

Design of a Website-Based Congregation Data Information System (Case Study: GKS Galutosi)

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Abstract

This study aims to design and build a website-based congregation data information system to assist the Congregation Council Executive Board (Badan Pelaksana Majelis Jemaat, BPMJ) of GKS Galutosi in managing congregation data more quickly, accurately, and efficiently. The system was developed using the Rapid Application Development (RAD) method, covering the requirements planning, design, development, and implementation stages. Built using PHP Native, MySQL, and Tailwind CSS, the system features congregation data management, commission grouping, family head data, neighborhood zones, church council data, and a comprehensive reporting module. Black Box Testing on 21 scenarios achieved a 100% success rate, and System Usability Scale (SUS) testing with 12 respondents yielded an average score of 96.88 (Grade A/Excellent), confirming a very high level of usability and user acceptance.

Keywords: Black Box Testing; GKS Galutosi, Information System; Rapid Application Development; SUS;

1. Introduction

The church is a religious institution that functions not only as a place of worship but also as a center for spiritual development, social service, and congregation management. In the era of information technology development, congregation data management should be carried out effectively, efficiently, and in an integrated manner. Proper congregation data collection is essential for determining the number of members, baptismal and confirmation (sidi) status, and involvement in church activities, all of which serve as the basis for service planning and decision-making by the church.

However, this condition has not been fully implemented at the Sumba Christian Church (Gereja Kristen Sumba, GKS) Galutosi. The congregation data collection process is still carried out manually by church elders and secretaries once a year, with data collected directly from house to house across various scattered locations. This makes the data collection process slow, inefficient, and difficult to update periodically. As a result, congregation data is often inaccurate and does not reflect current conditions, making it difficult for the Congregation Council Executive Board (BPMJ) to allocate services, plan activities, and manage overall church administration.

Several previous studies have demonstrated the importance of website-based information systems in church data management. Sihombin[1] designed a web-based congregation data processing information system for HKBP Yogyakarta that successfully improved data management efficiency. [2] developed a web-based congregation data collection system for the Evangelical Christian Church in Papua, yielding significant improvements in data access speed. In a more closely related context, [3] implemented a website-based worship scheduling and financial management information system at GKS Jemaat Padadita, while [4] designed a web-based financial information system at GKS Mauliru using the RAD method. These studies confirm that website-based information systems are able to overcome the weaknesses of manual record-keeping in church organizations.

Based on these issues, this study aims to develop a website-based congregation data information system at GKS Galutosi using the Rapid Application Development (RAD) method, in order to accelerate the recording, searching, and updating of congregation data, and to improve the quality of church services provided to the entire congregation.

2. Research Method

This research was conducted at GKS Galutosi, located in Sumba, East Nusa Tenggara, over the period from January to April 2026. The object of the research was the congregation data collection system managed by the BPMJ, encompassing a total of 671 individuals distributed across several service neighborhoods (lingkungan). Data were collected through direct observation of the ongoing data collection process and interviews with the church secretary and BPMJ officers to identify the system requirements.

The development method used was Rapid Application Development (RAD). RAD is an incremental approach that emphasizes rapid and iterative development cycles, with time constraints as the primary driving factor [5]. The RAD stages applied in this study are illustrated in Fig. 1.

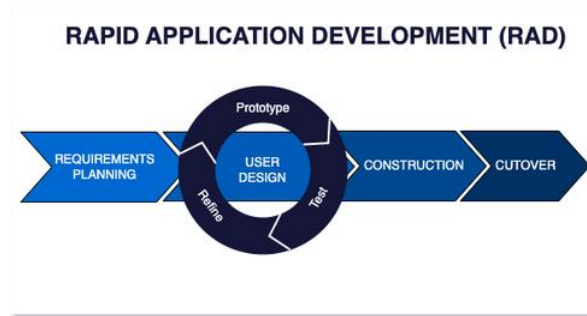


Fig. 1: Stages of the Rapid Application Development Method

Fig. 1 illustrates the four main stages of the RAD method applied in this study. The first stage is requirements planning, which involves identifying the system's objectives and information needs through discussions between users and developers; in this phase, the existing manual system was analyzed and a proposed solution was established. The second stage is design, in which the system was modeled using the Unified Modeling Language (UML), including use case diagrams, activity diagrams, and class diagrams, as well as the design of the database structure and user interface. The third stage is development, in which the system was built using PHP Native as the programming language, MySQL as the database, and Tailwind CSS for the interface, with XAMPP as the local server. The fourth stage is implementation, in which the developed system was deployed for use by the BPMJ of GKS Galutosi.

The system design was modeled using a use case diagram depicting two main actors: the Church Secretary, who has full access rights, and the Neighborhood Secretary, who has limited access rights corresponding to their assigned area. Fig. 2 presents the use case diagram of the system.

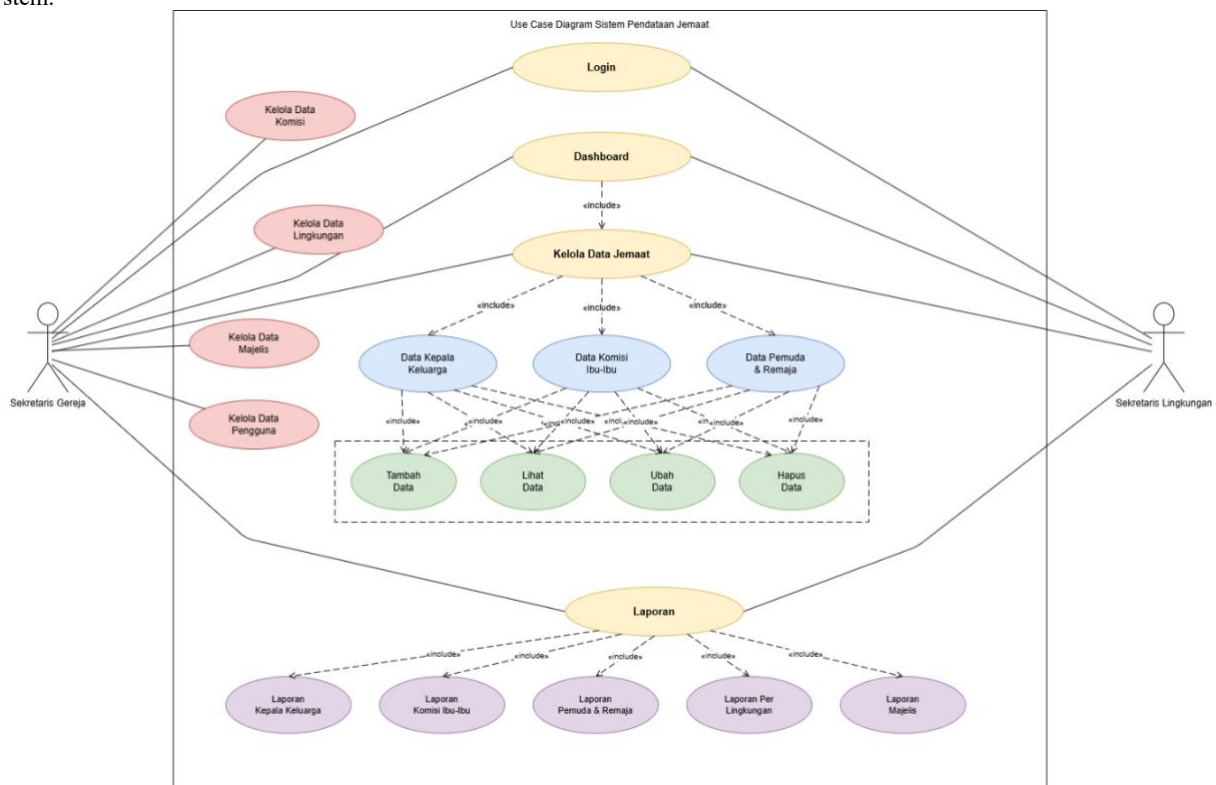


Fig. 2: Use Case Diagram of the Congregation Data Information System

Fig. 2 shows that the Church Secretary can perform all system functions, ranging from login and congregation data management (create, read, update, delete) to management of commission, neighborhood, council, and user data, as well as report generation. Meanwhile, the Neighborhood Secretary can only manage congregation data within their designated neighborhood, without access to commission, neighborhood, council, or user management. System testing was performed using Black Box Testing to verify functionality [6], and the System Usability Scale (SUS) to measure the level of usability [7]. The SUS instrument consists of 10 statements rated on a 1–5 Likert scale, with the scoring formula: odd-numbered items = $X - 1$, even-numbered items = $5 - X$, and the SUS score per respondent = total score $\times 2.5$.

3. Results and Discussion

3.1. System Implementation.

The congregation data information system for GKS Galutosi was successfully developed and implemented with several key features. Fig. 3 shows the login page, which serves as the entry point of the system.

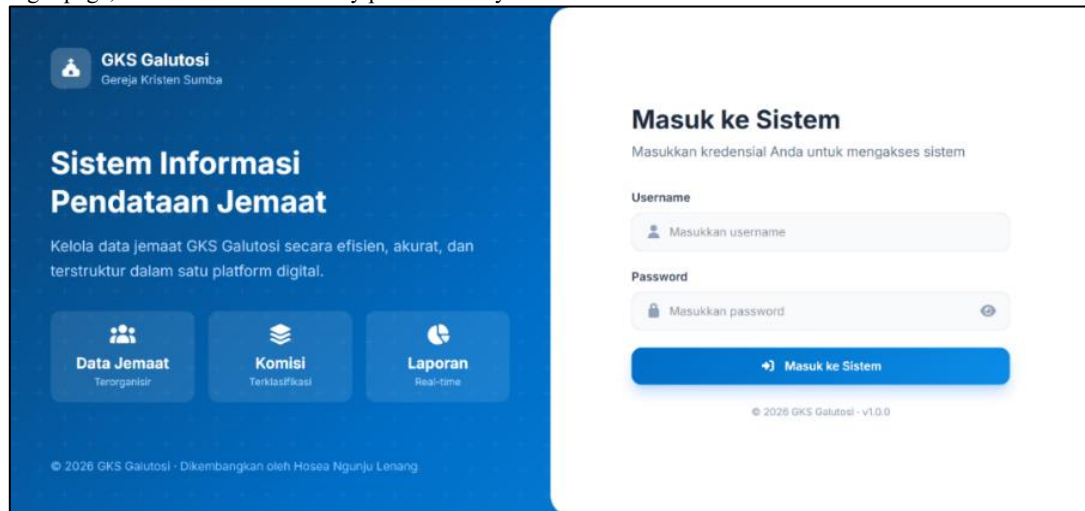


Fig. 3: Login Page and Dashboard Display

Fig. 3 shows the login page, which was designed with a two-panel interface: the left panel displays church information along with illustrations of the system's main features, while the right panel contains the login form. After successful authentication, users are directed to the Dashboard page, which displays four main statistical cards (total active congregation members, number of family heads, number of neighborhoods, and number of council members), charts of congregation distribution by commission, gender distribution, baptismal status, confirmation (sidi) status, a recap by neighborhood, and a table of the five most recently added congregation records.

Fig. 4 shows the congregation data management feature, which constitutes the core of the system.

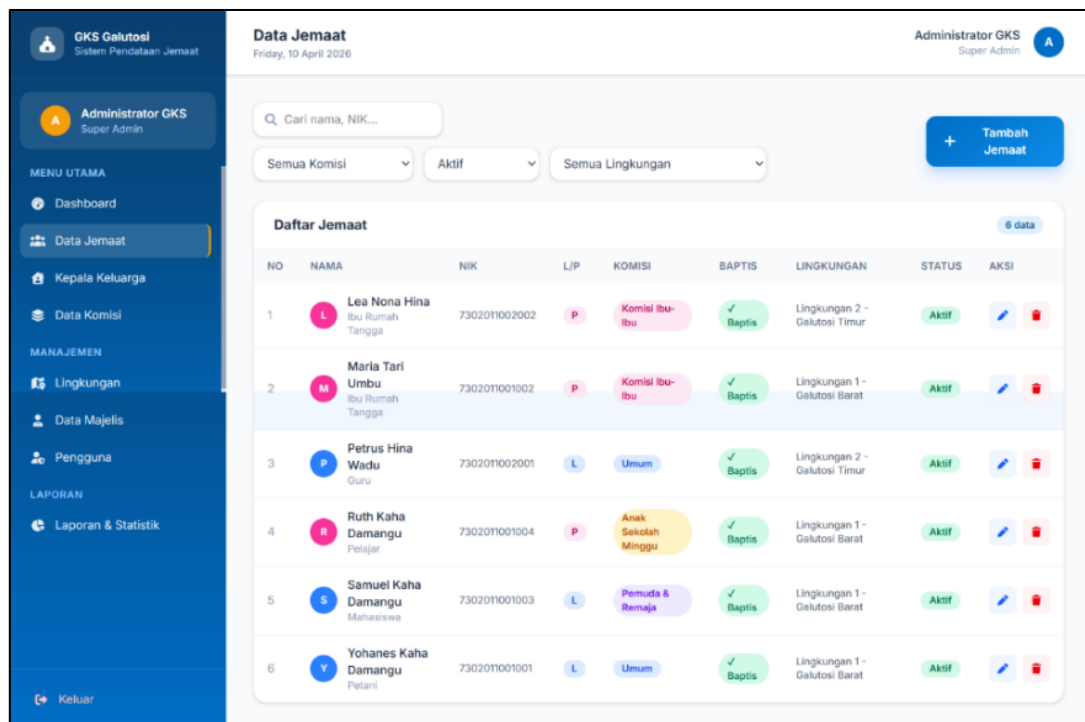


Fig. 4: Congregation Data Menu Display

Fig. 4 shows the Congregation Data page, which is equipped with a search feature based on name or National Identity Number (NIK), filters based on commission, member status, and neighborhood, and complete CRUD (Create, Read, Update, Delete) operations. The congregation data entry form contains complete fields, including NIK, full name, gender, place and date of birth, address, phone number, marital status, education, baptismal and confirmation (sidi) status along with their respective dates, occupation, commission, member status, neighborhood, family head, family relationship, and remarks.

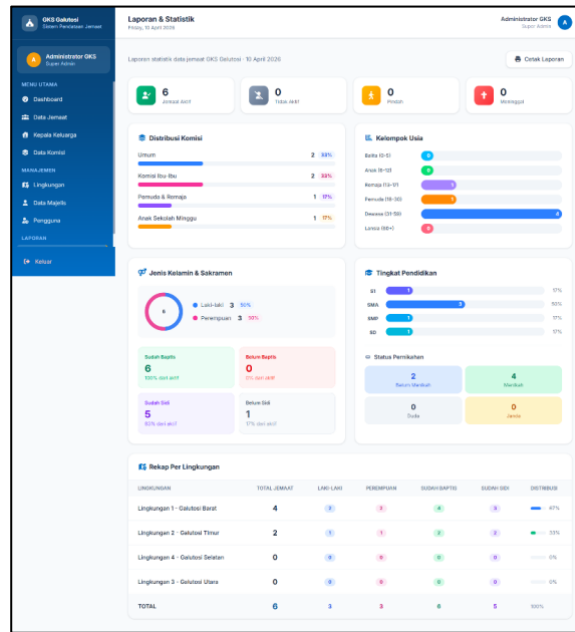


Fig. 5: Report and Statistics Menu

Fig. 5 shows the Report and Statistics menu, which presents a comprehensive recapitulation of congregation data in the form of bar charts of distribution by commission, age-group charts, pie charts of gender distribution, sacramental status, education level, and marital status, and a recap table by neighborhood, complemented by a print feature for generating physical reports.

3.2. Black Box Testing

Black Box Testing was carried out on 21 scenarios covering all of the system's main functions. A summary of the test results is presented in Table 1.

Table 1: Summary of Black Box Testing Results

No.	Function Tested	Test Scenario	Expected Result	Test Result	Remarks
1	Login (Church Secretary)	Entering correct username and password (Sekretaris/password)	System displays a login-success message and redirects to the Dashboard page	System successfully logs in and displays the Dashboard	✓ Passed
2	Failed login	Entering an incorrect username or password	System displays an error message and returns to the login page	System displays "Incorrect username or password"	✓ Passed
3	Login with empty fields	Clicking the login button without filling in username and password	System displays a validation message that fields cannot be empty	System displays a validation message on the empty fields	✓ Passed
4	Dashboard access	Secretary logs in and accesses the Dashboard page	System displays congregation statistics, commission/gender distribution charts, and the latest congregation table	Dashboard successfully displays all statistical information	✓ Passed
5	Add congregation data	Secretary fills in the add-congregation form with complete, valid data and clicks Save	System saves the new congregation data to the database and displays a success message	Congregation data successfully saved and shown in the list table	✓ Passed
6	Add congregation - empty required field	Secretary clicks Save without filling in required fields (Name and Gender)	System displays a validation message that required fields cannot be empty	System blocks submission and displays HTML5 validation	✓ Passed
7	Edit congregation data	Secretary clicks the edit icon on a congregation record, changes the data, and clicks Update	System updates the congregation data in the database and displays a success message	Congregation data successfully updated and the change is reflected in the table	✓ Passed
8	Delete congregation data	Secretary clicks the delete icon on a congregation record and confirms deletion in the confirmation dialog	System deletes the congregation data from the database and displays a success message	Congregation data successfully deleted and no longer shown in the table	✓ Passed
9	Congregation data search	Secretary enters a member's name keyword in the search field on the Congregation Data page	System filters and displays congregation data matching the entered keyword	Congregation data successfully filtered according to the search keyword	✓ Passed
10	Filter by commission	Secretary selects a specific commission from the filter dropdown on the Congregation Data page	System displays only congregation data belonging to the selected commission	Commission filter successfully filters data according to the selected commission	✓ Passed

No.	Function Tested	Test Scenario	Expected Result	Test Result	Remarks
11	Commission page access	Secretary accesses the Commission Data menu and switches between commission tabs	System displays congregation data corresponding to the active commission tab	Data per commission is displayed correctly according to the selected tab	✓ Passed
12	Add family head	Secretary fills in the add-Family-Head form with complete data and clicks Save	System saves the new Family Head data to the database and displays a success message	Family Head data successfully saved and shown in the list table	✓ Passed
13	Add neighborhood	Secretary fills in the add-Neighborhood form and clicks Save	System saves the new neighborhood data and displays a new neighborhood card	Neighborhood data successfully saved and the new card is displayed	✓ Passed
14	Delete a neighborhood containing members	Secretary attempts to delete a neighborhood that still has associated congregation data	System displays an error message that the neighborhood cannot be deleted because it still contains congregation data	System blocks the deletion and displays the appropriate error message	✓ Passed
15	Add council data	Secretary fills in the add-council-member form with complete data and clicks Save	System saves the new council data to the database and displays it in the council list table	Council data successfully saved and shown in the table	✓ Passed
16	Report page access	Secretary accesses the Report and Statistics menu to view the congregation data recapitulation	System displays all statistical visualizations of congregation data, including distribution charts by commission, age, gender, education, and a recap per neighborhood	All statistics and visualizations are successfully and correctly displayed	✓ Passed
17	Print report	Secretary clicks the Print Report button on the Report and Statistics page	System opens the browser print dialog with a formatted, print-friendly report	Print dialog successfully opens with a neat, print-ready report layout	✓ Passed
18	Add new user	Secretary fills in the add-user form with complete data (name, username, password, role, and neighborhood) and clicks Add	System saves the new user data with an encrypted password (BCRYPT) and displays it in the user list table	New user successfully added and able to log in to the system	✓ Passed
19	Add user - duplicate username	Secretary attempts to add a new user with a username that already exists in the system	System displays an error message that the username is already in use, and the user is not added	System blocks the addition and displays "Username already in use"	✓ Passed
20	Neighborhood Secretary access rights	Neighborhood Secretary logs in and attempts to access restricted menus (Neighborhood, User Management)	System does not display menus restricted from the Neighborhood Secretary and redirects to a page appropriate to their access rights	Restricted menus are not displayed, and the Neighborhood Secretary can only access permitted menus	✓ Passed
21	Logout	Secretary clicks the Logout menu on the sidebar and confirms logout in the confirmation dialog	System ends the user session, deletes session data, and redirects back to the login page	Session successfully ended and the login page is displayed again	✓ Passed

Table 1 shows that all 21 test scenarios produced output consistent with the expected results, yielding a 100% test success rate. These results demonstrate that all system functions ranging from authentication and congregation data management to role-based access control and the logout process operated without errors. This finding is consistent with the statement of Shadiq et al. [7] that black box testing is an effective technique for verifying the conformity of system output with user requirements without needing to know the internal structure of the program code.

3.3. System Usability Scale (SUS) Testing

SUS testing was conducted with 12 respondents from the BPMJ and the Neighborhood Secretaries of GKS Galutosi, who are active users of the system. The respondents' assessment data are presented in Table 2.

Table 1: Respondent Assessment Data for SUS Testing

Resp.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total Score	SUS Score
R1	5	2	5	2	5	2	5	2	5	2	35	87.5
R2	5	1	5	2	5	1	5	1	5	1	39	97.5
R3	5	2	5	2	4	2	5	2	5	2	34	85
R4	5	1	5	1	5	1	5	1	5	1	40	100
R5	5	2	5	2	5	2	4	2	5	2	34	85
R6	5	1	5	2	5	1	5	2	5	1	38	95
R7	5	2	5	1	5	2	5	1	5	2	37	92.5
R8	5	1	5	2	5	1	5	1	5	1	39	97.5
R9	4	2	5	2	5	2	5	2	5	2	34	85

Resp.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total Score	SUS Score
R10	5	1	5	2	5	2	5	1	5	2	37	92.5
R11	5	2	5	1	5	1	5	2	5	1	38	95
R12	5	1	5	2	5	2	5	1	5	2	37	92.5
Mean SUS Score											92.08	

Table 2 presents the assessment data from 12 respondents on the 10 SUS statements. The average SUS score was calculated using the following formula:

$$\bar{x} = (87.5 + 97.5 + 85.0 + 100.0 + 85.0 + 95.0 + 92.5 + 97.5 + 85.0 + 92.5 + 95.0 + 92.5) / 12 = 1105.5 / 12 = 96.88$$

The average SUS score of 96.88 is visualized in Fig. 6, which shows the position of this score on the SUS interpretation scale.

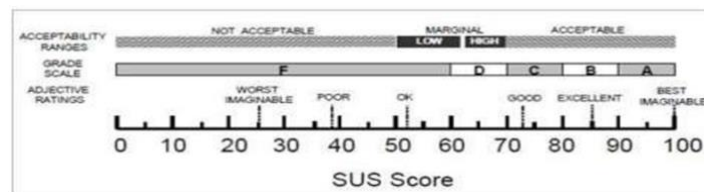


Fig. 6: Interpretation of the SUS Score on the Grade Scale

Fig. 6 shows that the average SUS score of 96.88 falls within the range above 80.3, placing it in Grade A (Excellent) with an "Excellent" category. This result indicates that the GKS Galutosi congregation data information system has a very high level of usability. Users rated the system as easy to use, with a consistent interface and well-integrated features, and the majority of users were able to quickly understand how to operate the system without intensive training. This score exceeds that obtained by Sundari et al. [8] in a similar church information system study, which achieved an SUS score of 85, indicating the success of the interface design in this study. Thus, the GKS Galutosi congregation data information system has met a very good usability standard and is ready to be fully implemented in the congregation data collection process, replacing the previous manual process which required one to two months with a much faster and more accurate procedure.

4. Conclusion

The website-based congregation data information system for GKS Galutosi has been successfully designed and developed using PHP Native, MySQL, and Tailwind CSS with the Rapid Application Development (RAD) method. The system is capable of digitally managing the data of 671 congregation members and replaces the previous manual recording process which required one to two months with a much faster and more accurate procedure. The system is equipped with CRUD-based congregation data management features, grouping by commission, management of family head, neighborhood, and council data, and a comprehensive report and statistics module. A role-based access control mechanism with two user roles ensures that data security and integrity are maintained. The results of Black Box Testing on 21 scenarios showed a 100% success rate, and SUS testing with 12 respondents yielded an average score of 96.88 (Grade A/Excellent), demonstrating that the system has met a very good usability standard and is ready for full implementation at GKS Galutosi.

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