

Enterprise Architecture Development At XYZ Institution For Human Resources System

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Abstract

Indonesia, as an archipelagic country with more than 17,000 islands, faces major challenges in maintaining the sovereignty of its maritime territory. XYZ as one of Indonesian institution has a strategic role in defending maritime territory, which is highly dependent on the effectiveness of human resource (HR) management. This study aims to evaluate the implementation of Enterprise Architecture (EA) in the Human Resource Management System (HRMS) in the XYZ Institution using TOGAF ADM as the main framework. The research method used is a qualitative approach with descriptive and exploratory analysis. The results of the study indicate that the current HRMS system still faces challenges in data integration, limited technology infrastructure, and manual administrative processes. The proposed solutions include the implementation of ERP/HCM, development of the HRMS Connect application, and adoption of cloud computing technology to improve operational efficiency and transparency of HR management. With the implementation of TOGAF ADM, HRMS in the XYZ Institution can transform into a more effective, adaptive system that supports data-based decision making.

Keywords: Enterprise Architecture, TOGAF, HRMS, HR Management

1. INTRODUCTION

Indonesia, as an archipelagic country with 17,504 islands and a water area of 3,110,000 km², faces major challenges in maintaining the sovereignty of its maritime territory. As part of its main duties, the XYZ Institution is responsible for ensuring maritime security and defense as mandated. In carrying out its duties, the effectiveness of the organization is highly dependent on human resource management [1]. Therefore, the management of its members, from recruitment, training, education, to separation, is a crucial aspect in maintaining operational readiness and personnel professionalism. The development of information technology in the Industrial Revolution 4.0 era has brought significant changes in various aspects of life, including in human resource management [2]. Information technology, such as machine learning and data integration, has been shown to increase the efficiency of performance management and decision making [3,4]. The XYZ Institution has adopted an internet-based information system in managing human resources through various systems such as the Personnel Information System, the Samapta Entity Provision Information System, and the salary and health service system. This system supports the administration, logistics, and welfare processes of personnel in order to improve the operational effectiveness of XYZ Institution.

However, in its implementation, there are still various challenges in the integration of information systems, especially related to data validity and bureaucratic efficiency. Previous studies have shown that the quality of hardware and software plays an important role in the effectiveness of information systems [5,6,7,8]. In addition, the success of information system integration also depends heavily on the regulations governing the mechanisms and procedures in HR management. So that studies show that regulations have a significant impact on the effectiveness of Management Information Systems (MIS) and data management in organizations [9,10,11,12].

The use of an integrated information system can improve administrative efficiency in developing soldier careers, including managing transfers and education [13,14,15]. However, until now, the implementation of HR information systems in XYZ Institution still faces obstacles. Several systems are still running manually and have not been fully integrated, causing delays in data processing and administrative services. In addition, differences in software and hardware between units hinder fast and accurate data exchange. Meanwhile, Enterprise Architecture (EA) is an approach that can be used to overcome information system integration problems. EA is a strategic design that bridges business objectives and information technology in an organization. In the context of the XYZ Institution, the use of The Open Group Architecture Framework (TOGAF) can assist in the design, implementation, and management of information system

architecture effectively. In addition, TOGAF provides an Architecture Development Method (ADM) methodology that allows organizations to develop more structured and integrated information systems. This study aims to evaluate the implementation of information systems in HR management in XYZ Institution and examine the role of Enterprise Architecture in overcoming system integration challenges. By understanding the factors that influence the effectiveness of information systems, this study is expected to provide strategic recommendations for the XYZ Institution in improving human resource management to optimally support its duties and functions.

2. MATERIAL AND METHODS

2.1 Literature Review

Human Resource Management (HRM) is a fundamental aspect in an organization because it is related to optimal workforce management to improve organizational efficiency and effectiveness [16]. Organizational effectiveness is highly dependent on HR systems that are able to identify, assess, and place individuals with appropriate competencies in strategic positions [17]. Along with technological advances, HR management is increasingly facilitated by the implementation of the Human Resource Management System (HRMS), which integrates HR management with information technology to improve operational efficiency and data accuracy [18]. By automating processes such as payroll, personnel administration, and recruitment, HRMS is able to reduce errors due to human factors and increase organizational productivity. In the context of the XYZ Institution, the use of HR information systems is expected to streamline bureaucracy and improve the accuracy of personnel data in supporting maritime defense missions. However, challenges such as lack of system integration and technological disparities between units are still major obstacles. In fact, in previous studies, the results of the researchers' research stated that there is a need in HR management to emphasize the importance of hardware quality standards and regulations in supporting the successful implementation of HR information systems [5,6,9,10].

Therefore, the use of Enterprise Architecture, especially with the TOGAF approach, can be a solution to improve the integration and effectiveness of HR information systems in the XYZ Institution environment. Considering the role of HR management as an administrative expert according to Ulrich (1997) can achieve maximum results if the implementers of HR management functions in the organization are able to contribute optimally and utilize developments in information technology to improve the quality of HR management services provided to employees. In addition, strategic planning of information technology is a key element in the management of information systems in modern organizations. According to Earl as quoted by Indrajati in his research, the reason why an institution needs to develop a strategic plan for its information technology in a planned manner is to avoid possibilities such as avoiding the development of IS and IT that are not in line with the institution's strategy, avoiding the development of IS and IT that is not patterned (sporadic) so that there is no integration between existing sub-systems (not integrated, not holistic, and not coherent), avoiding the implementation of IS and IT that does not provide benefits for related stakeholders, avoiding the allocation of investment funds that are not in accordance with the needs that should be (under or overinvestment), avoiding the implementation of various IS and IT sub-modules that do not pay attention to the principles of priority and criticality and the last is to avoid the quality of information systems and information technology that is relatively low in terms of various existing standards. Strategic planning involves strengthening the vision and mission, shared commitment, and managing organizational culture to ensure the sustainability and adaptation of the organization to environmental changes [19; 20]. In the context of information technology, strategic planning should include the development of a clear road map, prioritization, and continuous monitoring and updating to ensure the effectiveness of system implementation [21].

A strategic road map can help reduce individual bias in decision making and ensure a balance between cost, time, and technology performance [22,23]. So, the main objectives of information technology strategic planning include increasing operational efficiency, innovation, and achieving key performance indicators [8, 24, 25]. In HR management, the application of IT strategic planning allows for optimization of resource allocation, increasing organizational adaptability to technological developments, and implementing a decision support system that is able to provide data-based recommendations to organizational leaders. Thus, this approach contributes to increasing operational effectiveness and competitive advantage of organizations in the digital era. In selecting the appropriate EA framework, there are various factors to consider, such as completeness of methodology, standardization capabilities, governance guidelines, and implementation flexibility.

Research by Sessions and deVadoss (2014) identified several criteria in assessing the EA framework, including taxonomy completeness, process completeness, reference model guidance, governance guidance, and maturity model. Based on these criteria, TOGAF is considered most appropriate for process-oriented organizations, Zachman Framework for perspective-based approaches, FEAF for environments that require high standardization, and Value Realization Framework (VRF/SIP) for companies that focus on capability development. So in the context of XYZ Institution, TOGAF was chosen as the main framework for implementing EA in the HR management system, considering the organization's need for a clear structure in developing an information technology architecture that supports operational efficiency and personnel management.

Table 1: EA Framework Analysis based on Sessions and deVadoss for XYZ Institution

Criteria	Ratings			
	Zachman	TOGAF	FEA	VRF/SIP
Process Completeness	1	4	2	3
Business Focus	1	2	1	4
Governance Guidance	1	2	3	2
Prescriptive Guidance	1	2	4	2
Vendor Neutrality	2	4	3	1
Time for Value	1	2	1	4
Total	7	16	14	16

Previous research provides extensive insight into the application of Enterprise Architecture in various sectors. Ovalle, Lezcano, and Luna (2024) in their study discussed the application of TOGAF in the sales management of fast-food SMEs, which showed an increase in daily sales growth of 15% and a reduction in customer complaints by 30% [26]. This study confirms that technology integration through TOGAF can improve operational efficiency and customer satisfaction in small and medium businesses. In the context of higher education, research by Amin et al. (2024) analyzed the implementation of EA at Universitas Teknologi MARA (UiTM) to overcome the challenges of the complexity of information technology and business management in educational institutions [27]. By using the TOGAF and GAP Analysis approaches, this study produced an architectural model that can improve the efficiency of data, applications, and technology in supporting academic activities. In addition, a study by Setiawan (2018) highlighted the role of TOGAF 9.1 in defining the architecture of human resource management systems in Indonesian universities [28].

The findings of this study indicate that the implementation of a TOGAF-based blueprint can improve the alignment of information technology strategies with institutional needs, ensure efficiency in workforce management, and support data-based decision making. This is in line with the research of Sofyana and Putera (2019) who developed TOGAF-based business architecture planning to improve the efficiency of business processes in higher education organizations [29]. This study emphasizes the importance of stakeholder identification, gap analysis, and architectural design that optimizes the integration of information systems to support institutional operations. This is because TOGAF is a detailed procedure for developing, managing, and implementing enterprise architecture and information systems called the architecture development method (ADM). The generic approach called TOGAF ADM consists of a number of activities used for designing the creation of enterprise architecture. TOGAF ADM also functions to describe the development, transition, and management of the architectural framework. These stages are repeated so that the organization can continue to make adjustments to achieve its goals. Previous studies have shown that the Enterprise Architecture approach, especially with TOGAF, can be applied in various sectors to improve the efficiency and effectiveness of information systems. In the context of SMEs, universities, and business organizations, TOGAF has been proven to be able to provide structural solutions in managing data, business processes, and technology resources. The implications of these studies strengthen the argument that the adoption of the right EA can improve operational efficiency, reduce system complexity, and provide a strong foundation for digital innovation in organizations.

2.2 Research Methods

This study focuses on designing Enterprise Architecture (EA) using the TOGAF ADM framework in the context of the Human Resource Management System (HRMS) in the XYZ Institution, considering that TOGAF is a widely used Enterprise architecture framework with many advantages such as gap analysis,

governance management, change management and needs base so that the use of TOGAF can provide greater benefits in designing enterprise architecture. The method used includes a series of systematic stages to design, evaluate, and implement an integrated information system to improve the efficiency and effectiveness of personnel management.

2.3 Research Framework

The research framework includes:

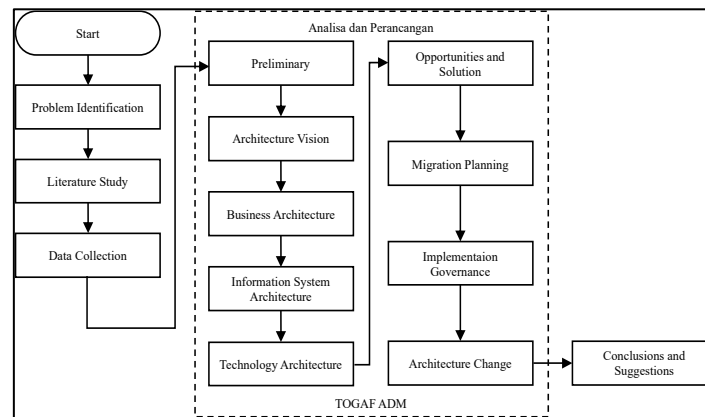


Figure 1: Research Framework by Researchers 2025

Problem Identification: Assessing the need for digital integration in managing XYZ Institution personnel data.

a. **Literature Study:** Analyzing literature related to information technology-based human resource management systems.

b. **Data Collection:** Conducting interviews, observations, and document studies related to the HRMS information system in XYZ Institution.

c. **Analysis and Design:** Using TOGAF ADM to define business architecture, information architecture, and the technology needed.

d. **Conclusions and Suggestions:** Compiling recommendations for implementing a more efficient and integrated information system.

This stage describes the basis of the research by detailing the research questions for the study.

2.4 Research Question

In carrying out this research, it was carried out based on the following research questions:

a. How does XYZ Institution service identify the need for a digital integration process, especially related to Personnel data to realize a Human Resource Management System?

b. How is the process of developing XYZ Institution Enterprise Architecture using TOGAF?

2.5 Research Process

This research method uses a qualitative approach with descriptive and exploratory analysis techniques. According to Moleong (2007), qualitative research aims to provide an in-depth understanding of the phenomenon being studied by utilizing various scientific approaches [30]. In this context, this study seeks to explore the Enterprise Architecture applied in HRMS in XYZ Institution, using the Open Group Architecture Framework (TOGAF) approach. The qualitative approach is used because this study focuses on the analysis of business processes, information systems, and technology infrastructure needs in HRMS. The data analysis technique is carried out using the TOGAF ADM approach, which consists of nine main phases:

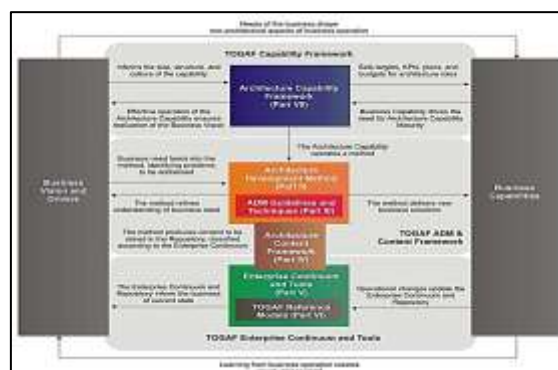


Figure 2: The TOGAF Standard V9.2 by OpenGroup

2.6 Design Method

The design methods implemented are as follows:

- a. Preliminary Phase – Determine the scope and principles of architecture.
- b. Architecture Vision – Develop a strategy for implementing HRMS information systems.
- c. Business Architecture – Analyze the organizational structure and business processes related to HRMS.
- d. Information Systems Architecture – Design an ERP/HCM-based information system.
- e. Technology Architecture – Identify technology infrastructure needs.
- f. Opportunities and Solutions – Evaluate the gap between the current system and the expected target.
- g. Migration Planning – Develop a roadmap for implementing the HRMS system.
- h. Implementation Governance – Develop policies and governance for implementing the system.
- i. Architecture Change Management – Manage changes and evaluation of the HRMS system.

3. RESULTS AND DISCUSSIONS

3.1 Preliminary

In the early stages of designing the Enterprise Architecture (EA) in the context of the Human Resource Management System (HRMS) in XYZ Institution, a needs analysis and identification of basic architectural principles were conducted. Based on this study, it was found that the current HRMS still has challenges in system integration, limitations in information technology, and a lack of regulations governing interoperability between information systems. Thus, a TOGAF ADM-based EA design is needed that can improve the efficiency of personnel data management, support strategic decision making, and ensure transparency and accountability in the human resource management system in XYZ Institution environment. These stages including Identify and Establish Architecture Principle which needed for XYZ Institution as follows:

Table 2: Principles Catalog

Principal	Description	Category
Standardization and Documented Business Processes	This principle emphasizes the importance of ensuring that every work process, activity, and regulation is properly documented to support clarity, consistency, and accountability in organizational operations.	Business Principles
Work Effectiveness and Efficiency	This principle ensures that work processes are conducted not only swiftly but also with accuracy and effectiveness, thereby enhancing the overall performance of personnel administration within XYZ Institution.	Business Principles
Shared Database	This principle promotes the joint use of data across organizational units, enabling updated information sharing and reducing the risk of data duplication.	Data Principles
Utilization of Existing Applications	This principle underlines the consideration of retaining existing applications, provided they remain compatible in terms of system design, architecture, and infrastructure.	Application Principles
User-Friendly Application	This principle highlights the necessity of developing applications that are intuitive and easy to use, both for official duties and for direct utilization by XYZ Institution personnel.	Application Principles
Long-Term Technological Sustainability	This principle ensures that the designed applications are capable of sustaining functionality and relevance over an extended technological life cycle.	Technology Principles
Secure Technology	This principal stresses that applications must operate within a secure system environment, ensuring data protection and safeguarding operational integrity.	Technology Principles

3.2 Architecture Vision

The analysis results show that the current HRMS system is still fragmented and not fully digitized. XYZ Institution personnel still have to carry out manual administrative processes for various purposes, such as updating personal data, submitting education applications, and managing supplies. To overcome this problem, the designed Architecture Vision emphasizes the implementation of cloud computing-based information system integration, development of the HRMS Connect application, and implementation of

Enterprise Resource Planning (ERP) based on Human Capital Management (HCM). With interoperability between systems, every XYZ Institution personnel can access data in real-time, reduce administrative errors, and increase efficiency in human resource management.

In this stage we found that current process flow at XYZ Institution (figure 3) should be changed to figure 4.

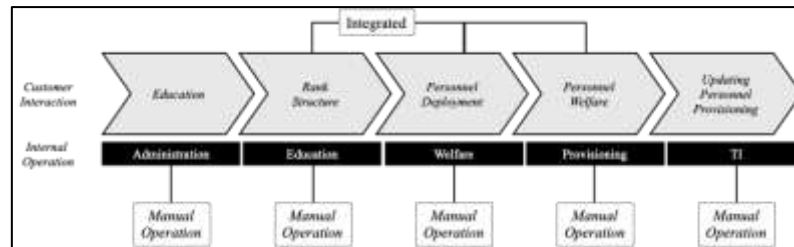


Figure 3: XYZ Institution Process Flow As Is

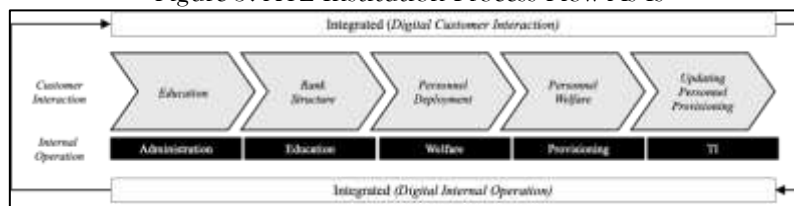


Figure 4: XYZ Institution Process Flow Target

To overcome these problems, based on principal catalogue, solution can be concluded as table 2.

Table 3: Solution Concept Diagram

Architecture Principle	Solution
Standardization and Documented Business Processes, Secure Technology, Utilization of Existing Applications	Defining the minimum infrastructure and processes in personnel management, along with the development of the HRMS Connect application
Work Effectiveness and Efficiency, Shared Database	Implementation of ERP/HCM, cloud-based servers, integrated applications and databases, and the development of the HRMS Connect application
User-Friendly Application	Development of IT services for the XYZ Institution HRMS, as well as the enhancement of the HRMS Connect application
Long-Term Technology Utilization	Implementation of ERP/HCM, cloud-based servers, and integrated applications and databases

3.3 Business Architecture

In Business Architecture, this study identified three main aspects that need to be improved, namely personnel administration, education, and personnel maintenance. Based on the analysis of the current business functions, it was found that the education application process is still manual, so it requires automation in the selection process, registration, and recording of personnel education results. In addition, the mutation and rank processes are still carried out manually, which results in inefficiencies in data management and decision making. Therefore, the use of ERP integrated with HRMS modules, such as rank, position, and supplies, is the main solution in improving the efficiency of HRMS business processes in the XYZ Institution.



Figure 5: XYZ Institution Business Process Target

As on figure 5, there are enhancements in both processes and capabilities, including personnel administration, XYZ HRMS services, education enrolment, education selection, management of education implementation, personnel education administration, and personnel supply updates. The improvements involve transforming current manual processes into new digital workflows via web or mobile applications—for example, education enrolment through a web app with notifications and approval flows following the unit's hierarchy. Additional capabilities include personnel administration, education management, and personnel supply, all integrated with core data from the Personnel Division for shared use. A new process is also introduced in XYZ Institution HRMS services at Personnel Division, defining workflows in the running system with communication channels such as live chat or hotline.

3.4 Information System Architecture

The information system architecture developed includes two main aspects, namely Application Architecture and Data Architecture. Based on the research results, the HRMS system in the XYZ Institution still uses SQL Server 2000 and a desktop-based system, which causes limitations in broad data access. Therefore, a system update is needed by implementing a centralized database based on SQL Server 2022 and developing web and mobile-based applications. With this approach, personnel can access data anytime and anywhere, either through the web portal or the HRMS Connect mobile application.

Table 4: XYZ Institution Technology Portfolio Catalog Baseline

Component	Technology
Computer Operating System	Windows 7
Server Operating System	Windows Server 2000
Database Application	SQL Server 2000
Browser	Google Chrome
Application Language	VB6, PHP
Reporting Application	Crystal Report 6.0

In addition, this study also found that data integration between departments is still not running optimally, resulting in duplication and data inconsistencies between work units. To overcome this, a data integration concept was designed using Application/Data Matrix which ensures that each application shares data in a centralized repository. Thus, each department such as Personnel Division, Educational Division, Personnel Welfare Division, and TI Division can access the same data in real-time and accurately, thus minimizing the risk of data errors and increasing system reliability.

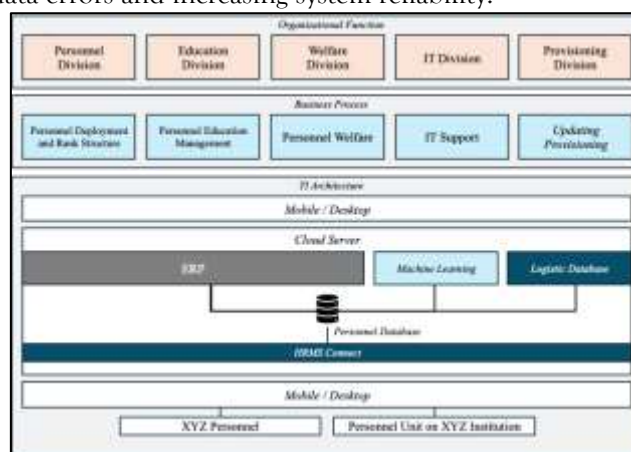


Figure 6: XYZ Institution Application Architecture Target

3.5 Technology Architecture

Based on the results of the Technology Architecture analysis, it was found that the IT infrastructure used by the XYZ Institution HRMS still uses a system that no longer receives update support, such as Windows Server 2000 and VB6-based software. Therefore, updating the infrastructure to Windows Server 2022, as well as the use of PHP and JavaScript as the main programming languages is one of the main recommendations in this study. In addition, to improve security and service availability, the HRMS system is designed using cloud computing technology, which allows the system to run more stably, safely, and scalable.

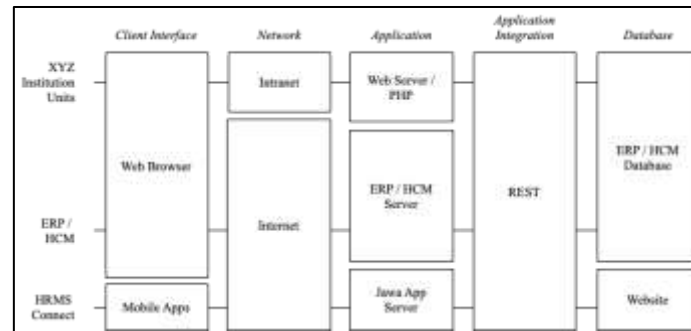


Figure 7 Technology Architecture Platform

3.6 Opportunities and Solutions

Through a gap analysis (GAP Analysis) on table 3, this study identified that XYZ Institution HRMS system requires better integration between personnel data, applications, and business processes. Some proposed improvement opportunities include:

- Implementation of ERP/HCM to ensure more effective and data-driven HR management.
- Development of HRMS Connect to enable personnel to perform various administrations digitally and in real-time.
- Standardization of IT infrastructure with the use of more modern servers and databases.
- Improving data security with stricter regulations on access and management of personnel information.

Table 5: GAP Analysis

Architecture	Baseline Architecture	Target Architecture
Business	Several business processes are still carried out manually	Automation and integration of business processes to achieve greater efficiency and effectiveness
	Absence of a dedicated service channel for personnel-related data matters	Establishment of an HRMS service channel within the XYZ Institution that is responsible for personnel services and handling data-related complaints
Information System	Lack of applications providing direct interaction with individual XYZ Institution personnel	Development of the HRMS Connect application
	Centralized data management	Development of a centralized database to enable integration
	Use of diverse and unstandardized applications	Standardization of applications used within the XYZ Institution, particularly those related to human resource management
	Supporting applications for business processes not yet integrated	Implementation of ERP/HCM applications to ensure integration across modules
Technology	Absence of data-driven system management	Development of database servers and ERP/HCM applications, along with upgrading and optimizing existing infrastructure
	Lack of file hosting servers dedicated to the XYZ Institution HRMS	Establishment of file hosting servers to support HRMS operations
	Outdated programs pose security risks	Implementation of updated and secure technological solutions to mitigate security vulnerabilities

3.7 Migration Planning

The prioritization of migration implementation is established through an analysis of the Benefit and Effort Matrix, utilizing a scoring scale derived from both the anticipated benefits and the required level of effort. This approach ensures the optimal allocation of resources, facilitates structured decision-making, and supports the achievement of efficiency and effectiveness in system development.

\Table 6: Benefit and Effort Matrix Analysis

Solution	Benefit Level	Benefit Score	Effort Level	Effort Score	Total
Infrastructure Standardization	Very High	5	High	2	7
Development of the HRMS Connect Application	High	4	Med	3	7
Implementation of ERP/HCM	Very High	5	High	2	7
Cloud Server Deployment	Very High	5	Low	4	9
Integrated Applications	High	4	High	2	6
Integrated Database	High	4	High	2	6
Development of IT Services for the XYZ Institution HRMS	High	4	Low	4	8

As part of the system migration process, this study compiled an IT Roadmap consisting of four main stages over a period of one year:

Q1: Development of XYZ Institution HRMS IT services and implementation of cloud servers.

Q2: Implementation of ERP/HCM and development of HRMS Connect applications.

Q3: Centralized database integration and system testing.

Q4: Infrastructure standardization and personnel training in using the new system.

So with this roadmap, it is expected that the transition from the old HRMS system to an Enterprise Architecture-based system can run gradually and in a structured manner.

3.8 Implementation Governance

To ensure optimal implementation of HRMS system, this study recommends governance policies, such as:

- Setting data access procedures and system changes with clear approval.
- Conducting periodic testing and evaluation of the system.
- Establishing data security policies to prevent misuse of personnel information.

3.9 Architecture Change Management

As part of the sustainability strategy, this study adopted the ADKAR (Awareness, Desire, Knowledge, Ability, Reinforcement) model in managing HRMS system changes. This process includes:

- Socialization and training to personnel on the use of the new system.
- Providing incentives for personnel who actively contribute to the adoption of new technology.
- Periodic evaluation of the effectiveness of the system and the readiness of the organization in implementing HR digitalization.
- Determining success indicators (KPIs) in the implementation of Architecture Change Management

4. CONCLUSION

This study reveals that the Human Resource Management System (HRMS) in XYZ Institution service still faces various challenges, including data fragmentation, limited information technology infrastructure, and manual administrative processes. By implementing the TOGAF ADM-based Enterprise Architecture process, the proposed solution includes the implementation of ERP/HCM, development of the HRMS Connect application, and cloud computing-based data integration. This transformation aims to improve operational efficiency, facilitate access to personnel data, and support more accurate and structured information-based decision making. To ensure the success of the implementation of a more modern and efficient HRMS system, several strategic steps need to be taken. First, improve personnel digital interaction through the development of web-based and mobile applications. Second, modernize IT infrastructure with the use of cloud-based databases and technology to increase data speed and security. Third, prepare clear data integration regulations to prevent duplication and inconsistency of personnel information. Fourth, provide ongoing training to personnel to improve understanding and skills in operating the new system. By implementing these steps, XYZ Institution HRMS is expected to transform

into a system that is more effective, adaptive, and supports operational efficiency in human resource management.

5. Limitations and Future Research

This study has several limitations that should be acknowledged. First, the research is based on a single case study conducted within one Indonesia institution (XYZ Institution), which may limit the generalizability of the findings to other branches of government, military services, or civilian organizations. Second, the study adopts a qualitative, descriptive, and exploratory approach, relying on interviews, observations, and document analysis; therefore, the impact of the proposed Enterprise Architecture on HR performance, service levels, or operational readiness has not been quantitatively measured. Future research could complement this work with quantitative evaluations using defined KPIs and system performance metrics. Third, the application of TOGAF ADM in this research focuses primarily on the preliminary phase through opportunities and solutions and migration planning. The full implementation and operation of the proposed architecture, including long-term monitoring of the HRMS Connect application and ERP/HCM integration, were beyond the timeframe of this study, so the identified benefits remain largely prospective. Finally, due to confidentiality constraints related to personnel and defense information, access to several internal HR and IT governance documents was limited, which may affect the completeness of the architectural model. Future research may extend this work through comparative studies across multiple institutions, longitudinal evaluations after system implementation, and deeper integration with IT governance and service management frameworks.

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Data openness and transparency. Due to the sensitivity and confidentiality of personnel and defense-related data in XYZ Institution, the raw data used in this study cannot be made publicly available. Aggregated or anonymized materials that do not compromise institutional security or individual privacy may be provided upon reasonable request. For access inquiries, please contact the corresponding author at ade_fadly@binus.ac.id, subject to institutional approval and applicable regulations.

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