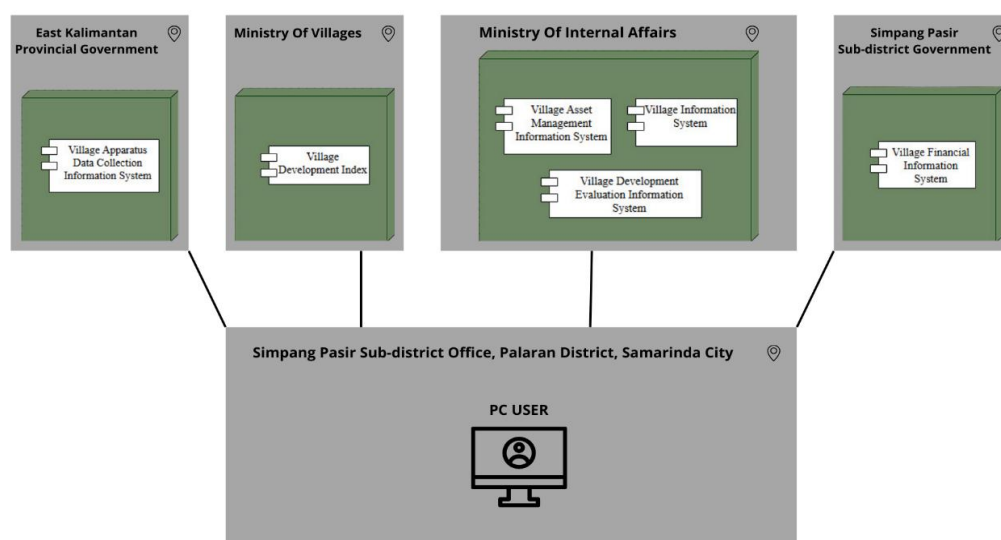


Fig. 6. Environment and Location Diagram of the Government of Simpang Pasir Village

3. Network and Communication Target

This diagram illustrates the communication between technology assets that are the target of the Government of Simpang Pasir Village, namely a cloud server, because previously the Government of Simpang Pasir Village did not have a self-managed server. The following is the Network and Communication Target diagram of the Government of Simpang Pasir Village in Fig. 7.

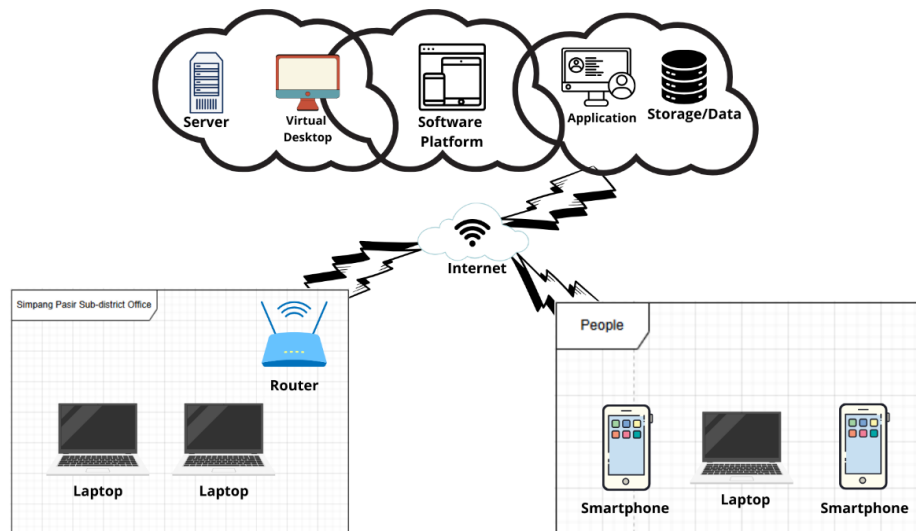


Fig. 7. Network Communication Diagram Government of Simpang Pasir Village Target

4. Technology Architecture Gap Analysis

An analysis of the technology architecture gap was carried out by comparing the current condition of technological architecture and the target architecture of the Government of Simpang Pasir Village. The following is the stage of analysis of the technology architecture gap of the Government of Simpang Pasir Village in table 7.

Table 7. Gap Analysis of Government Technology Architecture in Simpang Pasir Village

Target (Y) Baseline (X)	Operating System	Network	Provider	Cloud Server
Operating System	No Changes			
Network		No Changes		
Provider			No Changes	
Information				There is an addition of cloud server technology as a container to run the information system that will be created later

Information Table 7 = Target

3.7 Opportunity and Solution Diagram

Based on gap analysis in each domain from business architecture to technology architecture, an evaluation will be carried out at this stage. This stage will produce 3 artifacts consisting of a matrix and a diagram.

1. Consolidation Gap

The purpose of this consolidation gap is to describe the gap analysis of the target design that will be developed from the business architecture phase to the technology architecture. The following is the consolidation gap in the Government of Simpang Pasir Village in table 8.

Table 8. Consolidation of the Government of Simpang Pasir Village

Domain	Gap Analysis	Description
Business Architecture Phase	Addition of digital-based public services	Business design is carried out to add digital-based public services using an online system
Data Architecture Phase	Addition of data to community development business sub-functions and emergency business sub-functions	Designs are carried out related to the required data and cooperation with third parties is carried out to meet the required data needs
Application Architecture Phase	Creation of an information system for the management of village letters	The creation of an information system for the management of village letters was carried out to assist the administrative system in terms of correspondence for the internal government of Simpang Pasir Village
	Creation of a digital-based public service information system	The goal is to provide maximum service effectively and efficiently to the community, the creation of a digital-based public service information system is carried out
Technology Architecture Phase	There is an addition of technology, namely cloud servers	The procurement of cloud server technology is carried out as a container to run the information system to be created

3.8 Migration Planning Phase

This phase is carried out to create migration planning before implementation is carried out to support the development of a defined baseline and target enterprise architecture. There are 2 matrices at this stage.

1. Implementation factor Assessment and Deduction Matrix

Variables that affect the implementation plan and migration plan such as risks, issues, dependencies, actions, and impacts are described in this matrix. The following is the implementation of the Assessment and Deduction Matrix of Implementation Factors from the design of the government enterprise architecture of Simpang Pasir Village in table 9.

Table 9. Implementation Factor Assessment and Deduction

Factor Type	Factor	Description	Deduction
Risk	Internet connection disruption on the server	Interruptions of an unstable internet connection can affect connecting to a cloud server	Connection disruptions can hinder connecting to the cloud server which can hinder services to the community, so it is necessary to ensure the availability of stable internet connections at the Government of Simpang Pasir Village
	Human error	Human error that may occur that can cause data input in the system or inadvertently that can eliminate data in the system.	Data loss can occur due to human error, so it is necessary to back up data so that data is always maintained and safe, skill training is also needed to minimize the occurrence of human error
Issues	Creation of a new information system managed by the Government of Simpang Pasir Village to provide services effectively and efficiently to the community	Design and development are carried out to support effective and efficient services to the community	It is necessary to add infrastructure to support business processes, and socialize to system users
Dependencies	Linkage with data in business processes carried out by the Government of Simpang Pasir Village	All processes in the system require appropriate data needs and are always updated	The need for data is very important for the system in providing services to the community, so all data must be available as updated information on the system
Action	New data not yet available	There is a lot of data needed for the system, but there is data that is not available in the business processes of the Government of Simpang Pasir Village, so it requires cooperation with a third party as the necessary data provider	The need for data as an important instrument in the system to provide updated and accurate information, so cooperation with third parties or other agencies is needed to meet the required data needs
Impact	Implementation of the village letter management information system and digital based public service information system	Implementation of the village letter management information system used for internal government and digital-based public service information system used to provide maximum service to the community	The implementation of an optimal information system can affect business processes and services to the community so that maintenance is needed on the supporting infrastructure so that it can always run optimally

2. Consolidate Gaps, Solution and Dependencies Matrix

In this Matrix, gaps that have been identified previously are grouped, then from the results of the gap analysis, potential solutions and dependencies of one or more identified gaps are made. The following is the Consolidate Gaps, Solution, and Dependencies Matrix of the Government of Simpang Pasir Village in table 10.

Table 10. Gap Consolidation Matrix, Solutions, and Dependencies of the Government of Simpang Pasir Village

Architecture	Gap	Potential Solution	Dependencies
Business Architecture Phase	Addition of digital-based public services	Designing new business processes for digital-based public services	Availability of village and community tools in carrying out business processes online
Data Architecture Phase	Addition of necessary data in the sub-function of the community development and emergency business	The necessary data is designed and cooperation with third parties is carried out to meet the lack of data needed by the Government of Simpang Pasir Village	Cooperation with third parties who have data as needed

Application Phase	Architecture	Creation of an information system for the management of village letters	The creation of an information system for the management of village letters was carried out as a form to simplify the administrative process of letter management in the Government of Simpang Pasir Village	Cooperation with third parties in system creation
		Creation of a digital-based public service information system	The creation of a digital-based public service information system was carried out as a form of providing convenience for the community in providing services in Simpang Pasir Village	Cooperation with third parties in system manufacturing
Technology Phase	Architecture	There is an addition of technology, namely cloud servers	Procurement of cloud server technology is carried out as a forum to run a website-based information system	Availability of cloud server costs and technology as needed

3.9 Enterprise Architecture Design Implementation Plan

This section explains the implementation plan from the results of the enterprise architecture design that has been made before and conducts overall design testing. The implementation plan of the enterprise architecture design is made in the form of IT Roadmap. IT Roadmap is made based on the target design in the stages of business architecture, data architecture, application architecture and technology architecture with an estimate of 1 year or 4 quarters (Q) in 2023. Quarter (Q)1 January-March, quarter (Q)2 April-June, quarter (Q)3 July-September and quarter (Q)4 October-December. The following is the IT roadmap for the implementation of the design target that has been made in Fig. 8.

Phase	Q1 2023	Q2 2023	Q3 2023	Q4 2023
Business Architecture Phase	Project 1			
Data Architecture Phase		Project 2		
Application Architecture Phase			Project 3 Project 4	
Technology Architecture Phase			Project 5	

Fig. 8. IT Roadmap of the Government of Simpang Pasir Village

Information Fig. 8:

1. Project 1: Addition of digital-based public services.
2. Project 2: Addition of data needed in the community development business sub-function and emergencies.
3. Project 3: Creation of an information system for the management of village letters.
4. Project 4: Creation of a digital-based public service information system
5. Project 5: Creation of cloud server technology

3.10 Enterprise Architecture Testing

While the TOGAF ADM 9.2 framework offers a structured approach to enterprise architecture, its implementation requires careful consideration of financial and technical feasibility. Budget constraints may hinder the adoption of advanced IT infrastructure, necessitating phased deployment strategies or public-private partnerships. Additionally, the limited availability of technical expertise at the village level poses a challenge, highlighting the need for capacity-building initiatives and external consultancy support. Scalability is another key factor, as expanding the system to other municipalities may require cloud-based solutions or shared service models to enhance cost efficiency and operational effectiveness.

To evaluate the enterprise architecture design for the Government of Simpang Pasir Village, an Enterprise Architecture Scorecard was utilized. A 22-question questionnaire was developed and administered to four key respondents: the Village Head, the Village Secretary, the Head of Government, and the Head of Welfare and Service. The assessment criteria were as follows:

1. A value of zero (0) means that it is not well documented, undefined and not well written.
2. A value of one (1) means that it is partially documented, defined and written.
3. A value of two (2) means documented, defined and written as a whole.

Following these evaluation criteria, calculations were conducted using the Enterprise Architecture Scorecard formula, with the results presented in table 11.

Table 11. Enterprise Architecture Scorecard Calculation Results

No	Respondents	Business Architecture Phase	Data Architecture Phase	Application Architecture Phase	Technology Architecture Phase	Average
1	Respondent 1	78,50%	74,25%	83,50%	87,75%	81,50%
2	Respondent 2	80,75%	83,25%	87,50%	89,50%	85,75%
3	Respondent 3	76,50%	76%	87,50%	87,50%	81,88%
4	Respondent 4	74,25%	74,50%	85,50%	85,50%	79,94%
Total Average						82,27%

The average value of respondent 1 from the test results in this study is 81,50% from respondent 2 is 85,75%, respondent 3 is 81,88% and the average value of respondent 4 is 79,94%. Overall, the calculation of the average presentation totalled 82.27% and from the results the design of the enterprise baseline architecture and targets in the Government of Simpang Pasir Village are declared valid or already in accordance with the baseline conditions and targets in the Government of Simpang Pasir Village. The average score of 82.27% demonstrates that the enterprise architecture design is solid and ready to support the implementation of an effective digital system. It aligns with the vision of the Government of Simpang Pasir Village to enhance administrative processes and public services. Continuous monitoring and evaluation during the implementation phase will be critical to addressing any remaining gaps and ensuring the system achieves its intended outcomes.

4. Conclusion

This study confirms the feasibility of implementing enterprise architecture for e-government in Simpang Pasir Village using the TOGAF ADM 9.2 framework. The achieved EA Scorecard rating of 82.27% validates the proposed design, demonstrating its competitiveness against global benchmarks. However, challenges such as financial constraints, stakeholder adoption, and legal compliance must be addressed. Future research should explore cost-effective deployment strategies, expanded regulatory frameworks, and alternative validation models. Additionally, scalability assessments are essential to determine how the architecture can be extended to other villages or municipalities, ensuring broader applicability. Overcoming these limitations will strengthen the sustainability and long-term effectiveness of e-government initiatives in local governance. Although this study focuses on Simpang Pasir Village, its findings are applicable to other rural and small urban municipalities with similar governance structures. The proposed enterprise architecture can serve as a reference model for scalable e-government solutions, adaptable to different administrative contexts with minor modifications to align with local regulations, infrastructure constraints, and community engagement strategies.

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