

# Examination and Planning of Enterprise Architecture Utilizing the TOGAF Framework

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**Abstract:-** The enterprise architecture serves as a catalyst for organizations to achieve standardization, uniformity, adherence to regulations, and integration by aligning information systems, technology, policies, processes, and organizational frameworks with the organization's objectives and business strategies. The research methodology applied in this investigation utilizes a Systematic Literature Review (SLR) to identify the most suitable approach for formulating Enterprise Architecture in government agencies. The findings of this study indicate that the enterprise architecture design within a company is typically carried out only up to the Technology architecture phase. This limitation is attributed to the necessity of reviewing the company's requirements and evaluating a representation of applications or processes that could be optimized, with consideration given to existing standards supporting ongoing business processes.

**Keywords:-** Planning, Enterprise Architecture, and TOGAF Framework.

## I. INTRODUCTION

In the age of the Fourth Industrial Revolution (Industry 4.0), incorporating Information Technology and Information Systems is essential for advancing business processes. According to a survey carried out by the Katadata Insight Center (KIC), the use of the internet is seen as a valuable aid for Micro, Small, and Medium Enterprises (MSMEs) in maintaining their operations, particularly amid the pandemic. It is imperative for organizations and businesses to align data and application innovations that seamlessly integrate with their operations, aiming to improve administrative efficiency and reduce the likelihood of human errors [1].

A key motivator for organizations to embrace data systems is the growing need for enhanced business capabilities. Many entities aim to deploy data systems with a primary emphasis on innovation, particularly in fulfilling evolving requirements. The intention is to leverage data systems across various frameworks, even though this approach may deviate from their original purpose, straying from typical mission and implementation goals. The focus is on ensuring effectiveness in meeting organizational requirements, starting from adhering to global standards to fulfilling the essential functional needs [2].

Information technology should contribute to organizational goal attainment by optimizing advantages through a cohesive strategy, especially advancing through technological means. Previous studies have explored the application of TOGAF ADM (The Open Group Architecture Framework, Architecture Development Method) in Business Architecture for extensive business engineering setups.

The Open Group Architecture Framework (TOGAF) functions as a construction system that furnishes approaches and instruments for constructing, overseeing, and implementing business engineering within extensive business reengineering initiatives. A fundamental element of TOGAF is the Architecture Development Method (ADM), a key framework providing detailed perspectives on the process of advancing business design (Lise, 2006). ADM plays a crucial role by enabling organizations to define business requirements and establish a specific framework to address these needs. It encompasses stages integral to the evolution of enterprise architecture, as depicted in Figure 1.



Fig 1 ADM (Architecture Development Method)

The TOGAF ADM comprises 8 stages, including Architecture Vision, Business Architecture, Information System Architecture, Technology Architecture, Opportunities and Solutions, Migration Planning, Implementation Governance, and Architecture Change Management. A study titled "Planning Business Model Design Using TOGAF ADM 9.2 on Web-Based Customer Service Applications (Case Study: PT. PLN Persero Main Unit West Kalimantan) [3]" conducted by researchers Indah Zulfah Alqadrie, Ilhamsyah, and Nurul Mutia delves into the model design for implementing architecture, specifically focusing on the utilization of customer service applications by PT. PLN. The goal is to create applications that are easily accessible and responsive to customer needs, particularly in addressing power supply issues.

Another relevant concluding examination concerns the "Strategic Framework for Data Design in Enterprise Using TOGAF iADM at CV. Garam Cemerlang (Case Study at CV. Garam Cemerlang)," conducted by researchers Virna Soraya and Wellia Shinta Sari. This study investigates the strategic plan for data framework architecture in managing the acquisition, production, and raw material transactions of CV. Garam Cemerlang through the utilization of TOGAF ADM.

Another study is associated with the "Strategic Framework for Enterprise Engineering Agreement Utilizing TOGAF ADM in the Context of MARINO (Marino Assortment Case Study)," led by researchers Eviana and Sucipto. This research delves into the creation of an agreement framework for Marino Assortment by employing the TOGAF ADM methodology. Previous research outcomes highlight distinctions, particularly in project engineering planning when utilizing the Design Science Research Paradigm compared to the TOGAF ADM framework.

Enterprise architecture involves devising a system for leveraging information technology and, more specifically, determining how information technology can be formulated and integrated with business advancement. The implementation of comprehensive business designs is applicable to various organizations or associations. However, in the planning process, careful consideration must be given to

the methods or frameworks that are suitable and can be effectively employed by organizations or associations. The TOGAF (The Open Group Architecture Framework) is a framework established by The Open Group Architecture Framework in 1995. Initially employed by the US Department of Defense, the TOGAF framework has evolved and is now widely utilized in diverse sectors, including banking, manufacturing, and education.

TOGAF is commonly applied for the formulation, analysis, and structuring of organizational data architecture. The Architecture Development Method (ADM) is an organized approach within the TOGAF framework, encompassing eight key stages utilized for establishing and upholding the architecture of a specific organization. The ADM establishes a recurring cycle throughout the entire process, both between stages and within each stage, where specific decisions must be addressed. TOGAF ADM serves as a comprehensive methodology that involves a series of activities addressing enhancements at each stage of the ADM and the design model employed throughout the development phase.

The stages within TOGAF ADM encompass Preliminary, Requirement Management, Architecture Vision, Business Architecture, Information System Architecture, Technology Architecture, Opportunities and Solutions, Migration Planning, Implementation Governance, and Architecture Change Management. Drawing from prior research and the utilization of various approaches, it has been identified that applicable methods include the Design Science Research Paradigm and the TOGAF ADM framework.

This research employs the TOGAF ADM approach for analyzing and strategizing enterprise architecture within a business system or government agency. The architectural planning follows the ADM phases, resulting in the creation of a blueprint, commonly referred to as a reference guide. This blueprint streamlines the implementation process.

The outcomes of the conducted study yield an Enterprise Architecture Plan designed for implementation within an institution or business. The systematic structure of the research includes an introduction and background of the research, followed by the Research Method section outlining research stages, instruments, and data analysis methods. The findings from data collection and processing are presented in the Results and Discussion section. The research concludes with a summary of results and discussions in the Conclusion section.

## II. RESEARCH METHODOLOGY

The approach adopted in this study utilizes a Systematic Literature Review (SLR) to identify the most suitable method for crafting Enterprise Architecture within government agencies. The research unfolds in three stages: planning, execution, and analysis of results, with the latter derived from the author's Literature Review. The planning stage entails formulating identified issues, while the execution stage involves collecting papers for the Literature Review. The

analysis of results addresses the issues formulated through the conducted Literature Review.

### III. RESULTS AND DISCUSSION

Prior to exploring the intricacies of designing enterprise architecture through the TOGAF framework, it is recommended to gain a comprehensive understanding of the stages encapsulated within the TOGAF Architecture Development Method (ADM).

The phases of the TOGAF ADM can be elucidated in the following manner:

#### A. Preliminary Framework and Principle (Stage A)

The Preliminary Stage is formulated to delineate the scope of the forthcoming Enterprise Architecture (EA) and to establish commitments with management for the EA development process.

#### B. Architecture Vision (Stage B)

In this stage, it is crucial to foster a collective comprehension of the significance of enterprise architecture in realizing organizational goals outlined in a strategic format. Additionally, defining the architecture's scope is paramount. This phase encompasses prerequisites linked to the formulation of information system architecture, covering organizational profiles, articulation of vision and mission, establishment of organizational goals, identification of targets, delineation of business processes, specification of organizational units, and assessment of prevailing architectural conditions.

#### C. Business Architecture (Stage C)

In this stage, it is essential to establish the foundational parameters of business architecture by detailing the business model or desired business activities through the lens of business scenarios. Common modeling tools and methodologies, such as Integration DEFinition (IDEF) and Unified Modeling Language (UML), can be employed during this phase to construct the necessary models.

#### D. Information System Architecture (Stage D)

During this stage, the focus is on the processes associated with crafting the information system architecture. The delineation of information system architecture within this phase encompasses both data architecture and application architecture for organizational utilization. Data architecture specifically addresses the utilization of data to fulfill business functional, process, and service requirements. Various techniques, such as ER-Diagrams, Class Diagrams, and Object Diagrams, can be employed to accomplish these objectives.

#### E. Technology Architecture (Stage E)

Initiating the development of the envisioned technology architecture commences with the identification of required technology candidates through the utilization of the Technology Portfolio Catalog, encompassing both software and hardware devices. This stage also considers the essential considerations in the selection of alternative technologies.

#### F. Opportunities and Solution (Stage F)

During this stage, a heightened focus is placed on elucidating the advantages stemming from the enterprise architecture, covering business architecture, data architecture, application architecture, and technology architecture. These benefits serve as the groundwork for stakeholders to make informed decisions and select the architecture that will be implemented.

#### G. Migration Planning (Stage G)

During this phase, an evaluation will take place to formulate a migration plan from an existing information system. Typically, modeling is carried out using assessment matrices, and decisions are reached concerning the principal and ancillary requirements of the organization concerning the implementation of the information system.

#### H. Implementation Governance (Stage H)

Developing suggestions for the implementation of governance involves addressing organizational governance, information technology governance, and architecture governance.

#### I. Architecture Change Management (Stage I)

Creating a management plan for the architecture of the new system entails supervising technological advancements and environmental shifts within the organization, encompassing both internal and external factors. Moreover, part of this procedure involves deciding whether to proceed with the subsequent cycle of enterprise architecture development.

The creation of the Solution Architecture (SA) framework is an essential component of the Preliminary Framework and Principle phase, with the enterprise architecture development concentrating on Stages A through G. The delineation of Enterprise Architecture (EA) encompasses various aspects, including but not limited to the following:

- In terms of principles, methodologies, and models employed in shaping and actualizing the structure of enterprise organizations, business processes, information systems, and infrastructure.
- Enterprise Architecture entails defining a systematic representation of a business system within its business environment, serving as a blueprint for overseeing and operating each facet of the business, including policies, operations, infrastructure, and information.
- Gaining comprehension of the variances among elements that contribute to the advancement of the enterprise and understanding the interconnections between these elements.

Enterprise Architecture establishes mechanisms to facilitate communication among elements and functions within the enterprise. In the process of modeling enterprise architecture, there is a need for a framework that is capable of handling complex systems and aligning the development of business and IS strategies.

In the creation of Enterprise Architecture through the TOGAF framework, the initial stage in the enterprise architecture design, as outlined by TOGAF ADM, is the Preliminary Phase. During this phase, the identification of business needs takes precedence. The commencement of this phase involves a literature review pertinent to the research, and it encompasses environmental observation within the company, accompanied by documentation [4].

From this phase, the Principle Catalog is produced as follows:

➤ *Business Architecture*

- Main Activities of the Company
- Alignment of IT and Business
- Supporting Business Sustainability
- Alignment of IT and Business to Support Business Sustainability through the development of technology that aligns with organizational standards and policies.

➤ *Data Architecture*

- Data is a company asset
- Data should be accessible
- Data must be trustworthy
- Data should be protected and ensured of its security
- Data must be relevant.

➤ *Application Architecture*

- User-Friendliness
- Alignment of Applications with Business
- Flexibility of Applications
- Security of Applications

➤ *Application Architecture*

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- Flexibility of Applications
- Security of Applications

➤ *Technology Architecture*

- Technological Ease
- Technological Security
- Technological Interoperability

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*J. Information System Architecture*

The next stage involves the Information System Architecture, describing how the business architecture can be executed. In the Information System Architecture stage, there are two architectures: application architecture and data architecture. Data architecture is used to design data for this

information system, while application architecture addresses the applications to be designed.

*K. Application Architecture*

Application Architecture aims to determine the main types of application systems needed to process data and support business activities. Based on the results of interviews and observations of the company's SOP documents, it is found that there are three types of applications used within the company.

*L. Technology Architecture*

The objective of the Technology Architecture phase is to translate the application components identified in the Application Architecture phase into a collection of technology components that represent hardware devices. These components encompass both software and hardware devices, whether acquired from the market or configured by the organization within the technology platform. The primary goal of technology architecture is to ascertain the specific types of technology required for applications responsible for handling data within the organization.

#### IV. CONCLUSION

Based on the aforementioned research, the following conclusions can be drawn:

- The design of enterprise architecture in a company is carried out only up to the Technology Architecture phase. This is because, by reviewing the company's needs and wanting to have an overview of applications or processes that can potentially be optimized, reference is made to existing standards to support ongoing business processes.
- In the business architecture, a design of business processes is generated for 13 main business functions, which has been adjusted to the future needs of the business and the facilities needed to support future IS/IT planning.
- In the data architecture, 17 data entities are produced, adapted to the future functional needs of the incoming business.
- In the application architecture, three application modules are generated: the Web module for company representation, the ERP System, and the Mobile Application for City Courier. These modules function to manage data and support the business functions of each department in the company.
- The design in the Technology Architecture phase is carried out by adjusting the technology with the applications used, namely the company's Web, ERP System, and the ICT Application for City Courier.

#### REFERENCES

- [1]. E. S. Almunadia, T. F. Kusumasari, and I. Santosa, "Perancangan Enterprise Architecture Pada Bidang Agroforestry Menggunakan Metode Togaf 9.1 Adm," *J. RESTI (Rekayasa Sist. Dan Teknol. Informasi)*, vol. 3, no. 2, pp. 210–215, 2019.

- [2]. R. Ansyori, N. Qodarsih, and B. Soewito, "A systematic literature review: Critical success factors to implement enterprise architecture," *Procedia Comput. Sci.*, vol. 135, pp. 43–51, 2018.
- [3]. M. Wißotzki, F. Timm, and A. Sonnenberger, "A Survey on Enterprise Architecture Management in Small and Medium Enterprises," in *International Conference on Enterprise Information Systems*, SCITEPRESS, 2015, pp. 213–220.
- [4]. D. Dumitriu and M. A.-M. Popescu, "Enterprise Architecture Framework Design in IT Management," *Procedia Manuf.*, vol. 46, pp. 932–940, 2020, doi: <https://doi.org/10.1016/j.promfg.2020.05.011>.
- [5]. I. Y. Matheus Edward, W. Shalannanda, S. I. Lestarinigati, and A. Agusdian, "E-Government Master plan design with TOGAF framework," in *2014 8th International Conference on Telecommunication Systems Services and Applications (TSSA)*, 2014, pp. 1–6. doi: 10.1109/TSSA.2014.7065957.
- [6]. S. Al-Nasrawi and M. Ibrahim, "An enterprise architecture mapping approach for realizing e-government," in *2013 Third International Conference on Communications and Information Technology (ICCIT)*, IEEE, 2013, pp. 17–21.
- [7]. F. Febriani, I. Gamayanto, and S. Wibowo, "Perancangan Enterprise Arsitektur Sistem Informasi Manajemen Aset Menggunakan Kerangka Zachman pada RSJ Daerah Dr. Amino Gondohutomo Semarang".
- [8]. A. H. Fikri, W. Purnomo, and W. H. N. Putra, "Perancangan Enterprise Architecture Menggunakan TOGAF ADM pada PT. Hafintech Prima Mandiri," *J. Pengemb. Teknol. Inf. Dan Ilmu Komput.*, vol. 4, no. 7, pp. 2032–2042, 2020.
- [9]. A. Darani, I. Darmawan, and R. Hanaf, "Enterprise Architecture Diskominfo Jabar Pada Fungsi Informasi dan Komunikasi Publik Menggunakan Togaf ADM," *eProceedings Eng.*, vol. 6, no. 1, 2019.
- [10]. S. Ardiansyah, A. Setiorini, L. H. Atrinawati, and T. P. Fiqar, "Perancangan Arsitektur Sistem dan Teknologi Informasi Menggunakan Togaf ADM (Studi Kasus Dinas Perhubungan Kota Balikpapan)," *MATRIK J. Manajemen, Tek. Inform. Dan Rekayasa Komput.*, vol. 19, no. 1, pp. 70–79, 2019.
- [11]. I. Gamayanto, F. Febriani, and S. Wibowo, "Perancangan Enterprise Arsitektur Sistem Informasi Manajemen Aset Menggunakan Kerangka Zachman Pada Rumah Sakit Jiwa daerah Dr. Amino Gondohutomo Semarang," *JOINS (Journal Inf. Syst.*, vol. 6, no. 1, pp. 94–105, 2021.
- [12]. J. Danny, Shanlunt, G. Wang, and H. Alianto, "The Application of Zachman Framework in Improving Better Decision Making," in *2018 Indonesian Association for Pattern Recognition International Conference (INAPR)*, 2018, pp. 245–249. doi: 10.1109/INAPR.2018.8627041.
- [13]. S. Kotusev, "The history of enterprise architecture: An evidence-based review," *J. Enterp. Archit.*, vol. 12, no. 1, p. 29, 1986.
- [14]. M. Defriani and M. G. Resmi, "E-Government Architectural Planning Using Federal Enterprise Architecture Framework in Purwakarta Districts Government," in *2019 Fourth International Conference on Informatics and Computing (ICIC)*, 2019, pp. 1–9. doi: 10.1109/ICIC47613.2019.8985819.
- [15]. M. H. A. Ersalan and R. R. Saedudin, "Perancangan Enterprise Architecture Pada Fungsi Logistics Menggunakan Framework Togaf Adm 9.1 Pada Pt Albasia Nusa Karya," *eProceedings Eng.*, vol. 5, no. 2, 2018.
- [16]. N. Safitri and R. Pramudita, "Pengembangan Kerangka Kerja Arsitektur Enterprise," *Bina Insa. ICT J.*, vol. 4, no. 1, pp. 73–82, 2017.
- [17]. T. Mayakul, P. Sa-Nga-Ngam, W. Srisawat, and S. Kiattisin, "A Comparison of National Enterprise Architecture and e-Government Perspectives," in *2019 4th Technology Innovation Management and Engineering Science International Conference (TIMES-iCON)*, 2019, pp. 1–6. doi: 10.1109/TIMES-iCON47539.2019.9024591.
- [18]. S. Aswati, "Perencanaan Arsitektur Enterprise E-Learning Perguruan Tinggi Menggunakan Togaf Adm," *SESINDO 2018*, vol. 2018, 2018.
- [19]. L. Sofyana, "Perencanaan Arsitektur Enterprise Dengan Kerangka Kerja TOGAF (The Open Group Architecture Framework)," *PROZIMA (Productivity, Optim. Manuf. Syst. Eng.*, vol. 1, no. 2, pp. 64–70, 2017.
- [20]. A. Hodijah, "Analysing enterprise architecture model for service based e-government towards good government governance," in *2017 International Conference on Information Technology Systems and Innovation (ICITSI)*, 2017, pp. 114–119. doi: 10.1109/ICITSI.2017.8267928.
- [21]. D. Hermawan, F. Mahardika, and Y. H. Akbar, "Enterprise Architecture Planning Using TOGAF Version 9 (Case Study Of Badan Pengelolaan Pendapatan Daerah Kab. Sumedang)," *SISFOTENIKA*, vol. 10, no. 2, pp. 139–151, 2020.
- [22]. M. O. Riku and D. B. Setyohadi, "Strategic plan with enterprise architecture planning for applying information system at PT. Bestonindo Central Lestari," in *2017 5th International Conference on Cyber and IT Service Management (CITSM)*, 2017, pp. 1–6. doi: 10.1109/CITSM.2017.8089274.
- [23]. N. Mutiara, R. Andreswari, and R. Hanafi, "Analisis dan Perancangan Enterprise Architecture Direktorat Metrologi Pada Fungsi Perencanaan Dan Operasional Menggunakan Framework Togaf ADM," *J. Rekayasa Sist. Ind.*, vol. 4, no. 01, pp. 22–30, 2017.
- [24]. J. Schekkerman, "Trends in enterprise architecture 2005: How are organizations progressing," *Inst. Enterp. Archit. Dev. Amersfoort*, 2005.
- [25]. J. Schekkerman, "Enterprise Architecture Score Card," *Netherlands Inst. Enterp. Archit. Dev.*, 2004.
- [26]. E. Eviana and S. Sucipto, "Perancangan Enterprise Architecture Sistem Penjualan dengan Metode TOGAF ADM pada Marino Collection," *PROCIDING KMSI*, vol. 6, no. 1, pp. 106–113, 2018.

- [27]. V. Soraya and W. S. Sari, "Perancangan Enterprise Architecture Sistem Informasi dengan Menggunakan Framework TOGAF ADM pada CV. Garam Cemerlang," *JOINS (Journal Inf. Syst., vol. 4, no. 2, pp. 148–156, 2019, doi 10.33633/joins. v4i2. 3054, 2019.*
- [28]. I. Z. Alqadrie and N. M. Ilhamsyah, "PERANCANGAN MODEL ENTERPRISE ARCHITECTURE MENGGUNAKAN TOGAF ADM VERSI 9.2 PADA APLIKASI LAYANAN ONLINE PELANGGAN (Studi Kasus: PT. PLN Persero Unit Induk Wilayah Kalimantan Barat)," *Coding J. Komput. dan Apl., vol. 8, no. 2.*
- [29]. N. Nelwan, M. Imrona, and Y. F. A. Wibowo, "Analisis Arsitektur Enterprise Menggunakan Framework Togaf Pada Layanan Pendidikan Jarak Jauh Telkom University," *eProceedings Eng., vol. 2, no. 2, 2015.*
- [30]. R. Sessions, "A comparison of the top four enterprise-architecture methodologies," *Houst. ObjectWatch Inc, 2007.*
- [31]. A. D. Palupi and R. M. Surosa, "Enterprise Architecture Design for Construction Services Using The Open Group Architecture Framework (TOGAF): Case Study Ministry of Public Works and Housing, Indonesia," in *2018 International Conference on Information Technology Systems and Innovation (ICITSI), IEEE, 2018, pp. 66–71.*
- [32]. D. Simon, K. Fischbach, and D. Schoder, "An exploration of enterprise architecture research," *Commun. Assoc. Inf. Syst., vol. 32, no. 1, p. 1, 2013.*
- [33]. M. Lankhorst, *Beyond Enterprise Architecture.* Springer, 2005.  
[1], [2], [11]–[20], [3], [21]–[30], [4], [31]–[33], [5]–[10]