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Innovation of Digital-Based Spatial Planning and Land Services at the Jombang Regency PWPH Office

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A B S T R A C T

Spatial and land planning services are an important aspect of sustainable development that requires innovative approaches to face the challenges of the digital era. Digital-based service innovations implemented by the Public Works and Public Housing (PWPH) of Jombang Regency present solutions to increase efficiency, transparency, and accuracy in spatial and land management. By utilizing technologies such as Geographic Information System (GIS), document digitization, and online applications, administrative processes that were previously time-consuming can now be carried out quickly and easily accessible to people from various locations. This innovation includes the development of online service portals, mobile applications, and data integration between agencies to create connected and responsive services. This system allows the public to apply for spatial permits, monitor the status of applications, and obtain information transparently

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INTRODUCTION

Spatial and land planning is a vital sector in supporting planned and sustainable development. In today's digital era, digital-based spatial and land transformation is an important solution in improving the efficiency of services to the community. The Public Works and Public Housing(PWPH) of Jombang Regency has adopted digital technology to support more transparent, accurate, and integrated spatial and land management (Ali & Budi, 2025) This implementation involves the use of GIS (Geographic Information System)-based software for spatial planning and a digital system for land data management. The digital approach to the Jombang PWPH Office can provide services that are more responsive to the needs of the community, such as spatial planning licensing, land data management, and mapping strategic areas. This digitization also allows for cross-sector data synchronization, thus supporting more targeted decision-making. In addition, the public can now access information related to spatial planning and land more easily through portals or applications provided by the agency, reducing bureaucratic obstacles that often occur in conventional management (Lazuardi & Wahidahwati, 2022)

Digital-based innovations in spatial and land planning have been implemented, several challenges are still faced by the Jombang Regency PWPH Office. One of them is the limitation of technological infrastructure and the readiness of human resources (HR) in operating digital-based systems. Not all employees have the technical skills to utilize technology optimally, so the digitalization process is often hampered. In addition, there are still people who do not fully understand how to use digital services, so more intensive socialization is needed (Annisa & Vionica, 2024) Another challenge is the integration of spatial and land data with other related agencies. Lack of data synchronization between agencies can lead to information inconsistencies that have an impact on decision-making. In addition, data protection and system security are also important issues that need to be considered in this digital era, considering that land data is strategic and sensitive information. With these various challenges, the main question that arises is how to create effective and inclusive digital-based spatial and land service innovations in Jombang Regency (Tahar et al., 2022).

Innovation in digital-based spatial and land planning services at the Jombang Regency PWPH Office is a strategic step in realizing modern and community-oriented public services. One of the innovations that has been developed is an online application that allows people to apply for spatial planning permits or land certification online (Yahya & Amzan, 2022). This application is designed to facilitate public access, shorten process time, and increase transparency in the management of spatial and land administration. Another important innovation is the development of a GIS-based dashboard that can be used by local governments to monitor spatial development in real-time. With this innovation, policymakers can identify areas prone to spatial planning conflicts, plan strategic regional development, and ensure the suitability of land use in accordance with the spatial plan that has been set. The combination of modern technology and community-based service approaches is the key to

success in encouraging more innovative spatial and land planning (Sartika et al., 2022)

The challenges faced in the digitization of spatial and land planning require several strategic solutions. Increasing the capacity of human resources through training and technical assistance related to the use of digital systems (Abdi Muhammad & Maria Fitriani, 2021) The competence of PWPH Office employees in building the management of technologists is expected to run more optimally in the digitalization process. In addition, it is necessary to carry out massive socialization to the public regarding the use of digital services, so that these services can be accessed by all groups, including people in remote areas. Strengthening digital infrastructure, such as the development of more reliable servers, increased internet access throughout the region, and the implementation of adequate data security standards (Andriyan et al., 2024) Data integration between agencies must also be improved to ensure the accuracy and consistency of information. With this approach, digital-based spatial and land planning is not only a modern service innovation, but also a strategic solution in supporting sustainable development in Jombang Regency (Rijal et al., 2023)

LITERATURE REVIEW

Analysis of Digital-Based Spatial and Land Service Innovation at the Jombang Regency PWPH Office

Innovation in public services, including spatial and land planning, is very important in the digital era. At the Public Works and Public Housing (PWPH) of Jombang Regency, a digital-based approach has been implemented to improve service efficiency and transparency. An analysis of the main aspects of this innovation, namely, the Utilization of Information and Communication Technology (ICT) of the Jombang Regency PWPH Office has utilized ICT in compiling a digital-based service system (Nurlaila Nurlaila et al., 2024) Online applications and platforms allow the public to access services such as spatial planning licensing and land certificate management more easily and quickly. Provision of Web-Based Services One of the key elements of this innovation is the development of an integrated website or service portal. This portal allows users to submit applications, monitor the status of submissions, and obtain the required documents online (Tasyah et al., 2021)

Digitization of Spatial and Land Documents Digitization of documents makes it easier to access spatial and land data and information. It also reduces the risk of losing physical documents, which was previously a major obstacle in land administration. Integration with the National Innovation System is also in line with central government policies, such as the Complete Systematic Land Registration (PTSL) program (Sinen et al., 2022) Integration with the national system ensures that the data used is synchronous and valid. Manual Process Reduction Time-consuming manual processes have been minimized. With a digital-based system, administrative processes that usually take days can now be completed in a matter of hours. Increased Transparency and Accountability Through the digital system, the public can monitor the progress of their applications directly. This reduces the potential for corrupt practices and increases public trust in local governments (Febriandirza, 2020)

Human Resource Capacity Building The implementation of the digital system demands an increase in the capacity of human resources at the PWPH Office. Training and mentoring are carried out to ensure that employees are able to operate the system properly (Budhi Pamungkas Gautama et al., 2020) Ease of Access for the Community The digital-based system allows people in remote areas to access services without having to come directly to the PWPH Office. This is an effective solution, especially for those who have time and cost constraints (Warman et al., 2023) Operational Cost Efficiency The implementation of digital systems reduces the need for paper, ink, and other operational costs. These savings can be allocated for other service improvements. Adaptation to the COVID-19 Pandemic During the COVID-19 pandemic, this innovation has proven to be very relevant. Online services allow people to continue to get services without having to violate health protocols (Adinugroho et al., 2023)

Use of Geographic Information Systems (GIS) GIS technology is used to map areas in detail, thus helping more accurate and data-based spatial planning. Collaboration with the Private Sector In several aspects, the Jombang PWPH Office collaborates with the private sector for the development of digital systems (Adinegoro, 2023a) This collaboration accelerates the implementation of innovation and improves service quality. Mobile Application Development In addition to web portals, mobile applications are developed to provide easy access for the public. This application contains the main features of the PWPH Office's services. User Feedback The digital system allows the public to provide feedback directly through available platforms (Agustinah et al., 2023) This feedback is used for service evaluation and improvement. Digital Infrastructure ImprovementTo support this innovation, digital infrastructure such as internet networks and servers have been strengthened. This ensures that the service can be accessed without interruption. Data Security Data security is a major concern. The system is equipped with encryption and security protocols to protect sensitive information belonging to the public (Lomi et al., 2019)

Supporting Regulations The Jombang Regency Government has issued regulations that support the implementation of digital-based systems. This provides a strong legal basis for the implementation of innovation. Socialization to the CommunitySocialization is carried out intensively to ensure that the public understands how to use this digital service (Sastra, 2023) Social media, brochures, and live training are used as a means of socialization. Budget SupportThe implementation of this innovation is supported by adequate budget allocation. The budget is used for system development, training, and infrastructure maintenance. Periodic EvaluationThe PWPH Office conducts periodic evaluations to assess the effectiveness of the digital system. The results of this evaluation are used to make necessary improvements (Nopriyanto, 2024)

The Impact of Digital-Based Spatial Planning and Land Service Innovation at the Jombang Regency PWPH Office

Digital-based innovations implemented by the Jombang Regency PWPH Office have brought various positive impacts to the government and society. These impacts are, Improving Service Efficiency The service process that previously took time can now be done faster, thereby increasing the operational

efficiency of the PWPH Office (Annisa & Vionica, 2024) Ease of Access to Community Services No longer need to come to the PWPH Office office to take care of their needs. All processes can be done from home via digital devices. Transparency in Community Administration can directly monitor the status of their applications through the system. This increases transparency and reduces the potential for abuse of authority. Increased Public Trust With better and more transparent services, public trust in local governments has increased. Cost Reduction for the Innovation Community This reduces the costs that must be incurred by the community for transportation and administration (Tahar et al., 2022)

Reduction of Employee Workload The digitalization process reduces the workload of employees, so they can focus on other strategic tasks. Improved Data Accuracy Digital systems ensure that the data used is accurate and avoids human error. Support for Spatial Planning With integrated data, spatial planning becomes more effective and according to the needs of the community (Pujiono et al., 2023) Increasing Regional Competitiveness Jombang Regency is one of the regions recognized for this innovation, thereby increasing competitiveness at the regional and national levels. Reducing Environmental Impact Digitalization significantly reduces the use of paper, thereby contributing to environmental conservation (Adinegoro, 2023). Increase in User Satisfaction The survey results show that people feel more satisfied with digital-based services than previous manual services. Encouraging Digital Literacy This innovation encourages the public to be more familiar with digital technology, thereby increasing digital literacy at the local level. Government Budget Efficiency With a reduction in operational costs, the government budget can be allocated to other programs that are more prioritized. Ease of Monitoring and Evaluation The digital system makes it easier to monitor and evaluate the performance of the PWPH Office (Alim, 2022)

Increased Inter-Agency Collaboration Data integration with other agencies increases collaboration and efficiency of government administration. Ease of Dispute Resolution Structured digital data makes it easier to resolve disputes related to spatial and land (Yunus & Kuncoro, 2025) Increasing Legal Awareness The community has become more aware of the importance of managing legal documents related to land. Positive Social Impact The ease of this service helps people feel more cared for by the government. Increasing Employee Productivity Employees of the PWPH Office can work more productively with a supporting system. New Challenges for Advanced Innovation The success of this innovation is a motivation to create other better innovations in the epan period (Sutojo, 2021)

The overall analysis and impact show that digital-based innovations in the Jombang Regency PWPH Office make a great contribution to improving the quality of public services, both in terms of efficiency, transparency, and community satisfaction.

METHODOLOGY

This study uses a type of qualitative approach research method. The data is collected in the field, selected and simplified, and then analyzed according to the theory used. This research is a type of descriptive research which is a research method in researching a group of people, an object, a thought system, a set of conditions, or a class of events in the current period. The purpose of this descriptive research is to make a systematic, factual and accurate description, description or painting of facts, properties, and relationships between the phenomena being investigated. Public service innovation is in accordance with the formulation by Halvorsen quoted by Suwarno (2008:42), namely: 1. Conceptual Innovation, in the sense of introducing new ideas or new rational strategies or the results of conceptual innovation is the emergence of new paradigms, ideas, ideas, thoughts, and breakthroughs. 2. Delivery Innovation, which includes new or changed ways of solving problems, providing services or interacting with clients for the purpose of providing special services. 3. System Interaction Innovation, which is new or changed ways of interacting with organizations or as new forms and mechanisms in dealing with other parties in order to achieve common goals. Data collection techniques are the most important step in research, because the main purpose of research is to obtain data. Sugiyono (2007:209) when viewed in terms of data collection methods or techniques, data collection techniques can be carried out by observation, interviews, and documentation (Sugiyono :208, 2014) (Tasyah et al., 2021).

RESULTS AND DISCUSSION

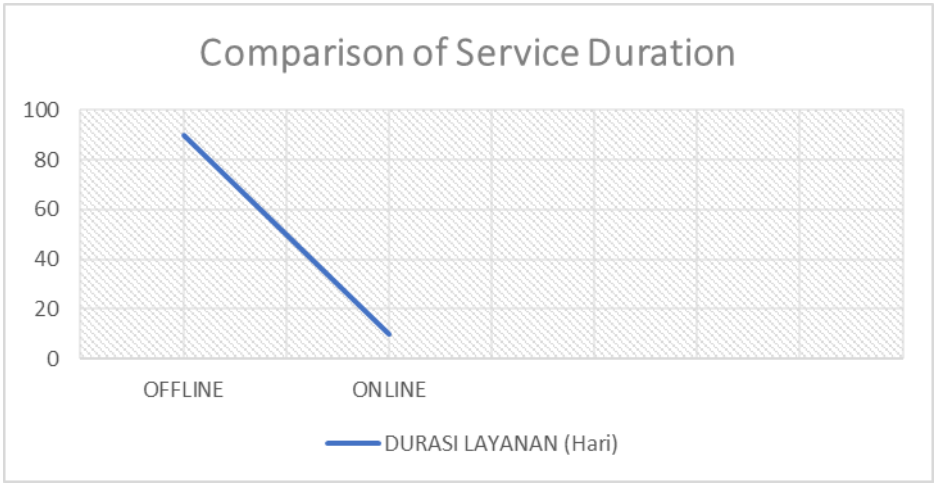
Analysis of Digital-Based Spatial and Land Service Innovation at the Jombang Regency PWPH Office

In analyzing innovations in digital-based spatial and land planning services at the Jombang Regency PWPH Office.(Siswanto et al., 2022), an approach based on innovation theory from Suwarno (2008:42) is needed which includes three main dimensions: conceptual innovation, delivery innovation, and system interaction innovation. Each of these dimensions provides a framework for understanding the implementation of digital innovation in the PWPH Office, both in terms of ideas, service methods, and interactions with stakeholders.

1. Conceptual Innovation: Conceptual innovations carried out by the Jombang Regency PWPH Office can be seen from a new paradigm in spatial and land governance. Previously, spatial and land planning was regulated through a manual mechanism that relied on physical documents and a long bureaucratic process. With digital innovation, new ideas and ideas are beginning to be introduced, such as the use of geographic information systems (GIS) for spatial mapping. GIS allows the integration of spatial data with administrative information so that decision-making becomes more rational and data-driven. This paradigm strengthens efficiency, accuracy, and transparency in land governance (Sasili, 2018) (Gosita et al., 2024).

In addition, the PWPH Office also introduced a cloud computing-based management strategy to store important data related to spatial planning and land. This approach describes a new mindset that addresses the challenges of physical limitations of documents and the risk of data loss. The concept of "smart land

management" is one of the ideas that leads to long-term efficiency, in line with the trend of digitizing public services.



Graph 1. Comparison of Service Duration (Before and After Digitalization)
Source: Researcher 2025

In graph 1, which discusses the comparison of services before and after digitalization, it is a positive impact of digitalization in spatial and defense governance by the Jombang Regency PWPH Office. Service efficiency at the previous PWPH Office was that the space and defense governance process was carried out manually which relied on long physical and bureaucratic documents. This graph shows a comparison of the duration of services before and after digitalization, which is shown in two main categories, namely offline and online services. This graph illustrates the impact of digitalization on time efficiency in service processing. The graph shows that the duration of the service in the offline system is very high, reaching about 90 days. This shows that before digitalization, the service process took a long time, possibly due to manual procedures, long bureaucracy, or limited resources in processing data and documents. On the contrary, after the service switched to an online system, the duration of the service decreased drastically to about 10 days. This shows that digitalization has a significant impact in speeding up service processes, reducing wait times, and improving overall efficiency.

This decrease in service duration can be caused by various factors, such as process automation, reduced reliance on physical documents, and increased accessibility and transparency in service submission and processing. With a digital system, users can apply at any time without having to come to a physical office, thus speeding up the workflow. In addition, the use of digital systems also allows for better integration between various agencies or parts involved in the service process. This reduces the possibility of administrative bottlenecks that typically occur in manual systems, such as delays in document verification or errors in data recording. While digitalization has been shown to improve efficiency, there are some challenges that remain to be considered. Some users may still have difficulty adapting to digital systems, especially those who are less familiar with technology. Therefore, socialization and guidance are needed so that all users can take

advantage of digital services optimally. Overall, this graph provides concrete evidence that digitalization can significantly reduce service duration, improve efficiency, and provide convenience for users. By continuing to develop and improve digital systems, public services and other sectors can be faster, more transparent, and more accessible to the wider community.

Overall, the graph proves that the conceptual innovations implemented by the PWPH Office have a real impact in accelerating and improving the effectiveness of public services related to spatial and land governance.

2. Delivery Innovation: In the dimension of delivery innovation, the Jombang Regency PWPH Office adopts application-based technology to simplify the service process. One form of delivery innovation is the launch of a digital land service application that allows people to apply for spatial planning permits online. This application is equipped with an application status tracking feature so that users can monitor the administrative process transparently (Cucun Supredi et al., 2023). These new methods also include a reduction in reliance on manual procedures. For example, the document verification process is now automated through a system designed to detect the completeness of files. Thus, the time required to process permit applications can be significantly reduced. This reflects an innovative approach to providing faster, more efficient, and more accessible services.

Graph 2. Increasing Trend of Digital Service Usage by Service Type
Source: Researcher 2025

In graph 2, it is explained that there has been an increase in the number of applications for City Planning Decree (CPD) that have been input and approved in recent years. Delivery innovations implemented by the Jombang Regency PWPH Office, such as the use of digital-based applications for land services, allow people to apply for spatial planning permits online. This innovation simplifies the service process with application status tracking features and document verification automation, thereby speeding up and increasing efficiency in application processing.

This graph shows the trend of increasing the use of digital services based on the number of CPD (City Planning Decree) applications for two service categories, namely "Application Input" and "Out SK", for three years: 2022, 2023, and 2024 (until November 30, 2024). This graph provides an overview of how the number of applications changes from year to year and how trends in the use of digital services are evolving. In 2022, the number of applications for both categories was relatively balanced, with figures ranging from around 370 to 400 applications. This shows that in that year, the use of digital services was quite stable and had a significant user base. The year 2023 shows a significant increase in the number of applications for both service categories. Both "Application Input" and "Out SK" have experienced a surge to close to 450 applications. This increase can be caused by the increasing adoption of digital services, policies that encourage the use of online systems, or the increasing public need for digital-based services. However, in 2024 until November 30, there will be a decrease in the number of applications compared to 2023. The number of applications for "Application Input" fell close to 370, while "Out SK" experienced a larger decrease, close to 350. This decline can be an indication of certain factors that cause the number of digital service users to decrease.

Some possible causes of this decline include regulatory changes, technical constraints in digital service systems, or changes in user preferences that may return to the manual application method. Other factors such as economic or social conditions can also affect the pattern of application for these services. Despite the decline in 2024, the number of applications is still at a fairly high number when compared to 2022. This shows that despite fluctuations, the use of digital services remains the top choice for many users. This graph can be an evaluation material for digital service providers to understand the factors that affect application trends. If the downward trend continues, it is necessary to make efforts to increase the number of applications, such as system improvements, further socialization, or improvement of service quality. As such, this graph provides important insights into how digital service usage trends have evolved in recent years. This data can be used to design better strategies in increasing the effectiveness and attractiveness of digital services so that they remain relevant and in accordance with the needs of society.

3. System Interaction Innovation : System interaction innovation in spatial planning and land services in Jombang Regency includes closer collaboration between the PWPH Office and other stakeholders, such as the National Land Agency (NLA), village governments, and the community. An integrated digital system enables real-time data sharing between organizations. This creates better synergy in solving spatial and land problems (Abdullah, 2024).

For example, the existence of a digital collaboration portal allows the PWPH Office to communicate directly with the village government to validate land ownership data. The portal is designed to facilitate coordination so that there is no more overlapping data or unauthorized claims. In addition, this system provides space for the public to submit complaints or suggestions directly through digital platforms, thus building a more transparent and accountable relationship.

Table 1. The Number of Users of Digital-Based Services in a Given Period

OFFLINE	**ONLINE**	
YEAR 2022	YEAR 2023	YEAR 2024
391	471	381

Source: Researcher 2025

Table 1 explains that the system interaction innovation described in the text emphasizes strengthening digital collaboration between the PWPH Office, NLA, village governments, and the community in spatial and land planning services. The implementation of this digital system allows coordination to be more effective and transparent, such as through digital collaboration portals. The table shows the number of users of digital-based services in recent years. It can be seen that in 2023, the number of digital service users will reach 471 people, higher than the number of offline service users in 2022 which is 391 people. However, as of November 30, 2024, the number of users of digital services has decreased to 381 people. The implementation of digital systems in spatial and land planning is expected to increase the number of digital service users. However, the data in the table shows a decline in 2024, which can be an indication of several factors such as limited access to technology, lack of socialization, or technical constraints in the digital system. In the text, it is explained that this digital system aims to facilitate the validation of land ownership data and provide space for the community to submit complaints and suggestions directly. If this system runs well, ideally the number of users of digital services should increase. Therefore, there needs to be an evaluation of the implementation of this innovation so that digital adoption continues to increase.

System interaction innovation is closely related to the changing trend of digital service use. However, even though digital systems have been implemented, data shows that there will be a decrease in the number of users in 2024, which could be a concern in optimizing digital services to remain relevant and beneficial to society.

The integration of technology in system interaction innovation can also be seen from the implementation of online interactive maps that can be accessed by the public. With this map, the public can obtain information about zoning status, land allocation, and regulations related to spatial planning. This innovation not only facilitates access to information, but also increases public participation in spatial planning. Based on the analysis of conceptual innovations, delivery, and system interactions, it can be concluded that the innovation of digital-based spatial planning and land services at the Jombang Regency PWPH Office reflects a significant transformation in spatial management. Through new ideas, digital strategies, and more integrated interaction systems, public services become more efficient, transparent, and responsive to the needs of the community. This innovation not only answers administrative challenges, but also strengthens the relationship between the government and the community through a technology-based approach (Fatimah & Chotijah, 2024).

The Impact of Digital-Based Spatial Planning and Land Service Innovation at the Jombang Regency PWPH Office

Discussing the impact of digital-based spatial and land service innovation in the Jombang Regency PWPH Office, the innovation theory from Suwarno (2008:42) is the main reference to see the influence caused by three dimensions: conceptual innovation, delivery, and system interaction.

1. Conceptual Innovation The impact of conceptual innovation can be seen from the paradigm change in spatial and land governance. By introducing new digital-based ideas, such as GIS systems and cloud computing, there has been an increase in efficiency in spatial data management. Data that was previously scattered and difficult to access is now centralized in a single digital platform, enabling more in-depth, evidence-based analysis. This new paradigm also has an impact on more transparent decision-making. The information stored in the system can be accessed by the authorities, thus preventing data manipulation or conflicts of interest. In addition, the public has become more confident in the governance process because the data used is open and verifiable. This conceptual innovation also opens up opportunities for further development, such as integration with Artificial Intelligence (AI) technology for predictive analysis related to land use. This has a long-term impact in the form of improving the quality of sustainable spatial planning.

2. Delivery Innovation The impact of delivery innovation is reflected in the increase in public satisfaction with the services of the PWPH Office. With digital applications, people can now access services from anywhere without having to come directly to the official office. This reduces transportation costs and waiting times that were previously the main complaints. In addition, the automation of the document verification process speeds up the administrative completion time. If previously the management of spatial planning permits took weeks, now the process can be completed in a matter of days. Another positive impact is the reduction in the workload of service employees, allowing them to focus on other strategic tasks. The application status tracking feature also provides a sense of security for the community. They can clearly know the stages of the ongoing process, thus reducing anxiety or uncertainty.

3. System Interaction Innovation System interaction innovation has a significant impact in building collaboration between stakeholders. With an integrated digital system, coordination between the PWPH Office, NLA, and the village government has become more effective. The new interaction system also strengthens government accountability. By providing data that is open and accessible to the public, the public can supervise the implementation of spatial and land planning policies. This impact strengthens public trust in local governments.

The impact of digital-based spatial and land planning service innovations at the Jombang Regency PWPH Office is very significant, both in terms of operational efficiency, community satisfaction, and increased transparency and accountability. Through the application of conceptual innovation, delivery, and system interaction, public services in the field of spatial planning and land have undergone transformations that bring real benefits to the government and society.

CONCLUSIONS AND RECOMMENDATIONS

The innovation of digital-based spatial planning and land services implemented by the Jombang Regency PWPH Office has brought significant changes in increasing the efficiency, transparency, and accuracy of public services. Through the use of technology such as Geographic Information System (GIS), document digitization, and online applications, administrative processes that previously took time are now faster and more accessible to the public. The implementation of this innovation includes the development of online service portals, mobile applications, and data integration between agencies to create a connected and responsive system. Document digitization also reduces the risk of data loss and minimizes manual processes that are prone to errors. As a result, this innovation has succeeded in improving operational efficiency, ease of access to services, and public trust in local governments. However, the implementation of this innovation also faces challenges, such as limited technological infrastructure, human resource readiness, and people's digital literacy. To overcome these obstacles, the Jombang Regency PWPH Office has taken various strategic steps, such as technical training for employees, strengthening digital infrastructure, and socializing digital services to the community. Overall, this digital-based service innovation shows a significant positive impact in supporting sustainable development and increasing regional competitiveness at the national level. Jombang Regency can be an example of a successful region in adopting modern technology to create public services that are inclusive, transparent, and oriented to community satisfaction.

FURTHER STUDY

This research still has limitations so that further research is needed on the topic of Innovation of Digital-Based Spatial Planning and Land Services at The Jombang Regency PWPH Office in order to perfect this research and increase insight for readers.

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