

An Integrated Web System for National Indonesian Number (NIK) Based Zakat Eligibility Verification Geospatial Mustahik Mapping

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Abstract

Inefficiencies in zakat management, particularly in eligibility verification and beneficiary distribution, remain a critical challenge due to fragmented data and manual processes. Existing systems rarely integrate identity-based verification with spatial analysis, resulting in delays, inaccuracies, and limited transparency. This study aims to develop and evaluate an integrated web-based zakat system featuring NIK-based eligibility verification and geospatial mustahik mapping to improve the management of Zakat Al-Mihnah. Using an Agile development approach, the system was iteratively designed based on user requirements identified through observation and literature review. The results demonstrate that the proposed system enhances data accuracy, accelerates verification processes, and improves the efficiency and transparency of zakat distribution. In addition, geospatial mapping enables more targeted and equitable allocation of funds. These findings highlight the system's potential as a scalable digital solution for strengthening accountability and decision-making in zakat management, while contributing to the advancement of technology-driven Islamic social finance systems.

Keywords: *Design and Development, Integrated Web-Based Zakat System, Mustahik Mapping.*

INTRODUCTION

Zakat plays a strategic role in Islamic social finance as a mechanism for wealth redistribution and poverty alleviation. However, in practice, zakat management—particularly in the context of Zakat Al-Mihnah—still faces significant operational challenges. Many institutions rely on partially manual systems that lead to data inconsistencies, delays in eligibility verification, and inefficiencies in distribution processes. In addition, fragmentation of data across institutions further complicates coordination and reduces transparency and accountability. Zakat is one of the five pillars of Islam and constitutes a mandatory obligation for every eligible Muslim who meets the prescribed nisab and haul requirements. Beyond its theological dimension as an act of worship, zakat embodies a profound socio-economic instrument aimed at reducing inequality, alleviating poverty, and promoting social justice.

In Indonesia, zakat management is institutionally coordinated by Badan Amil Zakat Nasional (BAZNAS), which operates at national, provincial, and district/city levels. Despite the institutional framework, the collection and distribution of zakat have not yet reached their full potential. According to the official report of Badan Amil Zakat Nasional (2022), the realized national zakat collection remains significantly below its estimated potential. One of the contributing factors is the limited integration of digital systems capable of comprehensively managing data on muzakki (zakat payers) and mustahik (zakat recipients) (Satria & Ariandi, Eky., 2025). This structural gap affects the effectiveness, transparency, and accountability of zakat distribution, particularly for zakat al-Mihnah, which has high potential in urban centers (Pratama, H., Kurnianti, A., & Setiawan, A., 2021).

The management of professional zakat in this city is still largely conducted manually by mosques, Unit Pengumpul Zakat (UPZ), and the local branch of Badan Amil Zakat Nasional. Manual administrative practices frequently result in recording errors, duplication of mustahik data, slow

verification processes, and uneven distribution of funds. Moreover, the lack of integration between provincial and district/city databases increases the risk of overlapping assistance and limits the ability to monitor beneficiaries' socio-economic progress over time (Tazhdinov, M., & Hidayanti, N. F., 2025). These weaknesses indicate that conventional management mechanisms are no longer sufficient to address the complexity of zakat administration in a rapidly digitizing society (Rival Rinaldi, Romi Adetio Setiawan, & Syaifuddin, 2026).

Several recent studies highlight systemic issues in zakat governance at the local level. Lubis, Mahyerni, and Albahi (2025) found that transparency, accountability, knowledge, trust, and institutional reputation significantly influence the public's decision to pay zakat through BAZNAS. Their findings suggest that institutional credibility is closely tied to the quality of governance and information systems. Similarly, Noorbani (2024) observed that although zakat funds have been allocated to productive programs, many beneficiaries have not experienced substantial improvements in welfare due to intuitive and unsustainable empowerment models. These findings reveal two major limitations in previous practices: first, inadequate technological support for integrated data management; and second, the absence of systematic monitoring tools to evaluate the effectiveness of zakat distribution.

The integration of information technology into zakat management has been proposed as a strategic solution to enhance efficiency and reduce human error. Saputra and Pratama (2021) argued that technological utilization in zakat administration can minimize distribution inaccuracies and accelerate service delivery. However, most existing digital initiatives remain partial, focusing primarily on online payment services without fully integrating beneficiary mapping, verification systems, and cross-regional data synchronization. Consequently, while digital payment features may improve convenience for muzakki, they do not necessarily address deeper structural issues related to data validation, duplication prevention, and equitable distribution.

It has introduced several digital features to support zakat collection and reporting. On the muzakki side, these features generally include digital payment services, transaction history, and zakat calculation tools. On the mustahik side, the system supports beneficiary registration, eligibility verification, and basic monitoring of fund distribution. Although these features represent progress toward digital governance, several critical limitations remain. First, there is no standardized "zakat checking" mechanism comparable to financial credit checking systems, which would allow institutions to trace beneficiaries' assistance history and objectively assess eligibility. Second, data integration between provincial and district/city levels is not yet fully synchronized, increasing the risk of duplication or inaccurate targeting. Third, the absence of GPS-based location services limits accessibility for both muzakki and mustahik seeking the nearest zakat service point. Fourth, zakat calculators are not automatically integrated with verified income data, resulting in semi-manual calculations. Finally, mustahik do not yet have comprehensive digital access to submit applications, upload supporting documents, track application status, or update personal data in real time (Rinaldi, R., Setiawan, R. A., & Syaifuddin, 2026).

Existing solutions, therefore, demonstrate incremental improvements but fail to offer a fully integrated, intelligent, and responsive zakat management system. The main limitation of previous research and system implementation lies in the absence of a comprehensive web-based platform that simultaneously integrates muzakki services, mustahik verification, geospatial mapping, centralized data storage, and monitoring mechanisms within a unified architecture. Addressing this limitation requires not only technological adoption but also systematic system design grounded in data integration principles and user-centered functionality. The system is developed using the Laravel framework, which offers robust security architecture, modular structure, and efficient maintenance capabilities (Khanna, L., 2020). By utilizing Laravel, the system is expected to support centralized database management, secure authentication, scalable application programming interfaces (APIs), and structured development processes (Mary, T., & Febriyani, N., 2025). The proposed platform integrates digital payment services for muzakki, automated zakat calculation, zakat checking features, National Identification Number (NIK)-based verification, and geospatial mapping of mustahik distribution (Adi Imantoyo, Arnolis, & Helvin, S., 2024).

From the existing literature, it can be observed that there is still a gap in the development of an integrated zakat system that combines identity verification, data integration, and spatial mapping in a

unified platform. Prior studies tend to treat these components separately, leading to limited effectiveness in addressing real-world challenges in zakat governance. Therefore, a more comprehensive system is needed to ensure accurate targeting, efficient verification, and transparent distribution.

This study contributes to the literature by proposing an integrated web-based zakat system that incorporates National Indoe-based eligibility verification, zakat checking mechanisms, and geospatial mapping of mustahik within a single platform. This integration represents a key novelty by enabling more accurate identification of beneficiaries, reducing duplication of data, and supporting data-driven decision-making in zakat distribution.

Based on this gap, the objective of this study is to develop and evaluate an integrated web-based zakat system that enhances efficiency, accuracy, and transparency in the management of Zakat Al-Mihnah. The study is expected to provide both practical contributions for zakat institutions and theoretical insights into the advancement of technology-driven Islamic social finance systems.

METHODS

This study employed a Research and Development (R&D) approach using the Agile software development method. The R&D approach was selected to produce and evaluate a functional product in the form of an integrated web-based zakat system. Agile was adopted to enable iterative development through continuous feedback, ensuring that the system meets user needs effectively (Chao, 2020).

The subjects of this study consisted of: zakat administrators (amil) – responsible for managing muzakki and mustahik data, verification, and distribution processes, system users (operators) – staff who interact directly with the system during daily operations, and eExpert validators – comprising one information systems expert and one Islamic finance/zakat expert. User testing involved 10–15 participants with basic digital literacy and experience in administrative or zakat-related activities. This selection ensured that the system was evaluated from both technical and practical perspectives.

Data were collected using the following techniques: observation, to identify existing problems in manual zakat management processes; literature review, to establish theoretical foundations and system requirements; interviews, to capture user needs and system expectations; questionnaires: used in expert validation and user testing to assess system quality.

The system was developed following Agile stages, which include requirement Analysis – identification of system needs based on user input, system design – development of system architecture, database structure, and interface design, development (Iteration/Sprint) – coding and feature implementation, including NIK-based verification and geospatial mapping, testing – functional testing and debugging, and evaluation and Revision – improvement based on expert and user feedback.

RESULT AND DISCUSSION

Designing and Developing an Integrated Web-Based Zakat Application to Facilitate Zakat Al-Mihnah Payments.

This study was conducted at BAZNAS Provinsi Riau to design and develop an integrated web-based zakat application that facilitates effective and transparent payment of Zakat Al-Mihnah. The project began with an analysis phase, where the System Zakat Checking (SZC) was conceptualized as an innovative digital platform to integrate zakat distribution data across institutions, prevent double-dipping, improve the accuracy of mustahik records, and strengthen accountability from muzakki (donors) to beneficiaries.

During this stage, the researchers examined existing zakat management practices, identified system limitations, analyzed user requirements (donors and verification officers), evaluated zakat and mustahik data structures, reviewed distribution workflows, and defined both functional needs such as status checking, verification, inter-institutional data integration, and reporting and non-functional needs, including security, usability, system performance, and real-time web accessibility.

The design phase then translated these findings into a structured system blueprint, defining objectives, scope, web-based architecture, workflow models, database structures (covering muzakki, mustahik, aid history, and verification status), and user interface specifications. The design prioritized

data integration accuracy, prevention of overlapping assistance, transparency of zakat distribution, secure role-based access, and user-friendly interaction, establishing a clear foundation for the development and implementation of the SZC platform.

Actors and Roles in the System

The system involves five main actors. First, the Super Admin acts as the system owner and is responsible for verifying LAZ and RT/RW accounts. Second, the LAZ Admin manages institutional data, verifies assistance applications, and creates internal staff accounts. Third, the Head of LAZ serves as the authorized decision-maker who grants approval (ACC) and provides a digital signature. Fourth, the LAZ Finance Officer executes the disbursement of funds or assistance after receiving leadership approval. Fifth, RT/RW officers function as field coordinators who collect mustahik (beneficiary) data and submit assistance applications..

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Stage 1: Account Registration and Verification

Before the system can be used for transactions, users must complete the registration process and obtain approval. In the RT/RW registration process, users begin by opening the RT/RW registration page. They then complete the registration form by entering their email address and password, followed by their full name, official position, and RT/RW number.

Figure 1. Account Registration 1

They provide their complete address details, including Province, City, District, and Sub-district, to ensure accurate identification and verification within the system.

Figure 2. Account Registration 2

After completing the registration form, the applicant must upload the required documents, including a copy of their ID card (KTP) and a valid RT/RW appointment letter (Surat Tugas). The appointment letter must still be active, as the system grants a one-year validity period based on the submitted document to ensure proper authorization and accountability.

Figure 3. Account Registration 3

After completing the required information, click Register, and the account status will automatically be set to *Pending* until verification is completed. For LAZ (Amil Zakat Institution) registration, the user begins by opening the Register page and selecting the role as Admin LAZ. The applicant then enters the institutional details, including the LAZ name, operational level (Province or City), full address, and contact information. Required documents, such as the Deed of Establishment and Operational License, must be uploaded to validate the institution's legality. After clicking Register, the account status will also be set to *Pending* until it is reviewed and approved.

Figure 4. Account Registration 4

To verify new registrations, the Super Admin logs into the system and accesses the Dashboard, then navigates to the LAZ Verification or RT/RW Verification menu. The Super Admin reviews the list of applicants whose status is marked as *Pending* and clicks Detail to examine the submitted documents, such as the ID card, appointment letter, or operational license. After reviewing the data, the Super Admin selects Approve to activate the account or Reject if the information is invalid. Only accounts with Approved status are permitted to log in and access the system features.

Figure 5. Account Registration 5

To register as an Admin LAZ, open the Register page and select the role as Admin LAZ. Then, enter the required institutional details, including the LAZ name, operational level (Province or City), full address, and contact information to complete the registration form.

Figure 6. Account Registration 6

Click **Register**. The account status will change to *Pending*.

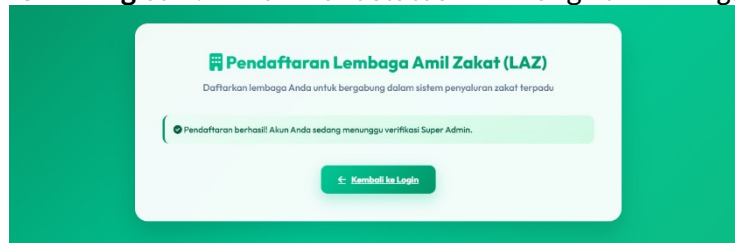


Figure 7. Account Registration 7

Verification by Super Admin

To begin the verification process, log in as Super Admin and access the Dashboard. From there, navigate to the LAZ Verification or RT/RW Verification section to view the list of applicants with *Pending* status. Select Detail to review the submitted documents, such as the ID card, appointment letter, or operational license, before making a verification decision. Only accounts with *Approved* status can log in and access system features.

STAGE 2: Internal LAZ Preparation

After the LAZ Admin account has been approved by the Super Admin, the Admin proceeds to prepare the internal team within the system. First, log in as Admin LAZ, then navigate to the User Management menu and click Add User to create staff accounts, including roles for the Head of LAZ and the LAZ Finance Officer. Next, access the Letterhead Settings menu through the designated button to upload the LAZ logo, enter the institution's name, address, and contact details for automatic document generation, and configure the document numbering format (for example, PM/*/*XII/2025) to ensure standardized and professional documentation.

STAGE 3: Assistance Application Process (Data Entry)

There are two channels for submitting assistance applications within the system. In Channel A, the RT/RW officer logs in and first checks the validity of the appointment letter (SK) on the dashboard, updating it if it has expired. The officer then selects Apply for Assistance, enters the beneficiary's (mustahik) data—including National ID number (NIK), name, family card number, economic information (occupation, income, dependents), and the type of requested assistance—and determines the location through geo-tagging by clicking "Get My Location" or selecting a point on the map to mark the beneficiary's residence. Required photos, such as the ID card, family card, and house condition, are uploaded before clicking Submit Application.

In Channel B, the LAZ Admin logs in, accesses the Incoming Applications menu, and selects Add Application. The Admin then enters the application title, category, applicant details, and requested

amount, uploads any supporting documents such as a proposal or request letter, and submits the application for further processing.

STAGE 4: Verification and Approval (Workflow Process)

It submitted data undergoes a tiered validation process to ensure accuracy and prevent duplication. In the first stage, the LAZ Admin reviews applications by opening the New Applications (submitted by RT/RW) or Incoming Applications menu. The Admin checks the completeness of the data, including required documents such as house photos and the applicant's NIK. A NIK analysis is then performed, where the system automatically verifies whether the applicant has recently received assistance from another LAZ to prevent double funding. If the data is valid, the Admin updates the status to Admin Approved, enters the recommended assistance amount, and adds verification notes. The system then automatically forwards the application to the Head of LAZ dashboard for final approval.

Approval by Head of LAZ

In the approval stage, the Head of LAZ logs into the system and accesses the Approval menu, where a notification appears if new applications are awaiting review. The Head carefully examines the application details, the Admin's recommendations, and the distribution map before making a decision. To proceed, the Head selects Approve or Reject and enters a secure passphrase as a digital signature. The system applies a cryptography-based digital signature rather than a handwritten image to ensure higher security and authenticity. If approved, the application status changes to Head Approved and is automatically forwarded to the Finance department for disbursement processing.

STAGE 5: Fund Disbursement (Finance)

In the disbursement stage, the LAZ Finance Officer logs into the system and opens the Disbursement menu to view applications that have already been approved. The officer selects an application and clicks Process Disbursement, then completes the disbursement form by choosing the method (bank transfer, cash, or goods), entering the final amount disbursed, specifying the disbursement date, and uploading proof of payment such as a handover photo or transfer receipt. After clicking Confirm Disbursement, the system automatically updates the status to Disbursed or Completed and records the transaction by deducting the corresponding balance in the cash flow report.

STAGE 6: Reporting and Monitoring

In the reporting and monitoring stage, the system provides comprehensive documentation and transparency features. Admin or Finance officers can generate and print disbursement receipts or official approval letters equipped with QR code validation to ensure authenticity. The Head of LAZ can download monthly financial reports in PDF or Excel format from the Reports menu to review total income and expenditure for performance evaluation. Additionally, the system supports public tracking, allowing beneficiaries or community members to check the status of assistance through the homepage by entering their National ID number (NIK). The system then displays the history of assistance received, with names partially masked to protect privacy and maintain data confidentiality.

Managing Assistance Applications Effectively and Accurately

This feature is designed to process assistance applications submitted directly to the Amil Zakat Institution (LAZ) office, rather than through community-based channels such as RT or RW. These applications include social activity proposals, incidental assistance requests, and submissions from walk-in applicants. This feature is essential to accommodate various types of requests that are not covered under the community-based submission mechanism, ensuring that all applications are managed systematically, efficiently, and accurately.

In the Incoming Application workflow, the process begins with the LAZ Admin, who receives physical documents or proposals and inputs them into the system. After logging in, the Admin opens the "Incoming Applications" menu, selects "Create New Application," and completes the form by entering the application title, selecting or adding a category (such as health, education, or economic

assistance), and filling in the applicant’s details, including name, identification number (if applicable), phone number, and full address.

The Admin then records the requested amount, provides a brief description of the purpose, uploads supporting documents (such as a PDF proposal or request letter), and submits the form. The application status is automatically set to *Pending*, awaiting leadership approval. The Head of LAZ then logs in, reviews the pending submission, examines attached documents, and makes a decision by approving or rejecting the request. The approved amount may be adjusted if necessary, and additional notes for the finance team can be added. To validate the decision, the Head enters a digital signature passphrase, after which the status changes to *Approved* and the request is forwarded to Finance.

The LAZ Finance Officer subsequently processes the disbursement by selecting the approved application, entering realization details such as disbursement method (cash, bank transfer, or e-wallet), date, uploaded proof of payment, and any additional notes, then confirming the transaction. The status updates to *Disbursed* or *Completed*. After disbursement, all parties can print an approval sheet containing the application details, approved amount, and a QR code for signature validation, while the complete digital record is securely stored in the history menu for audit purposes.

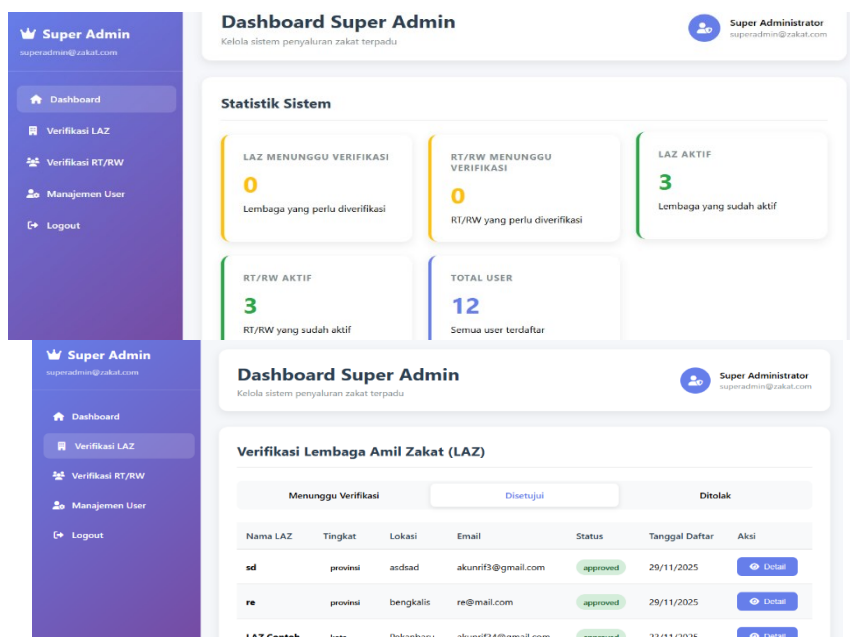


Figure 8. Super Admin

Financial Management Methods of LAZ (Amil Zakat Institution)

The financial management methods of a LAZ involve systematic procedures for collecting, recording, allocating, and reporting zakat funds in a transparent and accountable manner. These methods include documenting incoming funds (zakat, infaq, and sadaqah), verifying and approving disbursements, managing cash flow, and preparing periodic financial reports

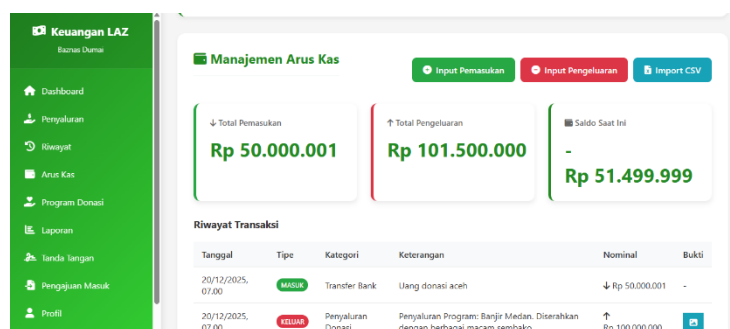


Figure 8. Financial Management Methods

Head of LAZ Dashboard

The Head of LAZ Dashboard is designed to support leadership decision-making and supervision of zakat management. Through this dashboard, the Head can review incoming applications, monitor verification results from the Admin, approve or reject requests using a secure digital signature, and oversee the status of fund disbursements.

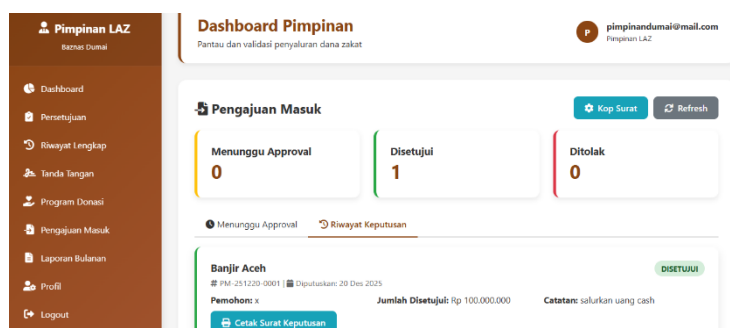


Figure 9. Head of LAZ Dashboard

The Head of LAZ Dashboard plays a crucial role in ensuring effective supervision, transparency, and accountability in zakat management. By providing clear oversight of approvals, fund distribution, and financial reports, the dashboard supports informed decision-making and strengthens institutional governance within the LAZ.

CONCLUSION

This study confirms that the development of an integrated web-based zakat system incorporating National Identification Number (NIK)-based verification and geospatial mustahik mapping represents a substantive advancement in zakat management. The findings show that the integration of identity validation and spatial analysis not only improves administrative efficiency, but also addresses fundamental challenges such as data duplication, verification delays, and inequitable distribution.

The primary contribution of this study lies in its ability to move beyond conventional digitalization toward a data-driven and integrated governance model in zakat management. By combining zakat checking mechanisms, identity-based verification, and geospatial analysis within a unified platform, this research offers a novel framework that enhances accuracy, transparency, and accountability in managing Zakat Al-Mihnah. The study highlights the importance of innovation in digital zakat systems to ensure more targeted, transparent, and effective distribution. Future research is recommended to expand system integration at the national level, incorporate real-time data synchronization, and explore advanced analytical approaches to further strengthen zakat governance.

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