



Web-Based Regional Map Repository System for Administrative Boundaries Survey Management

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ABSTRACT

Purpose – This study aims to design and implement a web-based regional map repository system to improve the management of administrative boundary survey archives at the Central Statistics Agency (BPS) of Bogor City. The study addresses the limitations of conventional physical archiving, including poor document traceability, potential data loss, damaged map records, and inefficient monitoring of map borrowing activities.

Methods – The system was developed using the Rapid Application Development (RAD) method through requirements planning, user design, construction, and cutover stages. Data were collected through semi-structured interviews, direct observation, and literature review. The system was built using Laravel 12, PHP, MySQL, and deployed through a local server environment. System design was modeled using UML, while evaluation was conducted using black-box testing and the System Usability Scale (SUS) involving 10 respondents.

Findings – The system integrates WA and WS map repositories, document borrowing history, role-based access, regional data management, and SLS merging and splitting features. Black-box testing showed a 100% success rate across all tested functional scenarios. The SUS evaluation produced an average score of 79 out of 100, categorized as “Good” and “Acceptable.”

Research implications – The findings are limited to one local BPS institution and a small usability sample. Further testing, including load and stress testing, is required to assess scalability and resilience.

Originality – This study offers an integrated repository model combining map archiving, administrative boundary management, and transaction-based tracking for local e-government archive transformation.

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INTRODUCTION

The implementation of digital systems in government institutions has become essential to improve data management, accessibility, and administrative efficiency. In this context, archiving management systems are very important for making sure that an agency's information can be accessed, monitored, and used effectively to make decisions [1], [2]. At the non-ministerial government agency level, the Central Statistics Agency (BPS) of Bogor City is responsible for managing statistical data archives and supporting documents, including regional map records generated from field survey activities [3], [4]. These map documents are continuously updated to reflect changes in population distribution and administrative boundaries, and serve as a vital component in maintaining the accuracy and sustainability of statistical data [5], [6].

In carrying out these regional mapping, Central Statistics Agency (BPS) conducts routine activities that include conducting censuses and various periodic socioeconomic surveys. To ensure effective data collection and management, the BPS utilizes operational instruments based on Statistical Work Areas (Wilkerstat). Wilkerstat is the smallest territorial division that defines the boundaries of each field officer's area of responsibility [7]. In the technical implementation of its mapping, this spatial data is represented through two main types of maps: the Administrative Area Map (WA) and the Statistical Area Map (WS). The WA map serves as a macro-level guide showing the official boundaries from subdistricts down to urban villages/villages. Meanwhile, the WS Map provides a much more detailed and dynamic spatial representation, covering the physical boundaries of Local Environmental Units (SLS) [8]. In real-world scenarios, the boundaries and attributes of this spatial data may change due to infrastructure development and population movements. This is evidenced by data from the Bogor City Central Statistics Agency (BPS), which recorded a population increase in Bogor City of 7,632 people between 2023 and 2024, representing a growth rate of 0.71% [9]. Therefore, to manage these spatial data changes, a system is needed that can record and archive maps effectively to facilitate the data-based decision-making process particularly in managing administrative boundaries surveys management.

However, BPS of Bogor City's management of map archives is still very conventional. For example, 3,933 Local Environmental Unit (SLS) map records are still kept and managed in physical form, with only limited digital support. Also, the distribution of these documents is not systematically recorded, so there is no way to trace the history of document usage. This has led to several important problems, a greater risk of data loss or damage, and inefficiency in tracking changes to administrative boundaries over time [10], [11], [12]. These limitations not only reduce operational efficiency but also create data inconsistencies, limit traceability, and potentially affect the accuracy of data-driven decision-making processes [13]. Therefore, the main issue lies in the absence of an integrated system capable of managing map archives in a structured, historical, and transaction-oriented manner.

To address these administrative challenges, the recent implementation of web-based information systems has demonstrated significant success in modernizing bureaucratic workflows. For example, study [14] highlights the urgency of transitioning from manual methods to a computerized system at the Central Statistics Agency (BPS) of Pidie Regency. The study developed the Regional Potential Information System (SIPW) to address time inefficiencies and the risk of errors in the data processing process. The research findings demonstrate that the implementation of information technology can significantly accelerate the data collection process and improve the accuracy of data presentation, which is essential for formulating regional development policies.

In line with the urgency of preserving physical documents, [15] designed a web-based system for digitizing archival collections at the South Sumatra Provincial Archives Office by implementing the Rapid Application Development (RAD) framework. This study focused on mitigating the risk of damage to physical archives of historical value through the process of digital media conversion. The use of the RAD method and the Laravel framework proved effective in facilitating rapid system development while ensuring that key features remained consistent with the original proposal.

Based on these literature review, it is evident that the technological innovations offered are still implemented separately, each with its own functional limitations. For example, the study [14] on the

Regional Potential Information System proved effective, but its focus was limited solely to the centralization of regional data management without addressing the circulation of physical documents. On the other hand, the digital archiving system developed in [15] has not yet taken advantage of the ability to transparently track a document's usage history, particularly in protecting government data.

To address this research gap, this study proposes the design and development of a regional map repository system integrated with the administrative boundary surveys management. The uniqueness of this study lies in the integration of the map repository system, document borrowing with a tracking mechanism, and the administrative boundary management system into a single platform. By implementing strict data usage controls to ensure data security, this system introduces a new approach to managing administrative boundary surveys that was previously unavailable at the BPS of Bogor City.

This study was conducted to achieve academic, practical, and specific objectives. Academically, this study aims to contribute to the field of information systems by expanding the application of government data archiving systems using the Rapid Application Development (RAD) framework. Practically, this study seeks to provide solutions to support digital transformation initiatives in government agencies. Specifically, the proposed system is designed to improve operational efficiency, thereby supporting more accurate and accountable decision-making processes at the Central Statistics Agency (BPS).

METHOD

Research Stages

This study implements Rapid Application Development (RAD) framework to design, build, and evaluate the developed system [16]. As illustrated in Figure 1, the research was systematically executed through interconnected sequential phases. It commenced with qualitative field data collection involving targeted stakeholders to elicit foundational system requirements. These empirical inputs were systematically translated into structural specifications using Unified Modeling Language (UML) diagrams. The development process followed the RAD lifecycle, characterized by compressed, iterative software development cycles. Finally, the validation stage involved a dual-evaluation matrix: rigorous functional verification via Black Box testing and user-centric impression assessment using the standardized System Usability Scale (SUS) to ensure operational readiness [17].

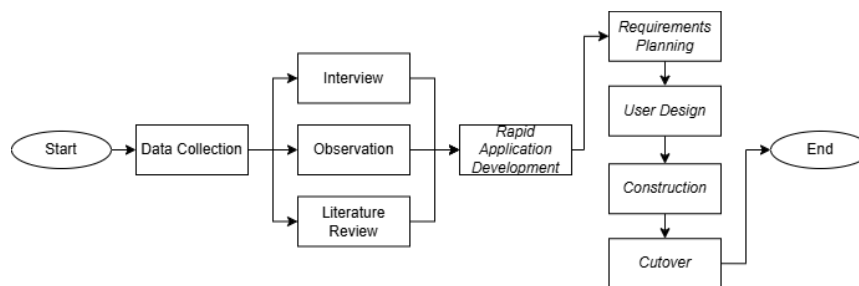


Figure 1. Research Stages

a. Data Collection

To establish a robust empirical foundation for system requirements, qualitative data collection was conducted within BPS of Bogor City. This process involved two primary field techniques supplemented by a literature review, adhering strictly to institutional data confidentiality protocols.

b. Semi-Structured Interviews

Interviews were conducted using a formal protocol focused on two primary thematic areas: legacy archiving bottlenecks and desired system functionalities. To capture both strategic and operational

perspectives, the interview was conducted with Mr. Bimo Nugroho, SST as a Survey Supervisor to define business objectives, data custody policies, and administrative tracking constraints.

c. Direct Observation

Direct observations were carried out within the BPS of Bogor City environment, guided by two Survey Supervisors (Mr. Rudi Susilo, SST and Mr. Bimo Nugroho, SST). Over the observation period, the research tracked the exact lifecycle of regional statistical documents from initial digital spatial data generation, through physical map plotting, to legacy storage across 3,933 Local Environmental Unit (SLS) units.

d. Literature Review

A rigorous review of internal BPS technical manuals, Wilkerstat guidelines, and academic publications on public sector e-archives was performed. This secondary data was utilized to ensure that the system's metadata structures aligned perfectly with national statistical mapping standards.

Rapid Application Development

This study employs the Rapid Application Development (RAD) method for system development, as described in [15] which has been shown to be an effective way of transforming government administrative processes. This is the reason why RAD was used in this study conducted at the BPS of Bogor City. By emphasizing the collaborative role among stakeholders in monitoring and evaluating the handling of various complex data, such as administrative boundaries data, survey results, and agency management data [18]. Given the relatively short timeframe, RAD was well-suited to the pre-survey period at the Bogor City BPS, allowing that time to be utilized for the development of this new system [19], [20]. The following stages are involved in the RAD method, as illustrated in Figure 2.

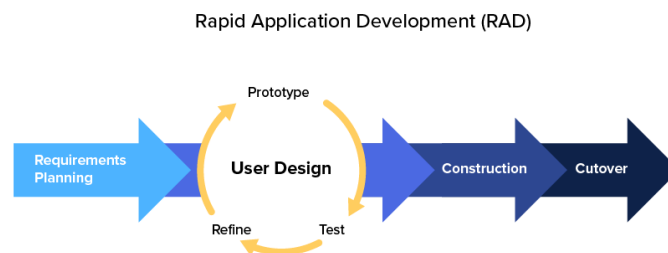


Figure 2. Rapid Application Development [11]

a. Requirements Planning

The analysis of problems and system requirements initiated the system development phase by gathering data through three stages of data collection at the BPS of Bogor City. This process aimed to acquire comprehensive specifications of the desired system requirements, identify business objectives, and analyze issues within the legacy system. Subsequently, these findings were utilized in Business Process Model and Notation as well with the analysis of functional and non-functional requirements to delineate user features, system processes, and reporting mechanisms.[21], [22].

b. User Design

This phase is the core component of RAD, in which various system prototypes are designed based on data obtained from the requirements planning phase, using Unified Modeling Language (UML) diagrams to clarify the development workflow [21]. The UML diagrams used include Use Case Diagrams that have been evaluated and adjusted 4 times, and Class Diagrams, that have been evaluated in stages through 4 evaluations and adjustments by the Supervisor until they meet the criteria.

c. Construction

Transforming the approved system design into a functional application is the focus in this phase. which involves data preparation carried out by migrating raw map data and related records into the database to ensure the system is populated with relevant information. It also involves writing the code using PHP with the Laravel 12 framework and MySQL based on the established system architecture prototype. Each developed feature, including map data management and transaction logging, is tested using Black Box Testing and System Usability Scale to verify that the system functions operate in accordance with the established requirements [23], [24], [25].

d. Cutover

The final phase aims to deploy the application developed in the previous phase onto the BPS local server. Orientation and training were also provided to stakeholders to educate them on implementing new workflows using the developed system.

RESULTS AND DISCUSSION

Requirements Planning

a. Proposed System Analysis

The results of the problem identification in the old system, obtained from field observations at the Central Statistics Agency (BPS) of Bogor City, are illustrated in Figure 3. The first stage begins when the supervisor prepares a routine monthly survey to observe and record changes in administrative boundaries in several areas, which is then carried out by field operators. Next, the field operators head out to conduct the survey, to obtain an updated Administrative Region (WA) and Local Environmental Unit (SLS) data which is then submitted to the Supervisor. The data received from the field operators is manually entered into Excel. From this data, the Supervisor can determine which areas require updated mapping, which is then instructed back to the operators to begin mapping the new areas in the field. In this process, the operators must borrow the original old-version map from the Supervisor as the initial template for mapping the new areas. Once the activity is complete, the operator must return the original map along with the new map that has been created. If accepted by the Supervisor, the Supervisor will record the new data and file the map in the archive shelf.

However, the findings of this observation indicate that the regional data recording system is still carried out conventionally, resulting in disorganized records. The lack of a system for monitoring and recording the borrowing of original maps has led to many field operators failing to take responsibility for safeguarding and returning maps borrowed from the archives. Furthermore, the physical archiving methods employed by supervisors have resulted in many maps being disorganized, damaged, or even lost, making the survey operational process inefficient. Therefore, it is necessary to transition from the old system to a new one through digitization, by conducting an analysis of the system's functional and non-functional requirements.

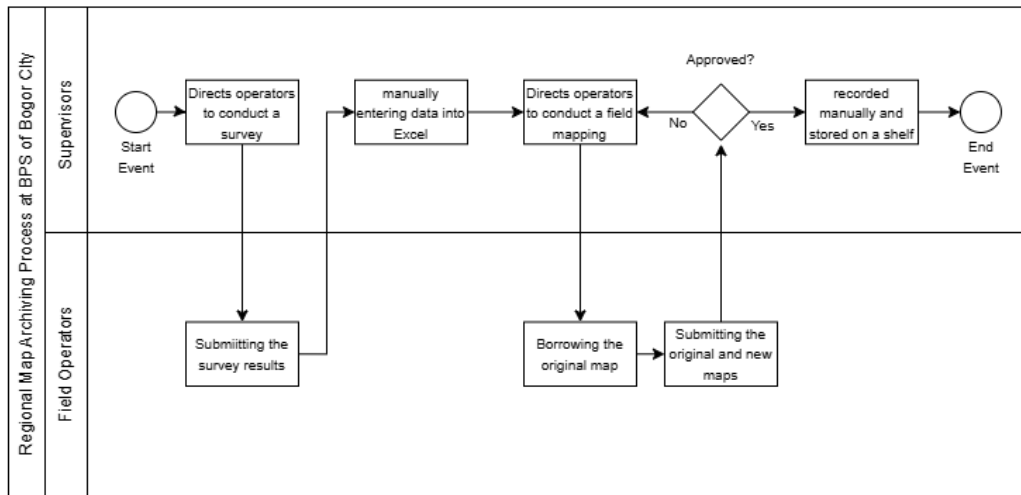


Figure 3. Old map archiving system at the BPS of Bogor City

In addressing these findings, Figure 4 illustrates the transition from the old system to the new computerized system. The key difference with this new approach is that supervisors no longer keep survey records on paper but instead use an app. Meanwhile, operators can now borrow digital maps through an app integrated with the map borrowing tracking system. Therefore, this system update helps reduce the use of physical documents and ensures document security through system monitoring.

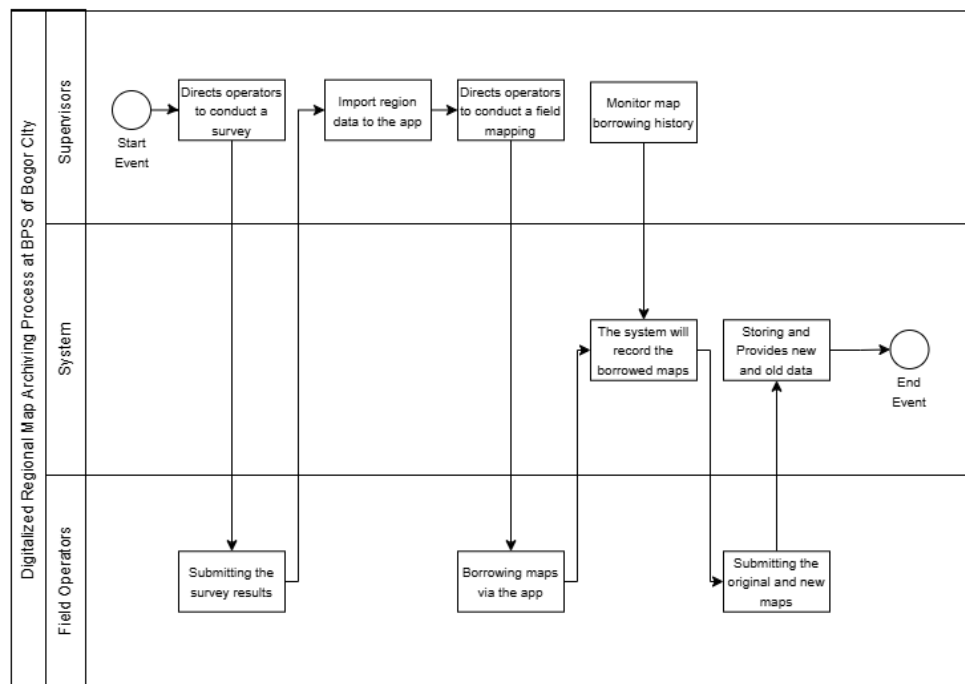


Figure 4. Digitalized map archiving process at the BPS of Bogor City

b. Requirements Analysis

The analysis of functional and non-functional requirements based on interviews with stakeholders is presented in Table 1.

Table 1. Functional and Non-Functional Requirements

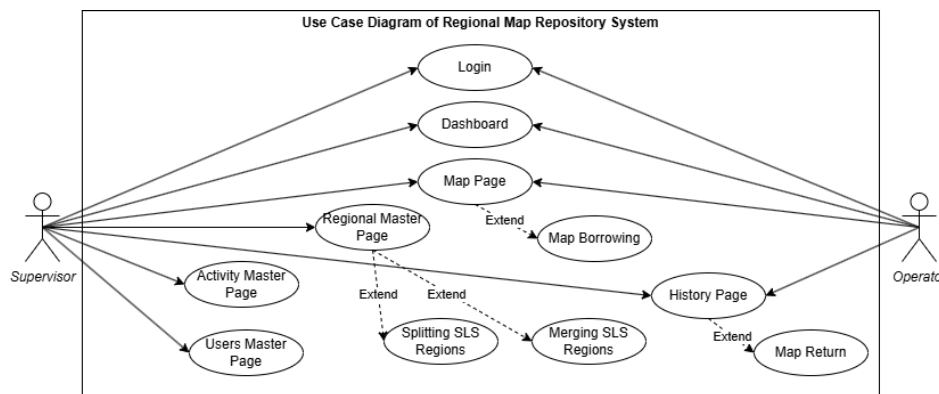
No	Functional	Non-Functional
1	Any user with access rights can log in to the system through the login page.	The system is web-based and can be accessed via the BPS of Bogor City's local server
2	The system can provide a dashboard page that is accessible to all users.	The system has a user-friendly interface that is easy to use by all actors.
3	The system can provide a repository of Administrative Area (WA) and Statistical Area (WS) maps, along with Create, Read, Update, and Delete (CRUD) features for Supervisors, and only print features for Operators.	The system shall ensure data protection through authentication mechanisms and controlled access.
4	The system grants Supervisors full access to and visibility of the history page, including the <i>cancel</i> and <i>return</i> buttons, while Operators have limited access and are granted only the <i>return</i> button.	The system is capable of handling the volume of data currently available.
5	The system is capable of providing supervisors with features for splitting and merging Local Environmental Unit (SLS) data.	The system shall operate consistently without failure and ensure data integrity.
6	The system provides supervisors with special access to master data management, such as regional data, user data, and activity data.	The data presented must be consistent with the operational data of the BPS of Bogor City.

User Design

At this stage, every stakeholders work together to evaluate the system design iterations using the Unified Modeling Language (UML) to illustrate the functional requirements of the system being developed [26]. The UML diagrams used at this stage include use case diagrams and class diagrams.

a. Use Case Diagram

Figure 5. Shows a Use Case Diagram depicting two actors at the Bogor City Statistics Agency (BPS) interacting with the developed system [27], [28]. The Supervisor and Operator each have their own login credentials. Both actors have access to the WA and WS map data repository pages; however, the Supervisor has full access rights, while the Operator is only permitted to view and borrow maps. Every map borrowed by each actor is automatically recorded on the tracking history page, but with different access rights: the Supervisor can view all borrowing history, while the Operator can only view their own borrowing history and is obligated to return the borrowed maps to the system. Additionally, the Supervisor can manage all master data, such as regional data, user data, and activity data.

**Figure 5.** Use Case Diagram

b. Class Diagram

Figure 6 illustrates various objects that represent the entities and classes that are interrelated within the system [29]. The diagram shows five classes: Regions, Map, mapTransaction, User, and Activity.

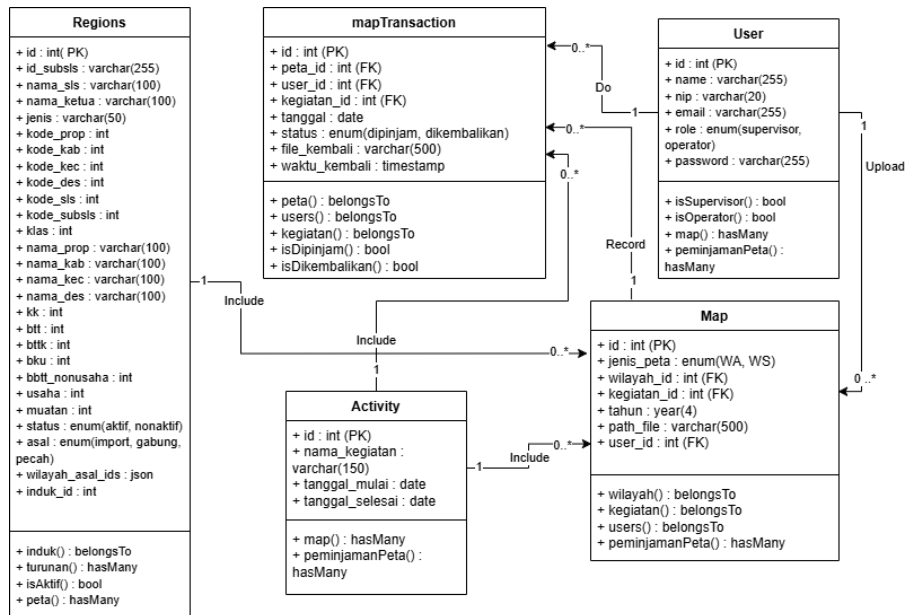


Figure 6. Class Diagram

Construction

a. User Interface

Figure 7 shows the login page that all users see before accessing the main page, which fulfills functional requirement 1 by granting access rights to each user. Each user is provided with login credentials an email address and password set up by the Supervisor based on staff data from the Bogor City BPS.

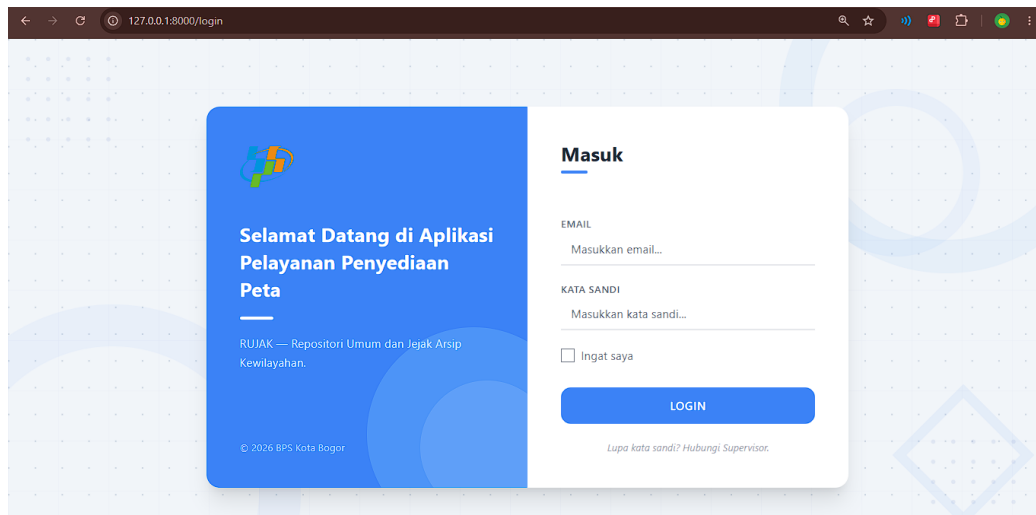


Figure 7. Login Page

To meet functional requirement number 2, a summary of data from all system activities is presented on the dashboard page, as shown in Figure 8. On this page, all users can view various information presented in the following sections:

1. **KPI Cards:** This card-shaped section contains a compilation of key metrics such as total area, total maps, total loans, and other information.
2. **Recent Activities/Logs:** This section contains the latest borrowing statuses recorded by users and is visible only to Supervisors. Additionally, there is a "Recent Activities" section visible to all users, which displays activity history based on the most recently uploaded maps.

3. Chart: This page features a bar chart comparing the number of SLS areas per subdistrict in the city of Bogor.

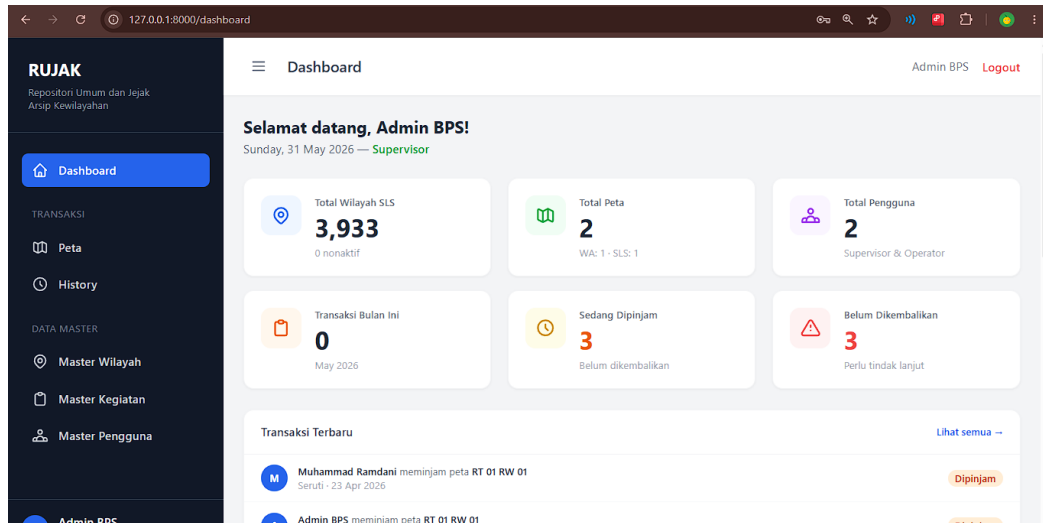


Figure 8. Dashboard Page

The map page shown in Figure 9 displays repository output for two types of maps, Administrative Areas (WA) and Statistical Areas (WS) as required by functional requirement number 3. Supervisors are granted full access to all features on this page, including Create, Read, Update, and Delete (CRUD) functions. Meanwhile, Operators are only granted access to retrieve data via the *print* button. In addition, the attributes of each map are classified based on region and activity. To distinguish between different versions of the maps presented, the period (year) attribute in the activity information serves as the reference. A filter feature is also included to help users find the maps they are looking for.

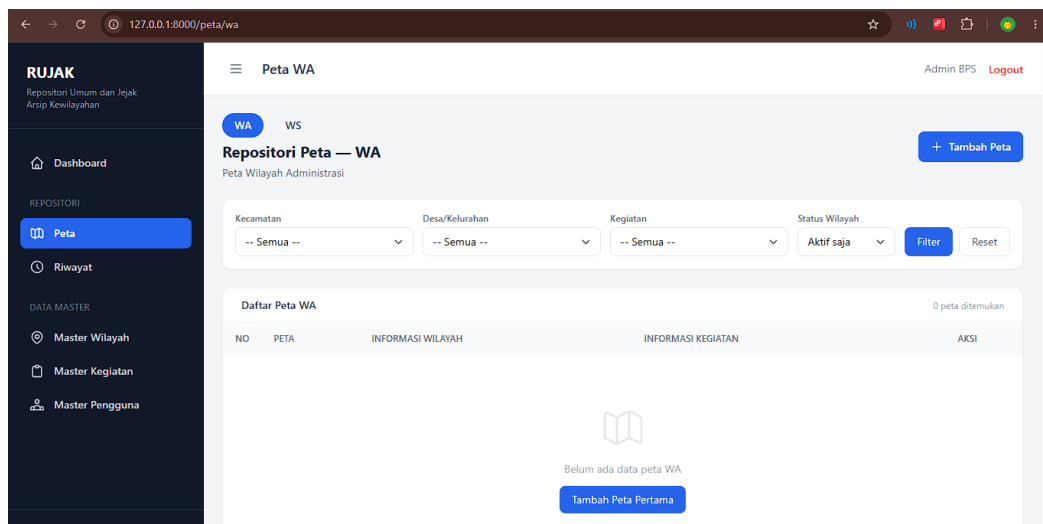


Figure 9. Map Page

All maps borrowed by users are automatically recorded on the history page, as shown in Figure 10. On this page, access rights to features are differentiated based on user roles, as described in functional requirement number 4.

1. Supervisor: Is provided with a summary of each user's borrowing history. Additionally, Supervisors have the authority to cancel a borrowing status.
2. Operator: Is only provided with their own borrowing history and does not have access to the cancellation button. Therefore, any requests to cancel a borrowing request must be reported to a Supervisor.

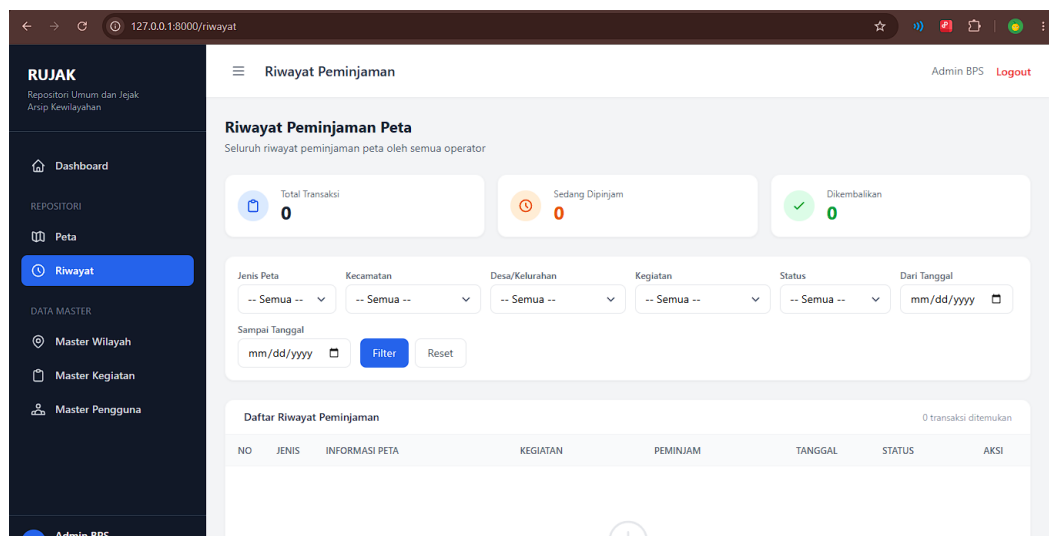


Figure 10. History Page

All attributes on the map are derived from administrative boundary data available on the region master page, as shown in Figure 11. This page is accessible only to Supervisors and provides various features for managing regional data, such as merging and splitting regions, as described in functional requirement number 5.

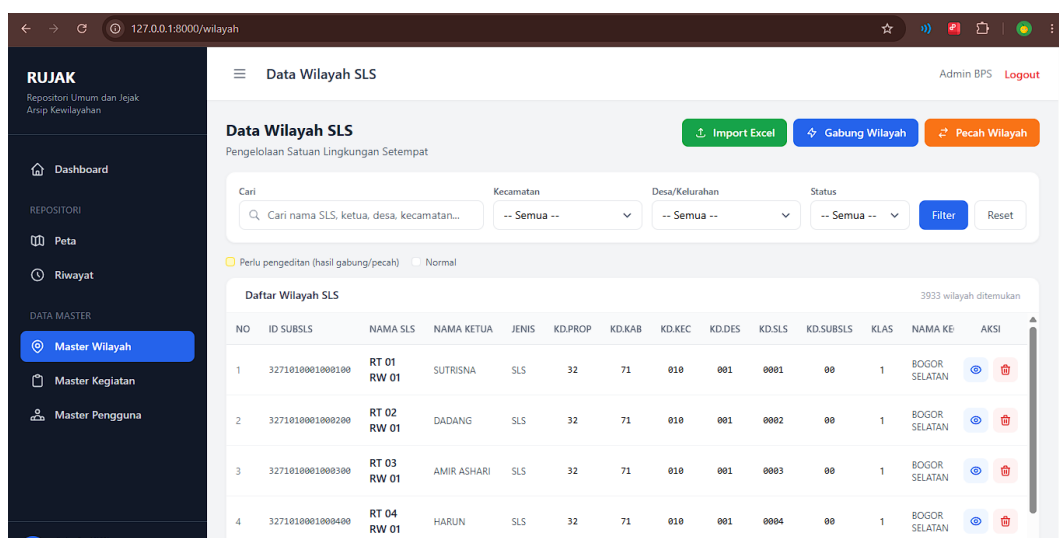


Figure 11. Regional Master Page

The activity master page shown in Figure 12 covers all survey activities conducted by the Central Statistics Agency (BPS) of Bogor City and is displayed as an attribute of each map presented. All master pages, including this one, can only be accessed by Supervisors, as described in functional requirement number 6.

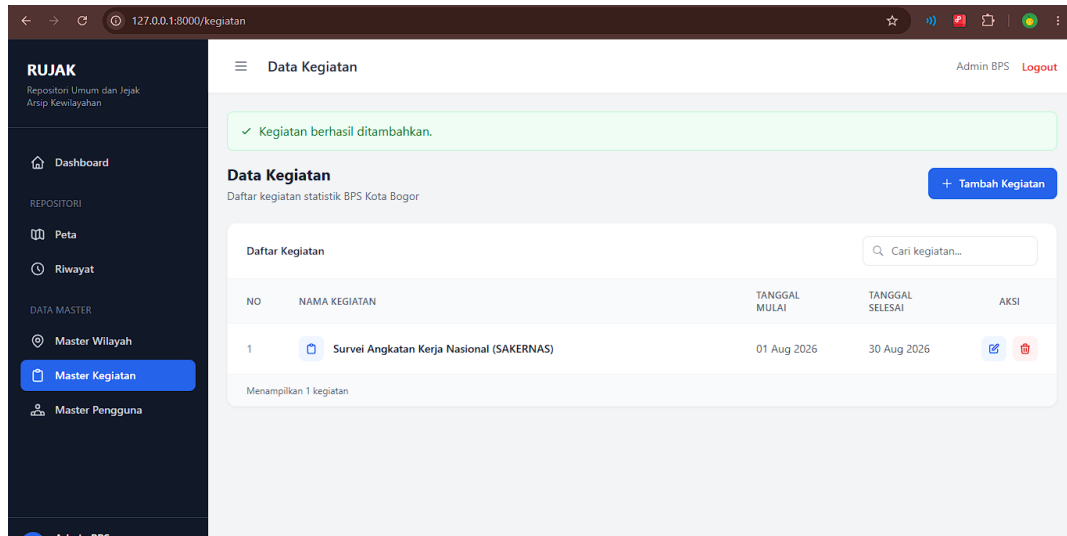


Figure 12. Activity Master Page

The page shown in Figure 13 contains all user data (Supervisors and Operators) and includes Create, Read, Update, and Delete (CRUD) features that are accessible only to Supervisors.

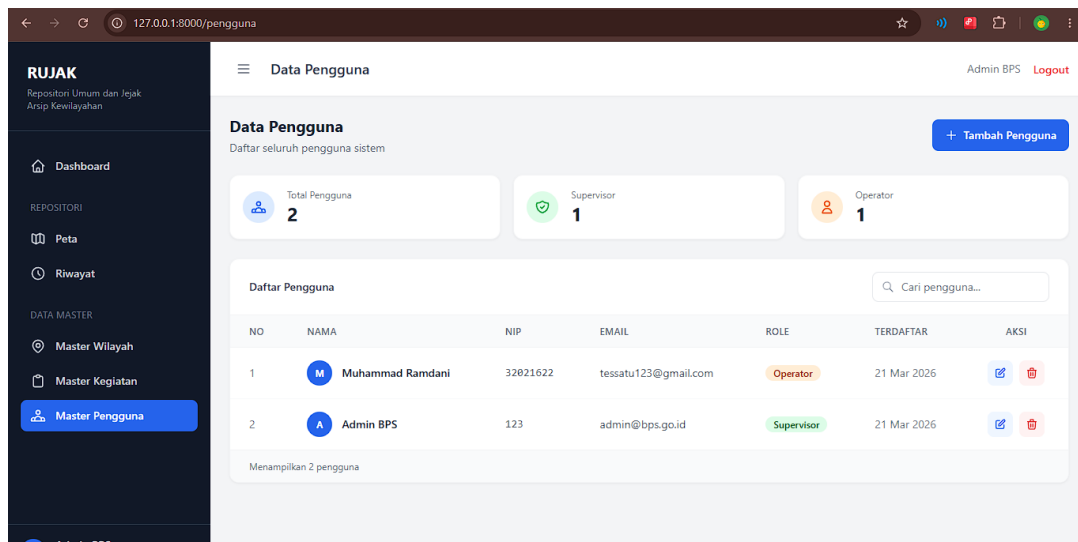


Figure 13. Users Master Page

b. Black Box Testing

Functional testing of the application developed during the construction phase was conducted using the Black Box Testing method. This testing method was chosen because it allows for testing the application's functional performance particularly its core features without requiring a deeper analysis of the internal code [23], [24], [25]. This phase aims to determine whether the application meets the criteria set by stakeholders. The results of this testing are presented in Table 2, based on feedback from the supervisor (Mr. Bimo Nugroho, SST) who have testing preferences based on operational procedures at the BPS of Bogor City.

Table 2. Black Box Testing Result

Tested Features	Test Scenarios	Expected Results	Status
Login	Submitting the user account into the login form	Users can log in to the system	Success
Logout	The user clicks the logout button	Users can log out of the system	Success
Dashboard	Clicking each stat card (total SLS region, total map, total transactions, and total users)	Navigated to each relevant page (map page, history page, region master page, and users master page)	Success

Tested Features	Test Scenarios	Expected Results	Status
Map Page	The supervisor uploads new maps, whether they are WA or WS	Uploaded maps appeared on the map management page (WA & WS)	Success
Map Page	Uploading a map in the wrong format (.docx) or with a file size exceeding 10MB	A validation error message appears	Success
Map Page	Borrow a map using the print button	A print dialog box appears and is automatically tracked to the history page	Success
History Page	Return the borrowed map using the "Return" button.	New maps from user input are displayed on the map page according to the map type.	Success
History Page	The supervisor clicks the "Cancel" button to cancel the borrowed maps for all tracked records	The selected record will be removed from the tracking system and the history page	Success
Regional Master Page	The supervisor imports Excel data into the regional master page	The input results appear according to the import template	Success
Regional Master Page	The supervisor merged several selected SLS regions into one using "merge" button.	Selected SLS regions are merged, and new regions become active while old areas become inactive	Success
Regional Master Page	The supervisor splits a selected SLS region into several other region using the "split" button.	Several new splitted SLS regions have formed and become active, while original region have become inactive	Success
Activity Page	The supervisor creates, reads, updates, and deletes activity records	Data can be accessed, added, edited, and deleted	Success
Users Page	The supervisor creates, reads, updates, and deletes other users' accounts	Data can be accessed, added, edited, and deleted	Success

c. System Usability Scale (SUS)

The System Usability Scale (SUS) is used to measure the usability of the developed system. To collect data, this instrument uses a questionnaire based on a 5-point Likert scale, ranging from a score of 1 (strongly disagree) to a score of 5 (strongly agree) [30]. The responses of the System Usability Scale (SUS) questionnaire using a Likert scale based on 10 questions from 10 respondents (2 supervisors and 8 operators) involved in survey procurement and records management at the BPS of Bogor City, are presented in Table 3.

Table 3. SUS Questionnaire Survey Responses

Respondents	Questions									
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
R1	4	1	5	2	4	2	4	2	4	2
R2	4	1	5	1	5	2	4	1	4	2
R3	4	2	4	2	4	2	4	2	4	2
R4	4	2	4	2	4	1	4	2	4	2
R5	4	2	4	2	4	2	5	2	4	1
R6	4	2	4	2	4	2	4	2	5	2
R7	4	2	4	2	4	2	4	2	4	2
R8	4	1	4	2	4	2	4	2	5	2
R9	5	2	4	2	4	1	4	2	4	2
R10	4	2	4	2	4	2	4	1	4	2

Based on the questionnaire responses, the average System Usability Scale (SUS) score was determined through a standardized, structured calculation process. First, the item score for each odd-numbered question was obtained by subtracting 1 from the raw response, while the item score

for even-numbered questions was calculated by subtracting the raw response from 5. The sum of these converted item scores for each individual respondent was then multiplied by 2.5 to normalize the total score to a base of 100. Finally, the cumulative scores across all participants were aggregated and divided by the total number of respondents to establish the final average SUS score for the system evaluation as shown in Table 4.

Table 4. System Usability Scale (SUS) Result

Respondents	Questions										Σ	SUS Score
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10		
R1	3	4	4	3	3	3	3	3	3	3	32	80
R2	3	4	4	4	4	3	3	4	3	3	35	87.5
R3	3	3	3	3	3	3	3	3	3	3	30	75
R4	3	3	3	3	3	4	3	3	3	3	31	77.5
R5	3	3	3	3	3	4	3	3	4	3	32	80
R6	3	3	3	3	3	3	3	3	4	3	31	77.5
R7	3	3	3	3	3	3	3	3	3	3	30	75
R8	3	4	3	3	3	3	3	3	4	3	32	80
R9	4	3	3	3	3	4	3	3	3	3	32	80
R10	3	3	3	3	3	3	3	4	3	3	31	77.5
Total											790	
Average SUS Score												79

Based on calculations using the System Usability Scale (SUS) formula, a score of 79 was obtained. This score indicates that the tested application or system received a “Good” rating on the adjective scale and falls into the “C” category. Meanwhile, in terms of the Acceptability range, this application falls into the “Acceptable” category. Based on these results, the designed repository system is considered suitable for use in accordance with the interpretation of the average SUS score shown in Figure 14.

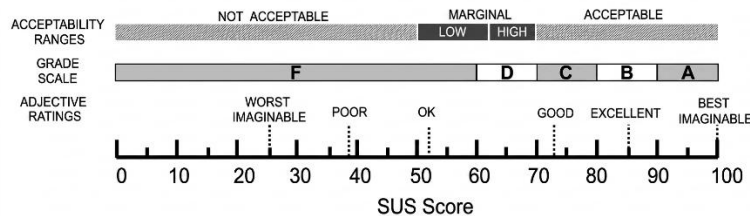


Figure 14. Interpretation of SUS Score Results [30]

Cutover

The deployment of the developed system was systematically executed within the local area network (LAN) infrastructure of BPS Kota Bogor. The production environment was configured utilizing an Apache, MySQL, and PHP architecture managed through XAMPP. The database migration process involved transferring the structured schema and complete data tables from the development environment into the BPS server database via phpMyAdmin. Concurrently, the application directories were deployed to the web server's root directory, and the environmental variables (.env) were calibrated to establish proper production parameters and secure database connectivity. Corresponding local host domain mappings were updated on client machines within the LAN to map the server's IP address. Following technical deployment, operational integration was achieved through sequential training sessions. The system architecture and modified administrative workflows were first introduced to the institutional supervisor, who subsequently conducted a secondary orientation session for four operators to ensure accurate user adoption.

Discussion

The empirical results demonstrate that transitioning from conventional physical custody to a web-based repository fundamentally modernizes administrative data governance at BPS Kota Bogor. Methodologically, the rapid and successful delivery of the prototype confirms that the Rapid Application Development (RAD) framework effectively mitigates software adoption failures in

public-sector offices through continuous user-feedback loops. Rather than operating as a passive database, the system restructures regional archive governance by enforcing an automated, digital chain of custody.

The contribution of this map repository system design lies in the integration of administrative boundary records (administrative regions and Local Environmental Units) tailored to local conditions and transaction-based tracking into a single platform. This active tracking system enforces accountability directly through its software architecture, ensuring a transparent audit trail whenever spatial documents are used by field operators. Furthermore, although this system does not provide analytical reporting or automated decision-support modules, it serves as a critical prerequisite for administrative accuracy. By ensuring strict data version control, this repository prevents the distribution of outdated maps, thereby maintaining the integrity of the baseline data required for regional socioeconomic surveys.

Despite these functional achievements, the prototype has technical limitations regarding long-term scalability and system resilience in a single regional office environment. The operational migration of large datasets poses ongoing risks, including database downtime, session timeouts, and disruptions during the upload process. To ensure long-term data preservation and accommodate ever-increasing data volumes, future research should scale this architecture to larger environments and conduct performance tests such as stress tests and load tests to measure the system's resilience and responsiveness. Integrating reliable database backup and recovery protocols, as well as adopting WebGIS visualization tools, will be the next major steps toward advancing the geospatial data governance infrastructure in a system designed to expand the utility of map management.

CONCLUSION

This study presents the development and initial validation of a web-based regional map repository system to modernize the management of administrative boundary surveys within the local-scale infrastructure like the Central Statistics Agency (BPS) of Bogor City. Utilizing the Rapid Application Development (RAD) framework, this development process integrated stakeholder input through iterative prototyping to align the application with the survey workflows at the BPS. By combining digital map archiving, document usage tracking, and administrative boundary management into a single platform, this system provides a structured alternative to conventional physical-based workflows. Although functional verification through black-box testing achieved a 100% success rate for predefined features, and the standardized System Usability Scale (SUS) yielded a "Good" (acceptable) usability score of 79 out of 100, these results represent an initial evaluation within a single institutional context. Therefore, the system's broader readiness and technical robustness still require further empirical validation such as stress test and load test to measure the system's resilience and responsiveness.

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AUTHOR CONTRIBUTION STATEMENT

MR conceptualized the research framework, collected data, developed the system using the RAD method, and wrote the manuscript. AL and CI oversaw the progress of the research, validated the system design, and reviewed the manuscript.

AI DISCLOSURE STATEMENT

This study utilized DeepL and Quillbot during the writing process to assist with translation and language checking. After using these services, the author thoroughly reviewed and edited the content as necessary and assumes full responsibility for the content of this publication.

REFERENCES

- [1] A. Wijaya and M. Saleh, "Sistem Pemerintahan Berbasis Elektronik (Spbe) dalam Mewujudkan Prinsip Good Governance pada Pemerintahan Daerah," *Jurnal Ilmu Hukum, Humaniora dan Politik*, vol. 5, no. 3, pp. 2154–2164, Jan. 2025, doi: 10.38035/jihhp.v5i3.
- [2] H. P. N. Soulthoni and M. Itasari, "The Implementation of Electronic-Based Archiving to Accelerate Government Digitalization in Indonesia," *Indonesian Journal of Innovation and Applied Sciences*, vol. 5, no. 1, pp. 49–57, Feb. 2025, doi: 10.47540/ijias.v5i1.1735.
- [3] S. Retno, R. K. Dinata, and A. Rahmadani, "E-Arsip Surat Tugas Pada Kantor Badan Pusat Statistik (BPS) Kabupaten Langkat Berbasis Website," *Jurnal Elektronika dan Teknologi Informasi*, vol. 4, no. 1, pp. 1–8, Mar. 2023, doi: 10.5201/jet.v4i1.401.
- [4] M. Sari and A. I. Purnamasari, "Sistem Informasi Arsip Surat Pada Badan Pusat Statistik Kab. Kuningan," *Jurnal Teknik Mesin, Industri, Elektro Dan Informatika (JTMEI)*, vol. 2, no. 1, pp. 143–160, Mar. 2023, doi: 10.55606/jtmei.v2i1.1287.
- [5] A. A. Y. Sukmatika, "Perubahan Struktur Demografis Indonesia: Tantangan & Rekomendasi," *Journal Humaniora: Jurnal Hukum dan Ilmu Sosial*, vol. 3, no. 1, pp. 27–31, Jan. 2025, doi: 10.37010/hmr.v3i1.62.
- [6] Muhaimin, L. Hakim, and A. Dharmawan, "Studi Desentralisasi dan Otonomi Daerah Analisis Pemekaran Daerah Otonomi di Indonesia Dalam Perspektif Undang Undang Nomor 23 Tahun 2014 untuk menciptakan pelayanan yang baik," *Journal of Law and Administrative Science*, vol. 2, no. 2, pp. 50–72, Nov. 2024, doi: 10.33478/jlas.v2i2.23.
- [7] Badan Pusat Statistik, "Berkenalan Dengan Pemutakhiran Kerangka Geospasial dan Muatan Wilkerstat," Badan Pusat Statistik Kota Manado. Accessed: Jun. 16, 2026. [Online]. Available: <https://manadokota.bps.go.id/id/news/2025/08/06/147/berkenalan-dengan-pemutakhiran-kerangka-geospasial-dan-muatan-wilkerstat.html>
- [8] Badan Pusat Statistik, "Pengenalan Kegiatan Wilkerstat SE2026," Badan Pusat Statistik Kota Makassar. Accessed: May 30, 2026. [Online]. Available: <https://makassarkota.bps.go.id/id/news/2025/06/17/25/pengenalan-kegiatan-wilkerstat-se2026.html>
- [9] Badan Pusat Statistik, "Jumlah Penduduk Menurut Kecamatan di Kota Bogor (Jiwa)," Badan Pusat Statistik Kota Bogor. Accessed: May 30, 2026. [Online]. Available: <https://bogorkota.bps.go.id/id/statistics-table/2/MTc0IzI=/jumlah-penduduk-menurut-kecamatan-di-kota-bogor--jiwa-.html>
- [10] A. Vatesia, F. P. Utama, N. Sugianto, and R. N. Turrahma, "Spatial Information System for Housing Data Collection at The Department Of Public Housing and Settlement Areas," *Jurnal Teknik Informatika (JUTIF)*, vol. 7, no. 1, pp. 720–729, Feb. 2026, doi: 10.52436/1.jutif.2026.7.1.5513.
- [11] D. R. Purnomo, I. D. Kurniawati, and L. Sofyana STT, "Design and Build a Quality Assurance Document Archiving Application Using the Rapid Application Development," *Journal of Computer Networks, Architecture and High Performance Computing*, vol. 5, no. 2, pp. 544–551, Jul. 2023, doi: 10.47709/cnahpc.v5i2.2521.
- [12] I. Zulfa, Salmandi, and Faradilla, "Birth Certificate Data Archive System with Web-Based Waterfall Method at the Population and Civil Registration Service of Central Aceh," *International Journal of Computer Technology and Science*, vol. 2, no. 3, pp. 30–40, Jul. 2025, doi: 10.62951/ijcts.v2i3.286.
- [13] K. Rahman, D. F. Adni, and M. A. T. P. Nasution, "Enhancing E-Government in Digital Transformation: Integrating Records Management and Digital Solutions in Pekanbaru, Indonesia," *Otoritas: Jurnal Ilmu Pemerintahan*, vol. 14, no. 2, pp. 262–276, Aug. 2024, doi: 10.26618/ojip.v14i2.12374.

- [14] E. Salfitri, L. Ahmad, and R. Akbar, "Sistem Informasi Potensi Wilayah pada Badan Pusat Statistik Kabupaten Pidie: Pengembangan dan Penerapan Teknologi Informasi untuk Efisiensi Pengolahan Data," *Jurnal Manajemen Sistem Informasi (JMASIF)*, vol. 3, no. 1, pp. 1–11, Jan. 2024, doi: 10.59431/jmasif.v3i1.459.
- [15] I. Z. Yadi, I. Effendy, Fatmasari, and Afriyudi, "Modernisasi Koleksi Arsip: Digitalisasi Berbasis Web Untuk Arsip Provinsi Sumatera Selatan Menggunakan Model Rad," *Jurnal Ilmiah BETRIK : Besemah Teknologi Informasi dan Komputer*, vol. 15, no. 03, pp. 546–553, Dec. 2024, doi: 10.36050/7jxpeg15.
- [16] S. Aryanto, Destriarini, and A. Rahman, "Membangun Aplikasi Web E-Arsip Jurnal Dosen: Integrasi Metode RAD pada Program Studi Informatika," *Jurnal Kajian Ilmu dan Teknologi (JKIT)*, vol. 1, no. 1, pp. 1–8, Sep. 2024, doi: 10.71200/jkit.v1i1.1.
- [17] R. D. Wijaya, N. A. R. Akbar, and S. Rokhmah, "The Implementation of a Web-Based Library Management Information System Using Barcodes at Al-Islam Vocational High School Surakarta: A Research and Development (R&D) Approach," *Journal of Artificial Intelligence and Engineering Applications*, vol. 4, no. 3, pp. 2488–2501, Jun. 2025, doi: 10.59934/jaiea.v4i3.1199.
- [18] M. Y. Safira, R. Sayekti, and M. Fathurrahman, "Analisis Kegunaan Situs Website Perpustakaan Khusus Badan Pusat Statistik Provinsi Sumatera Utara dengan Menggunakan System Usability Scale," *Da'watuna: Journal of Communication and Islamic Broadcasting*, vol. 4, no. 3, pp. 952–961, Apr. 2024, doi: 10.47467/dawatuna.v4i3.732.
- [19] G. C. Rorimpandey, N. A. Rombon, and Q. C. Kainde, "Web-Based Attendance and Leave Management System with Sequential Search Implementation at Tondano Religious Court," *Jurnal Teknik Informatika (Jutif)*, vol. 7, no. 1, pp. 185–200, Feb. 2026, doi: 10.52436/1.jutif.2026.7.1.4896.
- [20] H. A. Kurniawan, A. Prihadyatama, S. Wi. Nugroho, and D. D. Kurniawati, "Design and Development of a Web-Based Financial Reporting Application for UD Jaya Abadi, Magetan," *International Journal of Computer Technology and Science*, vol. 2, no. 4, pp. 15–20, Oct. 2025, doi: 10.62951/ijcts.v2i4.322.
- [21] A. Wicaksono, D. S. T. Manalu, V. B. Sebayang, A. J. Pratama, M. A. Pamungkas, and A. S. Puspa, "Geographic Information System for Land Suitability Mapping of Partner Farmers at Okiagaru Indonesia Agricoop Using Rule-Based System and Prototype Methodology," *Jurnal Teknik Informatika (JUTIF)*, vol. 7, no. 2, pp. 2723–3863, Apr. 2026, doi: 10.52436/1.jutif.2026.7.2.5471.
- [22] C. N. M. Bawole, S. C. Kumajas, and Q. C. Kainde, "Digitalisasi Kelurahan Kotobangon Berbasis Web Menggunakan Metode Rapid Application Development," *iSmartEdu: Jurnal Pendidikan Teknologi Informasi*, vol. 4, no. 1, pp. 77–96, Jun. 2023, doi: 10.53682/ise.v4i1.7942.
- [23] L. Nilawati and Martin, "Penerapan Metode RAD Pada Perancangan Sistem Informasi Permohonan Data Aduan Smartmaps Berbasis Web," *JURIKOM (Jurnal Riset Komputer)*, vol. 10, no. 2, pp. 648–658, Apr. 2023, doi: 10.30865/jurikom.v10i2.6041.
- [24] F. S. Fadilah and G. P. Insany, "Perancangan dan Implementasi Sistem Pengelolaan Data Keuangan di Badan Pusat Statistik Kota Sukabumi," *Jurnal Pengabdian Masyarakat Mentari*, vol. 2, no. 9, pp. 445–457, Mar. 2026, doi: 10.59837/jpmm.v2i9.271.
- [25] R. J. Meliala *et al.*, "Web-Based Financial Information System Testing of PT Perta Sakti Abadi Using the Black Box Testing Method," *International Journal of Computer Technology and Science*, vol. 2, no. 1, pp. 58–66, Dec. 2024, doi: 10.62951/ijcts.v2i1.129.
- [26] S. Narulita, A. Nugroho, and M. Z. Abdillah, "Diagram Unified Modelling Language (UML) untuk Perancangan Sistem Informasi Manajemen Penelitian dan Pengabdian Masyarakat

- (SIMLITABMAS),” *Bridge : Jurnal publikasi Sistem Informasi dan Telekomunikasi*, vol. 2, no. 3, pp. 244–256, Aug. 2024, doi: 10.62951/bridge.v2i3.174.
- [27] S. Syauqi and S. Suendri, “Information System Design of Web-Based Document Archives Management In The Office Bappeda of North Sumatra Province,” *Journal of Information Systems and Technology Research*, vol. 1, no. 1, pp. 7–17, Jan. 2022, doi: 10.55537/jistr.v1i1.66.
- [28] I. P. Sari, I. H. Batubara, Al-Khowarizmi, and P. P. Hariani, “Perancangan Sistem Informasi Pengelolaan Arsip Digital Berbasis Web untuk Mengatur Sistem Kearsipan di SMK Tri Karya,” *Wahana Jurnal Pengabdian kepada Masyarakat*, vol. 1, no. 1, pp. 18–24, Jul. 2022, doi: 10.56211/wahana.v1i1.101.
- [29] P. D. A. Putra, I. G. P. K. Juliharta, and I. N. Purnama, “Perancangan Sistem Informasi Pengarsipan Dokumen Berbasis Website Pada Sekolah Dasar Negeri 22 Dauh Puri,” *JATI (Jurnal Mahasiswa Teknik Informatika)*, vol. 8, no. 1, pp. 872–879, Mar. 2024, doi: 10.36040/jati.v8i1.8887.
- [30] F. B. S. Erman, Azhari, and A. A. Hendriadi, “ANALISIS USABILITY PADA APLIKASI UNSIKA CONNECT MENGGUNAKAN METODE SYSTEM USABILITY SCALE (SUS),” *Jurnal Informatika dan Teknik Elektro Terapan*, vol. 13, no. 3, Jul. 2025, doi: 10.23960/jitet.v13i3.6823.