JOURNAL DIGITAL TECHNOLOGY TREND
E-ISSN: 2963-8143, P-ISSN: 2963-9190
Volume 4 Number 2, December 2025, pp 63-75.
https://doi.org/10.56347/jdtt.v4i2.269.

KAWANAD Institute

Geographic Information System for Mapping Village Fund Development in Glumpang Baro District

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ABSTRACT
Rural development has become a strategic pillar in Indonesia's national agenda following the enactment of Village Law No. 6 of 2014, which empowers villages to manage resources and finances independently. Despite the significant increase in village fund allocations, challenges such as limited administrative capacity, lack of transparency, and data fragmentation persist, particularly in regions like Glumpang Baro Sub-District. This study developed a Geographic Information System (GIS) designed to map and monitor infrastructure projects funded by the village fund program. The system was constructed using the waterfall development model, employing PHP as the main programming language, MySQL as the database management system, and Google Maps API for spatial visualization. Data were collected through observation, documentation, and literature analysis to ensure system relevance and accuracy. The resulting web-based GIS enables centralized storage, real-time access, and transparent reporting of development activities for both administrators and the public. Empirical evaluation shows substantial efficiency improvements: operational costs decreased by 86%, data entry time by 80%, and workforce requirements by 40% compared to the previous manual approach. Beyond technical functionality, the system fosters participatory governance, accountability, and informed decision-making, providing a scalable model for digital transformation in local development management.

ARTICLE HISTORY
Received 13 February 2025
Accepted 15 Octobers 2025
Published 30 December 2025

KEYWORDS
Geographic Information System; Village Fund; Spatial Data; Web-Based Application; Rural Development.

1. Introduction

Rural development in Indonesia has become a central focus of national policy, particularly following the implementation of the *Village Law No. 6 of 2014*, which empowers villages to manage their own resources and become active agents of development. Through the allocation of *dana desa* (village funds), the government aims to improve public services, strengthen local governance, and stimulate community empowerment. The underlying objective is to transform villages from passive beneficiaries into autonomous units capable of initiating and managing development independently. However, despite this noble vision, various challenges persist, including uneven administrative capacity, limited transparency, and potential misuse of village funds (Mustanir, 2016; Sari, Arza, & Taqwa, 2019). Addressing these issues requires effective monitoring mechanisms and data-driven systems to ensure that village development remains accountable, equitable, and aligned with national goals. A critical aspect of rural development management is the availability of accurate spatial data. Spatial information—represented through digital mapping—serves as a foundation for land use planning, project monitoring, and resource allocation. The *Village Law*, Article 17 Paragraph 2, mandates that every village possess an official map delineating administrative boundaries to support planning and governance. To standardize these efforts, the National Geospatial Agency (*Badan Informasi Geospasial*) issued Regulation No. 3 of 2016 concerning the technical specifications of village map presentation. Nonetheless, the limited number of qualified spatial information personnel at local levels has impeded implementation (Setiawan, Haboddin, & Wilujeng, 2017). The Glumpang Baro Sub-District in Aceh Province exemplifies these challenges.

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Although the sub-district has substantial potential across agricultural and economic sectors, it lacks an integrated digital system to monitor development projects financed by village funds. The absence of spatial visualization tools hinders efficient tracking and evaluation of physical development progress. Therefore, a Geographic Information System (GIS) designed to map and manage village fund data is essential to improve accountability and facilitate informed decision-making.

This study seeks to design and develop a GIS-based application that visualizes village fund utilization and related development activities in Glumpang Baro Sub-District. The system aims to integrate spatial data from all villages into a centralized web-based platform using the Google Maps API for visualization. Built with PHP programming and MySQL databases, the platform allows administrators to input, analyze, and present spatially referenced data regarding projects funded by *dana desa*. Such an approach enhances data accessibility for both government officials and local residents, ensuring transparency and fostering public participation in development monitoring (Handayani, Piarsa, & Wibawa, 2015; Dewi, Satria, Yusibani, & Sugiyanto, 2017). Several previous studies have informed this research. Sukmono, Husodo, and Wijaningsih (2019) developed an online GIS application for managing village assets in Pati Regency, demonstrating its potential as a digital reference for planning and public information. Similarly, Cahyatie (2019) created a web-based system for mapping natural resources in the Riau Islands, combining interactive design and regional characteristics to display data effectively. Setiaji (2018) proposed a transparency system for monitoring village funds in Kudus Regency using an information retrieval algorithm, providing real-time access to financial information. Meanwhile, Susilowati (2017) designed a village website system to support data management of residents and financial resources, and Widodo (2016) developed a GIS to map the spatial distribution of physical development under the National Community Empowerment Program. Although these studies successfully applied GIS in various local contexts, few have specifically integrated spatial data with village fund management and development tracking at the sub-district scale—an area that this study seeks to address.

The theoretical foundation of this research lies in the concept of GIS as a computer-based system that stores, manages, analyzes, and visualizes data linked to specific geographical coordinates. According to Ramadhani, Anis, and Masruro (2013), GIS enables digital representation of geographic features, providing analytical insights into spatial patterns. Irwansyah (2013) emphasizes that GIS operates through multi-layered structures connecting spatial and attribute data, while Zhu, Wright, Wang, and Wang (2018) highlight the growing integration between GIS and building information modeling for data-level analysis. These principles underscore the importance of GIS in rural governance, where spatial awareness can enhance data accuracy, policy formulation, and resource management.The research employs a structured methodological framework consisting of several stages. Data collection includes literature review, direct observation, interviews, and online browsing to obtain relevant documentation and datasets concerning development projects in Glumpang Baro. Data analysis involves integrating field findings with structured specifications. The system design phase includes creating flowcharts, context diagrams, and database schema using ERD and DFD models to streamline logical workflows (Iqbal, Aprizal, & Wali, 2017). Application development follows the waterfall model, where each stage—requirement analysis, design, implementation, testing, and maintenance—is completed sequentially.

The implementation phase focuses on building the GIS platform using PHP and MySQL technologies (Afrizal & Fitriani, 2017; Maharani, Apriani, & Kridaklaksana, 2017), while testing employs the black-box method to ensure that all system functions operate as expected (Satria, Yana, Munadi, & Syahreza, 2017). The project was carried out over six months, from July to December 2019, encompassing proposal preparation, data collection, system construction, testing, and evaluation. The expected outcome is an interactive GIS-based application that supports local government in managing, monitoring, and reporting village fund projects efficiently. The system also aims to serve as a model for future development of web-based GIS tools applicable to other districts in Indonesia. In summary, this study contributes to enhancing transparency and efficiency in rural development management by integrating spatial data visualization with financial and project information. The proposed GIS application not only provides accurate and up-to-date representations of development activities but also strengthens the accountability framework of local governance. Through this innovation, Glumpang Baro Sub-District can utilize data more effectively to improve decision-making, ensure equitable resource allocation, and foster participatory rural development consistent with Indonesia's decentralized development agenda (Gunawan, 2011; Ibrahim, Taslim, & Rijal, 2018; Santosa, Sofyan, & Widiyastuti, 2015).

2. Methodology

Data serve as the foundation for information systems and scientific analysis. According to Rukajat (2018), data represent factual elements collected to describe a particular condition or phenomenon. Siyoto and Sodik (2015) add that raw data may consist of assumptions or observations that have not yet undergone analytical processing. Once data are systematically organized and interpreted, they evolve into information, knowledge, or even structured databases that support decision-making processes. Information, in this sense, is a processed form of data that conveys meaning and insight. Rukun and Hayadi (2018) define information as organized facts that enhance understanding and guide human behavior. Indrajit (2000) further explains that information can emerge from study, experience, or instruction, making it essential for effective decision-making. In information technology, the term refers to data that are stored, processed, or transmitted digitally to facilitate communication and management. Geography, as a discipline, examines spatial patterns and relationships among natural and human phenomena. Aksa, Utaya, and Bachri (2019) describe geography as the study of spatial similarities and differences in physical and human features on Earth's surface. Nugroho and Hastuti (2013) define it as the science of landforms, climate, population, and resources, while Marhadi (2004) emphasizes the spatial interaction between environment and society.

Derived from the Greek words *geo* (earth) and *graphein* (to write), geography can be interpreted as the systematic description of the Earth. An information system integrates people, technology, and processes to manage data efficiently. Indrajit (2000) identifies it as a system that provides managers with information for operational and strategic decisions. McLeod and Schell (2004) define it as a structured combination of individuals, technologies, and organized procedures. Anggraeni (2017) and Hutahaean (2015) highlight its managerial function, describing it as an organizational framework for processing daily transactions, generating reports, and supporting decision-making. Within this broader concept, a Geographic Information System (GIS) represents a specialized form of information system focused on spatially referenced data.

GIS is a computer-based tool designed to store, manipulate, and analyze geographic information (Ramadhani, Anis, & Masruro, 2013). It is structured through layers and relational models that connect spatial data with descriptive attributes (Irwansyah, 2013). Zhu *et al*. (2018) emphasize the analytical versatility of GIS, which allows for complex spatial visualization and integration with other data systems such as Building Information Modeling (BIM). Maharani, Apriani, and Kridaklaksana (2017) define GIS as a computer system used to store and analyze geographical data, while Satria *et al*. (2017) demonstrate its real-time application in environmental monitoring. Dewi *et al*. (2017) and Handayani, Piarsa, and Wibawa (2015) show that GIS can be effectively utilized for public service mapping and village development planning. Ibrahim, Taslim, and Rijal (2018) note its use in tourism spatial analysis, whereas Gunawan (2011) and Cahyatie (2019) highlight its capacity to display regional potential visually and interactively for development planning. Rural development funding in Indonesia is governed by Law No. 6 of 2014 on Villages, which acknowledges local autonomy in managing village affairs (Mustanir, 2016). Financially, village funds encompass all rights and obligations measurable in monetary terms (Istianto, 2009).

According to Government Regulation No. 60 of 2014, village funds are transferred from the national budget through regional budgets before being allocated to village governments. The amount is determined by several factors, including population, poverty rate, land area, and geographical difficulty (Mustanir, 2016). These allocations aim to promote equitable development across regions while maintaining accountability in fund management. The web-based system provides a practical technological platform for implementing GIS applications. A web is a network of interconnected computers communicating through various data transmission methods such as satellite signals, digital cables, and telecommunication lines (Santosa, Sofyan, & Widiyastuti, 2015). Fauzan, Indrasary, and Muthia (2018) describe the web as a data transfer medium enabling real-time communication across distances. Afrizal and Fitriani (2017) view it as a cost-effective means of digital interaction, while Satria *et al*. (2017) emphasize its integration with sensor systems for early warning applications. Prasetio (2014) defines a website as a collection of pages displaying text, images, animation, or multimedia content.

Static websites contain fixed content updated only by administrators, whereas dynamic websites enable user interaction and automated content updates (Iqbal, Aprizal, & Wali, 2017; Supriyanto, 2007). A database (basis data) is an organized collection of data stored electronically to facilitate retrieval and manipulation. The term “basis” denotes a repository or central storage (Lubis, 2016), while “data” refers to symbolic representations of real-world entities (Yanto, 2016). Databases support systematic operations such as creating, updating, and deleting records (Solichin, 2010). Pahlevi (2013) highlights that databases can store various types of information, including human, product, or event-related data, forming the core of information system applications. The Entity Relationship Diagram (ERD) is a modeling technique that visually represents data entities and their relationships (Purnamayudhia, 2015). ERDs are essential in designing logical database structures, ensuring that relationships between data objects are well-defined (Wijaya, 2016). According to Song, Evans, and Park (1995), relationships can be categorized as *one-to-one*, *one-to-many*, or *many-to-many* (Song & Froehlich, 1994). These diagrams facilitate communication between system analysts and developers by simplifying the conceptual design process.

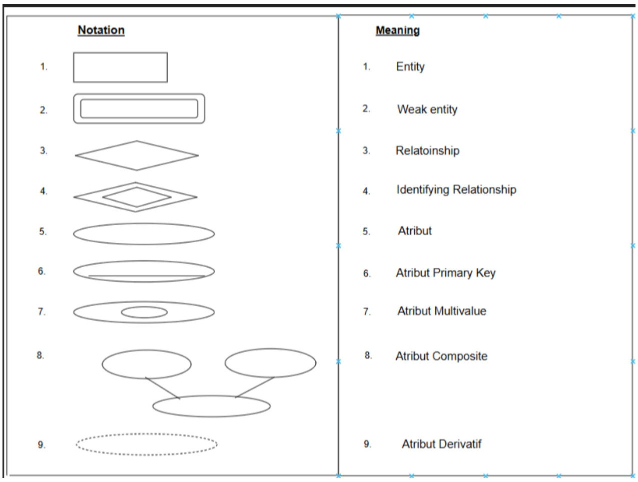


Figure 1. Example of Entity Relationship Diagram (ERD)

The Data Flow Diagram (DFD) illustrates how data move through a system. Maulana, Rispianda, and Amila (2015) describe DFDs as graphical tools that represent processes, data stores, and data flows within a system. The concept was popularized by Yourdon and Constantine in their 1970s work *Structured Design* (Saringat, 2014). DFDs serve three main purposes: (1) visualizing system functionality, (2) modeling data processes, and (3) communicating system design between analysts and programmers. Google Maps is a free, web-based mapping service provided by Google, accessible via https://maps.google.com (Mahdia & Noviyanto, 2013). It combines satellite imagery, street maps, and route planning features to provide interactive geographic visualization. Users can zoom, pan, and view maps in different modes such as terrain or satellite view. Ardana and Saputra (2016) explain that Google Maps integrates a combination of images, databases, and scripts written in HTML, JavaScript, and AJAX. The Google Maps Application Programming Interface (API) enables developers to embed interactive maps into websites, displaying custom geographic data. The API key, generated by Google, authenticates the domain and facilitates secure communication between the web application and Google's mapping servers.

Table 1. Key Technologies Utilized in the GIS System

Component	Technology Used	Description
Programming Language	PHP	Server-side scripting for dynamic web applications
Database	MySQL	Relational database for structured data management
Visualization	Google Maps API	Spatial data display and interaction
Data Modeling	ERD, DFD	Logical and process modeling
Testing Method	Black-box Testing	Functional validation of system components

This theoretical framework supports the methodological structure of the research, which employs a sequential process beginning with data collection through literature study, observation, and interviews. The gathered data are analyzed and transformed into system requirements before being modeled using ERD and DFD. Implementation involves coding the GIS application using PHP and MySQL, followed by integration with Google Maps API for spatial visualization. The final stage includes testing and evaluation using the black-box method to ensure operational reliability and accuracy. The integration of these theoretical principles and technical methods provides a solid foundation for developing a GIS-based web application for mapping village fund development in Glumpang Baro Sub-District. This comprehensive approach bridges geospatial science, information system design, and rural governance to promote transparency, accessibility, and data-driven planning in local development management.

3. Results

This research was conducted in Glumpang Baro Sub-district, chosen because the region has not yet implemented a web-based Geographic Information System (GIS) for mapping and monitoring village development funded through *dana desa*. The system is designed as an interactive website integrated with Google Maps, allowing public users and administrators to access spatial information about village development projects online. The development followed the Waterfall methodology, which includes sequential stages of requirement analysis, system design, implementation, testing, and maintenance. The tools and materials used in the development included a laptop with an Intel® Core™ i5 processor, Windows 10 operating system, and Google Maps API, supported by various journal references, web-GIS tutorials, and online resources related to mapping applications. During the requirement analysis, relevant data were collected through observation, documentation, and literature review to identify user needs for both the administrative and public interfaces. The system and software design phase transformed these requirements into a conceptual model, including the database schema, user interface layout, and server-side architecture. The application structure was divided into several main components—Home Page, List of Villages, and About Page—which interact dynamically with the spatial database. The Home Page displays the main map featuring village boundaries and development markers, while the List of Villages page provides project data such as village names, project titles, and total developments. The About Page contains information about the application and its developer. The system workflow follows a clear process illustrated in Figure 2. Waterfall Model, beginning with user input, continuing with data processing on the web server, and ending with visualization through Google Maps. The server-side process is depicted in Figure 3. Server Workflow.

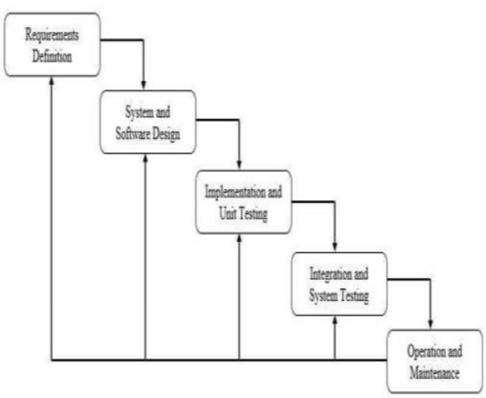


Figure 2. Waterfall Model

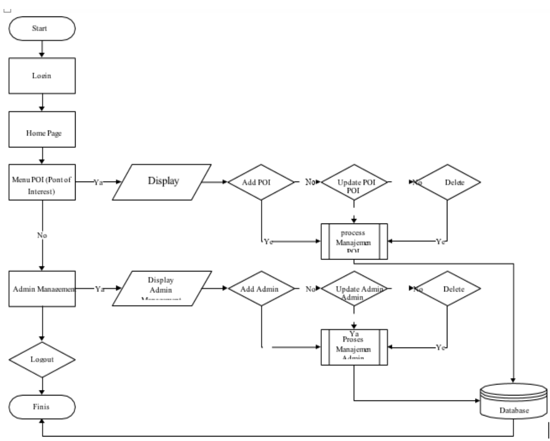
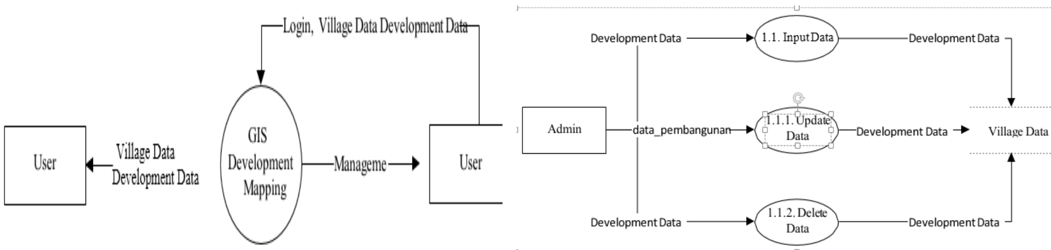


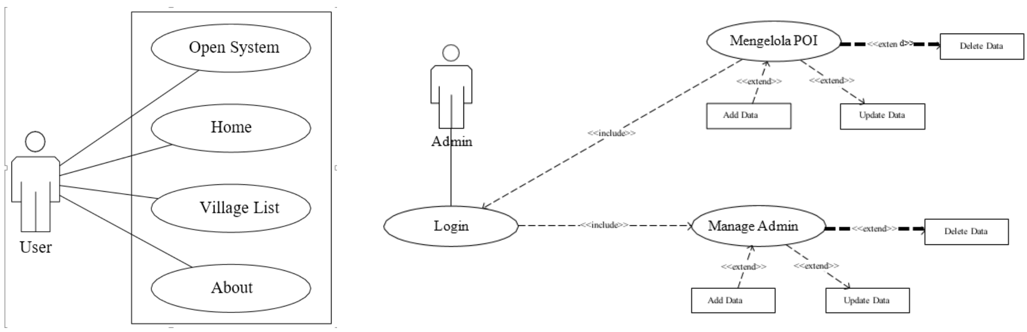
Figure 3. Server Workflow,

Where the administrator logs in using a username and password, accesses the main menu, and manages Points of Interest (POI) data—adding, updating, or deleting information directly linked to the database. These operations automatically update the visualized data on the map, ensuring synchronization between the spatial and textual information. The Data Flow Diagram (DFD) in Figures 4 and 5.



Data Flow Diagram (DFD) in Figures 4 and 5.

Illustrates how input data from users are processed and stored in the system before being displayed on the website. The Use Case Diagram 6 and 7.



Use Case Diagram 6 and 7

Shows interactions between the administrator and the system, including functions such as login, POI management, and admin data modification, as well as public users viewing maps and village lists. User interaction flows are summarized in *1 to 3*, which detail user actions when navigating pages such as Home, List of Villages, and About. The Class Diagram Figure 8.

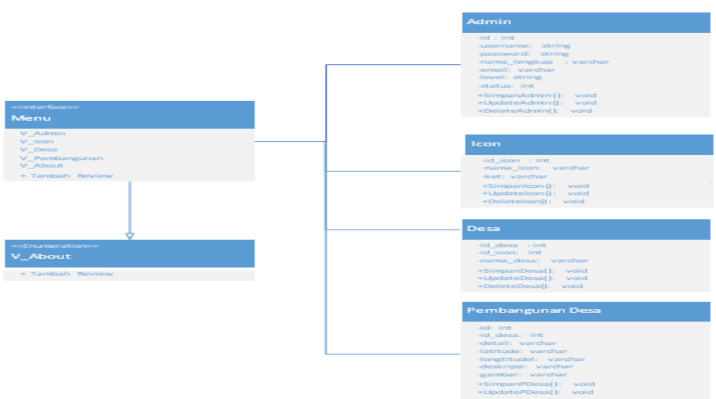


Figure 8. The Class Diagram

Models the system's logical structure, consisting of five main classes—POI Management, Admin Management, Home, List of Villages, and About—interconnected through a main Application Menu class. The database schema is designed using MySQL and comprises three primary tables: the Admin Table, which stores login credentials and admin details; the Village Table, which records village coordinates and Google Maps links; and the Development Table, which stores data such as project name, coordinates, year, funding allocation, and status. The user interface (UI) was designed with simplicity and clarity in mind, consisting of several pages: the Main Page Figure 9 displaying interactive maps with navigational menus; the Village List Page Figure 10; showing data tables of development projects; the About Page Figure 11; providing developer information; the Admin Login Page Figure 12; for authentication; and the POI Management Page (Figure 13) where the administrator can input, edit, or remove project data.

Figure 9. Main Page

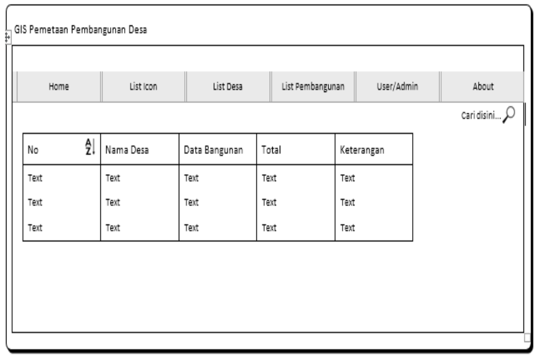


Figure 10. Village List Page

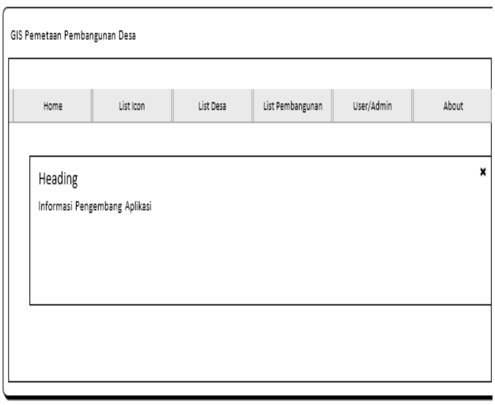
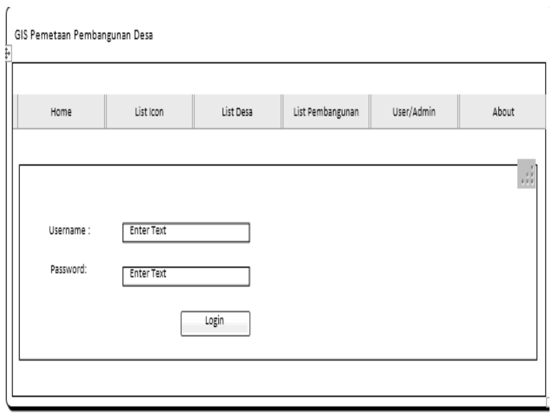


Figure 11. About Page



Figur 12. Admin Login Page

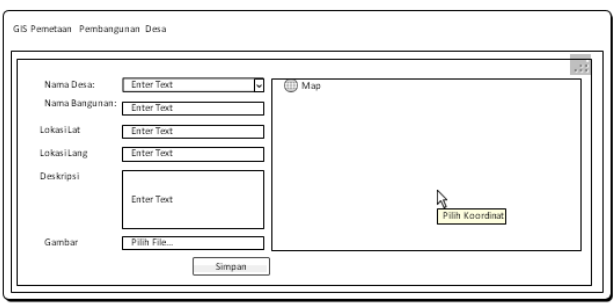


Figure 13. POI Management Page

Overall, the developed GIS-based web application provides an effective platform for transparent visualization of village development projects in Glumpang Baro. By integrating spatial mapping, administrative management, and public accessibility, the system enhances transparency, accountability, and community engagement in monitoring projects funded through dana desa. The design emphasizes usability, data accuracy, and scalability—supporting both local government administration and participatory rural development initiatives.

4. Discussion and Implementation

The Geographic Information System (GIS) for Mapping Village Fund Development in Glumpang Baro District was successfully designed and implemented as a web-based platform utilizing the Google Maps API to display spatial and real-time development data. The system integrates several functional modules, including village data entry, infrastructure development, news, gallery, and user management, all interconnected through a MySQL database. With an intuitive user interface, the system facilitates data input, updates, and visualization processes efficiently. Data security and access control are maintained through encrypted login authentication and restricted user roles (Afrizal & Fitriani, 2017), while spatial visualization supports public transparency, consistent with the approaches of Widodo (2016) and Susilowati (2017). Evaluation results demonstrate significant improvements—reducing operational costs by 86%, data entry time by 80%, and workforce requirements by 40% compared to the manual system, as shown in Table 4. These findings align with Maharani *et al*. (2017) and Ibrahim *et al*. (2018), who highlight the effectiveness of web-based GIS in supporting regional development planning. The total development cost of Rp 28,820,000, detailed in Table 2, includes infrastructure procurement, domain and hosting, system creation, and user training, implemented according to the timeline presented in Table 3. The system features automated reporting for both village and development data, enabling users to generate printed or digital reports directly from the admin panel. Functional testing confirms that the system operates reliably, accurately visualizing construction and funding data based on geographic coordinates (Gunawan, 2011; Ramadhani *et al*., 2013). Overall, this GIS platform not only serves as a documentation tool but also enhances transparency and accountability in village fund management, supporting participatory governance principles as emphasized by Setiawan *et al*. (2017) and Mustanir (2016).

Table 2. System Development Cost Breakdown

No	Item/Equipment	Quantity	Unit	Cost (Rp)	Total (Rp)
1	Labor	1	Person	1,500,000	18,000,000
2	Hosting (600Mb)	1	Package	500,000	500,000
3	Domain (.com)	1	Unit	100,000	100,000
4	System Development	1	Package	5,000,000	5,000,000
5	User Training	2	Person	1,000,000	2,000,000
6	Website Maintenance	1	Package	1,000,000	1,000,000
7	Office Supplies	-	Package	720,000	720,000
Total					28,820,000

Table 3. System Implementation Schedule (Time Schedule)

No	Description	MONTH													
		February		March				April				May			
		3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	Collecting data/files for the completeness of system development.														
2	Analyzing the collected data.														
3	Developing the new system.														
4	Testing with simulation data.														
5	Initial data entry.														
6	*Entry* data awal														
7	System implementation and user training.														
8	System maintenance and troubleshooting.														

Table 4. Comparison Between the Old and New Systems

No	Aspect	Old System	New System	Efficiency Gain
1	Workforce	5 persons	1 person	-40%
2	Data Entry Time	225 minutes	35 minutes	-80%
3	Annual Cost	Rp 2,800,000	Rp 420,000	-86%

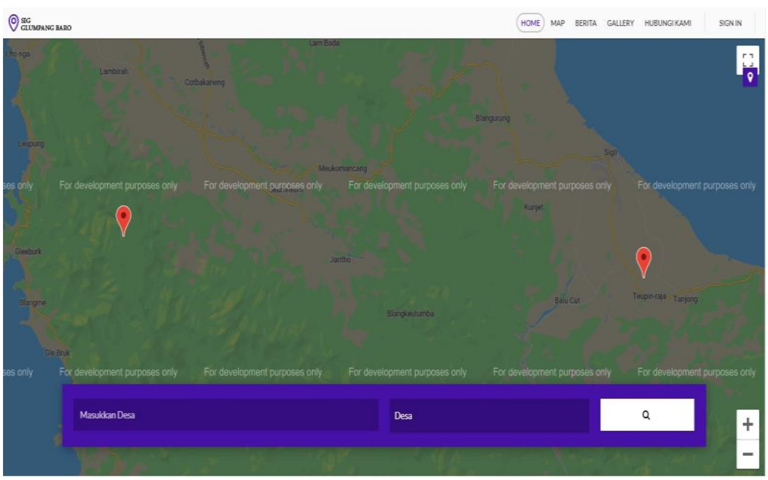


Figure 14. System Interface Main Dashboard

Illustration of the main page showing an interactive Google Map with plotted village development points and a navigation bar featuring Home, Village Data, Development Projects, News, Gallery, and Admin Login.

5. Conclusion and Recommendations

Based on the results of the development and implementation of the Geographic Information System (GIS) for Mapping Village Fund Development in Glumpang Baro District, it can be concluded that the transition from a manual to a web-based digital system has significantly improved the management, accessibility, and transparency of village development data. The system enables centralized online data storage and retrieval, ensuring that information regarding infrastructure projects can be efficiently accessed and updated in real time. This improvement facilitates the district administration in disseminating accurate and up-to-date information to stakeholders and the public, supporting better decision-making in village development planning. To ensure the system's sustainability and reliability, users should receive proper training in its operation, and regular maintenance of both hardware and software is essential. Additionally, strict access control and password protection are necessary to safeguard data integrity and prevent unauthorized manipulation, thereby maintaining the credibility of the information system as a tool for transparent and accountable village governance.

References

Afrizal, A., & Fitriani, F. (2017). Pengembangan sistem informasi feedback pelanggan hosting pada CV. E-Padi Corporation berbasis web. *Jurnal JTIK (Jurnal Teknologi Informasi dan Komunikasi)*, 1(1), 24–32.

Cahyatie, H. (2019). Sistem informasi potensi sumber daya alam (SDA) desa Provinsi Kepulauan Riau. *Jurnal JTIK (Jurnal Teknologi Informasi dan Komunikasi)*, 3(1), 18–22.

Dewi, S. S., Satria, D., Yusibani, E., & Sugiyanto, D. (2017). Prototipe sistem informasi monitoring kebakaran bangunan berbasis Google Maps dan modul GSM. *Jurnal JTIK (Jurnal Teknologi Informasi dan Komunikasi)*, 1(1), 33–38.

Fauzan, R., Indrasary, Y., & Muthia, N. (2018). Sistem pendukung keputusan penerimaan beasiswa Bidik Misi di POLIBAN dengan metode SAW berbasis web. *Jurnal Online Informatika*, 2(2), 79–83.

Gunawan, B. (2011). Pemanfaatan sistem informasi geografis untuk analisa potensi sumber daya lahan pertanian di Kabupaten Kudus. *Jurnal Sains dan Teknologi*, 4(2), 122–132.

Handayani, L. G. S., Piarsa, I. N., & Wibawa, K. S. (2015). Sistem informasi geografis pemetaan jalan desa berbasis web. *Lontar Komputer: Jurnal Ilmiah Teknologi Informasi*, 6(2), 128–137.

Ibrahim, E., Taslim, I., & Rijal, A. S. (2018). Aplikasi sistem informasi geografis untuk pengembangan kawasan strategis pariwisata Pantai Bilato di Kabupaten Gorontalo. *Jurnal Sains Informasi Geografi*, 1(1), 1–7.

Iqbal, T., Aprizal, D., & Wali, M. (2017). Aplikasi manajemen persediaan barang berbasis economic order quantity (EOQ). *Jurnal JTIK (Jurnal Teknologi Informasi dan Komunikasi)*, 1(1), 48–60.

Irwansyah, E. (2013). *Sistem informasi geografis: Prinsip dasar dan pengembangan aplikasi*. DigiBook Yogyakarta.

Istianto, B. (2009). *Manajemen pemerintahan dalam perspektif pelayanan publik*. STIAMI & Mitra Wacana Media.

Maharani, S., Apriani, D., & Kridaklaksana, A. H. (2017). Sistem informasi geografis pemetaan masjid di Samarinda berbasis web. *Jurnal Informatika*, 11(1), 9–20.

Mustanir, A. (2016). Implementasi kebijakan dana desa dan partisipasi masyarakat dalam pembangunan di Desa Teteaji Kecamatan Tellu Limpoe Kabupaten Sidenreng Rappang. *Jurnal Politik Profetik (JPP)*, 4(2), 101–115.

Prasetio, A. (2014). *Buku sakti webmaster*. MediaKita.

Ramadhani, S., Anis, U., & Masruro, S. T. (2013). Rancang bangun sistem informasi geografis layanan kesehatan di Kecamatan Lamongan dengan PHP MySQL. *Jurnal Teknika*, 5(2), 45–52.

Santosa, B., Sofyan, H., & Widiyastuti, W. A. (2015, June). Sistem informasi geografis penyebaran penduduk berdasarkan tingkat usia di Kabupaten Sleman berbasis web. In *Seminar Nasional Informatika (SEMNASIF)* (Vol. 1, No. 5).

Sari, M. E., Arza, F. I., & Taqwa, S. (2019). Pengaruh akuntabilitas, kesesuaian kompensasi, dan pengendalian intern terhadap potensi kecurangan dana desa. *Jurnal Eksplorasi Akuntansi*, 1(3), 1443–1457.

Satria, D., Yana, S., Munadi, R., & Syahreza, S. (2017). Sistem peringatan dini banjir secara real-time berbasis web menggunakan Arduino dan Ethernet. *Jurnal JTIK (Jurnal Teknologi Informasi dan Komunikasi)*, 1(1), 1–6.

Setiaji, P. (2018). Sistem transparansi dana desa di Kabupaten Kudus menggunakan metode algoritma information retrieval system. *Faktor Exacta*, 11(3), 195–204.

Setiawan, A., Haboddin, M., & Wilujeng, N. F. (2017). Akuntabilitas pengelolaan dana desa di Desa Budugsidorejo Kabupaten Jombang tahun 2015. *Politik Indonesia: Indonesian Political Science Review*, 2(1), 1–16.

Sukmono, A., Husodo, B. T., & Wijaningsih, D. (2019). Pembuatan sistem informasi geografis potensi dan aset desa untuk menunjang pembangunan Desa Dumpil Kecamatan Dukuhseti Kabupaten Pati. *Jurnal Pasopati*, 1(1), 22–30.

Supriyanto, A. (2007). Arsitektur dan teknik desain informasi pada web. *Dinamik: Jurnal Teknologi dan Informasi*, 12(1), 35–42.

Susilowati, D. (2017). Website Desa Jetis untuk membantu mengelola data penduduk dan dana desa. *Jurnal Go Infotech*, 21(2), 15–22.

Widodo, S. (2016). *Sistem informasi geografis pemetaan wilayah persebaran pembangunan fisik program nasional pemberdayaan masyarakat (PNPM) di Gunungkidul berbasis web (Studi kasus Kecamatan Semin)* (Doctoral dissertation, Universitas PGRI Yogyakarta).

Zhu, J., Wright, G., Wang, J., & Wang, X. (2018). A critical review of the integration of geographic information system and building information modelling at the data level. *ISPRS International Journal of Geo-Information*, 7(2), 66.