

Development of a Village Digital Ecosystem as a Strategy for Strengthening Smart Villages

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Keywords:	Digital Ecosystem; Smart Village; Community Empowerment; Village Digitalization; Information Management.	Abstract. The development of a village digital ecosystem is an important strategy for strengthening village governance and supporting Smart Village development. Before this community engagement program, information on the profile, public facilities, local assets, development activities, and economic potential of Lolawang Village, Ngoro District, Mojokerto Regency, was dispersed across administrative documents and conventional communication channels. This condition limited public access to information, systematic documentation of village assets, and the promotion of local potential. This program aimed to develop an integrated village digital ecosystem by connecting a village website, a spatial-based village potential map, and a village profile video to improve information accessibility, support digital information management, document local assets, and promote village potential. The program employed the Asset-Based Community Development (ABCD) approach through five stages: Discovery, Dream, Design, Define, and Destiny. Participants included five village government officials, three community leaders, university students, and two local micro, small, and medium enterprises (MSMEs). Activities consisted of field observations, interviews, Focus Group Discussions, village asset inventory, digital product development, validation with village authorities, training, and implementation assistance. The program produced an integrated digital ecosystem comprising three complementary components: a village website as an information hub, a spatial-based potential map for visualizing village assets, and a village profile video for digital communication and promotion. These outputs enhanced the availability and accessibility of village information while supporting asset documentation, information management, and local potential promotion. The program demonstrates that integrating complementary digital media can provide a practical approach to Smart Village development through local asset utilization, participatory engagement, and sustainable digital information management.	
Katakunci:	Ekosistem Digital; Smart Village;	Abstrak. Pengembangan ekosistem digital desa merupakan strategi penting untuk memperkuat tata kelola pemerintahan desa dan mendukung pembangunan Smart Village. Sebelum program	

*Pemberdayaan
Masyarakat;
Digitalisasi Desa;
Pengelolaan Informasi.*

pengabdian ini dilaksanakan, informasi mengenai profil desa, fasilitas publik, aset lokal, kegiatan pembangunan, dan potensi ekonomi Desa Lolawang, Kecamatan Ngoro, Kabupaten Mojokerto, masih tersebar dalam dokumen administratif dan saluran komunikasi konvensional. Kondisi tersebut membatasi akses masyarakat terhadap informasi, dokumentasi aset desa secara sistematis, serta promosi potensi lokal. Program ini bertujuan mengembangkan ekosistem digital desa yang terintegrasi melalui keterhubungan website desa, peta potensi desa berbasis spasial, dan video profil desa untuk meningkatkan aksesibilitas informasi, mendukung pengelolaan informasi digital, mendokumentasikan aset lokal, dan memperkuat promosi potensi desa. Program menggunakan pendekatan *Asset-Based Community Development* (ABCD) melalui lima tahapan, yaitu *Discovery*, *Dream*, *Design*, *Define*, dan *Destiny*. Peserta meliputi lima perangkat desa, tiga tokoh masyarakat, dan dua pelaku usaha mikro, kecil, dan menengah (UMKM). Kegiatan mencakup observasi lapangan, wawancara, *Focus Group Discussion*, inventarisasi aset desa, pengembangan produk digital, validasi bersama pemerintah desa, pelatihan, dan pendampingan implementasi. Program menghasilkan ekosistem digital desa yang terdiri atas tiga komponen yang saling melengkapi, yaitu website desa sebagai pusat informasi, peta potensi berbasis spasial untuk visualisasi aset desa, dan video profil desa sebagai media komunikasi serta promosi digital. Hasil tersebut meningkatkan ketersediaan dan aksesibilitas informasi desa serta mendukung pengelolaan informasi, dokumentasi aset, dan promosi potensi lokal. Integrasi berbagai media digital menunjukkan potensi sebagai strategi praktis dalam pengembangan *Smart Village* berbasis pemanfaatan aset lokal, partisipasi masyarakat, dan pengelolaan informasi digital berkelanjutan.

1 Introduction

Digital transformation has become an important strategy for supporting rural development by enabling new approaches to information management, public services, and the utilization of local resources (Gómez-Carmona et al., 2023). Within this context, the Smart Village concept provides a framework for integrating digital technologies with local assets and community needs to support more effective and sustainable village development (Syafiih et al., 2023). However, technology should not be regarded as an end in itself. Rather, digital technologies function as tools that can strengthen the capacity of village institutions to manage information, identify and utilize local assets,

improve public communication, and support community participation in development processes (Ikbal et al., 2025). Thus, the effectiveness of Smart Village development depends not merely on the availability of digital infrastructure but also on how digital technologies are integrated into village governance and local asset management (Hidayat et al., 2023).

In Lolawang Village, Ngoro District, Mojokerto Regency, preliminary observations and discussions with the village government identified several interrelated challenges in village information management and dissemination. Information on the village profile, public facilities, local assets, development activities, and economic potential remained dispersed across administrative documents and conventional communication channels and had not been systematically integrated into a single digital platform. This condition limited public and external stakeholders' access to comprehensive and up-to-date information, while village assets and local potential had not been adequately documented or visualized through spatial and digital media to support development planning and asset management. Furthermore, the village lacked integrated digital communication media capable of providing public information services, presenting village identity and development opportunities, and promoting local potential to a wider audience. These conditions provided the practical basis for developing an integrated village digital ecosystem.

These problems were primarily associated with the absence of an integrated digital ecosystem for managing, visualizing, and communicating village information and assets. As a consequence, public access to information remained limited, village assets were not optimally documented and utilized, and opportunities for promoting local potential and attracting external collaboration were constrained. Therefore, the identified problems indicated the need for a digital strategy that integrates information management, spatial visualization, and digital communication rather than relying on a single digital platform.

Based on this problem analysis, the community engagement program developed an integrated village digital ecosystem consisting of

three complementary components: a village website as an information hub, a village potential map for spatial visualization of local assets, and a village profile video for communication and promotion. The integration of these digital media was intended to address the identified problems by improving information accessibility, supporting the documentation and visualization of village assets, and strengthening the communication and promotion of Lolawang Village's development potential.

These findings are consistent with previous studies reporting that the digital transformation of villages continues to encounter significant challenges, including the underutilization of village information systems, limited digital service platforms, inadequate village data management, and the lack of integrated public information systems to support effective, transparent, and accountable village governance. (Kazlauskienė & Atkočiūnienė, 2025). Village digitalization initiatives that focus solely on developing a website, without strengthening content management, integrating spatial data visualization, or incorporating digital public communication media, are unlikely to generate substantial improvements in transparency, community participation, or the promotion of local development potential (Malik et al., 2022). Therefore, the successful implementation of the Smart Village concept requires a more comprehensive approach that integrates multiple digital platforms into a cohesive and mutually reinforcing digital ecosystem. (Dana et al., 2025).

Previous community engagement programs have largely concentrated on the development of village websites as platforms for delivering administrative services and disseminating public information. (Kadja, 2026). Previous studies have demonstrated that village websites can improve the efficiency of administrative service delivery and enhance the transparency of village governance. Nevertheless, these platforms are generally developed as standalone systems and are rarely integrated with complementary digital media that can strengthen village identity, promote local potential, and support broader public engagement. (Ihsan & Elyusra, 2025). Other studies have highlighted the importance of enhancing the digital literacy of village officials and strengthening information governance as key prerequisites for Smart

Village development. Nevertheless, existing initiatives have yet to develop an integrated framework that brings together village information systems, spatial-based village potential mapping, and audiovisual media into a cohesive digital information ecosystem. (Manapa Sampetoding & ER, 2024).

Based on these conditions, Lolawang Village was selected as the community partner due to its considerable local development potential, the village government's strong commitment to digital innovation, and its pressing need for an integrated information system capable of supporting data management, public communication, and service delivery. This community engagement program was implemented through three main initiatives: the development of a village website, the creation of a village potential map, and the production of a village profile video. The village website was designed as a digital hub for public information and administrative services, the village potential map was developed to provide spatial visualization of local assets and resources, and the village profile video was produced as a digital branding and promotional tool to showcase the village's identity and development potential to community members, potential investors, and other stakeholders. These three digital platforms were intentionally integrated into a unified digital information ecosystem to strengthen village governance, improve public service delivery, and support the implementation of the Smart Village concept.

The program resulted in an integrated village digital ecosystem that combines a village website, a village potential map, and a village profile video. The integration of these complementary digital media supports three main functions: public information management, spatial visualization of village assets, and digital communication and promotion. The program involved the village government and local stakeholders throughout the stages of asset identification, product development, validation, and implementation. These results provide a practical example of how digital media can be integrated to support village information management and the utilization of local assets within the context of Smart Village development. The integration of information, spatial visualization, and digital communication also represents a

practical model for organizing complementary digital tools within a village digital ecosystem.

2 Method

This community engagement program employed the Asset-Based Community Development (ABCD) approach, which emphasizes the identification, mobilization, and utilization of existing community assets as the foundation for local development. In Lolawang Village, Ngoro District, Mojokerto Regency, the approach was applied to identify and utilize human, institutional, economic, physical, and social assets in developing an integrated village digital ecosystem. The program followed five interconnected stages: Discovery, Dream, Design, Define, and Destiny.

Table 1. Stages of the Community Engagement Program

ABCD Stage	Activities	Outputs
Discovery	Field observations, interviews, and village asset inventory	Data on village potential and digital needs
Dream	Focus Group Discussions (FGDs) and development of a shared vision	Prioritized village digitalization program
Design	Design of the village website, village potential map, and village profile video	Digital product designs
Define	Website development, village potential mapping, video production, and product validation	Village website, village potential map, and village profile video
Destiny	Launch of digital products, website administrator training, and implementation	Smart Village implementation

technical assistance, and and program program evaluation	sustainability
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The program involved five village government officials, including the Village Head, Village Secretary, Head of General Affairs and Administration, Head of Financial Affairs, and Head of Planning Affairs; three community leaders; and 26 university students. Two local micro, small, and medium enterprises (MSMEs), namely Calvendis Banana Chips and a cashew nut enterprise, were also involved as sources of information on local economic potential. Village officials and community stakeholders contributed to data provision, asset identification, information validation, and the implementation of digital products.

The Discovery and Dream stages focused on identifying village assets and determining digital development needs. Data were collected through field observations, interviews, documentation, and village asset inventories. Identified assets included public facilities, educational and religious institutions, road infrastructure, economic activities, MSMEs, and strategic areas. The findings were discussed through meetings and Focus Group Discussions (FGDs) to establish priorities and formulate a shared direction for digital ecosystem development.

The Design and Define stages involved developing and validating three digital products: a village website, a spatial-based village potential map, and a village profile video. The website functioned as a public information hub, the map visualized village assets and strategic locations, and the video communicated village identity and local potential. All products were reviewed and validated by the village government to ensure the accuracy and relevance of the information presented.

The Destiny stage focused on implementation and initial sustainability (Cahill, 2019). The three digital products were introduced and transferred to the village government, accompanied by website management training and implementation assistance. Program outcomes were assessed based on the completion, validation, implementation, and stakeholder participation in developing the digital products. The integration of these products established a village digital

ecosystem supporting public information management, spatial asset visualization, and digital communication and promotion.

3 Results

a. Identification of Lolawang Village's Potential and Digital Needs

The primary partner in this community engagement program was the Lolawang Village Government, Ngoro District, Mojokerto Regency, East Java, Indonesia. The village government was represented by five officials, namely the Village Head, Village Secretary, Head of General and Administrative Affairs, Head of Financial Affairs, and Head of Planning Affairs. The village government served as the main partner responsible for providing village data, facilitating field activities, validating digital content, and supporting the sustainability of the digital products developed through the program.

The identification stage was conducted to understand the partner's existing conditions, village potential, and digital information needs. Field observations, interviews, and village asset inventories revealed that Lolawang Village possesses various strategic assets, including an industrial area, government facilities, educational institutions, religious facilities, village road networks, public facilities, and local economic activities. The program also involved three community leaders, 26 university students from Community Service Program (KKN) Group 23, and local MSMEs, including a banana chips enterprise and a cashew nut enterprise, as supporting stakeholders in the identification and documentation process.

Despite these considerable development potentials, discussions with the village government revealed that information related to the village profile, local resources, government activities, public facilities, and economic potential had not been systematically integrated into an accessible digital information system. Much of the information remained dispersed across administrative documents and conventional communication channels, making it difficult for

community members and external stakeholders to access comprehensive information about the village.

These findings identified the need for an integrated digital ecosystem that could support the village government in managing and disseminating information while also documenting local assets and promoting village potential. The identification process therefore became the basis for the development of three integrated digital products: a village website as a public information hub, a spatial-based village potential map for asset visualization, and a village profile video as a medium for digital communication and promotion.

b. Village Potential Map of Lolawang Village

Based on the results of the village asset inventory, a spatial-based village potential map was developed to present comprehensive spatial information on the administrative boundaries of Lolawang Village, road networks, public facilities, industrial areas, educational institutions, religious facilities, and the village government office. The map was developed through field data collection, satellite imagery processing, and location validation conducted in collaboration with the village government.

The resulting village potential map provides a visual representation of the spatial distribution of the village's strategic assets, enabling users to identify the location and characteristics of key development resources more efficiently. This digital mapping product serves as an important reference for village planning, public information dissemination, and the promotion of local development potential.

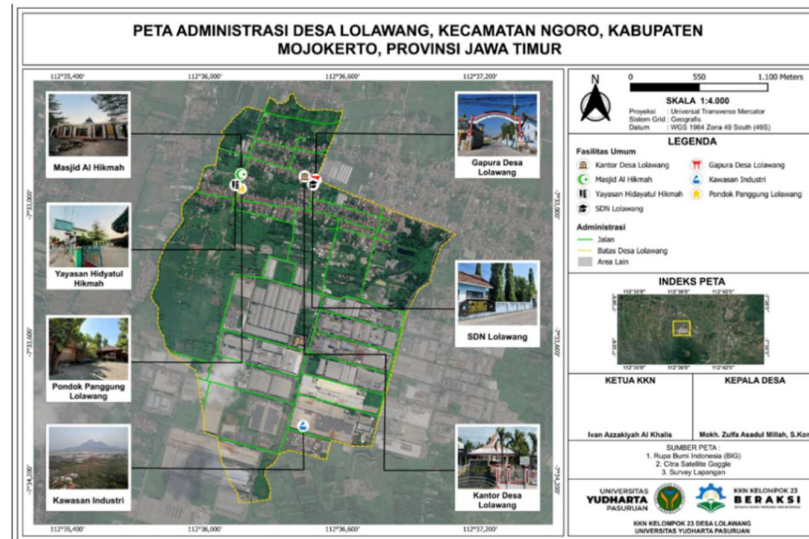


Figure 2. Spatial-Based Village Potential Map of Lolawang Village

c. Development of the Village Website

Another major outcome of the community engagement program was the development of the official website of Lolawang Village as a digital platform for public information and administrative services. The website was developed through a systematic process that included information architecture design, village data collection, content development, user interface design, and usability testing in collaboration with the village government.

The website provides comprehensive information on the village profile, governance structure, village statistics, local development potential, news and announcements, photo galleries, public information services, and the contact information of the village government. The homepage also features highlights of Lolawang Village's key development potential and the latest updates on village government activities, providing residents and external stakeholders with timely and accessible information. The official village website is available at <https://desa-lolawang-admin.web.app/>.



Figure 3. Homepage of the Official Lolawang Village Website.

d. Village Profile Video

The community engagement program resulted in a village profile video that presents Lolawang Village's identity and key local assets, including public facilities, economic potential, industrial areas, community activities, and the surrounding environment. The video serves as a digital communication and promotional medium that can be used by the village government to introduce Lolawang Village to residents, external stakeholders, and potential development partners. The completed village profile video is available at: https://www.youtube.com/watch?v=KzyfTigi2_Y.

e. Implementation of the Digital Products

All digital products developed through the community engagement program were officially handed over to the Lolawang Village Government for use as platforms for public information services and village promotion. The implementation phase commenced with the official launch of the digital products, followed

by capacity-building workshops for village officials on website administration and content management, as well as technical assistance on the utilization of the village potential map and village profile video.

Upon completion of the implementation phase, Lolawang Village had established three complementary digital platforms a village website, a spatial-based village potential map, and a village profile video which constitute the primary outputs of the community engagement program. Collectively, these digital products provide an integrated digital information ecosystem that supports public information services, promotes local development potential, and strengthens the foundation for Smart Village development.

4 Discussion

a. Integration of Digital Media for Smart Village Implementation

The findings of this community engagement program demonstrate that the digital transformation of Lolawang Village extended beyond the production of three digital outputs a village website, a spatial-based village potential map, and a village profile video to establish an integrated digital information system that supports village governance. Each digital platform performs a complementary function within the overall system. The village website serves as the primary hub for public information and administrative services, the village potential map provides spatial visualization of local assets and development resources, while the village profile video functions as a visual communication and digital branding tool to introduce the village's identity and development potential to the wider public. The integration of these three digital platforms creates a more comprehensive digital information ecosystem than the use of any single digital medium in isolation.

This integrated approach aligns with the Smart Village concept, which emphasizes the strategic use of digital technologies to improve governance, enhance public service delivery, strengthen community participation, and optimize the utilization of local resources. Rather

than functioning as independent digital products, the website, village potential map, and profile video operate as interconnected components that collectively support information management, public communication, and local development promotion. Consequently, the digital transformation implemented in Lolawang Village represents not merely the adoption of digital technologies but also a governance innovation that integrates information, spatial data, and visual communication into a unified digital ecosystem.

These findings are consistent with the Smart Village concept, which views digital technology as a strategic enabler for improving public service delivery, enhancing government transparency, fostering community participation, and promoting local economic development. According to Visvizi and Lytras, Smart Village extends beyond the digitalization of village administration; rather, it represents a governance transformation that leverages digital technologies to optimize local assets and resources while improving community well-being (Visvizi & Lytras, 2018). In the context of Lolawang Village, digital transformation was realized not merely through the provision of digital platforms but through the integration of information resources that support evidence-based decision-making, strengthen public information management, and enhance the promotion of the village's development potential. This demonstrates that the effectiveness of Smart Village implementation depends not only on the availability of digital technologies but also on their ability to function as an integrated governance ecosystem that connects information, spatial data, and digital communication.

b. The ABCD Approach in Optimizing Village Assets

The successful implementation of this community engagement program was strongly influenced by the application of the Asset-Based Community Development (ABCD) approach, which recognizes community members as both the custodians of local assets and the principal agents of sustainable village development. In contrast to conventional needs-based approaches, the program was initiated through a systematic process of identifying and mobilizing community assets by means of field observations, interviews, and participatory

discussions with the village government. This process ensured that the digital transformation initiatives were firmly rooted in the existing capacities, local resources, and development potential of Lolawang Village, thereby increasing community ownership and strengthening the sustainability of the program outcomes.

This approach is consistent with the Asset-Based Community Development (ABCD) framework proposed by John P. Kretzmann and John L. McKnight, which argues that sustainable community development is achieved by identifying, mobilizing, and leveraging the existing strengths and assets of a community rather than focusing on its deficiencies through a deficit-based approach. The asset identification process enabled a wide range of local resources—including the industrial area, educational institutions, community organizations, and public infrastructure—to be systematically documented, digitally mapped, and integrated into a unified digital information ecosystem. As a result, the village website, spatial-based village potential map, and village profile video should be understood not merely as technological outputs but as digital representations of the social, economic, institutional, and spatial capital of Lolawang Village. This transformation illustrates how local assets can be converted into strategic digital resources that support governance, public communication, and sustainable village development.

These findings suggest that the Asset-Based Community Development (ABCD) approach provides an effective framework for village digital transformation by linking local assets with the strategic application of digital technologies. This integration enables existing community resources to be transformed into digital assets that enhance information management, strengthen participatory governance, and support the implementation of the Smart Village concept.

c. Social Transformation Through Village Digitalization

The digital transformation initiative generated meaningful changes in the governance of village information and public communication (Muhammad & Aisyah, 2024). Before the implementation of the program, information concerning the village

profile, local development potential, and government activities was largely confined to administrative records and disseminated through conventional face-to-face communication. The integration of the village website, the spatial-based village potential map, and the village profile video fundamentally transformed this information management system by making village information more transparent, accessible, and readily available through digital platforms. As a result, the program expanded public access to information, improved communication between the village government and the community, and strengthened the digital foundation for more responsive and inclusive village governance.

In addition to enhancing public information transparency, the village website strengthened the capacity of village officials to manage digital information independently, consistent with the findings reported (Sopyan et al., 2025). Furthermore, the spatial-based village potential map facilitated the identification and documentation of local assets for village development planning, supporting the findings of Fathurrahman (Fathurrahman, 2026). Meanwhile, the village profile video enhanced the effectiveness of village promotion by increasing the visibility of Lolawang Village to prospective investors, development partners, and the broader public. Collectively, these outcomes indicate that digital transformation extends beyond technological innovation to foster more transparent, accountable, and participatory village governance.

These findings support the growing body of evidence that the digitalization of village governance contributes to improving the quality of public service delivery and strengthening community participation, provided that it is accompanied by enhanced institutional capacity, effective information governance, and sustainable digital management practices. (Riani et al., 2026).

d. Conceptual Contribution of the Community Engagement Program

The principal conceptual contribution of this community engagement program is the finding that Smart Village implementation becomes more effective when village digital transformation is developed through the integration of multiple

digital platforms with complementary functions rather than through the adoption of a single digital application. Unlike many village digitalization initiatives that primarily focus on developing a village website as a platform for public information dissemination, this program introduces an integrated digital transformation model that combines a village website, a spatial-based village potential map, and a village profile video within a unified digital information ecosystem. Although each platform serves a distinct purpose, they operate synergistically to strengthen village governance and improve the management and dissemination of public information.

The village website functions as the central hub for public information services and administrative communication, the spatial-based village potential map provides geospatial visualization of strategic village assets to support planning and decision-making, while the village profile video enhances digital communication, village branding, and the promotion of local development potential. The integration of these complementary digital platforms creates a more comprehensive and interconnected digital governance ecosystem than approaches that rely on a single digital medium. Consequently, this model demonstrates that effective village digital transformation depends not only on the adoption of digital technologies but also on the strategic integration of information, spatial data, and visual communication to support transparent, participatory, and sustainable village governance in accordance with the Smart Village paradigm.

The village website functions as an information hub, providing comprehensive information on the village profile, governance, public services, demographic statistics, village news, and development activities. The spatial-based village potential map serves as a spatial information system, documenting the village's physical, social, economic, educational, and strategic assets to facilitate resource identification and support evidence-based spatial planning. Meanwhile, the village profile video functions as a digital branding and communication medium, presenting the village's identity and development potential in an engaging visual format that broadens

promotional outreach to local communities, prospective investors, development partners, and other stakeholders.

The integration of these three digital platforms forms a unified village digital information ecosystem in which public information services, spatial asset management, and digital communication operate as complementary and interconnected components. Rather than functioning as standalone digital applications, the three platforms exchange and reinforce information to provide a comprehensive representation of the village's identity, resources, and development activities. Consequently, information is no longer fragmented but becomes integrated, easily accessible, and responsive to the needs of multiple stakeholders. This integrated ecosystem enhances governmental transparency and accountability, improves public access to information, supports evidence-based planning and decision-making, and strengthens village branding and investment promotion (Fontaine et al., 2022). These findings suggest that the effectiveness of Smart Village implementation depends not only on digital technology adoption but also on the strategic integration of multiple digital platforms into a coherent digital governance ecosystem (Fernández, 2026).

These findings further enrich the Smart Village discourse, which has traditionally emphasized the adoption of digital technologies in village governance and public administration. This community engagement program demonstrates that Smart Village implementation cannot rely solely on the availability of digital platforms; rather, it requires the strategic integration of three complementary dimensions: information management, spatial intelligence, and digital visual communication. The integration of these dimensions establishes a holistic digital governance ecosystem that supports transparent public service delivery, evidence-based planning and decision-making, effective promotion of local development potential, and broader community participation in village development. Accordingly, this study suggests that the effectiveness of Smart Village initiatives depends not only on technological adoption but also on the ability to integrate multiple

digital platforms into a coherent, user-oriented, and sustainable information ecosystem.

Based on these findings, this community engagement program proposes the Village Digital Integration Model for Smart Village Development, a conceptual framework that positions the village website as the central hub for information management, the spatial-based village potential map as the foundation for spatial data management, and the village profile video as a digital branding and communication tool, all integrated within a unified digital information ecosystem. The integration of these three components generates four principal benefits: (1) enhanced public information transparency, (2) strengthened digital public service delivery, (3) optimized promotion of village development potential, and (4) evidence-based development planning and decision-making grounded in local assets. Accordingly, the proposed model contributes not only technological innovation but also a governance innovation that promotes more participatory, transparent, and sustainable village governance.

The conceptual model developed through this community engagement program also demonstrates strong potential for replication in other rural communities, particularly villages with socio-economic characteristics and institutional capacities similar to those of Lolawang Village. Nevertheless, its implementation should be adapted to the local context, including the availability of digital infrastructure, the digital competencies of village officials and community members, and the specific socio-economic characteristics of each village. Therefore, the proposed model offers a practical and adaptable framework for implementing Smart Village initiatives based on local assets, community empowerment, and integrated digital governance across diverse rural contexts in Indonesia.

5 Conclusion

This community engagement program demonstrated that the development of an integrated village digital ecosystem can serve as a practical strategy for strengthening Smart Village development in Lolawang Village. By integrating a village website, a spatial-based village

potential map, and a village profile video, the program established complementary digital tools for public information management, village asset visualization, and digital communication and promotion. The implementation of the Asset-Based Community Development (ABCD) approach enabled the program to build upon existing local assets while involving the village government and community stakeholders throughout the stages of identification, development, validation, and implementation. The findings indicate that village digital transformation is more effectively supported when complementary digital media are developed as an integrated ecosystem rather than as separate technological products. This integrated approach provides a practical model for improving access to village information, documenting local assets, supporting village promotion, and strengthening participatory and sustainable village governance. To ensure long-term sustainability, continued capacity building for village officials, regular updating of digital content and spatial data, and the further integration of digital platforms with village administrative services are recommended.

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