Enterprise Architecture Design on Business Process Domain Using TOGAF Framework (Case Study: Communication and Informatics Office of Bandung City Government)

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Abstract. The development of information technology encourages governments around the world to compete to be better in Electronic-Based Government Systems (EBGS). The Department of Communication and Informatics of Bandung City Government or known as Diskominfo as an institution responsible for government affairs in the fields of communication, informatics, coding, and statistics is one of the institutions that plays an important role in the implementation of SPBE. Currently, in supporting the implementation of the Electronic-Based Government System in the Diskominfo of the Bandung City Government and which is the purpose of this research, an Enterprise Architecture (EA) design will be carried out using the TOGAF ADM method starting from the Preliminary phase to the Migration and Planning phase which focuses on Business Architecture which can increase effectiveness and efficiency in carrying out service activities and government administration. This EA design will produce an IT Roadmap which can later be applied as a reference in carrying out business processes that can help carry out activities more effectively and efficiently at the Diskominfo of the Bandung City Government.

Keywords: The Department of Communication and Informatics of Bandung City Government, Enterprise Architecture (EA), TOGAF ADM, Business Architecture, Electronic-Based Government System

1   Introduction

The current technological advancements are driving governments worldwide to enhance their electronic governance systems. In 2018, the Indonesian government issued Presidential Regulation No. 95 of 2018 regarding the Electronic Government System (SPBE). SPBE provides services to the public using information and communication technology. The regulation stipulates that the electronic government system must be implemented nationwide in Indonesia to achieve a clean, effective, transparent, and accountable governance system, as well as to provide quality and reliable public services [1].

Currently, to support the implementation of the Electronic Government System within the Diskominfo of Bandung City Government, there is no available Enterprise Architecture design available to improve the effectiveness and efficiency of government administrative activities. Therefore, this final research project aims to find a solution to this issue by optimizing the implementation and design of EA to support the SPBE implementation within the Diskominfo of Bandung City, focusing on the domain of business processes. EA represents a depiction of the business process model that optimizes and accomplishes organizational tasks by involving information technology. In short, Enterprise Architecture is a systematic blueprint that interprets the current state or desired vision and mission of an organization within a scope [2]. Designing this EA requires a framework used in development and alignment of business processes [3]. The framework utilized for Enterprise Architecture research in the domain of Business Processes at The Department of Communication and Informatics of Bandung City Government is TOGAF ADM. The EA design using TOGAF ADM provides a more comprehensive and detailed method, starting from the development, management, and design of the implementation of the Enterprise Architecture information systems [4].

This research will address the following questions: What is the overview of the existing conditions in the business processes running within the environment of the Bandung City Government's Diskominfo? How does the gap analysis work in the enterprise architecture planning for the business process domain in the environment of the Bandung City Government's Diskominfo? What are the stages involved in implementing the targeted enterprise architecture design for the Business Process domain to improve the quality of government administrative services and create a more systematic public service environment within the Bandung City Government's Diskominfo? With the implementation of the enterprise architecture design, The Department of Communication and Informatics of Bandung City Government can maximize the information technology system in enhancing the quality of administrative services in governance and achieving a more systematic public service.

2   Literature Review

Electronic-Based Government System is a government system that utilizes information and communication technology to provide services to the public [5]. These services are

accessed by the public through SPBE applications, which offer benefits to them. The purpose of SPBE is to create a governance system that is free from fraud, efficient, effective, transparent, and accountable, to deliver quality and trustworthy public services, and to establish an integrated and electronically based government system [1].

Table 1. Framework Comparison

Criteria	Ratings				
	TOGAF	Zachman	FEAF	Gartner	Architecture SPBE
Detail and Complete Architecture	4	1	2	3	4
Reference Overview	3	1	4	2	3
Guidelines Practice	4	1	2	3	3
Business Focus	2	1	1	4	2
Governance Guidelines	2	1	3	3	4
Guidelines Partitioning	2	1	4	3	1
Prescriptive Catalog	2	1	4	2	2
Vendor Neutrality	4	2	3	1	2
Provision of Information	4	2	1	1	4
Time to Value	3	1	2	4	3
Total Score	**30**	**12**	**25**	**26**	**29**

This comparison is conducted with the aim of designing and analysing an EA architecture, and the author can determine the appropriate framework for implementation in an organization. From the analysis of several studies referring to Table II.1, the following results are obtained: TOGAF framework with a total score of 28, Zachman framework with a total score of 12, FEAF framework with a total score of 25, Gartner framework with a total score of 26, and lastly, the SPBE Architecture framework with a total score of 29.

The framework used in this study is TOGAF because it has the highest total score among the compared methodology criteria [9]. TOGAF ADM is a flexible method with 8 (eight) repeating and continuous phases, making it adaptable to company or government transformations, and can be adjusted according to the organization's needs at that time. TOGAF ADM is a method used for developing enterprise architecture, forming the core of TOGAF standards [10]. ADM is defined as the sustained contributions of numerous architects, enabling a company to undergo a well-organized enterprise transformation based on its readiness.

3   Research Methodology

Conceptual model that represents or describes how a theory relates to the identified problem and provides guidance for research [11], as it involves a series of data and

information related to the implementation of enterprise architecture design in the domain of business processes at Diskominfo, as depicted below.
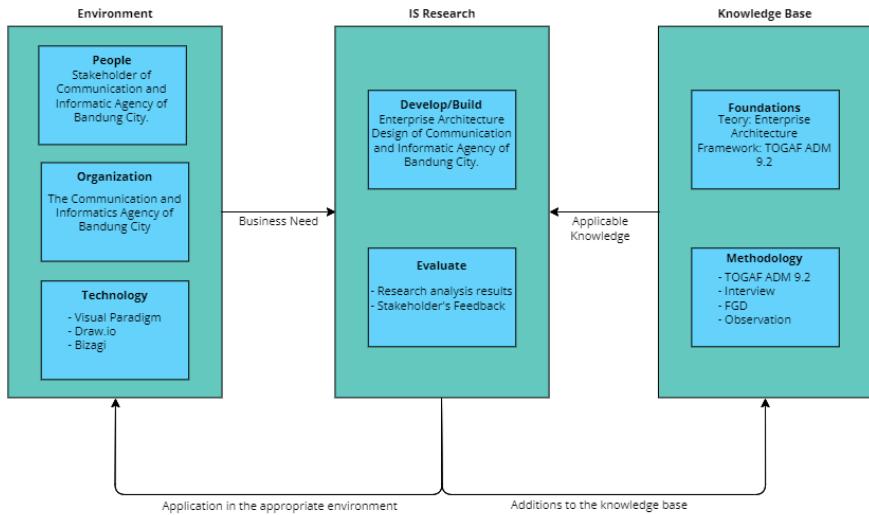

Fig. 1. Conceptual Model

Referring to the diagram above, it can be seen that the conceptual model consists of three constituent elements, namely:

- First component is the Environment, which describes the scope or information required for the research. In this Environment component, there are three aspects: people, organization, and technology. People are the actors playing a crucial role in this research as they serve as informants to provide information and data about EA design.
- The second component is the Knowledge Base, which serves as the foundation of knowledge aimed at providing information related to the framework and basic theories to be used in the research. In this study, the basic concept used is the enterprise architecture design in the domain of business processes, utilizing the TOGAF framework, and employing methods to aid the research, such as TOGAF ADM 9.2, interviews, focus group discussions (FGD), observation, and data analysis.
- The last component is Information System Research, which represents the results or outputs of the research. In this component, there is an evaluation aimed at examining the analysis results and feedback from the research.

4   Analysis and Design

4.1   Preliminary Phase

The Preliminary phase is the initial stage of Enterprise Architecture design using the TOGAF ADM approach. This phase aims to initiate the architecture development at Diskominfo of Bandung City, which involves gathering information and gaining a better understanding of the organization's goals and business needs. In this phase, the output produced is the Principal Catalog.

Table 2. Strategic Planning

Principle	Description	Rational	Implication
Primacy of Principles	Implementation related to information management principles that apply to business activities across all units or functions in the organization.	Facilitate decision making related to measuring and monitoring information quality if all units/functions in Diskominfo can apply the existing principles.	Information management can be free from inconsistency and subjectivity.
Compliance with Law	The information management process at Diskominfo is carried out by adhering to all regulations and policies stipulated in the applicable laws.	Operational organizations must comply with all regulations, policies, and laws that underlie business activities within the organization.	Diskominfo is able to carry out business activities in accordance with existing policies, enabling the business activities to run more consistently and have a fundamental reference.
Service Orientation	The information management design at Diskominfo is focused on providing integrated services with the assistance of systems/applications that are easily accessible.	It is used to accelerate the flow of exchange and management of service review information that supports the process.	The implementation of services at Diskominfo becomes more integrated and easily accessible for its entire usage, this is due to the comprehensive information access being carried out.
Information Management Everybody's Business	All stakeholders at Diskominfo actively participate in the decision-making process regarding information management, which is necessary for the organization to achieve its business objectives.	All stakeholders must have an interest in the aspect of information environment for the organization to operate in harmony in maximizing organizational development and goal achievement.	In carrying out business process activities at Diskominfo, all stakeholders are involved in focused tasks to move together towards achieving organizational goals.

4.2   Phase Architecture Vision

The TOGAF ADM is used to develop enterprise architecture. This phase is crucial as it helps to build a shared understanding among stakeholders about the direction and goals of the enterprise architecture at Diskominfo.
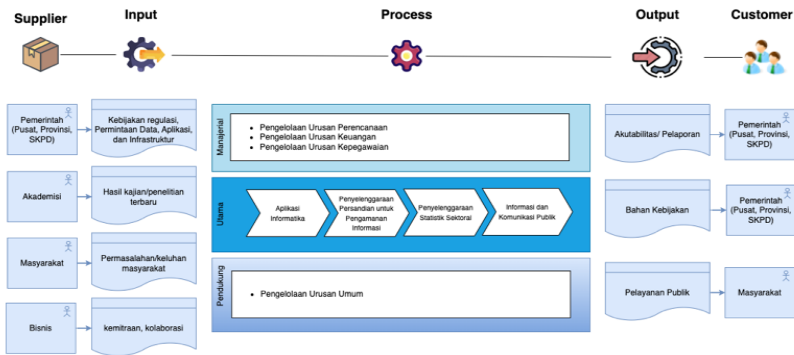

Fig. 2. Value Network Diagram

Fig. 2. depicts the Value Network Diagram, illustrating the activities present in the Bandung City Government's Diskominfo. This Value Network Diagram explains a set of connections/relationships between organizations that interact with each other to provide benefits. The depiction of the Value Network Diagram uses the SIPOC principle, consisting of five parts: supplier, input, process, output, and customer [12].
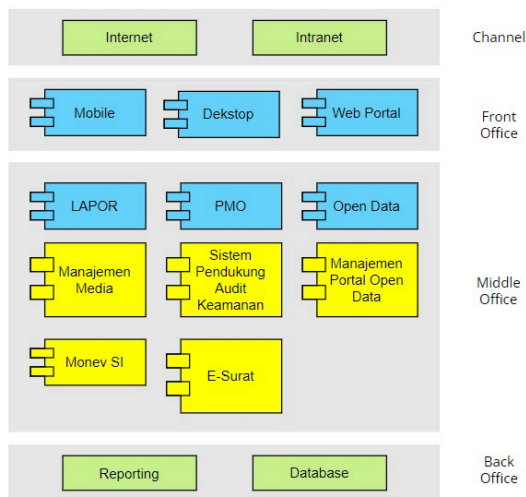

Fig. 3. Solution Concept Diagram

Fig. 3. Represents the Solution Concept Diagram, an artifact in the form of a diagram that represents the solution to be developed to address organizational problems. This artifact will serve as a reference or basis for achieving targets in the architecture design conducted during the research [13].

4.3   Business Architecture

The next phase is the Business Architecture, which is a crucial step in designing Enterprise Architecture. In this phase, it discusses how Diskominfo carries out business correlations to achieve integrated services and the targeted goals.

Table 3. Business Requirement

Requirement
Business processes can support the smooth flow of optimal services, ensuring consistent information and avoiding inconsistencies and subjectivity in decision-making.
The depiction of business process maps is based on rules defined in the preparation of business process maps, as per best practices.
Activities/business processes may require the addition or utilization of supporting information systems or applications.

Business Architecture Requirement is a stage to analyse the existing business needs in The Department of Communication and Informatics of Bandung City Government as a reference for the author in designing Enterprise Architecture in the Business Architecture domain, aiming to create a proposed solution beneficial for the organization [14].
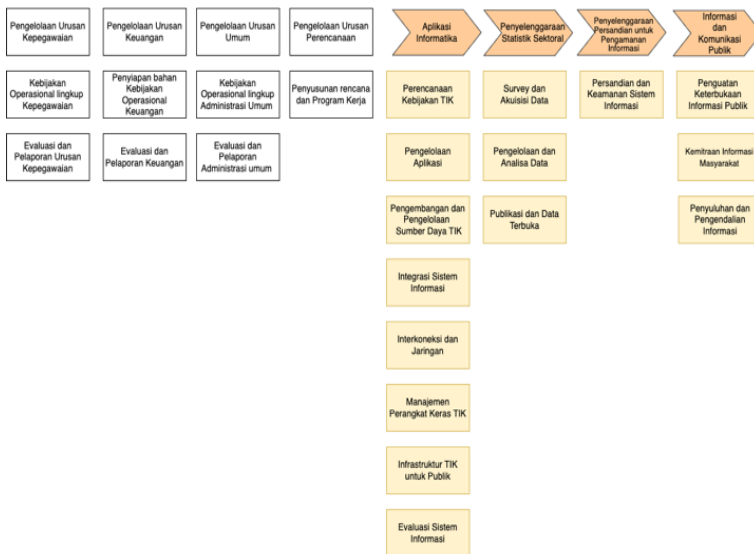

Fig. 4. Functional Decomposition

Fig. 4. represents the Functional Decomposition Diagram, which aims to illustrate the relationships between business functions within the organization. This diagram represents the functions present in The Department of Communication and Informatics

of Bandung City Government, obtained from the depiction of the value network diagram created in the Architecture Vision phase.
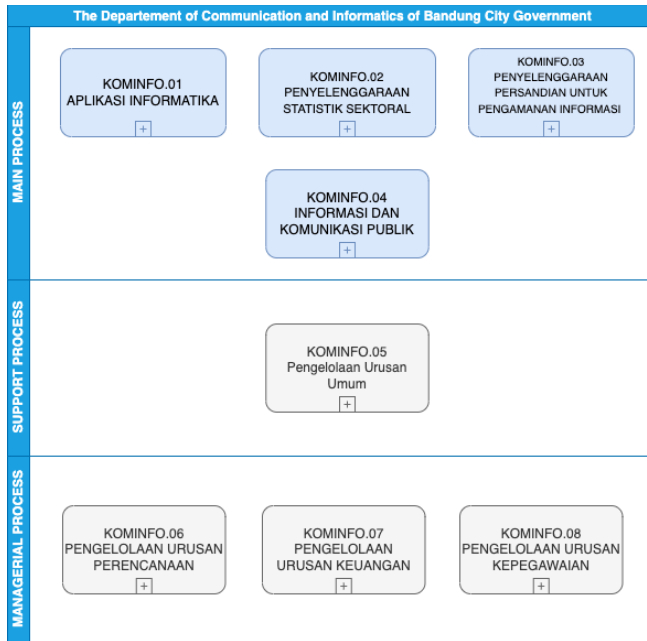

Fig. 5. Level 0 Business Process Map

Fig. 5. Level 0 represents the Business Process Map, encompassing all business processes at Diskominfo, including Core processes, Managerial processes, and Support processes. The Level 0 Business Process Map is derived from the organization's vision, mission, and goals, as defined in organizational work documents or relevant supporting documents.

4.4   Opportunity and Solution

Opportunities and Solutions represent Phase E in the enterprise architecture design using the TOGAF framework. This phase serves as an evaluation material from the previous stages and proceeds with identifying opportunities for the created enterprise architecture design model. The artifacts resulting from the Opportunities and Solutions phase include Consolidate Gaps, Solutions, and Dependencies Matrix, Project Catalog, and Project Context Diagram.

The Consolidate Gaps, Solutions, and Dependencies Matrix is an artifact presented in the form of a matrix, aimed at mapping the analysis results of gaps with the requirements in the business architecture domain, along with the provided alternatives. This gap analysis is based on Non-fulfilment (N), Partial-fulfilment (P), and Fulfilment (F) gaps. Below is Table IV, representing the Consolidate Gaps, Solutions, and Dependencies Matrix.

Table 4. Consolidate Gaps

Requirement	Fulfilment			Alternative Solution
	N	P	F	
Business processes can support the smooth flow of optimal services, ensuring consistent information and avoiding inconsistencies and subjectivity in decision-making.		V		Performing a redesign or revisualization of the business processes within Diskominfo using BPMN, ensuring that all activities, data, information, and applications used are properly documented.
The depiction of business process maps is based on rules defined in the preparation of business process maps, as per best practices.		V		Conducting development on the business process design according to the notation rules in BPMN, especially for mapping the business process at Level 2.
Activities/business processes may require the addition or utilization of supporting information systems or applications.		V		Making improvements to the overall business process by integrating proposed information systems or applications that will support the related activities or processes.

4.5   Migration Planning

Migration Planning is Phase F in the enterprise architecture design using the TOGAF ADM framework, which aims to develop detailed plans and strategies for implementing the proposed architecture from the existing state to the targeted state. This phase represents the finalization of the architecture roadmap [15].

The IT Roadmap is an artifact that serves to map out the timeline for the research, which will be implemented according to the project plan proposed in the research. This artifact is the result of the research on the current Enterprise Architecture Design. Below is the roadmap of the proposed project at Diskominfo of Bandung City. Table V. presents the IT Roadmap for the Enterprise Architecture Design at The Department of Communication and Informatics of Bandung City Government.

Table 5. IT Roadmap

Project	Sub-Project	Period					
		2023		2024			
		Q3	Q4	Q1	Q2	Q3	Q4
Implementation of Business Process Redesign at the Department of Communication and Informatics of Bandung City.	Implementing Business Process Redesign at the Task-Level scope.	▓					
	Implementing Business Process Redesign at the Flow-Level scope.	▓					
	Implementing Business Process Redesign at the Process- Level scope.		▓	▓			

From Table 5 of the IT Roadmap above, IT Roadmap outlines the strategic steps that will be taken by the Bandung City Communication and Information Office. The following is the explanation:

- Implementing Business Process Redesign at the Task-Level scope (Quarter 3, 2023). By improving tasks in the business process, it can avoid errors of inconsistency and subjectivity in decision-making.
- Implementing Business Process Redesign at the Flow-Level scope (Quarter 3, 2023). By improving the arrangement or sequence of the business process, which has not been appropriate, the business process can run more accurately and optimally.
- Implementing Business Process Redesign at the Process- Level scope (Quarter 4, 2023 until Quarter 1, 2024). By implementing application assistance in the business process, it can provide more efficient and effective services.

5   Conclusion

This research aims to address the challenges of integrating government systems by implementing Enterprise Architecture (EA) in the domain of business processes at Diskominfo. The research questions seek to understand the current conditions or existing in the domain of business processes, conduct gap analysis to plan the target enterprise architecture, and outline implementation steps to support a more systematic public administration process.

Gap analysis plays a crucial role in identifying shortcomings and gaps in the business processes. After evaluating the existing business processes, it was found that there are still many manual processes that can either trigger or hinder activities at Diskominfo. This study reveals the necessity of implementing a redesign of business processes at the Task-Level, Flow-Level, and Process-Level by adding applications such as E-Surat, Open Data Portal Management, Monev SI, Media Management, and Security Audit Support System. These implementations will help make the business processes and activities at Diskominfo more effective and efficient.

By implementing EA using the TOGAF ADM framework through IT Roadmap, Diskominfo can strategically make improvements and enhance the efficiency of public administration processes. This approach will enable the Bandung City Government to achieve its goal of building an electronic-based government system in accordance with Presidential Regulation No. 95 of 2018. Furthermore, the proposed improvements/redesigns in business processes will bring long-term benefits, enhancing efficiency in services and operations carried out by Diskominfo.

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