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Collaborative Development of Smart Villages: A Model with Pesantren Joglo Alit for Social, Cultural, Economic, and Ecological Enhancement

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ABSTRACT*:*
The research presented in this article seeks to reconstruct the concept of smart villages, focusing on the alignment with the aspirations of lecturers at the Educational Management Department at UIN Sunan Kalijaga Yogyakarta. In collaboration with Pesantren Joglo Alit, a smart public space model was developed to pioneer Smart Village, emphasizing social, cultural, economic, and ecological enhancements to support a better quality of life. Through Strengths, Opportunities, Aspirations, and Results (SOAR) analysis on two levels—academic society aspiration and mutual partner aspiration—a prototype of smart villages was constructed. The research identifies three strategic issues: smart village, star-up for education, and laboratory for social service. Several alternative models for smart village development were explored, leading to the agreement on an enterprise model in the targeted village. The prototype implementation took 41 days, and its implications offer a nuanced understanding of how education can drive broader relevant competencies in smart village development. The findings have significant implications for education, rural development, and sustainability. Constraints such as low technology are acknowledged, and recommendations for future research and policy formulation are provided.

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ABSTRAK

Penelitian yang disajikan dalam artikel ini berupaya merekonstruksi konsep desa pintar, dengan fokus pada penyelarasan dengan aspirasi dosen di Departemen Manajemen Pendidikan di UIN Sunan Kalijaga Yogyakarta. Dalam kolaborasi dengan Pesantren Joglo Alit, model ruang publik pintar dikembangkan untuk menjadi pelopor Desa Pintar, dengan penekanan pada peningkatan sosial, budaya, ekonomi, dan ekologi untuk mendukung kualitas hidup yang lebih baik. Melalui analisis SOAR (Strengths, Opportunities, Aspirations, and Results) pada dua tingkatan—aspirasi masyarakat akademis dan aspirasi mitra bersama—sebuah prototipe desa pintar dikonstruksi. Penelitian mengidentifikasi tiga isu strategis: desa pintar, star-up untuk pendidikan, dan laboratorium untuk layanan sosial. Beberapa model alternatif untuk pengembangan desa pintar dieksplorasi, yang mengarah pada persetujuan model kewirausahaan di desa yang ditargetkan. Proses implementasi prototipe memakan waktu 41 hari, dan implikasinya menawarkan pemahaman yang kaya akan bagaimana pendidikan dapat mendorong kompetensi yang lebih luas dalam pengembangan desa pintar. Temuan memiliki implikasi signifikan untuk pendidikan, pembangunan pedesaan, dan keberlanjutan. Kendala seperti teknologi rendah diakui, dan rekomendasi untuk penelitian dan formulasi kebijakan masa depan disediakan.

Kata kunci: *Desa Pintar, Manajemen Pendidikan, Pengembangan Kolaboratif*

INTRODUCTION

Smart villages have become famous for developing rural and urban villages worldwide. Since the European Commission 2017 published "EU Action for Smart Villages," many villages worldwide have adopted the smart village concept (European Commission, 2018). Even though the idea has imitated the smart city concept and shrunk in scale, the growth of smart villages has improved the efficiency of local bureaucracy, especially by utilizing information and communication technology (ICT). Smart villages also enhance the quality of villagers' life, provide more efficient bureaucracy and social service, and enhance competitiveness and the sustainability of village development.

In the global context, the growth of smart villages is accelerating several impacts of the Sustainable Development Goals for people in rural and urban areas. Based on an integrated approach to digital development, Smart Village enables accelerated impact on multiple SDGs – such as health, commerce, education, and agriculture – by increasing last-mile access and ensuring that available digital solutions reach all people worldwide (Natarajan & Kumar, 2017; Wang et al., 2022). Whenever a smart village deploys a common

integrated SDG platform, a select number of reusable ICT Building Blocks allow the integration of multiple digital solutions, and it might be applied in large priority development areas across different sectors – according to unique village characteristics and user needs (Alhari & Fajrillah, 2022). Even though, The impacts might include the development of digital services in areas such as Health, Education, Agriculture, Finance, and Commerce (Hartgrove et al., 2022).

The smart village concept has spread worldwide with these two main characteristics: dominated by figuring smart cities on a shrinking scale and stimulated by implementing integrated information and communication technology (ICT). These bring profound consequences for national issues.

The first characteristic is biased in positioning village development as a miniature of city growth. It might bring several fallacies in figuring out the village's future. Legally, a village is not a mere 'little' town or city, nor the colonization of a particular city. In Indonesia, according to law number 6/2014 and government regulation number 60/2014, a village is a unity of law society that has its territory border and has its authority to regulate government & arrange the interest of the local community based on their aspiration, original proper and traditional right that has been respected in the National United Republic of Indonesia(Adi et al., 2017; Vaishar & Šťastná, 2019). conception of the Village is no more about rural or urban areas that depend on certain cities to grow because a village today has its sovereignty. Even when village authority is the lowest direct government under the district chief, it still has authority to self-government bureaucracy and regulates domestic local interests and services. More ever, since law number 22/1999 was published, there have been different legal definitions of village and rural & urban areas as housing for villagers (Thuy To Nguyen et al., 2019).

A smart village's second characteristic has shifted the utilization of higher ICT from supporting tools toward minimum preconditions that must be fulfilled whenever villagers declare their smart town. It brings profound consequences to figuring out Indonesian future smart village and their generations. Conversely, educational & cultural ministry has taken several programs that dragged pupils and society into the deepest dependencies as ICT users rather than as content providers (Anastasiou et al., 2021; Rohan et al., 2022). In 2017, the Association of Indonesian Providers for Internet Service

reported that Internet service had reached 48 25% of rural villages and 49,49% of urban villages in the national scope (Bojja et al., 2019). The report also said that most villagers used tablets or smartphones rather than computers or laptops for internet service (Limaye, 2017). The following year, Council for Center statistic data (BPS) reported national data in 2018 that noted 9.658 villages (12%) have appropriate facilities for expedition service besides posts. The report also stated that 77.172 villages (92%) had reached cellular signal in the vast territory, and 70.190 villages (84%) had reached internet signal in the extended part (O'Brien et al., 2022; Singh, 2022). The data gave national warnings to pay serious attention to solving significant gaps between national potential capacity and its current actual capacity today.

Departing from that crisis, Educational Management Department (MPI) has a great responsibility to solve and find a better solution for the national interest. Since 2017, the Ministry of Communication and Information initiated the idea of 100 smart cities collaboratively with the Ministry of Housing Affairs, the Ministry of Administration and Bureaucratic Reform, the Ministry of Public Development, and the Council for National Development Planning, MPI has a deep concern to push gini growth ratio and educational gaps between city and villages. In 2019, the Government targeted 100 cities/regencies to become smart cities that become role models for the rest cities/regencies to improve their future local development. It means the national potential gap between cities and villages must be anticipated (Muhtar et al., 2023; Yuniar & Hasanah, 2021). For taking the correct issues and appropriate solutions, firstly, MPI has to find it significant for academic interest & trend based on three responsibilities, namely doctrine of Three Dedications of Higher Education. The doctrine consists of 1) Education & Teaching, 2) Research & Development, and 3) Social Service. Secondly, MPI is intensely interested in developing prototypes representing the solution and the recommendation (Ismanto et al., 2022; Jagustović et al., 2019; Rahoveanu et al., 2022; Tana et al., 2023; Tetteh et al., 2020; Tosida et al., 2020).

One notable limitation in previous studies revolves around the lack of standardization in the implementation of the smart village concept. The adaptation of smart city ideas to village contexts has led to diverse interpretations and applications that are sometimes incongruent with the specific characteristics and resources of the village. This absence of uniform

criteria may hinder the full realization of the smart village potential, especially in the domain of educational management. Additionally, previous works have not sufficiently explored the collaborative efforts between educational institutions and local communities, such as Pesantren Joglo Alit, in pioneering Smart Village initiatives. There may be existing controversies or debates on the alignment of technological advancement with the social, cultural, and economic fabric of the villages.

The focus of this study is to reconstruct the concept of a smart village that is in harmony with the aspirations of lecturers at the Educational Management Department at UIN Sunan Kalijaga Yogyakarta. By utilizing a model-building method, the research aims to bridge the existing gaps and controversies through the collaborative development of a smart public space with Pesantren Joglo Alit. The central argument posits that smart public spaces can enhance the quality of life for villagers in social, cultural, economic, and ecological aspects. The study's potential contributions include the establishment of a sustainable framework for smart villages that integrates learning societies and serves as a Laboratory of Social Service, offering a more nuanced understanding of how educational management can interact with the dynamic concept of smart villages.

METHODS

The research developed a model constructed through SOAR analysis on two levels: academic society aspiration and mutual partner aspiration. In this research, literary society refers to lecturers, communities, and experts in the educational management department (MPI). In comparison, joint partner refers to villagers' communities that collaboratively work to produce a prototype of the smart villages. SOAR analysis contains four components: Strength, Opportunities, Aspiration, and Results. It is an emic approach for the model-building method.

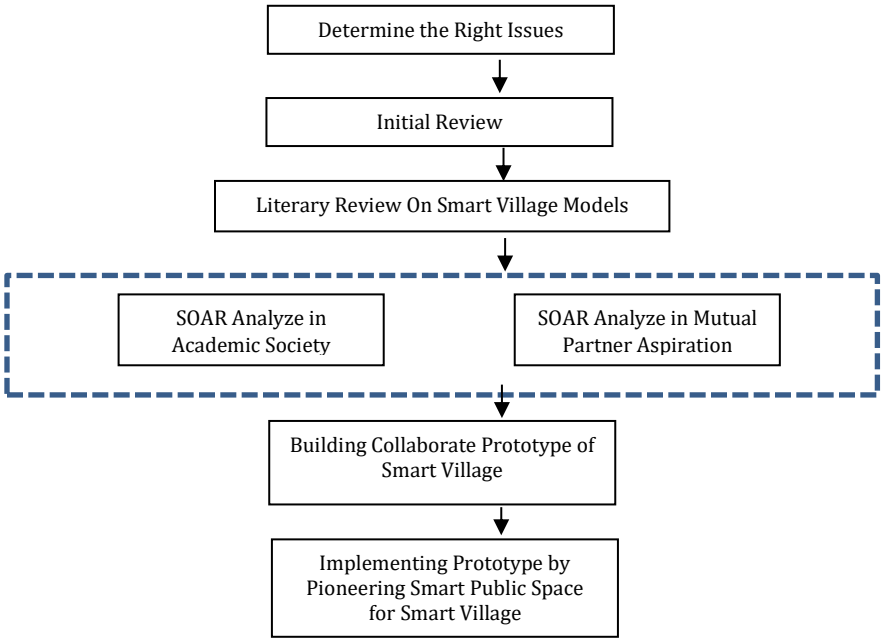

Figure 1. Illustrates the methodology used in the research

The research begins with a preliminary review of the correct issues at the end semester evaluation of the Educational Management Department, July 27th, 2021, determining several strategic points. The study resolves three strategic issues for the next three years: smart village, star-up for education, and laboratory for social service. In the next step, the research confirms the director of the educational management department on how three strategic issues must be handled in three subsequent years. As a result of the initial review, three interrelated proposals have been prepared by three teams, each targeted with a measurable schedule. For the smart village issue, the director sent a research team consisting of a senior lecturer as a research leader and a student team containing ten personnel that take in job learning (PPL) for two months and take social service (KKN) for the next month.

The third stage recommends a literary review of a specific smart village model. The research finds at least three alternative models for developing a smart village: enterprise, business, and government. Each model has a unique pattern and characteristic that must be negotiated between two parties with SOAR analysis: academic society aspiration and mutual partner aspiration.

Whenever the student team observes the targeted village while they do their "on-the-job learning" (PLP), they offer several alternatives for prototyping a smart village. The team held at least twice a meeting for Focus Group Discussions (FGD) to make a suite collaborative prototype of a smart village. In the first FGD, the team succeeded in making a great deal with a mutual partner, namely Pesantren Joglo Alit, after having share ideas to create smart public space for a pioneering smart village in Karangdukuh Village, at Jogonalan Regency, Klaten district. The first FGD also agreed to use an enterprise model for pioneering a smart village in Karangdukuh Village. In the second FGD, the team makes detailed and specific appointments for implementing the prototype into the actual field operationally. The prototype implementation process took 41 days, while the student team did their duty for social service for 26 days (3rd - 27th November 2021). For the rest day, the team completes the research voluntarily.

FINDINGS AND DISCUSSION

FINDINGS

Smart Village Concept is often interrelated with the smart city concept initiated by IBM. The trend shows that village development follows city style rather than its unique pattern. Even villagers reject it as a city miniature. This trend tends to underestimate village sovereignty as the unity of legal people. More often, village development is directed to track the same route as certain city development.

Since initiated by IBM, the smart city indeed relies on the support of Information and Communication Technology (ICT) to ensure efficiency, bureaucracy, and social service. Smart City in the IBM version has placed ICT as a smart tool to ensure connectivity around the city and the outer world. For the rest reasons, IBM developed six indicators for a smart city: 1) smart people (referring to social and human capital), 2) smart environment (referring to sustainable natural resources), 3) smart living (referring to live quality), 4) smart mobility (referring transportation and ICT), 5) smart governance (referring public participation), and 6) smart economy (referring competitiveness). The widening indicators of the IBM version are illustrated in table 1.

Table 1. Smart City by IBM Version

SMART ECONOMY (Competitiveness)	SMART PEOPLE (Social & Human Capital)
Innovative Spirit	Level of qualification
Entrepreneurship	Affinity to lifelong learning
Economic image & trademark productivity	A social and ethnic plurality
Flexibility of the labor market	Flexibility
International embeddedness	Creativity
Ability to transform	Cosmopolitanism/Open-mindedness
	Participation in public life
SMART GOVERNANCE (Participation)	SMART MOBILITY (Transportation & ICT)
Participation in decision-making	Local accessibility
Public and social service	(Inter-)national accessibility)
Transparent governance	Availability of ICT-Infrastructure
Political Strategies & Perspectives	Sustainable, Innovative, and safe transport system
SMART ENVIRONMENT (Natural Resources)	SMART LIVING (Quality of Live)
Attractivity of natural conditions	Cultural facilities
Pollution	Health conditions
Environmental protection	Individual Safety
Sustainable resource management	Housing quality
	Education facilities
	Touristic attractivity
	Social cohesion

Another smart city concept came from Cohen with modifications at the work area and indicators that make it different from the IBM version. The concept illustrates in table 2.

Table 2. Smart City by Cohen Version

DIMENSION	WORKING AREA	INDICATOR
Smart Environment	Smart Buildings	Sustainability-certified building
		Smart homes
	Resources Management	Energy

DIMENSION	WORKING AREA	INDICATOR
		Carbon Footprint
		Air quality
		Waste Generation
		Water consumption
	Sustainable Urban Planning	Climate resilience planning
		Densx`ity
		Green Space per capita
Smart Mobility	Efficient Transport	Clean-energy Transport
	Multi-modal Access	Public Transport
	Technology Infrastructure	Smart Cards
		Access to real-time information
Smart Government	Online Service	Online Procedure
		Electronic Benefit Payment
	Infrastructure	Wifi Coverage
		Broadband coverage
		Sensor Coverage
		Integrated helath+safety operations
Smart Economy	Entrepreneurship & Innovation	New startups
		R and D
		Employment levels
		Innovation
	Productivity	GRP per capita
	Local and Global Connection	Exports
		International Events Hold
Smart People	Inclusion	Internet-connected households
		Smartphone penetration
		Civic engagement
	Education	Secondary Education
		University Graduates
	Creativity	Foreign-born immigrants
		Urban Living Lab
		Creative Industry Jobs
Smart Living	Culture and Well-being	Life Conditions

DIMENSION	WORKING AREA	INDICATOR
		Gini Index
		Quality of life ranking
		Investment in Culture
	Safety	Crime
		Smart Crime Prevention
	Health	Single health history
		Life Expectancy

In 2017, European Commission, Collaberately with European Parliament, published a document called EU Action for Smart Villages. The document is a legal initiative to enlarge opportunities for villages and all villagers to develop their quality of life and manage their communities. To implement the document, in 2018, ENRD released a pilot project on Smart Eco-Social Villages, or popular the short name "Smart Villages." In the same year, European United emphasized the smart village definition by meaning Rural areas and communities which build on their existing strengths and assets as well as new opportunities to develop added value and where traditional and new networks are enhanced Through Digital Communications Technologies, Innovations, and the better use of Knowledge for the benefit of inhabitants. In the following years after the pilot project, smart villages grew up in many European regencies and countries in various patterns. For example, in Germany, the implementation of smart villages is oriented toward strengthening social cohesion, emphasizing the quality of public interaction and productive public participation. While in Portugal, smart villages succeed connecting people in mountainous areas and providing a friendly infrastructure called Eco-Taxi.

Even though smart Villages have spread worldwide with specific indicators, no single pattern has been followed as such a standard. As a literary review of the research, some perspectives from several experts can be resumed in table 3.

Table 3. Literary Review on Work Area of Smart Village

Expert	Work Area
Viswanadham & Vedula (2010), Susy Ella & Rosita Novi Andari (2018)	Resources, public institutions, Technology, Referral System For Public Service
Ramachandra, Hedge, Chandran, Kumar & Swamiji (2015). Chatterjee, Sheshadri & Arphan Kumar (2017)	Resources, public institutions, Technology, Sustainability

Common patterns of work areas characterized a smart village, namely resources, public institutions, and technology. Otherwise, there was a unique pattern of the work areas that may characterize a smart village: Referral system for public system and Sustainability. When the research used SOAR analysis, it may random aspiration for considering whether a typical pattern or a unique pattern at the same time.

According to the Chief of the Association for Islamic Educational management department (PPMPI), the output of the educational management department of an undergraduate program can be 1)Administrateur in Education Sector, 2) Researcher assistant in Education Sector, 3) Consultant assisted in Education Sector. KKNI emphasizes stratified output for Islamic educational management according to the undergraduate, magister, and doctoral programs.

The department needs everyday discourse to support those objective competencies to drive students to get broader relevant competencies. In the end-semester evaluation meeting on July 27th, 2021, the department has determined several strategic issues three strategic issues for three successive years: smart village, star-up for education, and laboratory for social service. Hopefully, all subject matter in this department will be driven into those issues next semester. For example, an event management class lecturer can connect several relevant topics to a smart village. So do lecturers in public relation class, English classes, and so forth. These common discourses conduct the department to certain scientific paradigms.

a. SOAR Analyze for Smart Village

The research held double SOAR analysis. The first is academic society aspiration, and the second is mutual partner aspiration. The result of two SOAR analyses might be illustrated in table 4 and table 5.

Table 4. SOAR analysis in academic society aspiration

STRENGTH	OPPORTUNITIES
Potential Researchers	SDG's discourse
Potential Students	European Smart Village Project

ASPIRATION	RESULT
Powerful Strategic Discourse	Connectivity to relevant Association
Original Discourse	Laboratory for social service
Institutional Character	Public Appreciation

Table 5. SOAR analysis in mutual partner aspiration

STRENGTH	OPPORTUNITIES
Social Capital	The national policy of the smart city
Cultural Capital	the law about the village

ASPIRATION	RESULT
Sustainability	Advance Partnership
Utility	Learning Access
Productivity	Public Infrastructure

b. Smart Public Space for Pioneering Smart Village

The research was held twice FGD with a mutual partner, Pesantren Joglo Alit. The first FGD has agreed to use an enterprise model for pioneering a smart village in Karangdukuh Village. In the second FGD, the team makes detailed and specific appointments for implementing the prototype into the actual field operationally.

The research introduced an innovative implementation named "Smart Public Space." Within this prototype of public areas, several key facilities are incorporated to enhance the utility and appeal of these spaces. Firstly, a sports center is established, featuring two tennis tables for enthusiasts. Secondly, recognizing the importance of digital connectivity, an Internet Center is provided, offering free access to the internet for a duration of at least two years. Lastly, to foster community productivity and engagement, spaces dedicated to communal farming and fishing are introduced, serving as hubs for economic activities.

c. The work area of Smart Public Space

The main work area of smart public space is related to natural resources, traditional public institutions, low technology, and sustainability. It may not provide a referral system for public service yet. In doing so, smart public spaces enhance the quality of life for villagers by increasing social cohesion, giving attention to traditional components, providing integrated farming and fishing, and supporting organic-fertilizer. In short, smart public spaces improve villagers' quality of life socially, culturally, economically, and ecologically.

DISCUSSION

The research in question aimed to reconstruct the concept of a smart village, focusing on aligning with the aspirations of lecturers at the Educational Management Department at UIN Sunan Kalijaga Yogyakarta and developing a smart public space with Pesantren Joglo Alit. The initiative emphasized social, cultural, economic, and ecological enhancements, striving to foster a better quality of life for villagers (Nuraini et al., 2021; Somwanshi et al., 2016; Subekti & Damayanti, 2019). Previous literature has delved into different facets of smart villages, from digital talent management (Andari & Ella, 2021) to IoT-enabled systems (Rohan et al., 2022), sustainable agriculture (Wang et al., 2022), and energy management (Natarajan & Kumar, 2017). These earlier studies provide a multifaceted context for the current research.

This research mainly focused on the departmental output concerning the education sector, including roles such as Administrateur, Researcher assistant, and Consultant assistant in Education Sector (Jorgenson & Fraumeni, 1991;

Miranda et al., 2021). The department has identified strategic issues, such as smart village development, education startups, and laboratory for social service, targeting three successive years (Hadian & Susanto, 2022; Nuraini et al., 2021). Significant achievements were realized in SOAR analysis for a Smart Village and the creation of a Smart Public Space, including a sports center, internet center, and productive economic space, for pioneering a smart village (Muhtar et al., 2023).

Comparing these findings with previous studies, it is evident that the current research builds on and extends existing knowledge in the field of smart village development. For instance, the emphasis on education, social cohesion, cultural capital, and sustainability parallels the findings of previous research on digital talent management for Smart Villages in Indonesia (Andari & Ella, 2021) and the importance of community engagement (Murty & Shankar, 2020). The utilization of SOAR analysis in academic society aspiration resonates with the global trends in smart village planning, highlighting the need for a holistic approach (Muhtar et al., 2023). However, the current study offers a localized perspective and distinct application in UIN Sunan Kalijaga Yogyakarta.

The findings from this research provide valuable insights into the potential of smart villages, focusing on academia and mutual partner aspirations. The emphasis on potential researchers, students, social and cultural capital, and strategic discourse demonstrates an understanding of the strengths and opportunities present in the community (Cooper et al., 2021; Pillai & Ahamat, 2018). This can be seen as a novel approach to smart village conceptualization, integrating academic and mutual partner aspirations to create a holistic, contextually relevant framework.

Furthermore, the results contribute significantly to understanding how smart public spaces can be operationalized. The research's innovative approach to prototyping public areas such as sports centers, internet centers, and communal farming and fishing facilities aligns with previous literature that emphasizes the role of localized smart actions(Anastasiou et al., 2021) and technological innovations in enhancing the quality of life(Singh, 2022). However, caution should be taken in interpreting the results, considering the limited scope of the research and the specific geographical and cultural context.

Implementing smart public spaces is essential to understanding how smart villages can improve villagers' quality of life socially, culturally, economically, and ecologically. The current research uniquely focuses on low technology, sustainability, and attention to traditional components (Trindade et al., 2017; Widiyastuti, St., Mt et al., 2021), contrasting with studies emphasizing high-tech solutions and IoT-based systems (Natarajan & Kumar, 2017; Rohan et al., 2022). These differences highlight the importance of context and the adaptability of the smart village concept, making it relevant across various technological landscapes and socio-economic conditions.

The implications of this research are manifold. The findings offer a nuanced understanding of how education can be leveraged to drive broader relevant competencies in the context of smart village development. The emphasis on collaborative, community-based initiatives aligns with sustainable development goals, enhanced quality of life, and social cohesion. These insights could guide future policies, education programs, and community engagement strategies, contributing to the broader discourse on smart villages, rural development, and sustainability. Moreover, this study demonstrates the necessity of context-specific approaches that recognize and capitalize on local strengths, opportunities, aspirations, and results, thus offering a path forward for academics and practitioners in education and smart village development.

CONCLUSION

This study aimed to reconstruct the concept of a smart village in conjunction with the Educational Management Department at UIN Sunan Kalijaga Yogyakarta and pioneer a smart public space with Pesantren Joglo Alit to enhance social, cultural, economic, and ecological aspects for a better quality of life for villagers. The findings reveal three key significances for the Islamic educational management department: the reconstruction of national educational thought, the development of a laboratory for social service, and broader opportunities for a learning society. Through pioneering smart public spaces at Pesantren Joglo Alit, encompassing sports centers, internet centers, and productive economics, the educational management department has shown that these interventions positively impact villagers' quality of life. These findings signify a substantial contribution to the field of education and smart village development, providing insights into leveraging education to drive broader

relevant competencies, emphasizing collaborative, community-based initiatives that align with sustainable development goals, and offering a nuanced understanding of rural development capitalizing on local strengths, opportunities, and aspirations. While the study demonstrates potential, it recognizes certain constraints, such as low technology and traditional public institutions, with no provision for a referral system for public service, and the sustainability of interventions such as the free accessible internet center. Future research is recommended to explore avenues for educational management departments towards future laboratories of social service and broader contributions to the development of learning societies as part of social service, including continuous discourse and strategic planning on vital issues such as smart village development. Collaboration with various stakeholders, alignment with national policies, and continuous evaluation and implementation of strategies can further enhance the quality of life in villages, thus fulfilling the aspirations of sustainable and inclusive rural development. In conclusion, the smart village discourse, under the stewardship of the educational management department, opens up novel horizons and potential partnerships for developing a learning society. The positive impacts on social, cultural, economic, and ecological aspects provide an innovative model for further research and policy formulation, emphasizing context-specific, sustainable approaches, with recommendations pointing to a promising future where education is critical for community growth and enrichment.

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