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FACTORS INHIBITING SPATIAL INFORMATION AND SYSTEM-BASED PUBLIC SERVICE INNOVATION IN SPATIAL PLANNING

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Abstract

This study examined the driving and inhibiting factors influencing the implementation of website-based service innovation (e-government) through the Spatial Planning Information System (SPIS) in Mojokerto Regency, Indonesia. SPIS, locally branded as Majapahit GIS, is a spatial planning information system designed to deliver online maps, tabular data, and animated statistical visualizations. A descriptive qualitative research design was employed. Data were collected through in-depth interviews, observations, and document analysis, and analyzed using an interactive qualitative data analysis approach. The findings indicate that SPIS has been implemented effectively and complies with key e-government principles, including accessibility, service continuity, technical feasibility, efficiency, and accountability. A distinctive feature of SPIS is its ability to automatically generate thematic maps based solely on numerical data input at predefined locations. This functionality eliminates the need for specialized cartographic expertise and enables broader user participation, representing a significant innovation in the application of Geographic Information Systems (GIS) for e-government. Despite these achievements, the aspiration to establish an integrated "one database system" capable of comprehensively supporting regional development planning has not been fully realized. The main driving factors include strong leadership commitment, supportive human resources, adequate infrastructure, and alignment with central government policies. Conversely, inhibiting factors comprise limited availability of IT specialists, slow internet access due to reliance on open networks, underutilized

public consultation features, incomplete supporting data, weak inter-agency coordination, and the absence of incentive-based governance mechanisms. This study contributes empirical insights into the sustainability and institutional challenges of GIS-based e-government innovation in local government contexts.

Keywords: inhibiting factors, public service, service innovation, special planning

Introduction

One form of public service innovation through e-government in the government bureaucracy is the Spatial Planning Information System (SPIS) service innovation implemented by the Mojokerto Regency Regional Development Planning Agency. The Spatial Planning Information System (SPIS) is a website-based spatial planning information system designed to provide transparent, accurate, and easily accessible land-use information to the public. This SPIS service provides information to the public about land use per Mojokerto Regency Regional Regulation No. 9 of 2012 concerning the Mojokerto Regency Spatial Planning for 2012–2032. The information presented in SIPR includes zoning designation, spatial utilization policies, and land-use suitability based on official regional spatial plans. Most of the SIPR customers are people with interests in or plans to use land in the Mojokerto Regency area. Before they invest, they must ensure that the designation suitability of the land they intend to use is in accordance with the applicable provisions. In this context, SPIS functions as an initial reference and verification tool for land-use compliance. This service is the initial stage before investors carry out the licensing process for industry, property business, or other purposes. Thereby supporting legal certainty, reducing information asymmetry, and improving the efficiency of investment-related public services.

The implementation of spatial information services at the Mojokerto Regency Regional Development Planning Agency is done offline or manually. This means that service users—in this case, the public—who wish to obtain spatial information must go directly to the Mojokerto Regency Regional Development Planning Agency office and meet the officer in charge to obtain the desired information service. This manual service system has been running for years. Systems and work procedures run as they are without any standard provisions. There is one officer in charge, who has one member of support staff, and is equipped with one computer device that supports spatial information application software. This kind of service condition causes the process to take longer, and it can often be convoluted and less transparent. Not infrequently, the customer has to visit the Mojokerto Regency Regional Development Planning Agency office several times because the officer in charge is working outside the region or carrying out other tasks.

Against the background of these various shortcomings, along with the development of information technology (IT) and the demands of the community for excellent, fast, and efficient service, at the end of 2017, the head of the Mojokerto Regency Regional

Development Planning Agency sparked an innovative website-based spatial information service, which represents the operational realization of the SPIS service innovation and was realized through the SIPR application known as "Majapahit GIS." In this context, SPIS refers to the institutional public service innovation framework, while Majapahit GIS is the concrete digital application used to deliver the service. Majapahit GIS contains spatial information related to land use plans in Mojokerto Regency based on the Mojokerto Regency Regional Regulation concerning regional spatial planning. This service is helpful for people who want to know about allotment and land use provisions, especially for investment and other activities. The advantages or uniqueness of this SPIS service innovation compared to other applications, namely the SIPR application, lie in its ability to present spatial planning information through interactive digital maps, using the Global Positioning System (GPS) for location reference and processed with geographic information system (GIS) technology, so that it can be presented in map form.

By using this online-based service system, the SPIS application can be accessed online by all people who wish to find information on land use in Mojokerto Regency through the website https://sipr.mojokertokab.go.id. If the community only wants to find spatial information (land allotment), then the service can be accessed independently through the intended website. This can be done simply by looking at the spatial plan map feature that has been prepared in the application. Furthermore, information can be obtained regarding the intended land use for housing, industry, trade, and so on. However, if someone wants a printed copy of the spatial information letter, they must go to the Mojokerto Regency Regional Development Planning Agency office in person. A spatial information letter is an official document issued by the local government to confirm the conformity and approval of a proposed land use with the applicable regional spatial plan. The spatial information letter must be verified and signed by the authorized official before being issued. The customer can then use this spatial information letter as a further requirement for managing the relevant business licensing process.

In general, the concept of an online-based service system innovation implemented by the Mojokerto Regency Regional Development Planning Agency seems to make it easier for service users to access more focused and systematic services. Transparent public service is one of the principles that is used to realize good governance. Previous research by Taufiqurokhman and Satispi (2018) unveiled that transparency in the administration of public services is the implementation of tasks and activities that are open to the public, especially in policy, planning, implementation, and monitoring/control processes, for example, which should be easily accessible to all parties who need information. Transparency is built in an atmosphere with a free flow of information. In this atmosphere, processes, institutions, and information can be directly accessed by those who are interested. In addition, there is also sufficient information available to understand and monitor these three things. However, many ideal prerequisites must be fulfilled to improve the quality of public services and achieve good governance; likewise, the application of e-government was chosen as an innovative step to improve public services. Therefore, based on existing

theory, as well as a set of initial information on issues surrounding the implementation of website-based public services at the Mojokerto Regency Regional Development Planning Agency, as mentioned above, the authors are interested in further analyzing the implementation of SPIS services as a website-based innovation (e-government). In response to the gaps and the need to analyze the implementation of e-government, two research questions are addressed in this current study:

1. What factors inhibit website-based service innovation (e-government) in the SPIS service "Majapahit GIS" at the Mojokerto Regency Regional Development Planning Agency?
2. What are the strategies to overcome obstacles in website-based service innovation (e-government) in the SIPR service "Majapahit GIS" at the Mojokerto Regency Regional Development Planning Agency?

Literature Review

Innovation in the public sector

Innovation in bureaucracy can be done through several models. Mas'ud (2009) contended that innovation in bureaucracy could be realized through implementing e-government, applying the citizens' charter, and using regional autonomy as a driving force for innovative bureaucracy. In its implementation, several experts identify public sector innovation models or types. There are three types of innovation spectrum in the public sector. The first is incremental innovation to radical innovation (characterized by the level of change, incremental improvements to existing products, and service processes).

The second is that innovation in changing public service behavior must start from the commitment of top management as a role model that plays a strategic role in changing the behavior of the apparatus, so that public service innovation can be realized, if it is driven from the top down through visionary leadership and strengthened from the bottom up through the active participation of all apparatus. The last is need-led and efficiency-led innovation (depending on whether process innovation has been initiated to solve specific problems or make existing products, services, or procedures more efficient). The types of innovation in the public sector, as identified by Sangkala (2013, 31), can be seen in Table 1 below.

Table 1. Types of Innovation in the Public Sector

No.	Innovation Type	Example
1	New service or service improvement	Home health care
2	Process innovation	Changes in making a service or product
3	Administrative innovation	Use of new policy instruments as a result of a policy change

4	System innovation	A new system or a fundamental change of an existing system by establishing a new organization or new patterns of cooperation or interaction
5	Conceptual innovation	Changes in the way actors such as change are achieved by using new concepts, e.g., integrating resource management
6	Radical change is now rational	Perspective or shift in the mental matrix of an organization's employees

Strategies, opportunities, and barriers to innovation

The United Nations World Public Sector Report in 2004, as mentioned in Sangkala (2013), notes that "the main strategies used in successful innovation practices in government bureaucracies are:

1. Providing integrated services. The government offers an increase in the number of services.
2. Involving citizens. The government gives citizens an active role in participating in the success of innovation and allows citizens to express their needs while ensuring successful and sustainable innovation.
3. Establishing cooperation/collaboration. The government conducts innovative collaboration and cooperation with various parties to improve the quality of public services.
4. Utilizing IT. The government provides computer and internet-based public administration services to accelerate and simplify governmental administrative and information services."

In addition, comprehensive strategy from the bureaucracy is needed to achieve success in innovating. The choice of the right strategy can be adjusted to the situation and conditions faced by the bureaucracy when carrying out its innovation. Whether it uses an integrated service delivery strategy that provides various services according to community needs, collaborates with the private sector, involves citizens in getting ideas for sustainability of innovation, or uses IT to simplify services, the most important thing is the bureaucracy's commitment to continuously improving efforts to develop community needs.

The use of innovation opportunities can result in outcomes that exceed initial expectations and were not previously planned, thereby producing positive and sometimes unexpected successes, whether in government organizations, companies, or other social organizations. We can use many opportunities to develop innovation, especially if we are willing to learn from reality by comparing expectations and reality. Innovation begins with the search and discovery of opportunities that can be obtained by members from outside an organization and within an organization. The dynamics of innovation opportunities arise from the organization's ability to read predictable conditions and respond to unpredictable situations, so that innovation is not only reactive but also anticipatory.

Changes in people's perceptions, including the demand for the fulfillment of structural needs and the development or changes in science and technology, create an opportunity if we respond well to create innovation. The development of social conditions fluctuates greatly. Each member of society determines this. Members of society who develop dynamically are members of society who can seize opportunities. Opportunity and innovation are mutually reinforcing—opportunities create innovation, and innovation creates new opportunities.

Supporting factors in spatial planning

Management experts put forward other definitions in a book by Hasibuan (2016), George R. Terry, in particular, says planning is an effort to select and connect facts and make and use assumptions about the future by describing and formulating the activities needed to achieve the desired results. From some of these definitions, several essential components in planning can be explained, namely goals (what is to be achieved), activities (actions to realize goals), and time (when these activities are to be carried out).

Research Method

Data collection

Data for this study were collected through in-depth interviews, observations, and document analysis at the SPIS service under the Mojokerto Regency Regional Development Planning Agency, located at the Mojokerto District Government, East Java, Indonesia. The interviews were conducted with the head, staff, and sub-division team of the agency.

Data analysis

The data analysis technique used in this research was the interactive model analysis informed by Miles et al. (2014). This data analysis technique included data collection, reduction, presentation, and conclusion drawing and verification. The interactive analysis model can be described as follows: the data reduction stage, the data presentation stage, and the conclusion. In the first stage, the data reduction stage, the data were reduced by summarizing, selecting, and focusing on data that were in accordance with the research objectives. Next, the data presentation stage was carried out after the data had been reduced or summarized. In addition, the data observations, interviews, and documentation were analyzed and presented as interview notes, field notes, and documentation. The final step in the qualitative data analysis interactive model is conclusion and verification.

Results and Discussion

Inhibiting factors

The first set of questions aimed to investigate the factors that inhibit website-based service innovation (e-government) in the SPIS service "Majapahit GIS" at the Mojokerto Regency Regional Development Planning Agency. Service providers had to identify inhibiting factors in public services. The identification results can now be used as input material for further policy improvements. Table 2 below illustrates the factors that inhibit e-government in the SPIS service.

Table 2. Inhibiting Factors in the "Majapahit GIS" Service

No.	Inhibiting Factors	
	Internal	**External**
1	Lack of human resources in the IT field to operate and control the "Majapahit GIS" service	Infrequently updated supporting data
2	The e-government application using free networks (open-source system) / lack of internet connection	Lack of support from other related regional apparatus organizations
3	The SPIS "Majapahit GIS" application is not fully meeting the needs of customers who would like to consult in person as yet	Absence of a regional government policy that supports implementing the "one database system and one map policy," such as a reward and punishment system for implementing spatial data services in Mojokerto Regency

As shown in Table 2, there are several obstacles to carrying out service innovation, namely that communication is not smooth and the budget is not sufficient. The results of the study indicate that several inhibiting factors in the SPIS service are as follows:

1. Internal factors, including the fact that there is limited human resource department support in the IT field. The results showed that, although a supporting factor, the lack of human resource in this service was also an inhibiting factor. The "Majapahit GIS" SPIS service is an innovative website-based service. In its implementation, this kind of service system does not rule out the possibility of system problems or disturbances. Therefore, special experts in the field of IT are needed, and their job is to oversee the running of this application system. Currently, the Mojokerto Regency Regional Development Planning Agency does not yet have staff or experts specialized in IT. Meanwhile, recruiting personnel (non–civil servants, i.e., contract-based or private-sector professionals who are not part of the permanent

government workforce) in the IT field is still constrained by the region's budget and regulations, so it becomes a separate obstacle for this service.

2. The application uses a free network (open-source system). The "Majapahit GIS" SPIS application is a website-based service that depends on the available internet network. The research results show that a slow internet connection often limits access to the SPIS application. This is because this application uses an open-source or free network system and does not use a paid network. This has an impact on access, as it is slower than that of paid applications.
3. The SPIS application has not met the needs of customers who wish to consult it. The implementation of website-based services has shifted several service functions that were previously handled directly by human resources to technology-based processes supported by information technology (IT). This certainly impacts changes in various aspects, both in mindset, habits, and work mechanism systems, as well as with this SIPR service. The transition from offline to online services requires preparation for maturity from various sides.

The study results show that in the third year this website-based service has been running, many service user communities still prefer using offline services and going directly at the Mojokerto Regency Regional Development Planning Agency. The main reasons given by these customers are that by coming in person, there is more flexibility during the consultation, and they can get more information. This condition is supported by other information that says that the public dialogue service menu provided in the SPIS application is not optimal. People very rarely use the menu that has been provided. This indicates that a rigid, less flexible system still hinders the use of e-government media in the SPIS application. Consultation and two-way communication functions that are usually done offline cannot be accommodated in this application. This is absolutely an obstacle to optimizing the use of e-government in the SPIS spatial information service at the Mojokerto Regency Regional Development Planning Agency.

E-government development is directed at achieving four goals according to Presidential Decree No. 3 of 2003 concerning National Policy and Strategy for e-Government Development, namely a. the establishment of an information network and public service transactions that have quality and scope that can satisfy the public at large and be reached in all parts of Indonesia at any time without being limited by time barriers and that is at an affordable cost to the community; and b. the formation of interactive relations with the business world to enhance the development of the national economy and strengthen the ability to deal with changes and competition in international trade.

Thus, it can be concluded that the inhibiting factors in SIPR service innovation include internal and external factors, such as the Mojokerto Regency Regional Development Planning Agency as the service provider. Internal factors lead to a lack of experts in the field of IT and weaknesses in the application system used, which is not optimal as a two-way communication channel. In contrast, external factors lead to the lack of integration of services, which is caused by the lack of data and support from other related agencies. The constraints

or inhibiting factors encountered also indicate a lack of readiness for the local government's support of IT network infrastructure.

Strategies involved

To overcome obstacles in the implementation of the Spatial Planning Information System (SPIS), several interrelated strategies were implemented by the Mojokerto Regency Regional Development Planning Agency. These strategies were designed to improve service effectiveness, efficiency, and sustainability, while responding to organizational, human resource, technical, and institutional challenges in delivering website-based public services.

The first strategy is leadership commitment which plays a fundamental role in supporting the success of public service delivery. In the context of public sector innovation, Sangkala (2013) emphasized that leadership firmness in policy formulation and implementation is a key determinant of successful innovation. The findings indicate that leadership commitment within the Mojokerto Regency Regional Development Planning Agency is very strong and serves as a major supporting factor in the development and improvement of SPIS as a website-based service. The Head of the agency demonstrates a high level of commitment to enhancing service quality so that it is easy to use, effective, efficient, transparent, and accountable. In addition, structural officials appointed as service implementers provide consistent support and cooperation. Such leadership conditions are essential for maintaining policy consistency and enabling continuous improvement in public service delivery.

Second, human resources are no less important in supporting the success of public service innovation. This strategy also involves encouraging citizen participation by providing opportunities for users to contribute input that supports the sustainability and improvement of the SPIS service. According to Hasibuan (2016), human resources refer to the abilities possessed by individuals, which are determined by intellectual capacity and physical capability. Regardless of how advanced the technology or equipment used; service innovation cannot function effectively without competent human resources. In public service delivery, service officers are often the main focus of public assessment, particularly in terms of politeness, discipline, and competence. The results show that officers assigned to manage the SIPR service, ranging from frontline staff and technical officers to spatial information letter verifiers, demonstrate a high level of competence. Frontline officers, in particular, are perceived as friendly, capable, and responsive in providing consultation services. These human resource conditions significantly support the successful implementation of the SPIS service.

Third, adequate facilities and infrastructure also constitute an important strategy in supporting the effectiveness of the SPIS service. The research findings indicate that the facilities provided are generally very good. The front desk service area is comfortable for visitors, and supporting infrastructure such as computer equipment, internet networks, and office furniture has been sufficiently provided. The importance of human resource competence and supporting infrastructure as components of service quality is also explicitly

recognized in Law No. 25 of 2009 concerning Public Services, which identifies these elements as part of public service standards.

The fourth important strategy involves strengthening cooperation between central and local governments, as well as collaboration with other stakeholders. Support from the central government is reflected in policies such as Presidential Regulation No. 27 of 2014 on the National Geospatial Information Network and Presidential Regulation No. 9 of 2016 on the Acceleration of the One Map Policy Implementation, which aim to improve data integration and spatial information accuracy. These policies provide opportunities and institutional support for enhancing SPIS service quality, particularly in efforts to develop an integrated "one database system" for comprehensive regional planning. At the local level, government support is primarily reflected in budget allocation for improving SPIS service quality at the Mojokerto Regency Regional Development Planning Agency. In addition, collaboration with both public and private sector partners is necessary to strengthen service capacity and innovation sustainability.

The last strategy focuses on the optimal utilization of information technology to deliver public services that are fast, easy to access, transparent, and reliable. The Mojokerto Regency Regional Development Planning Agency has made significant efforts to develop an IT-based service system that is trustworthy and accessible to the broader community. These efforts include improving system reliability, increasing private sector participation, and aligning management systems and work processes with ongoing technological advancements. Nevertheless, although these strategies have been implemented effectively, they have not yet fully achieved the goals of service integration or the provision of comprehensive, accurate, and up-to-date data required for regional development planning in Mojokerto Regency.

Conclusion

This investigation aimed to analyze the driving and inhibiting factors in applying website-based service innovation (e-government) in the SIPR service. In addition, the current study has shown that there were two factors (internal and external) that inhibited the SPIS "Majapahit GIS" services at the Mojokerto Regency Regional Development Planning Agency. First, the internal factors were the lack of IT experts, inadequate internet connection, and the large number of customers. So far, the governance does not have an IT expert to control and operate the e-service system. Then, during the operational service, users of the "Majapahit GIS" application often faced issues and poor network performance due to the use of the open-source system's internet connection. As a result, a backlog had formed due to customers waiting to be served and the SPIS application system gave ineffective service. Second, the external factors were the infrequent updates, lack of support, no regional government policy of one database system, and unclear regulatory policy. The Mojokerto Regency Regional Development Planning Agency has also provided several strategies to

optimize the quality of the SPIS "Majapahit GIS" services. However, recently, the strategies could not be stated as working 100%smoothly in achieving the goal of service integration and providing comprehensive, accurate, and updated data for regional planning needs in Mojokerto Regency. The strategies implemented included establishing cooperation with the private sector to provide IT personnel, utilizing a fiber-optic network, and optimizing the public dialogue menu function. Overall, this current research provides insights for the government of Mojokerto Regency and the people around there to constantly develop and improve the quality of the e-governance system. The findings reported here also shed new light on other governments using e-systems in public services. Last, although the current study is based on a small sample in one city, the findings suggest investigating a broader and larger e-governance public service system in Indonesia.

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