

Digital Governance Transformation in Rural Areas: A Strategic Framework for Sustainable Public Services in the Society 5.0 Era

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ABSTRACT: The transition to Society 5.0 presents a critical opportunity for rural governance to overcome chronic geographical and bureaucratic barriers. The evolution of Society 5.0 mandates a paradigm shift in rural public administration, moving from manual bureaucracies to human-centric cyber-physical systems. This study proposes a strategic framework for sustainable digital governance by integrating the System Development Life Cycle. Using a Design Science Research approach, analysing how mobile-based self-service modules and real-time community asset mapping spanning livestock, crops, and land ownership can mitigate spatial marginalization. This research provides a scalable roadmap for achieving permanent, efficient, and location-independent public service excellence in resource-constrained rural environments. The results indicate that this framework significantly reduces transaction costs and prevents innovation intermittency by ensuring legal institutional synchronization.

KEYWORDS: Digital Governance, Society 5.0, SDLC Methodology, Rural Transformation, Mobile Government

INTRODUCTION

The adoption of mobile technology is particularly critical in rural contexts where smartphone penetration significantly outpaces personal computer ownership. However, despite the rapid proliferation of electronic correspondence applications (*e-surat*), the implementation trajectory is frequently disrupted by innovation intermittency. Empirical evidence suggests that rural digital initiatives often succumb to the "pilot project trap" a state where initial peak adoption is followed by a precipitous decline in utility due to a failure to sustain the socio-technical ecosystem (Linders et al., 2018). Sustainability is further undermined by a lack of legal-institutional synchronization, such as the absence of integrated Electronic Signatures (E-Sign) and poor interoperability with national biometric databases (Janowski, 2015). Without a robust framework, the promise of "real-time" service delivery remains hindered by the very bureaucracies it seeks to replace.

The advent of Society 5.0 has fundamentally shifted the paradigm of public administration from mere digitization to a human-centric cyber-physical integration (Viale Pereira et al., 2020). In rural contexts, the primary administrative touchpoint document issuance is often hindered by spatial marginalization, where geographical dispersion creates significant "shadow costs" for residents in terms of time and transportation (Salemink et al., 2017). This "tyranny of distance" often leads to administrative exclusion for marginalized populations (Park, 2017).

While existing literature has extensively deconstructed e-government in metropolitan centers, there remains a critical lacuna regarding the sustainability mechanisms of mobile

governance in resource-constrained, geographically dispersed rural environments. Current scholarship often overlooks the strategic nexus between geographic distance and mobile accessibility as a driver for permanent institutional change (Twizeyimana & Andersson, 2019). This study addresses this void by investigating the strategic dimensions of mobile-based document services. It aims to develop a Comprehensive Sustainability Model that integrates technical interoperability, spatial accessibility, and legal-institutional frameworks. By reframing traditional correspondence as a sustainable mobile ecosystem, this research contributes to the discourse on Rural Digital Resilience, providing a roadmap for local authorities to move beyond ephemeral trends toward permanent, efficient, and location-independent public service excellence.

The transition to Society 5.0 represents a milestone where digital innovation is harmonized with social needs to ensure no one is left behind. However, rural governance often remains trapped in "geographical inertia. Villagers in remote areas face significant shadow costs excessive travel time and high transportation expenses merely to obtain basic administrative documents such as poverty certificates (SKTM) or domicile letters.

METHODOLOGY

This research utilizes the System Development Life Cycle (SDLC) to ensure that the digital artifact is not only technically sound but also institutionally sustainable (Sommerville, 2021).

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a. Requirement Analysis & Spatial Mapping

The initial phase involved identifying the "Administrative Access Gap." Data from a critical need for eight primary document modules: Birth, Death, Domicile, Travel Permits, and Poverty Certificates. Furthermore, requirements were identified for a Community Potential Data module to track rural assets, which are often missing from national databases.

b. System Design & Architecture

The system architecture follows a Service-Oriented Architecture (SOA) with a "mobile-first" and "offline-first" philosophy. The design includes:

- Government-to-Citizen (G2C): Mobile self-service for document requests directly from home.
- Government-to-Government (G2G): Real-time dashboards for Village Heads to monitor processed, rejected, and completed applications.
- Citizen-to-Citizen (C2C): The "Pasar Digidesa" module to facilitate local economic transactions.

c. Implementation & Data Integration

The implementation phase integrated API bridges for NIK (National ID) verification. A distinctive feature is the Asset Mapping Module, which digitizes data on land ownership (forest, plantation, and food crops), livestock (cattle/fish farming), and local commodities (Mergel, 2021).

- User Profile & Verification: Shows the resident's name, identity number, and account verification status.
- Administrative Services: Access to various village office services, including certificates for poverty (Tidak Mampu), domicile (Domisili), and birth (Kelahiran).
- Online Reporting: A center for residents to submit complaints directly to the Village Head.
- Digital Marketplace (Pasar Digital): A dedicated section for the village digital market and UMKM products.
- Village News & Info: A portal for residents to view the latest news and information from their village.

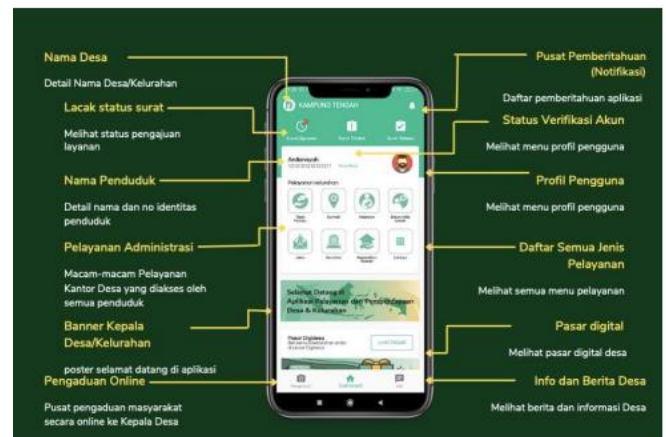


Figure 2. Mobile Application Interface Features

b. Service Workflow

The digital service process follows a streamlined cycle:

- Resident: Initiates a request through either the Digidesa Application or a KIOSK at the Village Office.
- Notification: A real-time notification is sent to the Village Head for review.
- Village/Sub-district Office: The administration processes and approves the request.
- Document Issuance: The official service document is generated.
- Final Notification: The resident receives a notification that the document is complete and ready for pickup.

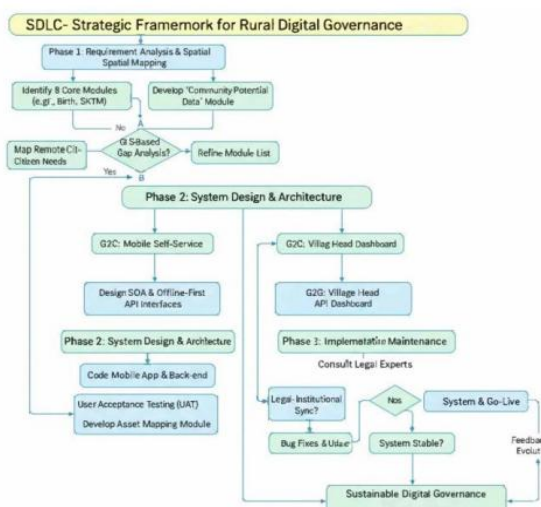


Figure 1. SDLC – Strategic Framework Methodology

RESULTS AND DISCUSSION

a. Mobile Application Interface Features

The Mobile Application interface provides comprehensive tools for village administration and residents:

- Village Name: Displays the specific name of the Village or Sub-district.
- Track Document Status: Allows users to view the current status of their service requests, such as "In Process," "Rejected," or "Completed".
- Notification Center: A list of all application notifications for the user.

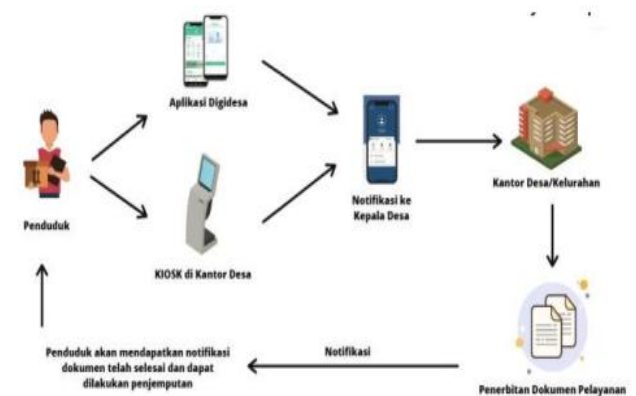


Figure 3. Service Flow

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c. Strategic Benefits for Villagers (Residents)

- Boundless Access:** Residents can access administrative services 24/7 from any location, eliminating the need to be physically present at the village office during specific hours.
- Real-Time Monitoring:** The system allows users to track and monitor the status of their document applications (e.g., "In Process," "Rejected," or "Completed") directly through the mobile application.
- Economic Empowerment:** Through the "Pasar Digidesa" and "Labalokal" modules, residents can market their local products and UMKM commodities on a national scale.
- Direct Public Reporting:** Citizens can easily submit reports or complaints regarding local issues such as broken streetlights, trash, or road damage through a dedicated service.

d. Strategic Benefits for Village and Sub-district Governments

- Administrative Efficiency:** The system facilitates easy administrative services and dynamic mail disposition, significantly reducing manual paperwork.
- Enhanced Accountability:** Automated tracking and tiered approval processes ensure that every administrative action is recorded and verifiable.
- Improved Service Satisfaction:** Digitalizing services leads to increased productivity and higher community satisfaction with village governance.
- Effective Communication:** Village officials can easily monitor public complaints and send mass information or instructions to all residents simultaneously.

e. Strategic Benefits for Local (Regency/City) Governments

- UMKM development through a centralized, real-time Data-Driven Planning:** Governments can create more accurate development plans by utilizing "Smart Data" collected directly from residents regarding village potential and needs.
- Precision Decision-Making:** Detailed dashboards allow officials to make informed decisions based on the unique, real-time conditions of each village.
- Regional Potential Mapping:** The framework enables the mapping of regional assets, population types, and economic commodities across the entire regency.
- Integrated Command Center:** Local authorities can oversee various sectors such as education, health, and database concept.

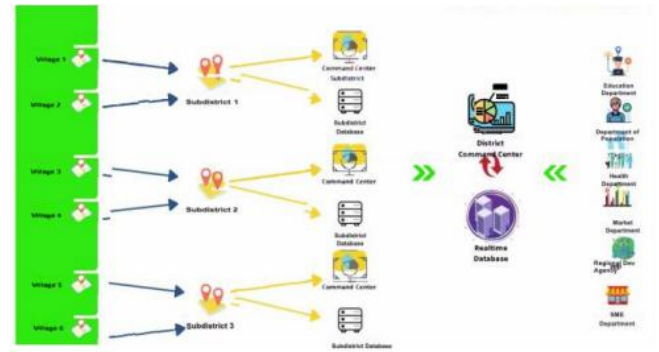


Figure 4. Data-Driven Planning

f. Quantitative Performance Metrics

The success of the strategic framework is measured through four primary Key Performance Indicators (KPIs):

- Administrative Response Time (ART):** This measures the duration from a citizen's application submission to the final document issuance. Based on the Digidesa alur pelayanan, the automated notification to the Village Head allows for "whenever and wherever" approval, targeting a 70% reduction in processing time.
- Spatial Transaction Cost (STC):** This quantifies the travel expenses and time-loss avoided by residents. By enabling document requests directly from home, the framework effectively eliminates the fuel and opportunity costs associated with physical visits to the Village Hall.
- Public Service Satisfaction Index (PSSI):** Utilizing the Technology Acceptance Model (TAM), this metric evaluates "Perceived Usefulness" and "Ease of Use." The Sistem interface is designed for simplicity, with 16 integrated services easily accessible via mobile devices.
- Economic Conversion Rate (ECR):** This tracks the growth of local UMKM transactions through the Market Place modules. It measures how many rural commodities are successfully marketed and sold nationally via the digital marketplace.

Table 1. Indicators for Performance Metrics

Indicator	Pre-Implementation (Manual)	Post-Implementation (Digidesa)	Expected Outcome
Location Access	Limited to Village Hall	Accessible via Mobile/Anywhere	Geographic Inclusivity
Service Window	Limited to Working Hours	24/7 Availability	Constant Accessibility
Tracking	Manual inquiry ("Is it done yet?")	Real-time digital monitoring	Enhanced Transparency
Data Accuracy	Manual/Paper records	Real-time Database/Smart Data	Evidence-Based Policy

CONCLUSIONS

a. Research Contributions

Sustainable digital governance in rural areas requires moving beyond simple digitization toward a holistic ecosystem. The integration of SDLC methodology model proves that addressing the distance barrier is not just a technical task but a strategic institutional shift. By mapping community assets and decentralizing service delivery, rural administrations can achieve permanent, efficient, and inclusive public service excellence in the Society 5.0 era.

b. Strategic Impacts

The transition from manual to mobile-based governance provides measurable improvements in three critical dimensions:

- i. Administrative Inclusivity: Real-time document requests, including Poverty Certificates (SKTM), Domicile, and Birth Certificates, enable 24/7 access regardless of a citizen's physical distance from the village hall.
- ii. Data-Driven Resilience: Mapping community assets spanning livestock, fisheries, and land ownership provides local governments with "Smart Data" for precision policy-making and evidence-based planning.
- iii. Economic Sustainability: By incorporating Village-Owned Enterprises (BUM Desa) into a national-scale digital marketplace like Pasar Digidesa, the framework ensures that digital tools act as drivers for rural economic growth.

c. Future Work

To ensure long-term sustainability, future research should focus on:

- i. AI-Driven Governance: Utilizing the collected "Smart Data" to predict commodity trends and community needs.
- ii. Expanding Integrated Services: Increasing the current 16 integrated service types to cover more complex legal and administrative requirements.
- iii. Cross-Regional Integration: Strengthening the "Smart Data for Smart City" concept by linking village database with sub-district and regency command centers for global monitoring.

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