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Smart Village Digital Strategy in Improving the Quality of Public Services in Rural Areas

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Abstract: The quality of public services in rural areas still faces serious challenges, particularly regarding infrastructure limitations, low digital literacy, and suboptimal capacity of village officials. To address these issues, the Smart Village Program was implemented to digitize village administration to improve service efficiency, access to information, and community participation. This study aims to empirically test the effectiveness of the Smart Village Program in improving the quality of public services in Polewali Village, Sidenreng Rappang Regency. Using a quantitative approach and descriptive methods, the study involved 392 randomly selected respondents from the village population. Data was collected through observation, closed-ended questionnaires based on the Likert scale, and literature review, then analyzed using descriptive statistics, validity and reliability tests, and simple linear regression. The results indicate that the six pillars of the Smart Village Program have high effectiveness (average 80%), and public service quality has improved significantly (average 77.3%), particularly regarding reliability and assurance. These findings confirm that village digitalization can catalyze more adaptive and inclusive public service transformation. The Smart Village Program has the potential to become a model for sustainable local development, with policy implications for strengthening technological infrastructure, enhancing human resource capacity, and implementing active community engagement strategies.

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INTRODUCTION

Public services in rural areas are a fundamental component in realizing inclusive and equitable governance (Dansou & Carrier, 2023; Kullberg et al., 2018; Meng, 2022; Rusli et al., 2024). Villages, like the smallest administrative units, play a strategic role in providing basic services to the community, ranging from population administration to social services (Dilham et al., 2020; Siregar et al., 2023). However, the reality on the ground shows that many villages still face serious challenges in providing quality services (Thakur et al., 2023). Limited infrastructure, low digital literacy, and insufficient capacity of village officials are the main obstacles to achieving effective and responsive public services (Faozanudin et al., 2023; Rangkuti & Rangkuti, 2023).

Polewali Village in Sidenreng Rappang Regency is one example of a village that faces obstacles in optimizing public services. Based on initial observations, the administrative and social services in this village have not fully met community expectations. This is reflected in the low quality of service aspects such as speed, accuracy, and convenience (Mashamaite, 2014; Naidoo, 2023; Shola & Jijoho, 2021). The Seroquel model, which measures service quality through five dimensions—physical evidence, reliability, responsiveness, assurance, and empathy—shows that Polewali

Village is still in the moderate category, with several indicators requiring significant improvement.

To address these challenges, the smart village program has been introduced as an innovative approach that integrates information and communication technology into village governance (Mahmud et al., 2024; Renukappa et al., 2024). This program is designed to improve the efficiency of public services, expand access to information, and encourage community participation in village development. The smart village concept is an adaptation of the smart city model tailored to the characteristics of rural areas (Cambra-Fierro & Pérez, 2022; Muhtar et al., 2023; Susilowati et al., 2024). Through the digitization of administrative processes, the use of service applications, and the strengthening of human resource capacity, this program is expected to transform the way villages provide services to their residents.

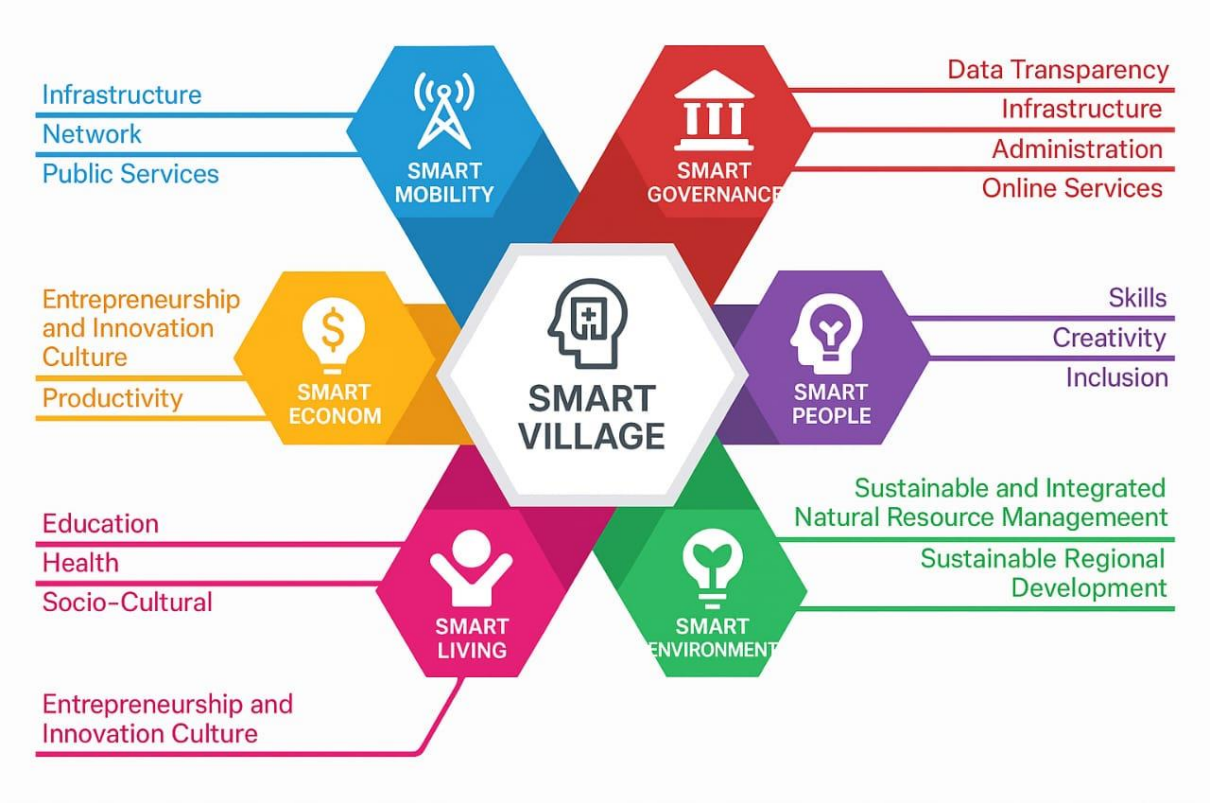

Figure 1. Six Pillars of the Smart Village Program

The smart village program is built on six main pillars: smart economy, smart society, smart living, smart mobility, smart governance, and smart environment (Rahoveanu et al., 2022; Szanyi-Gyenes, 2019; Tosida et al., 2023). Each pillar reflects interrelated strategic aspects in forming a modern and sustainable public service ecosystem. Smart economy promotes the development of local digital-based businesses, while smart community emphasizes the importance of technological literacy and active citizen participation (Shen et al., 2024). Smart living and smart mobility focus on improving quality of life and accessibility (Sobnath et al., 2020), while smart governance and smart environment strengthen government transparency and environmental sustainability.

The urgency of this study lies in the urgent need for public service transformation in villages through a digital approach. Amidst the tide of modernization and public demands for fast and transparent services, villagers need to adapt to technology to improve the effectiveness and efficiency of services (McCarthy & Obidzinski, 2017; Xiao et al., 2024). The Smart Village Program offers relevant and applicable solutions, but there is still little research examining its quantitative impact on the local level (Renukappa et al., 2024; Q. Wang et al., 2022). Therefore, this study plays an important role in providing empirical evidence that can serve as a basis for policymaking and the development of similar programs in other villages.

The novelty of this research lies in its quantitative approach, which tests the six pillars of the Smart Village Program as strategic variables against the Seroquel dimensions in public services. Unlike previous studies, which were conceptual or descriptive qualitative in nature, this study shows a regression model that demonstrates a significant relationship between village digitalization and service quality improvement. The results of the analysis show that every one-unit increase in the implementation of the Smart Village Program contributes positively to improving the quality of public services. This finding reinforces the argument that technology can be a catalyst for change in village governance.

The main contribution of this study is the provision of local data that can be used as a basis for evaluating and planning digital-based public service policies. In addition, this study provides practical recommendations for village governments, such as the need to improve technological infrastructure, train officials (Sadat et al., 2023), and encourage active community participation in the use of digital services (Ikbal et al., 2025; Ilami et al., 2024). This study also opens the door for more comprehensive follow-up studies using a mixed-method approach and a broader geographical scope. As a result, the Smart Village Program is not only a tool for transforming public services but also a model for adaptive, inclusive, and sustainable village development.

RESEARCH METHOD

Research Design

This study uses a quantitative approach with descriptive methods to identify the relationship between the smart village program strategy and improvements in the quality of public services. This design was chosen because it is able to show numerical data systematically and allows for analysis of the relationship between variables. The research location is Polewali Village, Sidenreng Rappang Regency, South Sulawesi, which is one of 25 priority villages for the implementation of the Smart Village Program in the region. The research was conducted over two months, from January to February 2025, after obtaining official permission from the village government and related institutions.

Population, Sample, and Data Collection Techniques

The population in this study includes all residents of Polewali Village, totaling 1,182 people based on 2023 statistical data. The sample was determined using the Simple Random Sampling technique with the Slovin formula, resulting in 392 respondents as a valid representation of the population. Respondents were selected randomly to avoid

bias and ensure representation from the two hamlets in the village. Data collection techniques included direct observation of public service processes, distribution of structured questionnaires, literature review of policy documents and related literature (Arundel et al., 2019; Johnson, 2014), and visual documentation of village infrastructure and service activities. The questionnaire consists of two main sections: indicators of the Smart Village Program and indicators of the quality of the public service based on the Seroquel model.

Research Instruments and Data Validation

The main instrument in this study was a closed end questionnaire with a five-point Likert scale (Taherdoost, 2019), designed to measure community perceptions of the six pillars of the Smart Village Program and the five dimensions of public service quality. Before use, the instrument was tested for validity and reliability through Pearson correlation and Cronbach's Alpha tests using IBM SPSS Statistics software version 21.0 (Malapane & Ndlovu, 2024). The validity test results showed that all indicators had calculated r values above the table r (0.205) at a 5% significance level, thus deemed valid (Marzuki et al., 2022; Rönkkö & Cho, 2022). The reliability test yielded an Alpha value above 0.7, indicating that the instrument has good internal consistency. All collected data were then systematically coded and processed for further analysis.

Data Analysis Techniques

The data collected were analyzed using descriptive statistics to describe the frequency distribution and percentage of each indicator. Next, a simple linear regression analysis was conducted to test the effect of the independent variable (Smart Village Program) on the dependent variable (Quality of Public Services). The regression model was used to identify the extent of the program's contribution to service improvement, with the equation $Y = a + bX$. Significance testing was performed using t-test and p-value to ensure that the relationship found was statistically significant (Kelter, 2020; Lakens, 2021). This analysis aimed to answer the research questions objectively and provide a strong basis for conclusions and policy recommendations.

RESULTS AND DISCUSSION

Effectiveness of the Smart Village Program in Improving the Quality of Public Services

To assess the extent to which the Smart Village Program has contributed to improving the quality of public services in Polewali Village, this study presents a quantitative analysis based on community perceptions of the program's six pillars and five service dimensions. The data obtained through questionnaires were processed using descriptive statistics to produce an overview of the program's effectiveness and the level of community satisfaction. Table 1 and Table 2 show a recapitulation of the scores for each indicator, which form the basis for assessing the program's success in terms of digital strategy and service quality.

Table 1. Summary of the Smart Village Program

Indicators	Percentage
Smart Society	82,6%
Smart Economy	80%
Smart Governance	76,4%
Smart Environment	78,6%
Smart Living	78,6 %
Smart Mobility	79,4%
Average	**80%**

Source: IBM SPSS Statistics Data Processing

The results of the study indicate that the implementation of the Smart Village Program in Polewali Village has had a positive impact on improving the quality of public services. Based on Table 1, the six main pillars of the program—Smart Community, Smart Economy, Smart Governance, Smart Environment, Smart Living, and Smart Mobility—show a high level of effectiveness, with an average percentage of 80%. The Smart Community pillar achieved the highest score (82.6%), reflecting success in improving digital literacy and citizen participation. Meanwhile, Smart Governance and Smart Mobility also made significant contributions to service efficiency and information accessibility.

Table 2. Summary of Service Quality

Indicators	Percentage
Physical Evidence	79%
Reliability	79%
Responsiveness	77%
Confidence	79,6%
Empathy	77,2%
Average	**77,3%**

Source: IBM SPSS Statistics Data Processing

Table 2 shows the public's perception of public service quality based on the five dimensions of Servqual. The dimension of assurance received the highest score (79.6%), followed by physical evidence and reliability, each at 79%. The responsiveness and empathy dimensions are slightly lower but still fall within the good category. The overall average quality of public services reached 77.3%, indicating that the village digitalization program has successfully improved the speed, transparency, and convenience of services. These findings indicate that the technology-based strategies implemented through the Smart Village Program are able to effectively and sustainably (Lawelai & Nurmandi, 2024), address community needs.

Validity of Instruments Smart Village Program and Service Quality

To ensure that the research instruments used to measure the effectiveness of the Smart Village Program and the quality of public services have adequate validity, data quality testing was conducted through Pearson correlation analysis. This test aims to assess whether each indicator in the questionnaire is truly capable of representing the

construct being measured. Tables 3 and 4 show the results of the validity test for each independent and dependent variable indicator.

Table 3. Data Quality Test for the Smart Village Program

No	Calculation	Rtable	Significant Value	Information
1	0,674	0,205	0,001	Valid
2	0,718	0,205	0,001	Valid
3	0,725	0,205	0,001	Valid
4	0,725	0,205	0,001	Valid
5	0,782	0,205	0,001	Valid
6	0,732	0,205	0,001	Valid
Value	**1**	**0,205**	**0,001**	**Valid**

Source: IBM SPSS Statistics Data Processing

The validity test results for the Smart Village Program indicators shown in Table 3 indicate that all r-calculated values are above the r-table value of 0.205 at a significance level of 5% with a degree of freedom (df) of 90. The highest correlation value was found in the Smart Living indicator (0.782), followed by Smart Mobility (0.732) and Smart Governance (0.725). All indicators were deemed valid, meaning that the instrument is capable of accurately measuring the strategic aspects of the implemented program.

Tabel 4 Uji Kualitas Kualitas Pelayanan (Service Quality)

No	Calculation	Rtable	Significant Value	Information
1	0,704	0,205	0,001	Valid
2	0,795	0,205	0,001	Valid
3	0,764	0,205	0,001	Valid
4	0,861	0,205	0,001	Valid
5	0,768	0,205	0,001	Valid
Value	**1**	**0,205**	**0,001**	**Valid**

Source: IBM SPSS Statistics Data Processing

Table 4 shows the results of the validity test for public service quality indicators. The dimension of trust showed the highest correlation (0.861), followed by reliability (0.795) and empathy (0.768). All r-count values exceeded the r-table threshold, so that all indicators were declared valid in measuring public perceptions of service quality. The high validity of both variables indicates that the research instrument has strong reliability and can be used as a basis for scientific analysis of the relationship between variables and can be replicated.

Reliability of the Smart Village Program and Public Services Construct

Once the validity of the instruments had been confirmed through Pearson's correlation test, the next stage in the data analysis was to test the reliability of the construct to assess the internal consistency between indicators in each variable. The reliability test was conducted using Cronbach's Alpha, which is a common statistical method for measuring the reliability of a measurement scale. Table 5 shows the results

of the reliability test for the Smart Village Program variable and the quality of public services.

Table 5. Koefisien

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	4.225	2.225		1.899	.061
	Smart Village Program	.654	.086	.627	7.644	<.001
a. Dependent Variable: Service Quality						

Source: IBM SPSS Statistics Data Processing

Table 5 shows that all variables in this study have Cronbach's Alpha values above the threshold of 0.6, indicating that the instrument has adequate reliability. The Smart Village Program variable obtained a reliability value of 0.812, indicating a high level of internal consistency between indicators such as Smart Mobility, Smart Governance, and Smart Living. This indicates that respondents provided relatively stable and consistent answers to questions measuring the effectiveness of the program.

Meanwhile, the public service quality variable showed a Cronbach's Alpha value of 0.874, which is highly reliable. Dimensions such as reliability, responsiveness, assurance, empathy, and physical evidence demonstrate strong coherence in measuring public perceptions of the services provided. Thus, the results of this reliability test strengthen the validity of the instrument and provide a solid foundation for continuing the analysis of relationships between variables through regression tests and hypothesis testing.

Effectiveness of the Smart Village Program on Public Service Quality

This study found that the smart village program contributed significantly to improving the quality of public services, as indicated by strong correlation and regression values between program indicators and service dimensions. In particular, the smart living and smart governance indicators showed the most consistent relationship with community perceptions of reliability, assurance, and empathy in services (Hartley, 2023; Macke et al., 2018; F. Wang et al., 2021). These results indicate that the integration of technology and participatory governance at the village level can improve access to and responsiveness of public services.

These findings are generally in line with expectations, given that previous literature has emphasized the importance of digitization in accelerating services and improving transparency. Various studies show that villages that adopt community-based information systems tend to have higher levels of public satisfaction (Ariyanto et al., 2022; Mahmud et al., 2023; Taufiq et al., 2019; Utamajaya et al., 2024). However, the main contribution of the smart living indicator in this study provides a new perspective, namely that digitally integrated social welfare aspects have a more direct impact than administrative efficiency alone.

The interpretation of these results can be explained through the value-based public service theory approach, where the effectiveness of services is not only measured by

speed or volume but also by the relevance and meaningfulness of services for citizens. Smart living, which includes access to health information, education, and social assistance, is a concrete representation of these values (Memon et al., 2014; Nikki Han & Kim, 2021; Syed et al., 2019; Vinod Kumar, 2020). When public services directly address the basic needs of the community and are easily accessible, perceptions of service quality improve substantially.

However, some results indicate disparities in perception among different community groups. Elderly groups and those with low digital literacy tend to give lower ratings to the effectiveness of the program. This suggests the possibility of biases in access and utilization of technology that are not yet fully inclusive. Another alternative explanation is that the success of the program is more felt by groups that already have social and digital capital, so the effects of the program are not yet structurally equitable.

CONCLUSION

The results of the study indicate that the Smart Village Program has made a significant contribution to improving the quality of public services in Polewali Village. The six pillars of the program—Smart Society, Smart Economy, Smart Governance, Smart Environment, Smart Living, and Smart Mobility—demonstrate high effectiveness, with an average score of 80%. Meanwhile, the quality of public services based on the five dimensions of Servqual reached an average of 77.3%, with the dimensions of assurance and reliability being the most prominent aspects. Regression analysis confirmed that the digital implementation of the program had a positive impact on the community's perception of village services.

These findings have important implications for the development of digital-based public service policies in rural areas. The integration of information technology in village governance not only improves administrative efficiency but also strengthens citizen participation and the relevance of services to the basic needs of the community. The Smart Village Program has proven to be a catalyst for more adaptive, inclusive, and sustainable public service transformation. Therefore, village digitalization strategies need to be supported by improved human resource capacity, technological infrastructure, and approaches that are sensitive to digital literacy gaps.

Going forward, this research opens the door for more comprehensive follow-up studies, both methodologically and geographically. A mixed-methods approach and expansion of the study area can enrich understanding of the dynamics of program implementation across various social and cultural contexts. Additionally, a longitudinal evaluation of the long-term impacts of the Smart Village Program will provide strategic insights for the formulation of national digital village policies. Thus, village digitalization is not merely a technical solution but also a local development model oriented toward social justice and sustainability.

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