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Original Article

Design and Development of a Digital Hajj Service Information System Using the TOGAF ADM Framework (A Case Study at the Ministry of Hajj and Umrah of Sukabumi City)

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Abstract

The implementation of hajj administrative services requires an effective, efficient, and transparent system. However, the current service process at the Ministry of Hajj and Umrah of Sukabumi City is still conducted manually, resulting in limited access to information, low service efficiency, and a high risk of administrative errors. This study aims to design a web-based digital hajj service information system architecture to improve service quality and accessibility. The study applies the TOGAF framework using the Architecture Development Method (ADM), covering nine architecture phases from preliminary analysis to architecture change management. The results of this study produce an enterprise architecture blueprint consisting of business architecture, information system architecture, technology architecture, and implementation roadmap. The proposed system enables digital management of registration, cancellation, and transfer services, improving service efficiency, administrative transparency, and public access to hajj information. The implication of this study is that the proposed architecture can serve as a strategic reference for digital transformation in public service institutions, particularly in hajj administration services.

Keywords: Digital Public Service, Enterprise Architecture, Hajj Administration, TOGAF ADM.

1. Introduction

Hajj is the fifth pillar of Islam that is obligatory for Muslims who have the physical, mental, and financial capability (Noor, 2018). Its implementation not only concerns aspects of worship, but also involves a considerably complex administrative process. Therefore, a structured, efficient, and transparent service system is needed to support the smooth implementation of hajj (Khairunnisa et al., 2025).

In Indonesia, hajj services are organized by the government through relevant agencies down to the regional level, including the Ministry of Hajj and Umrah of Sukabumi City. The services provided include quota registration, cancellation, transfer, and the delivery of information to prospective pilgrims. However, conditions in the field show that the process is still carried out manually through direct face-to-face interactions at the office (Farida, 2020).

This situation gives rise to a number of obstacles, such as limited access to services, lack of transparency, and low administrative efficiency. Prospective pilgrims must come directly to the office to obtain information or handle administrative matters, resulting in long queues, wasted time, and the potential for errors in data management (Farid, 2019). Based on data

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from Hajj Services in 2025 at the Ministry of Hajj and Umrah of Sukabumi City, the volume of services includes 498 hajj registrations, 201 cancellations, 57 quota transfers, and 876 information consultation services. The high volume of these services indicates the need for an integrated digital information system to improve service effectiveness and efficiency.

Along with the development of information technology, the digitalization of public services has become an unavoidable necessity. The implementation of a web-based information system is seen as a solution to improve service quality, broaden public access, and create a more efficient and integrated system (Mulhaeriyah et al., 2026).

This condition constitutes the research gap in this study (Widjaja et al., 2025). Several previous studies have explored the development of Hajj service information systems and enterprise architecture in different contexts. Fahrudin et al. (2011) developed a web-based Hajj service information system for KBIH Ar Rohman Mabrur Kudus to improve information delivery and administrative processes. Similarly, Khairunnisa et al. (2025) proposed a web-based Hajj service information system for KBIH Wadi Fatimah that improved service accessibility and efficiency. However, both studies mainly focused on application development and did not address the alignment between business processes and information technology architecture.

In the enterprise architecture domain, Munazilin et al. (2024) applied TOGAF ADM to design enterprise architecture for an educational institution, while Widjaja et al. (2025) utilized TOGAF ADM for digital optimization in the real estate sector. Although these studies demonstrated the effectiveness of TOGAF ADM, their implementation contexts differ from public Hajj services and do not specifically address the needs of regional government institutions.

Therefore, a research gap still exists regarding the development of an integrated enterprise architecture for digital Hajj services at the regional government level. Unlike previous studies, this research comprehensively applies all nine phases of TOGAF ADM to design a Digital Hajj Service Information System for the Ministry of Hajj and Umrah of Sukabumi City. The resulting architecture integrates business processes, information systems, technology infrastructure, and implementation planning into a unified framework to support digital transformation in public services.

The contribution of this study is to produce a blueprint of a web-based digital Hajj Service information system architecture using the TOGAF ADM Framework that can serve as a guide for system implementation at the Ministry of Hajj and Umrah of Sukabumi City as well as similar agencies at the regional level.

This study focuses on designing the Hajj Service information system architecture at the Ministry of Hajj and Umrah of Sukabumi City using the TOGAF ADM Framework. The problem formulations raised include analysis of the current system conditions, identification of information system needs, system architecture design, and the preparation of a web-based digital Hajj Service information system blueprint that meets the organizational needs.

The objectives of this study are to analyze the current system, identify user and agency needs, design the system architecture using TOGAF ADM, and implement a web-based system to improve the efficiency, transparency, and accessibility of hajj services. Practically, this study is expected to be a structured solution for the Ministry of Hajj and Umrah of Sukabumi City, while also serving as an academic reference in the development of enterprise architecture and digital-based public service information systems.

The scope of this study covers several aspects. The study was only conducted within the Ministry of Hajj and Umrah of Sukabumi City and does not cover integration with the national SISKOHAT system. The services discussed are limited to hajj quota registration, cancellation,

and transfer, as well as hajj news services, while aspects of manasik guidance, transportation, accommodation, and health services in the holy land are not included in the discussion. The design uses nine phases of TOGAF ADM, and system validation is carried out through black box testing on a prototype to ensure the suitability of main functions with user needs.

The novelty of this study lies in the comprehensive application of all nine phases of TOGAF ADM in the design of a digital hajj service information system at a regional government agency. Unlike previous studies that generally only focused on application development or partial architectural stages, this study produces a complete enterprise architecture blueprint starting from business needs analysis to system implementation planning.

2. Literature Review

2.1. Enterprise Architecture

Enterprise Architecture is an approach or method for managing organizational structure, business environment, and information systems more effectively. It aims to simplify the integration process between strategy, data, and information technology (Dinata et al., 2024). With the existence of Enterprise Architecture, an organization can have complete and clear documentation regarding information systems, the technology used, and the parties involved in achieving the vision and mission of an organization. In addition, Enterprise Architecture can also help an organization to provide more integrated and transparent information (Zachman, 1997). In this study, Enterprise Architecture is used as an approach to align the business needs of Hajj Services with the digital system design to be built.

2.2. Web Information System

A web information system is an information system designed using web technology so that it can be accessed through a browser and internet network or Wi-Fi to provide information services in real-time, anywhere and anytime (Fahrudin et al., 2011). This is all important in the context of public services, especially in the case of a Ministry that is required to provide the best service to the community, because it can improve the efficiency and accessibility of information to the wider community, including prospective hajj pilgrims who need fast and accurate hajj service information, so as to improve the quality of public services, public trust, and pilgrim readiness in performing the hajj optimally (Khairunnisa et al., 2025). In the context of public services, an information system not only functions as a data processing tool, but also as a medium for integrating business processes to improve the effectiveness, efficiency, accuracy, and transparency of services to the community. In this study, the use of a web-based system was chosen because it is able to address the main problems of Hajj Services, namely the limitation of access to information and dependence on face-to-face services.

2.3. System Analysis and Design

The results of the analysis stages currently running in the information service flow of Hajj at the Ministry of Hajj and Umrah of Sukabumi City still reveal several obstacles, including access to information that is still difficult because it has not been integrated into a digital platform accessible to prospective pilgrims, so that if they want to obtain information, prospective pilgrims must come to the office to meet directly with officers. Considering these problems, the author intends to create a web-based information system using the Unified Modeling Language (UML). UML is a methodology used to completely map the system design (Azim & Saepudin, 2026).

In this case, the diagrams to be used are the Use Case Diagram, which is a visual representation of one or more actors involved in a system; the Sequence Diagram, which is used to describe the sequence of interactions between objects or actors in the system so that the communication process in the system can be understood in detail; and the Activity Diagram, which shows the flow of a process or work steps in a system (Ginting et al., 2025).

2.4. TOGAF Framework (The Open Group Architecture Framework)

Several commonly used Enterprise Architecture frameworks include the Zachman Framework, FEAF, and TOGAF. Zachman is more oriented toward the classification of architectural artifacts without detailed implementation stages, while FEAF focuses on cross-agency government integration. TOGAF was chosen in this study because it has advantages through the ADM method, which provides complete stages starting from needs identification to architecture change evaluation, making it the most suitable for designing a digital Hajj Service information system that requires a systematic and sustainable approach.

TOGAF (The Open Group Architecture Framework) is a framework designed to help organizations build and manage Enterprise Architecture in a comprehensive and structured manner (Munazilin et al., 2024). Developed by The Open Group, this framework has become a global reference for government and private agencies in designing information system architectures that are aligned with business needs (Supriyana, 2010), so that architecture development can be carried out in a directed and consistent manner (Jaja, 2026). The core of TOGAF is the Architecture Development Method (ADM), which is a systematic method for designing, implementing, and managing enterprise architecture so that the technology built always supports the strategy and objectives of the organization as a whole.

2.5. Research Framework

The research framework (Figure 1) of this study describes the logical flow starting from problem identification to producing a solution in the form of a web-based Hajj Service information system. The main problem at the Ministry of Hajj and Umrah of Sukabumi City is the use of a manual service system, which creates limitations in access to information, lack of transparency, and low efficiency in serving pilgrims. To address these problems, an analysis is carried out to determine the condition of the current system and the expected system needs. This analysis becomes the basis for determining the right solution to improve service quality.

The next stage is system design using the TOGAF ADM Framework, which provides a structured approach to building enterprise architecture. The design process covers business architecture, information system architecture, and technology architecture. The design results are then realized in the form of a web-based Hajj Service information system that supports digital service processes. It is hoped that Hajj Services will become more efficient, public access to information will be easier, and transparency in hajj administration management can be improved.

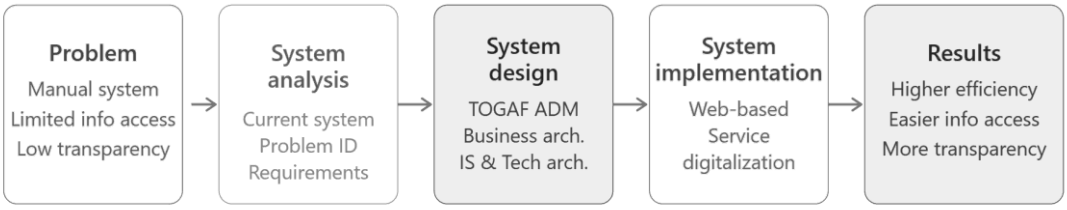


Figure 1. Research Framework

3. Methods

3.1. Research Design and Approach

This study uses a descriptive qualitative method supported by quantitative data. The qualitative approach is used to understand in depth the real conditions of Hajj Services at the Ministry of Hajj and Umrah of Sukabumi City, particularly in the registration, cancellation, and hajj quota transfer processes. Through this approach, the researcher identifies the business processes currently running, service obstacles, and user needs for the system to be developed.

Quantitative data is used as supporting data in the form of the number of hajj services and system testing results. After the needs analysis process is carried out, the next stage is system information design using the TOGAF Framework through the ADM (Architecture Development Method) to produce a structured system architecture blueprint that suits the organizational needs. In the process of system analysis and design, this study uses an Enterprise Architecture approach with the TOGAF (The Open Group Architecture Framework) Framework through the stages of the Architecture Development Method (ADM). This approach was chosen because it is capable of producing a structured, integrated information system design that is in accordance with organizational needs.

3.2. Data Collection Methods

Data collection was carried out through observation, interviews, and documentation. Observation was conducted directly on the hajj service process at the Ministry of Hajj and Umrah to identify the flow of hajj quota registration, cancellation, and transfer, as well as service obstacles that occur (Abdillah et al., 2025). The results of observation indicate that the delivery of information is still carried out directly, document management is still manual, and the public does not yet have access to information outside of working hours.

Interviews were conducted with relevant parties through a question and answer technique to obtain information regarding service experiences, perceptions of information availability, and recommendations for system development (Lestari et al., 2024). In addition, documentation was carried out by collecting archives and hajj service data as a complement to the results of observation and interviews. Data indicates an increase in the number of prospective pilgrims and the volume of services every year, including registration, cancellation, quota transfer, and hajj information consultation. The high volume of services indicates that the manual system is no longer effective, so a digital system is needed to improve efficiency and service data management.

3.3. System Analysis Method Using TOGAF ADM

This study uses an Enterprise Architecture approach with the TOGAF framework through the ADM stages as a method of analysis and design of a web-based Hajj Service information system at the Ministry of Hajj and Umrah of Sukabumi City. All nine ADM phases are applied in a structured and interrelated manner, starting from the Preliminary Phase to establish the scope and identify problems; Architecture Vision to formulate the direction of system development; Business Architecture to analyze current business processes; to Information System Architecture, which covers data design using ERD and application design using UML diagrams. Furthermore, Technology Architecture establishes web-based technology infrastructure with MySQL as the database, followed by Opportunities and Solutions to formulate service digitalization solutions, Migration Planning to prepare a transition plan from manual to digital systems, Implementation Governance to ensure implementation is in accordance with the design, and Architecture Change Management to maintain the ongoing relevance of the system.

3.4. Data Analysis Techniques

Data analysis was carried out through four stages. First, data reduction by grouping and sorting relevant data from observation, interview, and documentation results. Second, data presentation in the form of flowcharts and UML diagrams to describe the condition of the current system. Third, system needs analysis that produces functional needs such as hajj quota registration, cancellation, and transfer, as well as non-functional needs including ease of use, web-based accessibility, and data security through encryption and Multi-Factor Authentication (MFA). Fourth, drawing conclusions as the basis for system architecture design using TOGAF ADM.

3.5. System Design

System design covers three main activities. First, UML modeling using a use case diagram to describe the interaction of actors with the system, an activity diagram to explain the process flow, and a sequence diagram to model the communication between components in sequence from login to data validation. Second, database design that defines the table structure and relationships between tables to manage pilgrim data, registration, cancellation, transfer, and system user data in a structured manner. Third, interface design that designs a user-friendly interface, covering the home page, service information, registration, pilgrim data management, and administration pages for officers.

System testing was done by the black box testing method by testing six main scenarios, including login with correct and incorrect data, account registration, adding pilgrim data, accessing hajj information, and the service administration process. Each scenario is designed to ensure that the system functions run in accordance with user needs. Based on the test results, all main system features, namely login, login validation, registration, pilgrim data management, access to hajj information, and service administration, were declared successful and align with the predetermined scenarios. This indicates that the system has met the functional needs and is feasible to be used as a solution design to support Hajj Services digitally.

3.6. Research Procedures

The research procedure was carried out through several stages. First, problem identification was carried out through direct observation and interviews at the Ministry of Hajj and Umrah of Sukabumi City. Second, needs analysis was carried out to map the current business processes while exploring user needs for the system. The next stage is enterprise architecture design using the TOGAF ADM framework, which covers nine phases. Subsequently, the system is modeled with UML diagrams in the form of a use case diagram, activity diagram, and sequence diagram. After that, a web-based digital hajj service information system prototype was developed. The final stage is testing using the black box testing method to ensure that all system features function in accordance with user needs.

4. Results and Discussion

4.1. Research Results

4.1.1. Comparison of the Old System and the New System

Based on the results of field research, the Hajj Service system currently in operation is still entirely face-to-face. Prospective pilgrims are required to come directly to the office of the Ministry of Hajj and Umrah of Sukabumi City to obtain information or submit services, because no online service access is available. This condition creates various problems, including time and cost inefficiency, potential for queues, and dependence on officers that can

result in differences in explanation. In addition, the manual document completion process often requires pilgrims to make repeated trips to the office due to incomplete administrative requirements. These findings indicate a gap between the need for fast and transparent public services and the condition of the existing manual system, making a digital transformation based on an integrated information system necessary as the basis for designing a web-based Hajj Service system using the TOGAF ADM Framework.

The proposed system is a web-based Digital Hajj Service Information System that refers to the Information System Architecture phase in TOGAF ADM. This system allows prospective pilgrims to obtain information and complete administration online without needing to come directly to the office. The system flow begins with the user accessing the website and logging in, after which the user is directed to a dashboard that provides a main service menu consisting of hajj quota registration, cancellation, and transfer. The user then fills in the form and uploads the required documents, which are then automatically validated by the system. If the data is not valid, the system provides a revision notification; if valid, the process is continued by the officer according to the type of service selected. After the process is complete, the system displays the service success status, which can also be delivered via a WhatsApp message to the user.

To identify the differences between the current system and the proposed system, a comparative analysis was carried out based on several key aspects as follows:

Table 1. Comparison of the Old System and the New System

No	Aspect	Old System	New System
1.	Service Process	Manual (come directly)	Web-based (online)
2.	Access to Information	Limited, must ask	Easily accessible anytime
3.	Time Efficiency	Slow (queues)	Faster
4.	Transparency	Less transparent	More transparent
5.	Data Management	Manual / not centralized	Integrated in the system
6.	Administrative Services	Carried out directly at the office	Can be done online
7.	Risk of Errors	High	Lower

From the results of the comparison that has been carried out, it can be concluded that the new system design has significant advantages over the old system. The proposed system is able to improve operational efficiency, strengthen the transparency of administrative processes, and provide ease of access to information for the community. Thus, the implementation of this system is expected to support Hajj Services that are more structured, modern, and in accordance with the needs of users and agencies.

4.1.2. System Design Using the TOGAF ADM Framework

In this study, the digital Hajj Service information system was designed using TOGAF (The Open Group Architecture Framework) through the Architecture Development Method (ADM). This approach was chosen because it is capable of providing a systematic, structured workflow that is oriented toward business and technology needs.

The phases used in this study include: Preliminary Phase, Architecture Vision, Business Architecture, Information System Architecture, Technology Architecture, Opportunities and Solutions, Migration Planning, Implementation Governance, and Architecture Change Management.

Table 2. TOGAF ADM Phases

No	TOGAF ADM Phase	Brief Description	Design Results of the Hajj Service System at the Ministry of Hajj and Umrah of Sukabumi City	Main Output/ Artifact
1.	Preliminary Phase	Establishing architectural principles and organizational scope.	Determination of the research object at the Ministry of Hajj and Umrah of Sukabumi City, focusing on registration, cancellation, quota transfer, and hajj information.	The output of this phase is the definition of architecture principles and identification of stakeholders involved in the digital Hajj service system.
2.	Architecture Vision	Formulating the architectural vision and business objectives.	Vision: a web-based digital Hajj Service system that is efficient, transparent, and easily accessible to the community.	The main artifact produced in this phase is the architecture vision document that defines system objectives, stakeholders, and expected business value.
3.	Business Architecture	Modeling organizational business processes.	Analysis of the Hajj Service business flow (registration, cancellation, transfer) using flowcharts and value chain.	This phase produced a business process model and value chain analysis describing primary and supporting activities in Hajj services.
4.	Information System Architecture	Designing data and application architecture.	Design of a centralized database, diagrams, activity diagrams, and sequence diagrams for the Hajj Service system.	The resulting artifacts include data architecture, application architecture, and UML models consisting of use case diagrams, activity diagrams, and sequence diagrams.
5.	Technology Architecture	Determining technology infrastructure.	Selection of web platform, server, network, and supporting software (database, application framework).	This phase generated a technology architecture blueprint describing hardware, software, database, and network requirements.
6.	Opportunities and Solutions	Identifying digitalization opportunities and system solutions.	An integrated web portal with modules for registration, cancellation, transfer, hajj information, and	The output of this phase is a proposed digital solution and recommendations for improving existing manual services.

No	TOGAF ADM Phase	Brief Description	Design Results of the Hajj Service System at the Ministry of Hajj and Umrah of Sukabumi City	Main Output/ Artifact
			automatic notifications.	
7.	Migration Planning	Preparing a phased implementation roadmap.	Phase 1: registration, Phase 2: cancellation and transfer, Phase 3: admin dashboard, Phase 4: information services.	The artifact produced is an implementation roadmap consisting of infrastructure preparation, data migration, and user training stages.
8.	Implementation Governance	Governance of system implementation.	Formation of a supervisory team, employee training, pilgrim socialization, monitoring through the admin dashboard.	This phase resulted in implementation guidelines and system testing procedures to ensure conformity with the architecture design.
9.	Architecture Change Management	Management of architecture changes.	Adaptation strategy for new policies, integration with SISKOHAT, mobile application development, and security improvements.	The output of this phase is a change management strategy to support continuous system improvement and future adaptation.

The design of the Hajj Service information system in this study was carried out using the TOGAF ADM approach, which consists of a number of main phases. Each phase produces interrelated artifacts, starting from problem identification to the selection of technology used. With this method, the system design becomes more systematic, integrated, and aligned with organizational needs.

4.1.3. UML System Design

The system design is visualized using the Unified Modeling Language (UML), which consists of three types of diagrams. The use case diagram as in Figure 2 describes the interaction between two main actors, namely admin and prospective pilgrims. The admin has the authority to manage accounts, pilgrim data, and hajj information, as well as process service submissions, while prospective pilgrims can register, log in, access information, and submit administrative services. The include relationship in the service submission use case indicates that every submission always covers one of the processes of hajj quota registration, cancellation, or transfer.

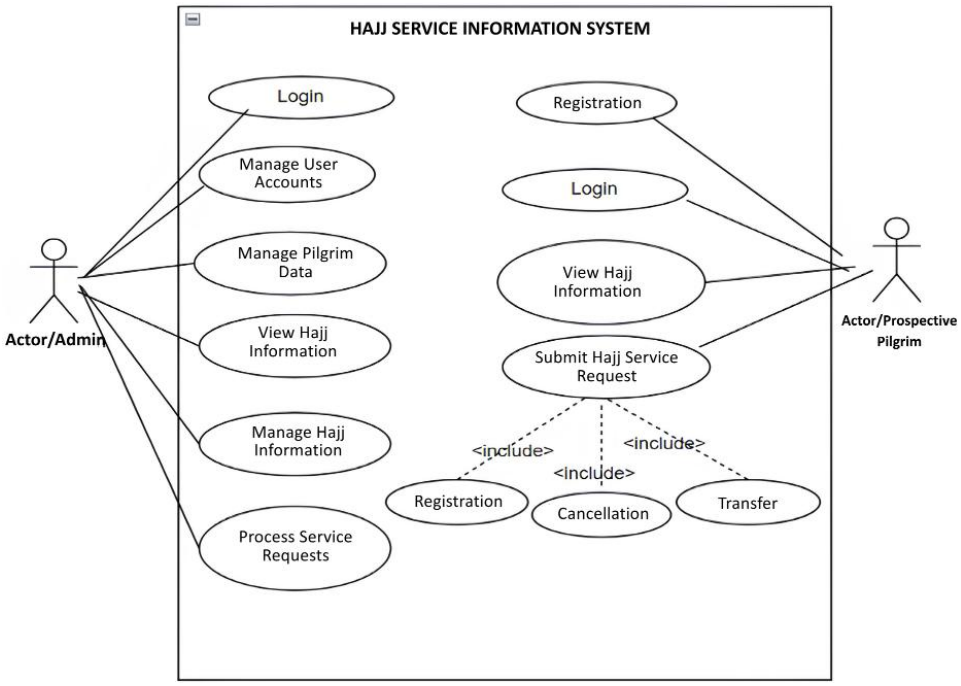


Figure 2. Use Case of the Hajj Service Information System

The activity diagram as in Figure 3 shows the transformation of manual processes into something more structured and integrated. The new system introduces automatic login validation, form completeness validation as an initial control before admin verification, and a clear correction path for pilgrims if documents are incomplete. The role of the admin is maintained as the final decision maker, but is now supported by a systematic system flow, so that efficiency increases and the risk of data errors decreases.

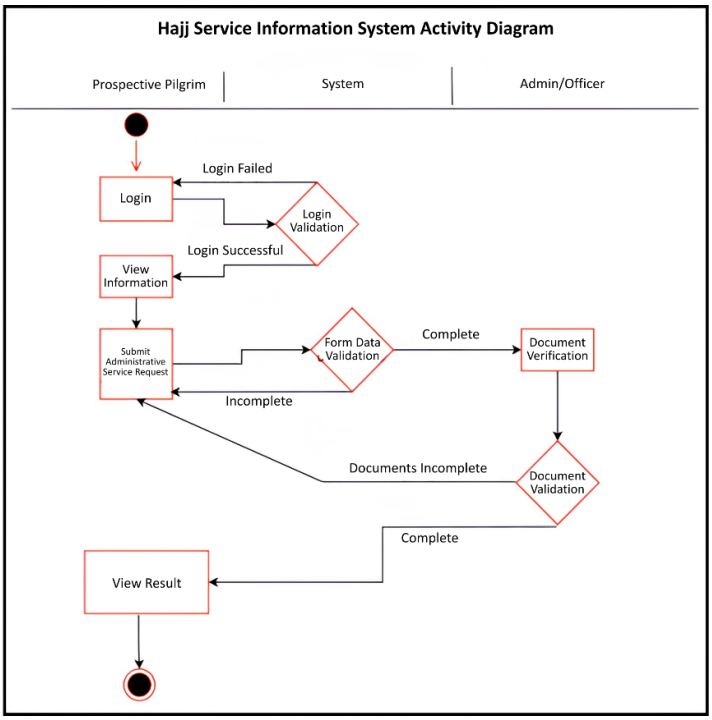


Figure 3. Activity Diagram of the Hajj Service Information System

The sequence diagram as in Figure 4 describes the flow of interaction between prospective pilgrims, the system, and the admin in sequence. The process begins with

automatic login validation that takes place quickly and with minimal errors, followed by instant access to service information, filling in digital forms that are forwarded to the admin for verification, to sending verification result notifications directly to pilgrims without the need to come to the office. The clear division of roles between the system as data manager and the admin as decision maker reflects the principles of Enterprise Architecture based on TOGAF ADM that emphasizes the balance between automation and human control.

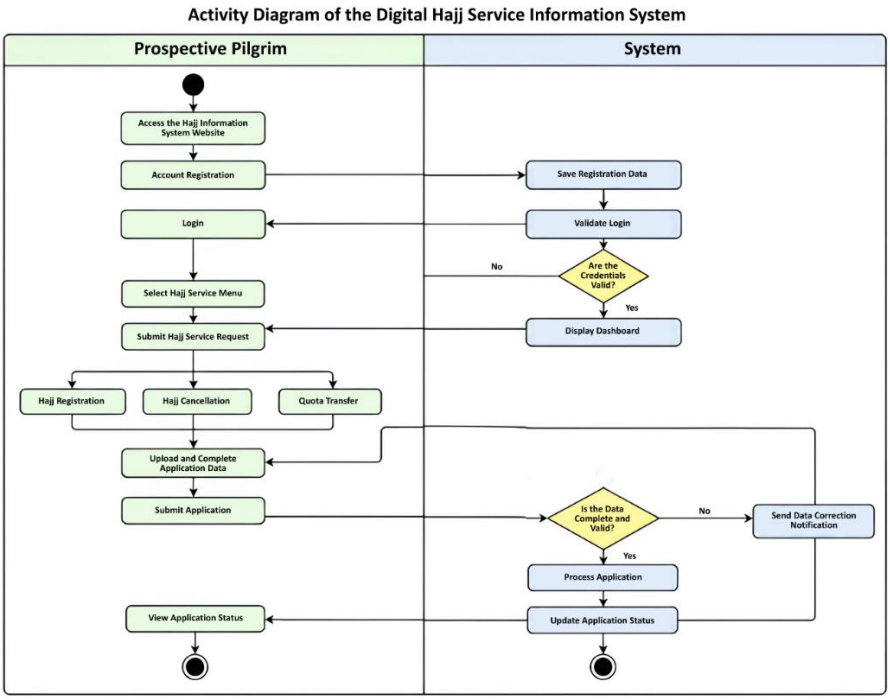


Figure 4. Sequence Diagram of the Hajj Service Information System

4.1.4. Interface Design

The design of the Hajj Service information system interface is an important stage in development, because this display is the main means of interaction between users and the system. The interface is designed to be simple, informative, and easily accessible so that prospective pilgrims and officers can understand and utilize the services effectively. The main pages provided support various service processes, such as hajj quota registration, cancellation, and transfer, so that the overall display design functions to facilitate user needs while ensuring the smooth administration of Hajj Services.

A. System Interface Design

The following are several interface designs in this system:

1) Login Page

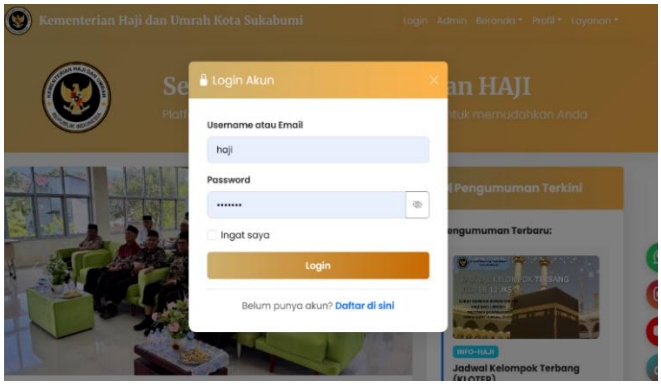


Figure 5. Login Display

The login page as in Figure 5 is the main entry point for the admin or Hajj Service officer to access the system. At this stage, the user is asked to enter the registered username and password, after which the system verifies the data. If the verification process is successful, the user can then proceed to the main menu and access all available Hajj Service features.

2) Dashboard Page

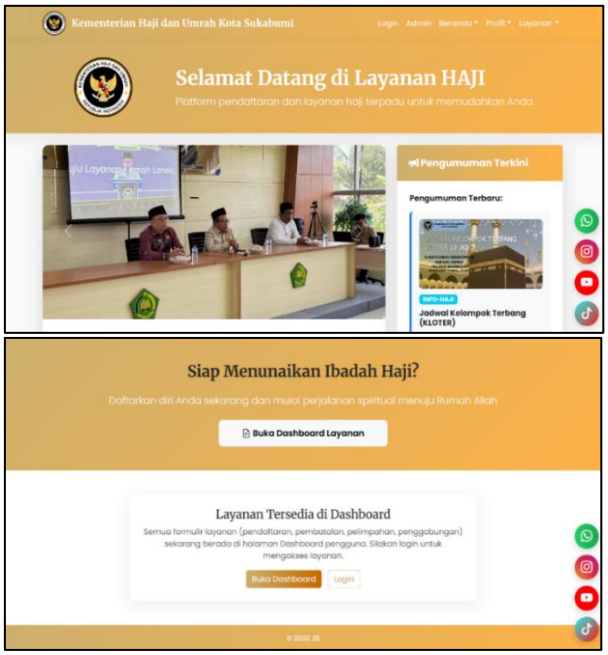


Figure 6. Dashboard Display

The dashboard page as in Figure 6 is the main display that appears after the login process is successful. On this page, the system presents a summary of information related to Hajj Services, such as hajj news, as well as various other available services.

3) User/Pilgrim Dashboard Display Page

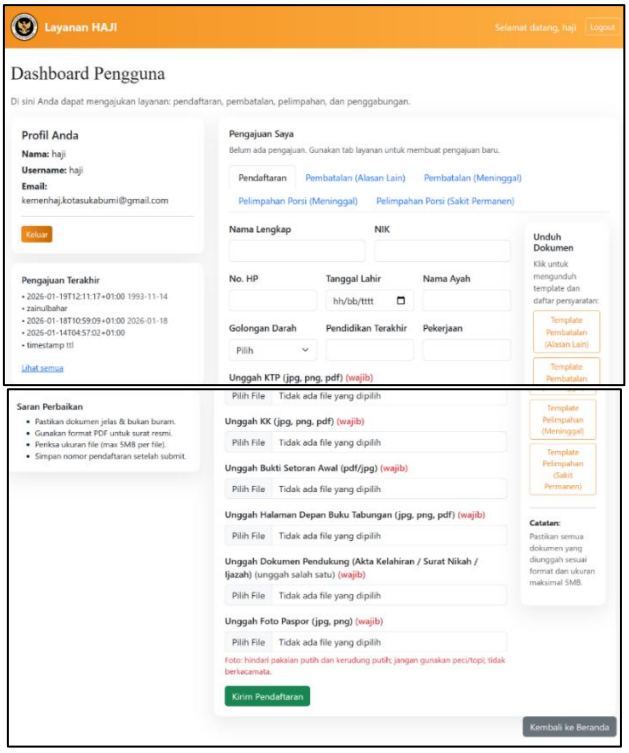


Figure 7. User Dashboard Display

The User Dashboard Page as in Figure 7 is the main control center that appears after prospective pilgrims successfully log into the digital Hajj Service information system. Through this page, users can access various services such as submitting registration, cancellation, or hajj quota transfer. The header displays the system identity in the form of the agency logo and the name of the Hajj Service application, while in the upper right corner there is user account information along with a logout button. The left panel contains the user profile with basic data such as name, username, and email, and provides a logout button as an alternative for logging out. In addition, on the left side there is also a Last Submission menu that displays the history of services that have been submitted, making it easier for users to review Hajj Service activities that have been carried out.

In the main content section of the dashboard, there is a Submission menu that serves as a means for users to submit various hajj services. The system provides several service options, namely:

a. Hajj Registration for new prospective pilgrims,
b. Cancellation (Other Reasons) for those who want to cancel for certain reasons,
c. Cancellation (Deceased) if the pilgrim passes away,
d. and two types of Quota Transfer, namely due to the pilgrim's death or due to a permanent illness that prevents them from performing the hajj.

With this structure, users can access services according to their needs in a more directed and practical manner.

In the main content section of the dashboard, users will find a data entry form that must be filled in to complete the service submission. This form covers basic information such as full name, National Identity Number (NIK), phone number, date of birth, father's name, blood type, last education, and occupation. In addition, the system provides a document upload feature for required documents, including identity card, family card, initial deposit proof, savings book page, supporting documents, and passport photo.

On the right side of the page there is a Download Documents panel that provides document templates as a guide for users in completing administrative requirements. After all data and documents have been filled in completely, the user can press the Submit Registration button, the Submit Cancellation button, and the Transfer button to send the service submission, so that the system can process it further through the administrative officer.

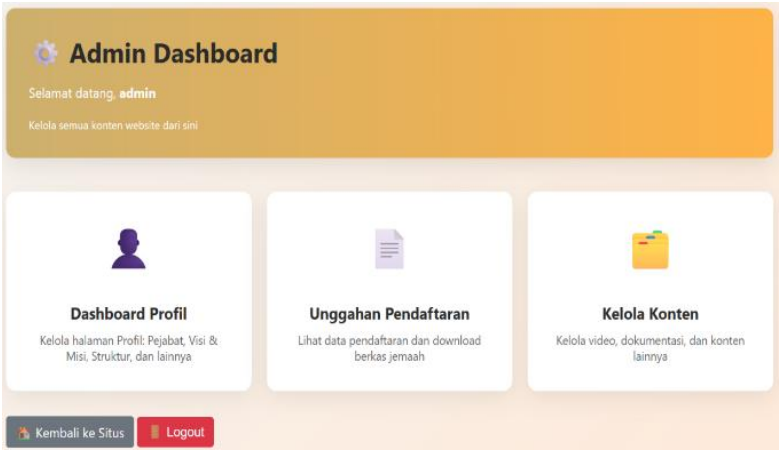


Figure 8. Admin Dashboard Display

The Admin Dashboard Page as in Figure 8 is the main display after the administrator successfully logs into the digital Hajj Service information system. Its function is as a control center for officers/admins in managing data and application content.

B. Page Structure

The Admin Dashboard serves as the main control center for managing the Hajj Service Information System. At the top of the page, a dashboard header displays the title "Admin Dashboard" along with a welcome message for the currently active administrator. This section also informs administrators that all website content can be managed through the dashboard. The main menu is presented in the form of cards to provide easy access to various management features. These include the Dashboard Profile menu, which is used to manage agency profile information such as official data, vision and mission statements, organizational structure, and information related to the Ministry of Hajj and Umrah of Sukabumi City. The Registration Uploads menu allows administrators to view submission data from prospective hajj pilgrims, review registration details, and download supporting documents uploaded by users. Meanwhile, the Manage Content menu is designed for managing website content, including videos, activity documentation, and other information related to Hajj services. At the bottom of the page, the dashboard footer provides a Back to Site button that enables administrators to return to the main website, as well as a Logout button for securely exiting the system.

C. User Experience (UX) Interface Analysis

The design of the Digital Hajj Service Information System interface is based on User Experience (UX) principles that prioritize ease of use, interaction efficiency, and information clarity. Given that most prospective pilgrims are not yet accustomed to using digital systems, the display is designed to be simple, structured, and easily understood by various age groups.

Each page is designed with specific UX considerations. The login page is made minimalist with only username and password inputs to reduce the user's cognitive load and speed up access. The dashboard applies the principle of visibility of system status so that users can immediately see important information and the main menu in one display without having to switch pages. The user dashboard uses a task-oriented design principle by presenting the registration, cancellation, and transfer service menus directly for more efficient navigation. The form and document upload page is designed in one continuous flow (single flow interaction) to minimize the risk of data errors. The download documents panel provides standardized templates based on a self-service system concept to reduce pilgrim dependence on officers. Meanwhile, the admin dashboard uses a card-based design that supports visual hierarchy for faster and more intuitive navigation.

Overall, the five main UX principles applied include ease of use, access efficiency, information clarity, error prevention through automatic validation, and user independence. With this approach, the system not only functions as a digital tool, but also becomes a real solution to the weaknesses of the previous manual system, so that hajj services can run more efficiently, transparently, and in a user-friendly manner.

4.1.5. System Implementation

System implementation is the stage of applying the results of analysis and design into a web-based application form that can be accessed via the internet. The system is built using Windows as the operating system, Apache (XAMPP) as the web server, PHP as the programming language, MySQL as the database, and Google Chrome or Mozilla Firefox as the web browser. The MySQL database is implemented to manage user data, prospective pilgrims, service submissions, required documents, and submission history in a structured manner so that the data storage and retrieval process takes place faster and more efficiently.

The system interface is implemented in several main pages. The login page serves as the main entry point as well as a security mechanism with username and password verification. After logging in, the user is directed to a dashboard that displays the service menu for

registration, cancellation, hajj quota transfer, and submission history. The submission form page is used to fill in pilgrim identity data such as name, NIK, and other personal information, while the document upload page provides a facility for uploading required files such as identity card, family card, and initial deposit proof as material for officer verification. In addition, there is a document template download page to help users independently complete the requirements for cancellation or quota transfer.

On the admin side, the admin dashboard functions as a control center that displays menus in card form, covering the management of agency profiles, pilgrim service submission data along with supporting documents, and management of website content such as videos and Hajj Service information. With this implementation, administrative processes that were previously carried out manually can take place more effectively, efficiently, and digitally organized.

4.1.6. System Testing

System testing was carried out using the Black Box Testing method that focuses on the suitability between user input and the output produced by the system. Testing covers five main aspects, namely the login page, hajj registration submission, hajj cancellation submission, quota transfer submission, and the admin dashboard.

In the login testing, the system successfully validated all scenarios including valid login, wrong password, and empty username or password fields. Hajj registration testing showed that the system was able to save data when the form was completely filled in, display warnings when required fields were empty, and successfully receive uploads of required documents. Similar results were shown in the cancellation and quota transfer testing, where the system successfully saved complete submission data while also rejecting submissions that did not meet the requirements. In the admin dashboard testing, all menus worked well, covering admin login, agency profile management, access to pilgrim registration data, document download, content management, and logout.

Based on all the test results, all main system features were declared valid and running in accordance with the design. The system is able to process input correctly, produce output that meets expectations, and display error messages that help users correct input errors. Thus, this digital Hajj Service information system has met the functional needs and is ready to be used to support hajj service administration more effectively and efficiently.

4.2. Discussion

4.2.1. Discussion Using the TOGAF ADM Framework

The discussion of this study refers to the application of TOGAF ADM as a systematic approach in analyzing and designing the Hajj Service information system at the Ministry of Hajj and Umrah of Sukabumi City. Each ADM phase is applied in a structured and interrelated manner to ensure alignment between business needs and the resulting system solution.

In the Preliminary Phase, the results of observations and interviews revealed that the Hajj Service process is still carried out manually with limited access to information, low service efficiency, and a high potential for data errors. Based on these findings, the basic principles of system development were established, namely web-based, easily accessible, integrated, and capable of improving service transparency.

In the Architecture Vision phase, the system vision was formulated as a digital service that improves the quality of public services with two main stakeholders, namely the admin as data manager and verifier, and prospective pilgrims as service users. The Business Architecture phase then analyzed business processes using a value chain approach, dividing

activities into primary activities (registration, cancellation, transfer, and hajj information) and support activities (information management, system development, and pilgrim data management).

The Information System Architecture phase produced a data architecture design covering user data, pilgrims, registration, cancellation, and quota transfer, as well as a web-based application architecture with features for registration, login, online service submission, and admin dashboard. System modeling was visualized using UML including use case diagrams, activity diagrams, and sequence diagrams. In the Technology Architecture phase, the system was built using PHP, MySQL, and Apache (XAMPP), which were selected based on considerations of implementation ease, cost efficiency, and the ability to support web-based applications.

The next three phases focus on implementation strategy. Opportunities and Solutions produced a service digitalization solution as an alternative to the manual system to improve service speed and minimize administrative errors. Migration Planning prepared a phased implementation plan starting from infrastructure preparation, data migration, to officer training. Implementation Governance ensured that implementation was carried out in accordance with the design through supervision and testing of all system features. The final phase, Architecture Change Management, focused on managing ongoing system changes through regular evaluations and adjustments to regulations and service needs in the future.

Based on the application of the nine phases of TOGAF ADM, a web-based Hajj Service information system design was produced that is capable of improving service effectiveness and efficiency, speeding up administrative processes, improving data accuracy, and providing ease of access to information for the community and officers.

The research findings show that the application of TOGAF ADM provides a systematic and structured approach in aligning organizational business needs with information technology solutions. Unlike previous studies that tended to focus solely on application development, this study presents a more comprehensive enterprise architecture perspective by integrating business processes, system design, and technology planning in one unified framework. This confirms that TOGAF ADM is an effective method for supporting digital transformation in public service institutions.

4.2.2. System Limitations

The Digital Hajj Service Information System designed in this study has a number of limitations that need to be understood so that its development and implementation remain directed and do not extend beyond the established scope. In terms of service scope, the system only covers administration of hajj quota registration, hajj quota cancellation, hajj quota transfer, and the provision of information and news related to hajj services. Other services such as *manasik* guidance, transportation, accommodation, and health services in the holy land are not included in the scope of this system.

In terms of platform, the system is web-based and can only be accessed through a browser with an internet connection, either through a computer or smartphone. System users are limited to two main actors, namely prospective hajj pilgrims as service users and admins or officers of the Ministry of Hajj and Umrah of Sukabumi City as system managers. In terms of features and data processing, the system provides login functions, dashboard, service forms, document upload, data validation, and submission result notifications. Data processing only covers basic administrative data and is not integrated with the national SISKOHAT system or the central database, so data synchronization between regional and central agencies cannot yet be carried out automatically. The validation applied is also administrative in nature, which only checks the completeness and format suitability of data entered by users.

In terms of access to information, the system provides general information about hajj services without a real-time consultation feature. This means that users who need further explanation still need to contact officers through communication channels outside the system. Meanwhile, in terms of security, the system applies username and password-based authentication strengthened by Multi-Factor Authentication (MFA) and data encryption to protect sensitive user information such as NIK and hajj administrative data. Finally, in terms of geographic coverage, this system is only designed for and applies within the Ministry of Hajj and Umrah of Sukabumi City, so it is not intended as a solution that can be directly applied to similar agencies in other regions without further adjustments.

5. Conclusion

This study successfully designed a web-based digital hajj service information system architecture by utilizing the TOGAF ADM framework. The proposed system is expected to improve efficiency, transparency, and accuracy in Hajj services. The main contribution of this study is the preparation of a comprehensive enterprise architecture blueprint specifically designed to support hajj services at regional government agencies. Practically, the results of this study can be used as a strategic guide in promoting digital transformation at the Ministry of Hajj and Umrah of Sukabumi City and similar institutions.

Nevertheless, this study has limitations because the system design is still limited to the regional scope and has not been integrated with the national SISKOHAT system. In addition, the system developed is still a prototype and has not been fully implemented in the operational environment. For future research, development is directed toward mobile platforms based on Android and iOS, integration with the national system, and broader usability testing by involving users directly.

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