E-ISSN : 2540 - 8984

JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)
Volume 07, Nomor 04, Desember 2022 : 1011 - 1024

ENTERPRISE ARCHITECTURE DESIGN BLUEPRINT FOR SMART VILLAGE IMPLEMENTATION IN SUMUR BANDUNG SUB DISTRICT (CASE STUDY : SMART LIVING DIMENSION)

Dzaky Muhammad Rafi Permana[1)], Berlian Maulidya Izzati[2)], Fitriyana Dewi[3)]
[1, 2,3] Information System Study Program, Faculty Industrial Engineering, Telkom University
Jl. Telekomunikasi No. 1, Sukapura, Kec. Dayeuhkolot, Kabupaten Bandung, Jawa Barat 40257
e-mail: dzakypermana22@gmail.com[1)], berlianmi@telkomuniversity.ac.id[2)],
fitriyanadewi@telkomuniversity.ac.id[3)]

ABSTRAK

Kecamatan Sumur Bandung merupakan salah satu kecamatan di Kota Bandung yang memberikan pelayanan publik dan pemberdayaan kepada warganya. Kecamatan menghadapi beberapa kendala dalam menjalankan tugas dan pelayanannya. Salah satu kendala yang dihadapi Kecamatan Sumur Bandung adalah kurangnya Tempat Pengolahan Sampah Akhir (TPPAS). Dengan model pengelolaan sampah saat ini, tumpukan sampah di TPPAS akan semakin banyak sehingga menimbulkan masalah lingkungan bagi penghuninya. Oleh karena itu, diperlukan penerapan salah satu dimensi dalam Smart Village yaitu Smart Living. dengan memperbaiki model pengelolaan sampah yang ada dan didukung oleh inovasi teknologi. Namun, inovasi teknologi itu dapat menimbulkan masalah baru jika dilihat hanya sebagai kegiatan penyediaan perangkat lunak/perangkat keras untuk kebutuhan otomatisasi. Berdasarkan permasalahan tersebut, maka perlu dibuat suatu perancangan Enterprise Architecture dari pengelolaan sampah yang bertujuan untuk menyelaraskan strategi teknologi dengan strategi bisnis. TOGAF ADM dipilih sebagai kerangka kerja karena menyediakan metode untuk mengembangkan, mengelola, dan mengimplementasikan pemeliharaan arsitektur. Hasil perancangan berupa blueprint yang dapat dijadikan acuan bagi Kecamatan Sumur Bandung untuk mengatasi permasalahan.

***Kata Kunci**: Smart Village, Enterprise Architecture, TOGAF ADM, Smart Living, Blueprint*

ABSTRACT

Sumur Bandung District is one of Bandung City's sub-districts that provides public services and empowerment to its residents. The sub district faces a number of issues in carrying out its duties and providing services. One of the issues confronting Sumur Bandung Sub District is the lack of Final Waste Processing Sites (TPPAS). With the current waste management model, there will be more garbage piles in TPPAS, causing environmental problems for its resident. As a result, The implementation of one of the dimensions in the smart village, namely smart living, is required. by improving current waste management model and supported by technological innovation. However, technological innovation itself will cause new problems if management is seen only as an activity provision of software/hardware for automation needs. Based on these issues, it is necessary to create a Enterprise architecture design of waste management that aims to align technology strategy with business strategy, TOGAF ADM was chosen as the framework because it provides a method for developing, managing, and implementing enterprise architecture maintenance. The results of the design are in the form of a blueprint that can be used as a reference for Sumur Bandung Sub District to overcome issues.

***Keywords**: Smart Village, Enterprise Architecture, TOGAF ADM, Smart Living, Blueprint*

I. INTRODUCTION

THE rapid development of information technology is something that cannot be avoided in various aspects of life. The use of information technology in all aspects of life has encouraged the application and use of information technology to integrate city elements to support technology-based urban life, which is commonly referred to as a Smart City [1] Smart City is a city planning concept that utilizes technology to make life easier and healthier with high efficiency and effectiveness [12] Several cities in Indonesia have tried to implement smart cities to increase efficiency, improve public services, and improve the welfare of citizens. In Bandung City, for example, the implementation of a Smart City began with the presence of Bandung Mayor Regulation Number 1470 of 2018 concerning the Master Plan for the Smart City of Bandung, which aims to develop “Bandung as a Smart City” based on the six dimensions of the Smart City[15] namely: Smart Governance, Smart Environment, Smart Living, Smart People, and Smart Mobility [10] In line with the development of a smart city in Bandung, in a smaller scope (village or kelurahan), the concept of a technology-based village is also developed and is commonly called a smart village.

E-ISSN : 2540 - 8984

JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)
Volume 07, Nomor 04, Desember 2022 : 1011 - 1024

Smart village is a derivative concept that adopts components or indicators of a smart city. Although there is no agreement on the smart village concept, in general a village can be said to be a smart village if the village is innovative in the use of information technology to improve quality of life, efficiency, and competitiveness in the economic, social, and environmental aspects [2]

Based on the above concept, Sumur Bandung Sub District, a government with a smaller scale than the Bandung City Government, can apply the Smart Village concept to solve problems intelligently. According to the Sumur Bandung Sub-District Plan and Strategy for 2018-2023 and the interview result. One of the problems faced by Sumur Bandung Sub District is the absence of a Final Waste Processing and Processing Site (TPPAS) [11] With the current model of waste management that still uses the Collect - Transport - Dispose method, it will result in more piles of garbage. cause various environmental problems and inconvenience for residents in Sumur Bandung Regency. Therefore, it is necessary to apply one of the dimensions in a smart village, namely smart living because Smart Living has four missions, namely creating a decent, comfortable, and efficient environment, the smart living dimension is divided into two aspects, namely trying to create security and comfort and convenience. access to public facilities [4]

The concept of smart living in a smart village can certainly help overcome the problem of the absence of TPPAS in Sumur Bandung Sub District by implementing a new waste management model supported by technology. However, technological innovation itself will cause new problems if management is seen only as an activity provision of software/hardware for automation needs. Based on these issues, it is necessary to create a Enterprise architecture design of waste management that aims to align technology strategy with business strategy.

II. RESEARCH METHOD

A. Systematic Problem Solving

In this research, there are planned and systematic steps. The conceptual model is used which is conceptual explanation of how a research project will proceed. Based on the issues that arise and the fundamental information needed to develop information systems, the conceptual model is used to comprehend, carry out, and develop information systems. The explanation of the conceptual module is in Figure 1.

Figure 1. Conceptual Model

In the research there are also steps that must be done to solve the problem. This section will explain the stages. In outline, systematic research is devided into four stages: including initiation, identification, analysis, design, and conclusions and sugestions as to the last stage. The systematic research of this research is described as follows:

1. Initiation Stage: This stage has the aim of determining the object of research and obtaining research approval. Initiation begins by conducting a survey of the research object, followed by making a timeline of activities, and ending with the submission of research. The author request and receive permission to conduct research in Sumur Bandung Sub District

E-ISSN : 2540 - 8984

JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)
Volume 07, Nomor 04, Desember 2022 : 1011 - 1024

2. Identification Stage : This stage aims to identify the problems encountered and propose appropriate solutions. Identification begins with conducting a literature study and collecting data by interviewing stakeholders and observing. The next process is result identification aims to determine the current problems that occur at Sumur Bandung Sub District and categorized it based on Smart Village dimension put forth by AA. Aziiza & TD. Susanto in their case study on the Banyuwangi Regency Smart Village Model for Rural Area[4] Then the result used as a foundation in formulating the problem. One of the problems discovered in Sumur Bandung Sub District is the lack of a final waste processing and processing plant (TPPAS) which related to Smart Living dimensions in Smart village. Furthermore, the formulation of the problem will be obtained which will be the basis for designing solutions to problems in the Sumur Bandung Sub District.
3. Analysis and Design Stage : This stage aims to design an EA blueprint or target information system architecture. This stage aims to cover the domains of Business Processes, Data, Applications, and Technology at the Sumur Bandung Sub District by applying the TOGAF ADM framework.
4. Conclusion and Recommendation Stage : At this stage an evaluation is carried out with the aim of concluding the results of the study. The evaluation begins with validating the resulting EA blueprint with relevant stakeholders and ends with compiling conclusions and recommendations from the entirety research.

B. Collecting Data

In designing the Blueprint EA for smart villages in Sumur Bandung Sub District, it requires data that is classified into two types of data, namely primary data and secondary data. Primary data were obtained directly from each stakeholder related to Sumur Bandung District through interviews with the Head of the General Data and Information Subdivision Frida Nurcahyani, SE., MM, Head of the Economy and Development Division, Rachmat Firmansyah, S.Ap, and the Staff of the Economy, Development and the Environment, Dewa Edo Aditya Kurniawan, S.AB. These three stakeholders were chosen as one of the research mechanisms for data validation. Interviews were conducted for one hour with each resource person. In the interview process, the stakeholder were given several questions that described the current conditions in the Sumur Bandung Sub district and the problems in it. And then for the Secondary Data is obtained through various external sources apart from stakeholders in the Sumur Bandung sub district in the form of documents and information related to this research. The following Table I is describe the secondary data used in this research.

TABLE I
SECONDARY DATA

No	Data Name	Description
1	Plan and Strategies 2018 – 2023 of Sumur Bandung Sub District	As a reference that explains the existing conditions in the Sumur Bandung Sub District, such as problems and targets to be achieved.
2	Mayor of Bandung Regulation Number 1470 of 2018	Provide information about the development goals of the Bandung as a smart city
3	The TOGAF® Standard, Version 9.2	The TOGAF standard is a framework for designing an Enterprise Architecture that includes a thorough process and a collection of supporting tools.

C. Smart City

According to Abdoulevv, a Smart city is a city that combines digital, and social concepts to form an economic improvement, good urban infrastructure, a friendly environment with transportation, and comfortable life. [13]

The Smart City concept was first coined by the IBM company. According to IBM, a smart city is a city whose instruments are interconnected and work intelligently. IBM makes 6 (six) indicators that must be achieved. The six indicators are:

1. Smart People: Smart people are citizens who can be considered smart not in terms of one's educational qualifications but also in terms of the quality of social interactions that are only formed.
2. Smart Environment: A smart city dimension describes technological advances used to protect and maintain the urban environment.
3. Smart Living: It is a smart city dimension under the feasibility of living in a city in several indicators such as Health, Housing, Accessibility, Solid Waste, Energy, Water, Technology, and transportation.

E-ISSN : 2540 - 8984

JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)
Volume 07, Nomor 04, Desember 2022 : 1011 - 1024

4. Smart Mobility: A system that allows mobility or access for residents within the city and access outside the city quickly, safely, and comfortably on transportation and infrastructure development.
5. Smart Economy: In the smart economy aspect, it is marked by the higher the innovations that are improved, it will add new business opportunities and increase business/capital market competition. Then the city must be supported by suitable economic activities and be able to take advantage of the development of information technology to increase its economic activities.
6. Smart Governance : Governance (empowerment and participation): Smart Governance is a dimension related to politics, community participation, population, and the use of new communication networks such as e-government and e-democracy. The primary key to governance is good governance. Namely, systems and processes of governance and development that heed the principles of the rule of law, justice, democracy, participation, transparency, professionalism, and accountability coupled with a commitment to upholding values and principles, decentralization, efficiency, effectiveness, clean governance, responsible and competitive.

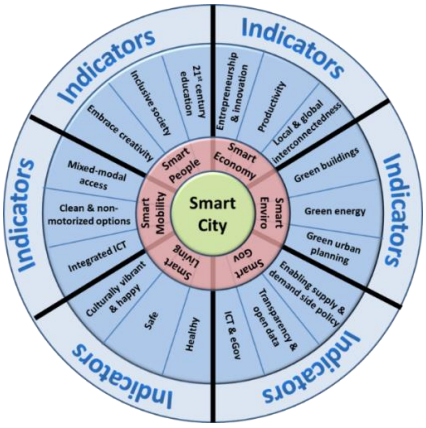

Figure 2. Smart City Indicators according to IBM

D. Smart Village

Smart Village is a concept that adopts the components or indicators of the Smart City concept but on a smaller scale to realize better governance and services to its citizens. Although there is no convention on the smart village concept, in general, a village can be said to be a smart village if the village is innovative in using information technology to improve quality of life, efficiency, and competitiveness in economic, social, and environmental aspects [3] A Smart Village concept can be used to overcome various problems that occur in villages and sub-districts. By adopting the Smart City component, there is no doubt that excellent human resources, clean and transparent government, and an ideal social environment will emerge from the Smart Village implementation.

The smart village concept has been implemented by several countries before. For example In Korea, smart village is being promoted to improve residents' lives and encourage national development as a sustainable service to solve village issues and improve living convenience by using intelligent information technology. For example, it is in Muan-eup Smart Village. They identify the current status of agricultural and fishing village garbage (pesticide bottles, waste plastics, etc.) widely distributed by smart garbage can service through IoT sensors and drones and suggest optimal collection route and waste bin arrangement plan through prediction of load[14]

E. Enterprise Architecture

Enterprise Architecture (EA) is a principle, method, and model used to realize and design organizational structures in companies or organizations, including business processes, information systems, and IT infrastructure [5] Enterprise Architecture is a management practice to maximize the contribution of enterprise resources, IT investments, and system development activities to achieve goals [6] Enterprise Architecture has three main components, namely: data architecture, technology architecture, and application architecture. Furthermore, in designing Enterprise Architecture, it is necessary to use architectural principles and practices. This process is known as Enterprise Architecture Planning (EAP). EA can support re-designs or re-organization, especially in significant organizational changes, systems development, IT management.

E-ISSN : 2540 - 8984

JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)
Volume 07, Nomor 04, Desember 2022 : 1011 - 1024

F. TOGAF ADM

The Open Group Architecture Framework (TOGAF) was developed by the US Department of Defense (DoD) in 1995. TOGAF provides a precise method of building, managing, and implementing enterprise architecture and information systems called the Architecture Development Method (ADM) [9] ADM is a generic method containing a list of activities used in modelling the development of enterprise architecture. This method can also be used as a guide or tool for planning, designing, developing, and implementing an information system architecture to the organization[8] And to do enterprise design architecture, TOGAF ADM has several phases that can be implemented. These phases are as follows:

1. The Preliminary Phase, is the initial stage for planning preparation enterprise architecture. This stage is carried out so that the modeling process can be directed well.
2. Phase A : Architecture Vision, This phase is the initial phase in ADM which will be carried out the determination of architectural scope, identification of stakeholders, creation of architectural visions and obtaining approvals. This stage carried out on a goal basis to develop a high-level aspirational vision) of the capabilities and business values that will be delivered as a result of the proposed enterprise architecture.
3. Phase B: Business Architecture, This phase includes the development of a business architecture to support the architectural vision that has been agreed upon.
4. Phase C: Information Systems Architectures: At this phase, more emphasis is on how the information system architecture is developed. The definition of information system architecture in this stage includes data architecture and application architecture that the organization will use.
5. Phase D: Technology Architecture, In this phase, the architectural design of the technology will be carried out used to implement the design results in the phase previously.
6. Phase E: Opportunities and Solutions, In this phase, the definition of the architectural implementation plan will be determined previously to be linked with opportunities and solutions business.
7. Phase F: Migration Planning, In this phase, we will discuss the stages for the architectural transition accompanied by the implementation plan.
8. Phase G: Implementation Governance: In this phase, architectural management will be provided for implementing Enterprise Architecture.
9. Phase H: Architecture Change Management, This phase includes developing procedures for managing changes to the new architecture.
10. Requirement Management, This phase is the stage for managing needs (requirement) architecture during the ADM cycle.

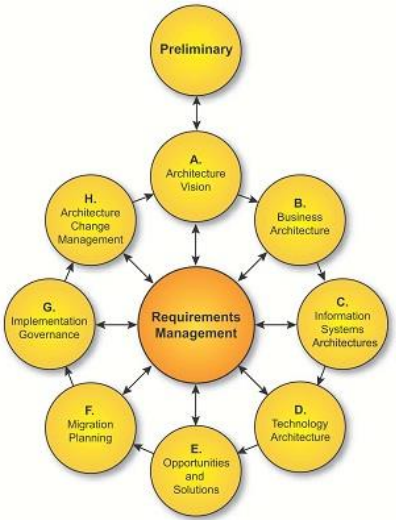

Figure 3. TOGAF ADM Phase

E-ISSN : 2540 - 8984

JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)
Volume 07, Nomor 04, Desember 2022 : 1011 - 1024

G. Sumur Bandung Sub District

Figure 4. Sumur Bandung Sub District Location

Sumur Bandung sub-district is one of 30 sub-districts in Bandung City. Sumur Bandung sub-district Bandung was de jure formed through the stipulation of Bandung City Regional Regulation No. 6 of 2006 concerning the Exhibit and Formation of Sub-Districts and Villages within the Bandung City Government, but de pacto running after the inauguration of the Bandung Sumur Sub-district working area by the Mayor of Bandung on March 20, 2007. Based on the Regional Regulation, Sumur Bandung District includes working area, 1) Braga Village; 2) Merdeka Village; 3) Kebon Pisang Village; and 4) Babakan Ciamis Village.

III. ANALYSYS AND RESULT

A. Preliminary Phase

The preliminary phase is the initial stage that describes the preparation and initiation of the enterprise architecture design process. The purpose of this stage is to establish architectural capabilities that are under the architectural principles of an organization. Preliminary phase generates the principle catalog. The following is Table II of Principles Catalog which was created based on the results of the Sumur Bandung Sub District needs and adjusted to the EA design.

TABEL II
PRIJNCIPLE CATALOG

Architecture	Principle	Description
Business Architecture	Optimization of waste management activities	Improved waste management services through optimizing operasional activities in waste management
	Information publication	Convey information related to services in the organization
	Business alignment with IT	Utilization of applications in running operational waste management function at Sumur Bandung sub district to be more effective and efficient
Data Architecture	Data is an asset	Data is an asset that has value for the organization and must be maintained and managed properly.
	Data integration	Data can be connected from one user to another to support business processes.
	Data is real time	The data owned by the company must be available at all times and can be updated quickly.
	Data security	Data owned by the company must be maintained and protected from data exploitation.
	Data valid	Data must be accountable authenticity and validity of the data.

E-ISSN : 2540 - 8984

JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)
Volume 07, Nomor 04, Desember 2022 : 1011 - 1024

Application Architecutre	Application integration	Applications that will be used in Sumur Bandung District are integrated with other applications.
	Ease of use	The application is easy to use by the user because of the manual book
	Flexibility	The application used can operate on various mobile platforms
Technology Architecture	Requirement based change	Applications and technologies created can respond to changing business needs.
	Interoperability	Software and hardware should adhere to defined standards that promote data, application, and technology interoperability.
	Technology Infrastructure Backup	There is a backup of the server in case of a disaster.

B. Phase A : Architecture Vision

Architecture vision is the initial phase in designing enterprise architecture in the TOGAF ADM framework. Architecture vision describes the scope of the architecture and the identification of each stakeholder represented by the stakeholder map matrix and value chain diagram. The following is one of the outputs produced in this phase , namely Stakeholder Map Matrix of the Sumur Bandung Sub District which can be seen in Table III.

TABLE III
STAKEHOLDER MAP MATRIX

Stakeholder	Concern	Class
Sub-district Head	Carry out part of the government authority given by the Mayor to Sub-district Head to handle some regional autonomy affairs.	Keep Satisfied
Sub-district Secretary	Carry out some of the tasks of the sub-district in the secretarial field.	Keep Informed
General and Personnel Sub-Section	Some of the tasks of the sub-district secretariat in the general and Staffing.	Keep Informed
Program and Finance Sub-Section	Carry out some of the tasks of the sub-district secretariat in the field of finance and programs.	Keep Informed
Government Section	Carry out some of the tasks of the Lurah in the field of government.	Keep Informed
Section of Citizen Peace and Welfare	Carry out some task in field of peace and welfare.	Keep Informed
Section of Community Empowerement	Carry out some of the Camat's duties in the field of Community empowerment.	Keep Informed
Section of Social Welfare	Carry out some task in field of social welfare development programs.	Keep Informed
Section of Economy, Development	Carry out some task in field economy development.	Key Player
Lurah	Carry out some of government affairs which are the regional authority delegated by Mayor to Lurah.	Keep Satisfied

Value chain diagrams below are diagrams used to describe an organization’s primary functions and support functions of an organization. In this case, the primary functions are taken based on the main functions of the Sumur Bandung Sub District and supported by relevant stakeholders under Sumur Bandung Sub District. This research focuses on the function of maintaining facilities and infrastructure carried out by the economic and development functions. The following is a Value Chain artifact at the Sumur Bandung Sub District which can be seen at Figure 5.

E-ISSN : 2540 - 8984

JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)
Volume 07, Nomor 04, Desember 2022 : 1011 - 1024

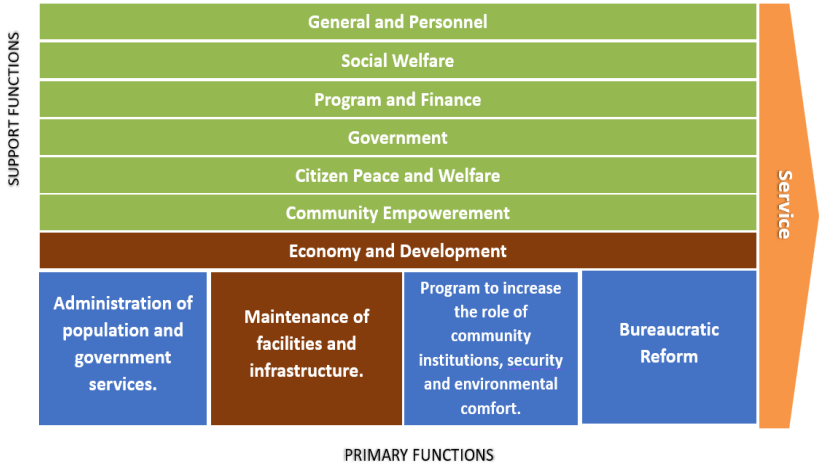

Figure 5. Value Chain

Solution Concept Diagram is an artifact that aims to provide an overview of the final architectural solution concept in the form of a high-level diagram. The solution concept diagram depicts a general overview of the proposed architecture that will be implemented by the Economy and development function in Sumur Bandung Sub District. The following is a Solution Concept Diagram artifact at the Sumur Bandung Sub District which can be seen at Figure 6.

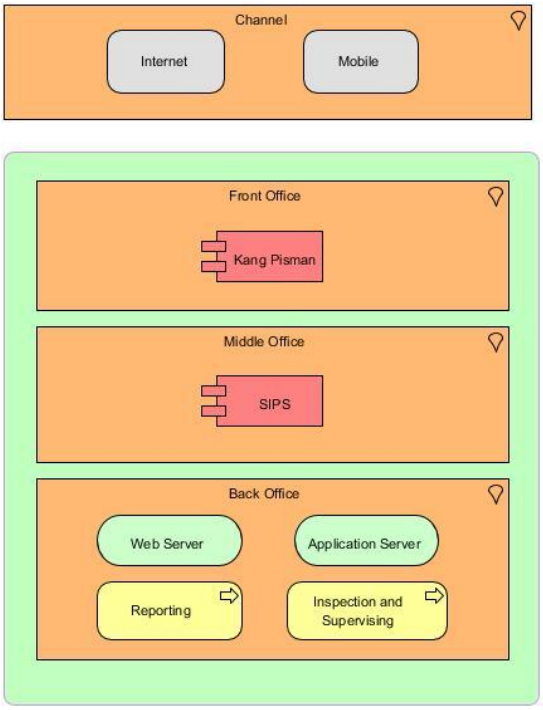

Figure 6. Solution Concept Diagram

C. Phase B : Business Architecture

Business Architecture is the second phase of TOGAF ADM. Business Architecture describes the existing business process and its development targets based on the organization's objective requirement and goals determined. This phase expected to be an effective and efficient recommendation so that it can be useful for the organization to overcome the current probem. The outputs produced in this architecture are Business Architecture Requirements and Functional Decomposition Diagrams. The following is one of the outputs produced in this phase , namely Business Service/ Function Catalog of the Sumur Bandung Sub District which can be seen in Table IV.

E-ISSN : 2540 - 8984

JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)
Volume 07, Nomor 04, Desember 2022 : 1011 - 1024

TABLE IV
BUSSINESS SERVICE/FUNCTION CATALOG

No	Function Name	Business Service
	Primary Activity	
1	Administration of population and government services.	Service quality improvement activities
		RT RW Development
2	Maintenance of facilities and infrastructure.	Drainage maintenance and environmental cleaning activities
		Sub-district green open space maintenance activities
		Painting of kereb bahu jalan
3	Program to increase the role of community institutions, security and environmental comfort.	Environmental control activities
		Activities for strengthening regional non-governmental organizations
		Activities to increase human resources for social welfare cadres
		Regional KUMKM empowerment activities
		Implementation of the RKPD Musrenbang
4	Bureaucratic Reform	RW scope empowerment activities
		PKK scope empowerment activities
		Community youth empowerment activities
		LPM scope empowerment activities
	Support Activity	
1	General and Personnel	Preparation of scope management plan and program materials
		Management of general administration and staffing
		Reporting on activities in the scope of general administration and staffing.
2	Program and Finance	Prepares a work plan and work program for the Sub-Section Programs and Finance
		Preparation of materials for the preparation of budget plans
		Preparation materials sub-district work plan
3.	Government	Prepares a work plan and work program Section Government
		Fostering subordinates by motivating them to increase work productivity
		Carries out general administrative services government
4.	Citizen Peace and Welfare	Prepares a work plan and work program Section Peace and Welfare
		Preparation of reports management of peace and Welfare
5.	Community Empowerement	Prepare a work plan and work program Section Community empowerment
		Compiling data and materials for the scope of community empowerment
		Directing tasks to subordinates based on direction policies so that goals and objectives are achieved
6.	Social Welfare	Prepare a work plan and work program Section Social welfare
		Divide tasks to subordinates so that work can be done implemented effectively and efficiently
7.	Economy and Development	Carrying out some of the Camat's duties in the economic sphere and development
		Facilitate efforts to preserve the environment and implementation of the cleanliness and beauty program.
		Carry out training, monitoring, evaluation, and reporting scope of economy and development.

E-ISSN : 2540 - 8984

JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)
Volume 07, Nomor 04, Desember 2022 : 1011 - 1024

Functional Decomposition Diagram is a complete description of the value chain. there is a primary activity and a support activity in which there are services from each supporting function. Functional Decomposition Diagram based on Value Chain and TUPOKSI (Main Tasks) of every function in Sumur Bandung Sub District. The following is a Functional Decomposition Diagram at the Sumur Bandung Sub District which can be seen at Figure 7.

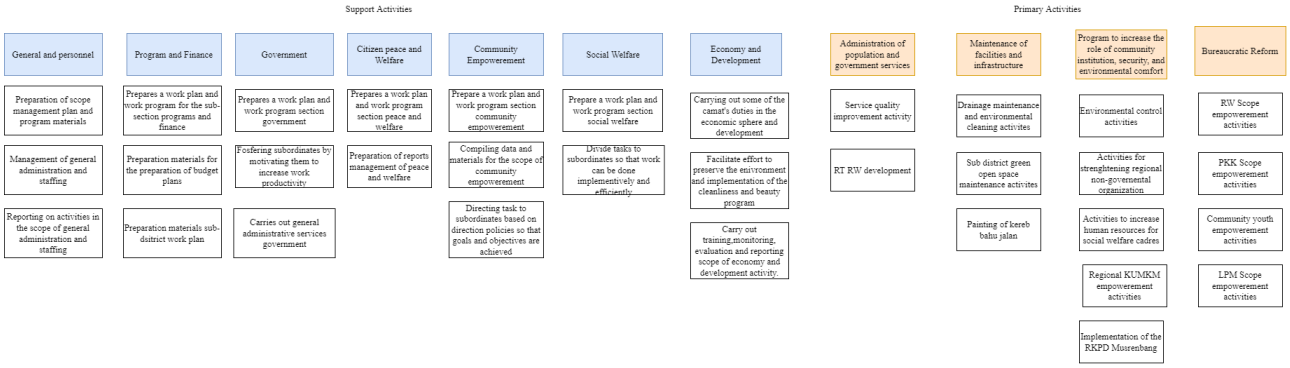

Figure 7. Functional Decomposition Diagram

D. Phase C : Information System Architecture – Data Architecture

TABLE V
APPLICATION / DATA MATRIX

Application	Description	Entity	Data Type
		Kang Pisman	
Waste Bank	This application is based on Android and iOS which is used by residents to recap data on organic waste deposits and see the balance of their waste collection.	Deposit Data	Transactional Data
		Waste Bank Officer	Master Data
		Waste Bank User	Master Data
		SIPS	
E SPJ	This application is used by the head of the economy and development section to issue warrants and send it to officer	Organic Waste processing schedule	Transactional Data
		Street Cleaning warrant	Transactional Data
		Head of section economy and development	Master Data
E Reporting	This application is a liaison between Recyclable waste officers, organic waste officers, street cleaning officers and the Head of Section economy and development to send activity reports.	Waste transport report	Master Data
		Waste transport officer	Master Data
		Street Cleaning report	Transactional Data
		Street cleaning officer	Master Data
		Organic waste report	Transactional Data
		Organic waste officer	Transactional Data
		Recyclable waste report	Transactional Data
		Waste bank officer	Master Data
E Monitoring	This application is used by the head of the economy and development section for the function of monitoring activity reports from waste processing and displaying information from waste data at TPS.	Monitoring report	Transactional Data
		Head of section economy and development	Master Data

Information system architecture is a third phase of enterprise architecture that concerns the design of information systems. The two main architectures in information system architecture are Data Architecture and Application Architecture. This section describes the data architecture. at this stage the identification of the data needs of the

E-ISSN : 2540 - 8984

JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)
Volume 07, Nomor 04, Desember 2022 : 1011 - 1024

organization is carried out by designing a data model that can meet the specified needs. The following is one of the outputs produced in this phase , namely Application/Data Matrix of the Sumur Bandung Sub District which can be seen in Table V.

Application/data matrix is used to describe the relationship between applications and data entities that are accessed and updated.. There are two kinds of data: master data and transactional data. Master data is the primary data used in the data collection process, whereas transactional data is the data from transactions that can be changed. The following is a Data Dissemination Diagram at the Bandung Sub District Well which can be seen in Figure 8

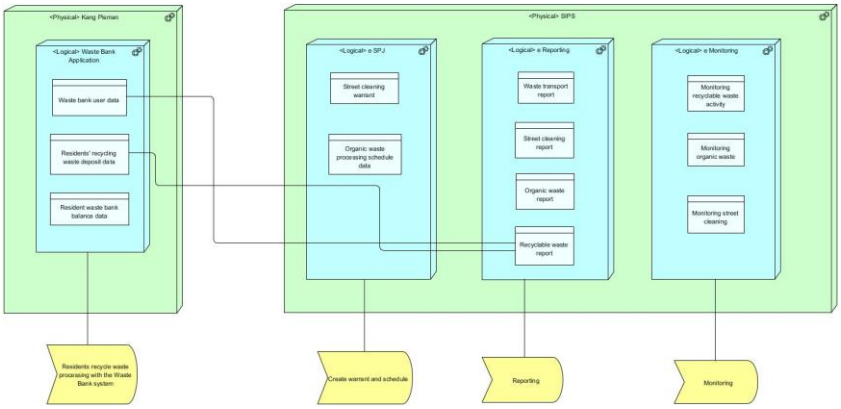

Figure 7. Data Disemination Diagram

Data dissemination Diagram describing the relationship between data entities, business services and application components in the organization. This diagram improves the effective measurement of IT implementation so that it can be refined because it is able to describe how logical entities of data are in physical form in each application component.

E. Phase C : Information System Architecture – Application Architecture.

The application architecture is in the same design phase as the data architecture, namely Phase C: Information System Architecture. This means that the designs must support each other. The Application Architecture itself defines the applications that are used and how the interactions between applications to process data to meet the business needs of the organization. The following is one of the outputs produced in this phase, namely Application Portofolio Catalog of the Sumur Bandung Sub District which can be seen in Table V.

TABLE VI
APPLICATION PORTOFOLIO CATALOG

Physical Application Component	Logical Application Component	Description
Kang Pisman	Waste Bank Application	This application is based on Android and iOS which is used by residents to recap data on organic waste deposits and see the balance of their waste collection. This application is connected to a server that functions as monitoring of waste bank activities in the sub-district.
SIPS	E SPJ	This application is used by the head of the economy and development section to issue warrants.
	E Reporting	This application is a liaison between Recyclable waste officers, organic waste officers, street cleaning officers and the Head of Section economy and development to send activity reports.
	E Monitoring	This application is used by the head of the economy and development section for the function of monitoring activity reports from waste processing and displaying information from waste data at TPS.

Application portfolio catalog is used to describe the entire list application that is used to support waste management activities in Sumur Bandung Sub District. The application portfolio catalog consists of a logical application component and a physical application component. To produce the artifact of the application portfolio catalog targeting, identification of application development to current business processes is carried out. then the proposed

E-ISSN : 2540 - 8984

JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)
Volume 07, Nomor 04, Desember 2022 : 1011 - 1024

application and improvement of existing applications that can support the waste management process in Sumur bandung sub district are generated.

TABLE VII
APPLICATION / ORGANIZATION MATRIX

Organizational Unit / Application Component	Waste Processing officer	Resident	Waste Bank Officer	Street Cleaning Officer	Waste Transport Officer	Head of Section Economy and Development
Kang Pisman Application						
Waste Bank Application		V				
SIPS						
E SPJ	V			V		V
E Reporting	V		V	V	V	
E Monitoring						V

Application/Organization Matrix in Table VII is a matrix that describes the relationship between application components and organizational units related to waste management in Sumur Bandung Sub District.

F. Phase D: Technology Architecture

The technology architecture phase is the fourth phase in TOGAF ADM which describes the software, hardware, and network infrastructure that needed to support the process of sharing data and information in the environment of Sumur Bandung Sub District. Technology architecture serves to build a technology architecture needed to support the application environment and data to be managed in the application. The following is one of the outputs produced in this phase, namely Application/ Technology Matrix of the Sumur Bandung Sub District which can be seen in Table VIII.

TABLE VIII
APPLICATION / TECHNOLOGY MATRIX

Application / Technology	Kang Pisman	SIPS
Data Server		V
Web Server		V
Application Server	V	
Backup Server	V	V
Server	V	V
OS Server	V	V
Switch Core		V
Access Point		V
Switch Distribution		V
Switch Access		V
Internet	V	V
VPN		V
Firewall		V
Antivirus		V
OS Android	V	
OS IOS	V	
OS Client		V

E-ISSN : 2540 - 8984

JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)
Volume 07, Nomor 04, Desember 2022 : 1011 - 1024

Application/ Technology Matrix has a function to map the relationship between applications and technology needs. and the next output is the Environment and Location diagram which describes the relationship between applications and technologies based on the location of use The following is a Environment and Location Diagram at the Sumur Bandung Sub District which can be seen in Figure 9

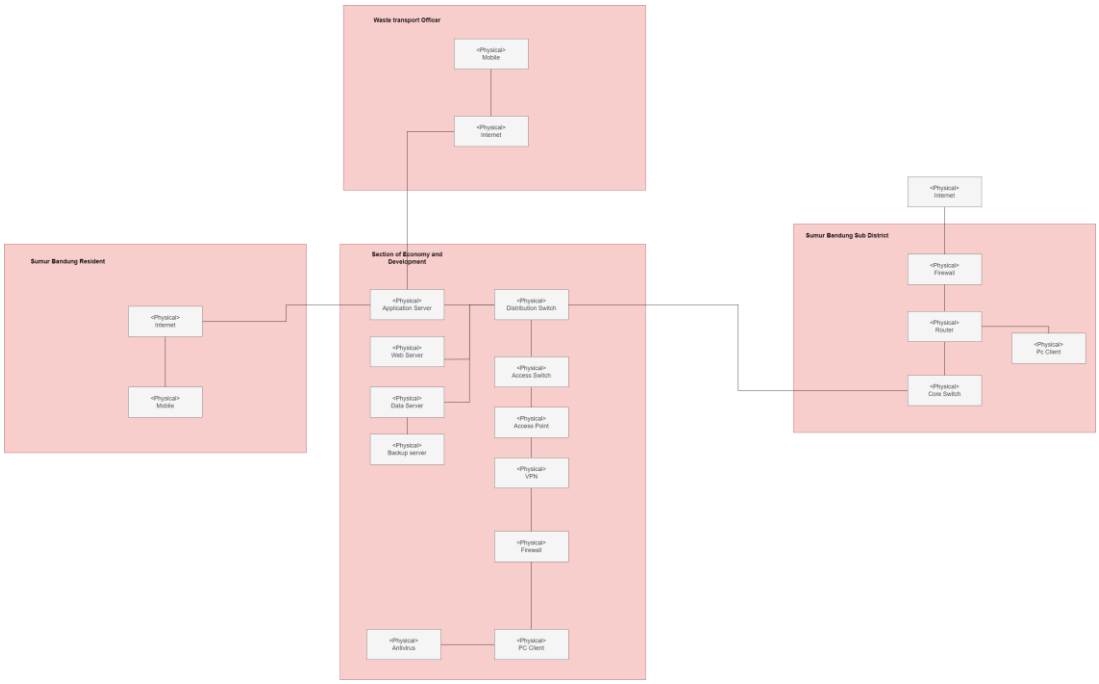

Figure 8. Environment and Location Diagram

IV. CONCLUSION

In this research, an analysis of the relationship between smart village and Enterprise Architecture was carried out with the current strategic issues in Sumur Bandung Sub District. Then it was concluded that the research focused on implementing one of the dimensions of the smart village, namely the smart living dimension by designing an enterprise architecture of waste management that can help economy and development function in Sumur Bandung Sub District to overcoming the strategic issue of the absence of permanent waste processing and final processing facilities (TPPAS).

The design of the enterprise architecture is carried out using the TOGAF ADM framework which begins with an approach to the Preliminary Phase and Architecture Vision phase then proceeds to the design of Business architecture, Data Architecture, Application architecture, and Technology Architecture which aims to produce a blueprint containing the results of the analysis of existing conditions and recommendations that can be used as a reference for the economy and development function at Sumur Bandung Sub District in overcoming strategic issues the absence of permanent waste processing and final processing facilities (TPPAS) by facilitating environmental conservation efforts and the implementation of cleanliness and beauty programs with the proposed developing waste bank functions in the Kang pisman application, socialization of the kang pisman program to sub-district residents extensively, and Optimizing management activites and reporting activities with the proposed SIPS application for reporting, monitoring and warrant making functions.

REFERENCES

[1] A. Meijer and M. P. R. Bolívar, “Governing the smart city: a review of the literature on smart urban governance,” Int. Rev. Adm. Sci., vol. 82, no. 2, pp. 392–408, 2016, doi: 10.1177/0020852314564308.
[2] Munir, D. "SMART VILLAGE: Desa Maju, Desa Bahagia." APEKSI: Asosiasi Pemerintah Kota Seluruh Indonesia, 2017.
[3] Ramesh, B. "Concept of Smart Village and it’s Impact on Rurbanization." International Journal of Trend in Scientific Reseach and Development 2, no. 3 (2018): 1948–1950.
[4] A. A. Aziiza and T. D. Susanto, “The Smart Village Model for Rural Area (Case Study: Banyuwangi Regency),” IOP Conf. Ser. Mater. Sci. Eng., vol. 722, no. 1, 2020, doi: 10.1088/1757-899X/722/1/012011.

[5] J. Perez Castilloz, E. Barjau Gonzalez, J. M. Lopez Vivas, and J. A. Armenta Quintana, “Taxonomic Diversity of the Fish Community Associated with Soft Bottoms in A Coastal Lagoon of the West Coast of Baja California Sur, Mexico,” Int. J. Mar. Sci., vol. 9, no. 2, pp. 20–29, 2018, doi: 10.5376/ijms.2019.09.0002.
[6] Gronlund A., “It’s The Economy Stupid”- Why the Swedish E-Government Action Plan Will Not Deliver Better Government, and How It Could. International Journal of Public Information Systems. 2009; 5(2): 61-75.
[7] Schekkerman J, “How To Survive In The Jungle Of Enterprise Architecture Frameworks. Victoria, Canada: Trafford”, 2004.
[8] R. Yunis and Theodora, “Penerapan Enterprise Architecture Framework Untuk Pemodelan Sistem Informasi,” JSM STMIK Mikroskil, vol. 13, no. 2, pp. 159–168, 2016.
[9] T. TOGAF, "The Open Group Library," 2018. [Online]. Available: http://pubs.opengroup.org.
[10] Cohen, B, “*The Smartest Cities in The World 2015*.”,https://www.fastcompany.com/3038818/the-smartest-cities-in-the-world-2015-methodology,2014.
[11] Kecamatan Sumur Bandung, “Rancangan Rencana Strategis 2018-2023 Kecamatan Sumur Bandung,” 2018.
[12] Muliarto, H, “ Konsep Smart City Smart Mobility. Bandung: Institut Teknologi Bandung”, 2015.
[13] A. Abdoullaev, “A Smart World : A Development Model for Intelligent Cities,” *11th IEEE Int. Conf. Comput. Inf. Technol.*, pp. 1–28, 2011, [Online]. Available: http://www.cs.ucy.ac.cy/CIT2011/files/SMARTWORLD.pdf.
[14] C. Park and J. Cha, “A Trend on Smart Village and Implementation of Smart Village Platform,” *Int. J. Adv. Smart Converg.*, vol. 8, no. 2, pp. 177–183, 2019, [Online]. Available: http://dx.doi.org/10.7236/IJASC.2019.8.3.177.
[15] P. K. Bandung, “Peraturan Walikota Bandung No. 1470 Tahun 2018, Rencana Induk Bandung Kota Cerdas (Masterplan Bandung Smart City) Periode 2018-2023,” 2023.