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Leveraging TOGAF ADM for Enterprise Architecture in West Seram Environment Agency

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Abstract

Despite its critical role in environmental governance, the West Seram Environment Agency in Maluku has yet to fully integrate information systems (IS) and information technology (IT) into its operational processes. Recognizing the pivotal role of IS/IT in enhancing organizational efficiency and effectiveness, this study proposes an innovative enterprise architecture planning approach to facilitate IS/IT development within the agency. Employing a qualitative research methodology, the study utilizes The Open Group Architecture Framework (TOGAF) Architecture Development Method (ADM). This method concentrates on three key domains: business architecture, information systems architecture, and technology architecture. The results of this research offer a suite of IS/IT solutions tailored to the agency's needs. These include the strategic recruitment and development of appropriate work systems, implementation of comprehensive IS/IT work plans, advanced data processing techniques, creation of digital-based applications, and the design and implementation of efficient network topologies. These solutions are poised to revolutionize the agency's operations, significantly enhancing its capacity for environmental management and governance.

Keywords: Organization, Enterprise Architecture, West Seram Environmental Agency, TOGAF ADM

1. INTRODUCTION

The development of information technology and information systems has a huge influence on an organization, whether private or government organizations [1]. Information systems and technology are very important components in the success of an organization's business because they can assist in making managerial decisions, increase the efficiency and effectiveness of the business processes carried out, and can strengthen the competitive position of businesses and organizations in a changing market [2]. Based on the West Seram Regent's Regulation Number 39 of 2016 concerning the Main Duties and Functions of the Environmental Service, the main task of the West Seram Environmental Service (DLH) is to carry out government affairs in the environmental sector [3]. In carrying out these main tasks, West Seram DLH still does not use information technology, still does not utilize information systems in its operational processes,

still does not utilize information systems optimally in its operational processes. IT needs in processing data and information needs are still not well organized due to lack of performance automation and work systems that are still done manually or done by bookkeeping.

All data and technology that will be applied to an organization must of course be in accordance with the organization's business processes. These components must be integrated so that business operations can be carried out effectively and efficiently. Therefore, it is necessary to plan an IS/IT architecture (Enterprise Architecture) to support the organization's business processes. Enterprise architecture (EA) planning is important for organizations because through enterprise architecture planning, the information systems and technology implemented will be in harmony with the organization's needs and will help the organization successfully achieve goals that are consistent with its business strategy [4].

EA planning requires a method for its implementation. One method that can be used in EA planning is the Open Group Architecture Framework (TOGAF) method. TOGAF provides a detailed method for building, managing, and implementing EA and information systems called the Architecture Development Method (ADM). TOGAF ADM is a general method used for architectural development and is designed to meet most systems and needs of organizations [4]. Based on the problems above, researchers conducted research related to EA planning for the West Seram DLH using the TOGAF framework with ADM as the architectural development method, especially three domains, including business architecture, information systems architecture, and technology architecture. TOGAF ADM has 8 stages in helping develop an information technology system that is useful for the West Seram DLH which has not yet implemented an information system in its operational processes. This framework can be useful for creating technology architecture in the future [5].

Therefore, the aim of this research is to define TOGAF ADM as a model for enterprise architecture information systems in supporting business activities at West Seram DLH. To answer this objective, there are limitations to the research used by researchers, namely planning does not involve managing the finances of the organization, in this case West Seram DLH and is limited to West Seram DLH and the TOGAF ADM method only includes preliminary phase, architecture vision, business architecture, information systems architecture, and technology architecture.

Previous studies have highlighted the efficacy of TOGAF ADM in various contexts. Ramadhani and Tedy [6] noted its adaptability and clear stages in designing comprehensive business architectures for the Bantul Basic Education Department. They emphasized the importance of analyzing business processes

through the value chain model, leading to significant improvements in both primary and supporting activities. This analysis forms a critical input for business architecture modeling in TOGAF ADM. Similarly, Rifai, Bratakusuma, and Arvianti [7] found that requirement management analysis using TOGAF ADM yielded a blueprint that significantly enhanced village government performance. Angeline and Chatitas [8] observed that the TOGAF ADM framework offered strategic solutions and directions for leveraging information technology and systems in village governments, aligning with their vision and mission for improved future performance. Additionally, Sasgita and Setiawan [2] reported that enterprise architecture designed under this framework led to more time-efficient and effective business processes, supported by IT integration. This includes a technological architecture that provides robust network services, integrates data and information effectively, and reflects both current conditions and future developments.

Information systems (IS) are an arrangement of people, data, processes, and information technology that interact to collect, process, store, and provide output information needed to support an organization [1]. In simple terms, an information system is a system that can support the needs of activities within a company or organization [9]. Technically, an information system can be defined as a set of interrelated components that collect or retrieve, process, store and distribute information to support decision making in an organization. Apart from that, information systems can also help managers and employees analyze problems, visualize complex topics, and create new products for the organization [1].

Enterprise Architecture (EA) is a master plan that acts as a collaborator in aspects of business planning such as goals, vision, mission and principles of good governance. Basically, EA can be interpreted as a strategy for utilizing IT and integrating business development with IT development which describes a system development plan. Master plans can help plan organizational structures, company tasks and activities in computerization aspects, and help with technological infrastructure that supports business processes, such as computers, networks and operating systems [10]. EA can provide a systematic approach in managing information system assets, directing the needs of business strategy, tracking the impact of organizational and business changes on systems, assisting in supporting strategic decision making and change management [11]. Various methods and frameworks that can be used in EA planning include, Zachman Framework, EAP (Enterprise Architecture Planning), EAS (Enterprise Architecture Strategy), BEAM (Basic Enterprise Architecture Methodology), TOGAF ADM (The Open Group Architecture Framework - Architecture Development Method) , and others. Based on research that has been carried out by comparing various methods and frameworks, the results obtained are that TOGAF ADM is a complex method that can meet all EA development needs, namely 92% [12].

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2. METHODS

The Open Group Architecture Framework (TOGAF) is a framework used to develop EA which provides a specific description of the EA development process [13]. TOGAF provides a comprehensive approach to design, plan, implement and manage enterprise information architecture in more detail, as well as to develop organizational architecture principles with detailed methods in the implementation process [14], [15]. TOGAF provides detailed stages on how to build, manage, and implement the Architecture Development Method (ADM), which is a generic method containing a set of activities used in modeling EA development. This method can be used as a guide or tool for planning, designing, developing and implementing information system architecture for organizations [14]. As for the characteristics and advantages, yesowned by TOGAF ADM [16]:

1) Included in 3 frequently used architectural design frameworks,
2) It is an open standard, which means it can be used generally without interference from other parties regarding permission and use,
3) Can be accepted by the wider community and covers many aspects needed to support the design of a system,
4) It is open source so that it can be developed according to the needs and conditions in the system design location without being tied to a particular vendor,
5) Can be integrated into different systems, and
6) Focused on implementation cycles (ADM) and processes.

TOGAF ADM consists of several stages, namely: 1)Preliminary Phase, 2) Architecture Vision, 3) Business Architecture, 4) Information System Architecture, 5) Technology Architecture, 6) Opportunities and Solutions, 7) Migration Planning, 8) Implementation Governance, 9) Architecture Change Management, 10) Requirements Management [16].

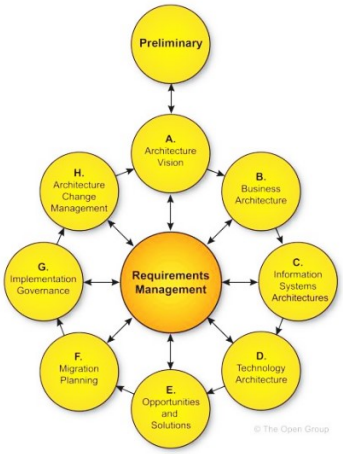

Figure 1. Architecture Development Method [1]

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Research conducted at the West Seram DLH used a qualitative approach which aimed to obtain in-depth information regarding phenomena in the field and understand these phenomena specifically. The research stages carried out are as follows.

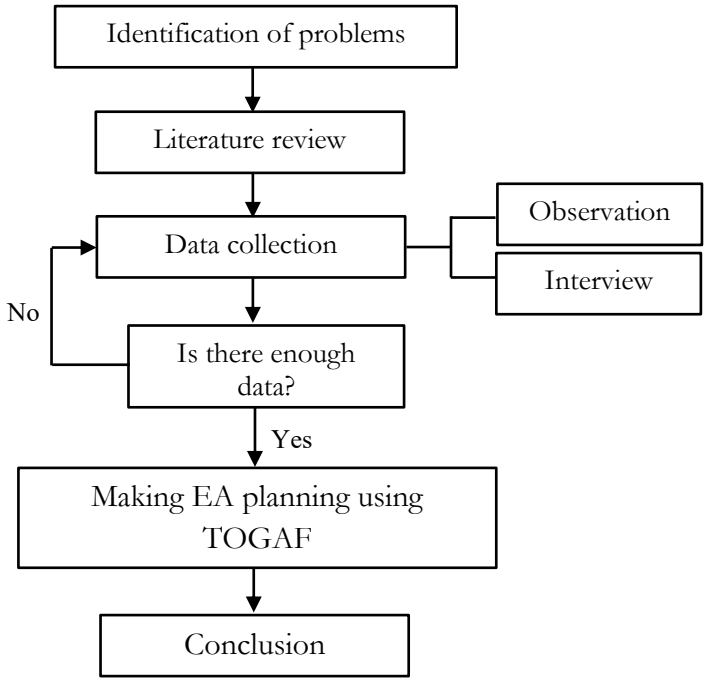

Figure 2. Research Stages

The steps of the research, as illustrated in Figure 3, are described as follows.

1) Identification of problems, stages for identifying problems that occur in strategic planning at the West Seram Environmental Service.
2) Literature review, this stage aims to study and understand various theories that can be used as references in solving problems. Apart from that, at this stage, researchers study various research that is relevant to the problem being studied.
3) Data collection, data collection was carried out through observations and interviews with the West Seram Environmental Service. This stage is carried out to find out more deeply about the problems that occur in the field. If all the data is deemed insufficient, then another interview will be conducted with the relevant department.
4) Making EA Planning Using TOGAF, at this stage, researchers make strategic planning for information systems using TOGAF. The work cycle carried out

consists of preliminary phase, architecture vision, business architecture, and information system architecture, as shown in Figure 3.

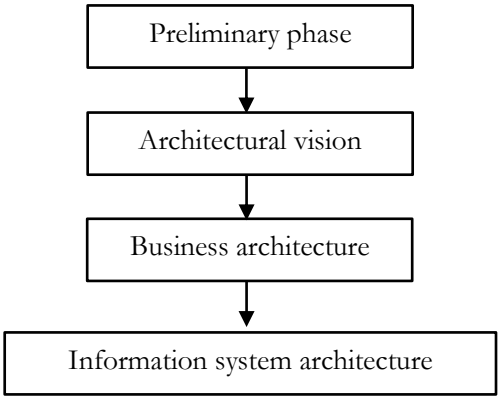

Figure 3. Research Method based on the TOGAF Framework.

Preliminary Phaseis the initial phase in enterprise architecture design and preparatory activities for information system strategic planning [16][17]. Vision Architectureis the initial phase of the architectural development method [19]. Business Architectureor business architecture is a stage for developing business architecture by creating baselines and targets for business architecture [21]. Information system architectureis a stage that discusses the design of information system architecture based on the needs of the business architecture in TOGAF ADM [24].

5) Conclusion, After making strategic information system planning using TOGAF, the researcher made conclusions from the results obtained.

3. RESULTS AND DISCUSSION

3.1 Preliminary Phase

West Seram DLH is a regional institution that carries out functions and obligations regarding the environmental sector as regulated in West Seram Regent Regulation Number 39 of 2016 [3]. Understanding that the responsibilities of the West Seram DLH are in accordance with the West Seram Regent Regulation Number 39 of 2016, which has an important role in helping local governments to provide the best services in the environmental sector, therefore IS/IT Strategic Planning is needed to realize the vision and mission from DLH West Seram. The scope of IS/IT Strategic Design uses TOGAF enterprise architecture with its method, namely TOGAF ADM (Architecture Development Method) which consists of business architecture, technology architecture, vision architecture, solutions and opportunities [18].

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3.2 Vision Architecture

In this phase, several analyzes are carried out such as company profile, organizational structure, scope, business objectives, business targets, stakeholder identification and obtaining approval to be able to map out all the desired strategies [20]. The vision of the West Seram DLH based on the data obtained is "Creating a Prosperous, Noble and Cultured Community of West Seram Regency Based on Local Economic Potential". This vision is important so that the regional development management process is more planned, measurable, transparent and accountable by having measurable indicators. Meanwhile, the mission is to develop quality public health services and accelerate infrastructure development.

Table 1. Company Goals

No	Mission	Objective	Target	Strategy	Policy Direction
1	Development of quality public health services	Towards the people of West Seram who are physically and mentally healthy	1. Increasing the quality of life and public health status	1. Optimizing w 2. aste services and environmental sanitation	1. Improved waste management and processing services 2. Arrangement and operational improvement of waste final disposal sites (TPA). 3. Improving the quality and capacity of the drainage system 4. Increasing the Environmental Quality Index (IKLH).
2	Accelerate infrastructure development	Creation of an integrated sea, land and air transportation system	1. Increasing the quality of environmental management	1. mimplement climate change mitigation and adaptation.	Preparation of a Roadmap for Climate Change Mitigation and Adaptation.

3.3 Business Architecture

This phase describes a collection of business activities, data and information originating from the organizational environment, both internal and external [22]. In this section analysis is used using Porter's Value Chain Activity. In the value chain there are two activities, namely primary activities and supporting activities

[23]. The West Seram Environmental Service is divided into two groups of activities, namely main activities and supporting activities. The following is the definition of business processes at West Seram DLH which is described using Porter's Value Chain Activity.

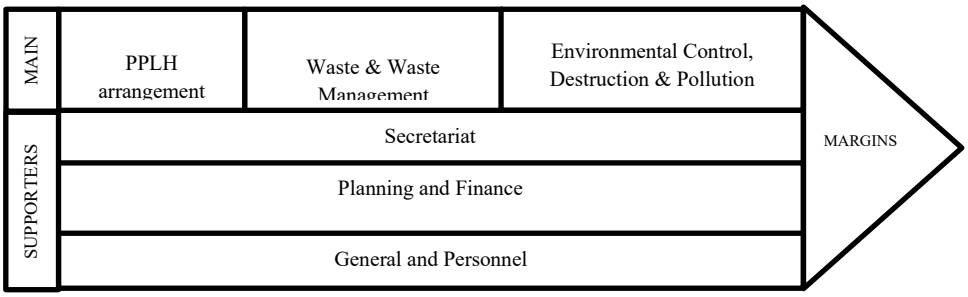

Figure 4. Porter's Value Chain Activity

Main Activities

There are 4 (four) main activities at DLHWestern Seramincludes:

a. Arrangement of PPLH (Environmental Protection and Control)
b. Waste and Waste Management
c. Environmental Control, Destruction and Pollution

Supporting Activities

There are 3 (three) supporting activities at DLHWestern Seram includes:

a. Secretariat.
b. Planning and Finance.
c. General and Personnel.

To run each processThe business architecture, West Seram DLH is divided into 6 (six) work areas, including:

a. Secretariat
b. Sub-section Planning and Finance
c. General and Personnel Subdivision
d. Arrangement of PPLH (Environmental Protection and Control)
e. Waste and Waste Management
f. Environmental Control, Destruction and Pollution

3.4 Information Systems Architecture

This stage consists of 2 architectures, namely data architecture and application architecture [25]. Below are several data entities from each SI that the West Seram DLH requires.

Table 2. Architectural Information Systems

No	Part	Application Solutions	Data Entities
1	PPLH Compliance Sector	SI structuring PPLH	Facilities and Infrastructure Data PPLH Arrangement Data
2	Sector of Waste and B3 Waste Management	SI for waste and B3 waste management	Facilities and Infrastructure Data Waste and B3 waste management data
3	Field of Pollution Control and Environmental Damage	SI controls pollution and environmental damage	Monitoring and Pollution Data Water Quality Data, Environmental Quality Data, Environmental Laboratory Infrastructure Data
4	Secretariat	SI Secretariat	General Administration Data, Public Relations Data, Personnel Data, Environmental Work Program Data
5	Planning and Finance	SI Planning and Finance	Environmental Financial Administration Data, Strategic Plan and Work Plan Preparation Data, RKPD and PPAS Data
6	General and Personnel	General SI and Personnel	Job analysis data and training planning within the environmental service, Service Filing Data, Asset and Vehicle Data Service

3.5 Technological Architecture

Technological architecture is the stage for determining the technology and software that will be used to help implement information technology in the agency [26]. This stage describes technological facilities consisting of software, hardware and networks which function to run applications and data to fulfill the business needs ofWest Seram DLH.

1) Hardware Facilities

West Seram DLH uses several hardware devices to operate the existing information system shown in the following table:

Table 3. Hardware Facilities

No	Hardware	Specification	N
1	PC	Asus PC AIO V222FAK-BA341T	12
2	Laptops	Asus VivoBook 14 A416JA	6
3	Printers	EPSON All-in-One Ink Tank L3210	6
4	Access Points	Ubiquiti Network UBNT UniFi Access Point Lite 6 (U6-LITE-US)	3
5	Switches	Cisco SF220-24-K9-EU 24 Port Smart Plus	3
6	Routers	Tent AC10U AC1200	1
7	Servers	PowerEdge DELL T40 Xeon E 2224 8Gb 1TB	1

2) Software Facilities

DLH West Seram operates several software to carry out data management processes to obtain results that suit the business needs of DLH Seram West, which can be seen as follows:

Table 4. Software Facilities

No	Software	Specification
1	Operation System	Windows 10 and 11
2	DBMS	Microsoft Access
3	Number Processing	Microsoft Excel
4	Web Servers	XAMPP
5	Word Processing and Presentation	Microsoft Word Microsoft Power Point
6	Web Browser	Google Chrome, Mozilla

3) Network Facilities

West Seram DLH applies a star design to the network topology, so it can be modeled in the following picture:

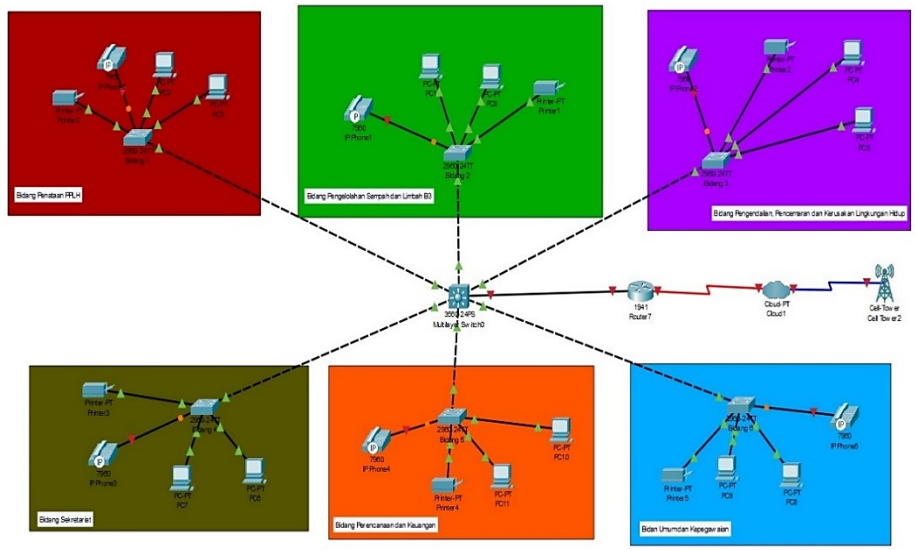

Figure 5. Network Topology

3.6 IS/IT Solutions

The results of observations of this agency show that there are several things that need to be adjusted to perfect business processes. The following are IS/IT adjustments to encourage this agency's Information System:

Table 5.IS/IT Solutions

Architecture	Inaccuracy	Solution
Business	• The number of human resources/professional skills for managing business processes is still limited • Limited infrastructure to accommodate agency business processes • The use of IT Governance has not been implemented properly	• Carry out appropriate employee recruitment and assessment according to agency needs • Carrying out requirements using appropriate work system development methods to take into account the agency's business needs • Implement strategic work plans for information systems and information technology
Data	• Data management is done manually or by bookkeeping	• Create a digitally organized data management process
Application	• There is no IT-based information system application that supports the agency's business process functions	• Carrying out digital-based application design/creation projects to support the development of agency business processes
Technology	• The network topology does not yet exist and is not fully integrated	• Design and implement network topologies according to the agency's business process needs

4. CONCLUSION

The enterprise architecture design at West Seram DLH is meticulously crafted using the TOGAF ADM method, encompassing three critical domains: business architecture, information system architecture, and technology architecture. This comprehensive approach not only aligns with the specific needs in IS/IT at West Seram DLH but also paves the way for innovative IS/IT solutions. These solutions include strategic recruitment aligned with effective work system development methods, the implementation of well-thought-out IS/IT work plans, advanced data processing techniques, and the development of digital-based applications. Additionally, the design and implementation of network topologies are tailored to meet the evolving technological needs of West Seram DLH, ensuring a robust and efficient IT infrastructure. This holistic strategy signifies a significant step forward in enhancing the operational efficiency and technological prowess of West Seram DLH.

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