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The Implementation of a Local Wisdom-Based Smart City System in Cirebon

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Abstract:
The city of Cirebon began developing its smart city system in 2017. The Cirebon Smart City system consisted of thirty-five applications, thirteen of which are developed and offer services in the local Cirebon's language. This study aims to investigate and evaluate the implementation of a smart city in Cirebon. Furthermore, this study also analyzes the factors that can support and hinder the implementation of a smart city in Cirebon. Some literature sources discuss several smart cities, but it is still very rare to discuss the factors that support and hinder the implementation of smart cities. However, the smart city analysis in Cirebon has never been done; therefore, such analysis becomes novelty in this study conducted using the qualitative method. The data were collected using documentary analysis, fieldwork, interviews, and observation. The study has revealed that, from the perspective of policy, the system was an innovative policy. It can be seen in the Innovative Government Award (IGA) 2020 gained by the Government of Cirebon city. However, in practice, the implementation of the Smart City system is still far from being successful. This can be seen from the small number of users accessing the applications. Cirebon citizens in general are not aware of the system. Therefore, only few citizens use the applications offered in the Smart City system. The study has found that the factors such as poor communication, limited support system and resources, and complicated bureaucracy system inhibit the implementation of the Smart City system in Cirebon. It is hoped that this research will be able to complement literacy related to smart cities, e-government and policy theory and can be input for the government, especially the Cirebon Regency government.

Keywords: policy implementation, smart city, e-government, digital government.

在井里汶实施基于地方智慧的智慧城市系统

摘要：
井里汶市于 2017 年开始开发其智慧城市系统。井里汶智慧城市系统由 35 个应用程序组成，其中 13 个应用

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程序是用井里汶当地语言开发和提供服务的。本研究旨在调查和评估井里汶智慧城市的实施情况。此外，本研究还分析了支持和阻碍井里汶智慧城市实施的因素。一些文献来源讨论了几种智慧城市，但讨论支持和阻碍智慧城市实施的因素仍然很少。然而，井里汶的智慧城市分析从未进行过；因此，在使用定性方法进行的这项研究中，这种分析变得新颖。数据是通过文献分析、实地考察、访谈和观察收集的。研究表明，从政策角度看，该制度是一项创新政策。这可以从井里汶市政府获得的 2020 年创新政府奖（政府间协定）中看出。然而，在实践中，智慧城市系统的实施还远未取得成功。从访问应用程序的用户数量很少可以看出这一点。井里汶市民一般不了解该系统。因此，只有少数市民使用智慧城市系统中提供的应用程序。研究发现，通信不畅、支持系统和资源有限、官僚体制复杂等因素阻碍了智慧城市系统在井里汶的实施。希望这项研究能够补充与智慧城市、电子政务和政策理论相关的素养，并为政府，特别是井里汶摄政政府提供输入。

关键词：政策实施、智慧城市、电子政务、数字政府。

1. Introduction

Countries worldwide have begun implementing digital systems in their government, in which the internet has become an integral part of the system. In the public administration sector, the Internet of Things was implemented by providing public services using online platforms, generally known as e-government. According to UNDP, e-government is the application of Information and Communication Technology (ICT) by government agencies (Indrajit, 2004). The implementation of an e-government system provides an alternative solution to reform the bureaucracy and deliver healthy public services to the community (Rokhman, 2009; Baheer et al., 2020; Gong et al., 2020).

In various countries, e-government is a topic that is widely discussed as a form of adjusting government governance in the development of technology and information (Dias, 2020; Adam, 2020; Ingrams et al., 2020). Kumar et al. (2020) analyzed the factors that can optimize e-government and found that individualism and long-term orientation as dimensions of natural culture and GDP per capita can increase e-government development.

Rozhkova et al. (2021) emphasized the implementation of e-government in tackling emergencies such as the COVID-19 pandemic. The study evaluated the implementation of e-government in the health care industry and found that the concept was good but the implementation mechanism was still lacking. These findings indicate that the implementation of e-government requires a sharper analysis and must adapt to the conditions of the people who are the object of the policy (Turmanidze et al., 2020; Osman & Zabith, 2021).

The practice of e-government in Indonesia was marked by the implementation of a smart city system in many governmental institutions. Indonesian government provides full support for the implementation of a smart city system by launching the "Movement toward 100 Smart Cities" in 2017. The movement was meant to provide guidance for cities and municipalities governments to design their masterplan of smart city systems. As of 2017, twenty-four cities and municipalities gained "Movement toward 100 Smart Cities"; one of which was the Cirebon.

Cirebon began developing its smart city system in 2017 and named the system "Cirebon Smart City". The system consisted of thirty-five applications where thirteen of which offered services in the local Cirebonese language. The thirteen applications included *Cirebon Brojol Aja Klalen, Wistakon, Cirebon Wadul Bae, Cirebon Eling, Cirebon Lunga,* and so forth. The Cirebon Smart City is a policy that must be implemented optimally to deliver benefits to the community. However, the number of users accessing the application is still limited.

Smart city is a novel breakthrough, therefore, analysis related to the concept plays an important role in evaluating and providing input as the smart city concept is more mature and optimal (Hardi & Gohwong, 2020; Syalianda & Kusumastuti, 2020). The analysis of the smart city concept is mostly carried out in various areas such as Makassar (Hardi & Gohwong, 2020), Jakarta (Syalianda & Kusumastuti, 2020) to London (Bibri & Krogstie, 2020) and Africa (Oke et al., 2020).

According to several studies related to smart cities, the existing literature deals with the role of smart cities (Angelidou, 2017; Gohar & Nencioni, 2021) and the evaluation of smart cities (Caird & Hallett, 2019; Caird, 2018; Mallapuram et al., 2017). It is still rare to combine the evaluation and analysis of factors that impact smart city implementation, especially in rural areas.

Therefore, this study tries filling the existing research gap by analyzing smart city policies in Cirebon in the form of evaluating policy implementation and analyzing inhibiting factors in implementing smart city policies. It is hoped that this research will be able to complement literacy related to smart cities, e-government and policy theory and can be input for the government, especially the Cirebon Regency government.

2. Theoretical Overviews

2.1. Policy Implementation

According to Jones (1996), policy is a standing decision characterized by behavioral consistency and repetitiveness on the part of both those who make it and those who abide by it. Meanwhile, Dye (2013) defines

public policy as whatever governments choose to do or not to. Rabin (2003) defines public policy as a policy made by government apparatuses. Moreover, Andersen (1994) defines public policy as a course of public action in the form of regulative, allocative, and distributive followed by its implementation and enforcement carried out by authorities by a government official in the political system. According to Islamy (1997), public policy is a series of actions taken by the government, no matter whether they are implemented or not, to serve peoples' interests.

Winarno (2003) outlines that every action taken by the government is a public policy. He also asserts that every public policy has predicted implications. This imperative nature of public policy is a specific feature of policy in government institutions. Such a feature would not have existed in the private sector. Therefore, public policies require obedience from the community. This obedience demand made public policy different from that of private sector policies.

Dunn (2003) and Fontaine (2020) argue that public policy consists of agenda setting, policy formulation, policy adoption, policy implementation, and policy evaluation. Meanwhile, according to Andersen (1994) and Sánchez et al. (2020), public policy consists of problem formulation, policy determination, policy implementation, and evaluation.

Based on the definition of public policies as outlined above, the implementation of public policy is one of the processes in the public policy system. According to Denhardt & Denhardt (2006), and Akao et al. (2020), implementation is the action phase. Once plans have been made and policies have been decided on, one must put them into operation. Whereas, according to Turner & Hulme (1997) and Pierre & Peters (2020), implementation is frequently a highly political process. It is an area where those with an interest in a policy engage in negotiations over the goals of the policy and conflict over the allocation of resources.

Udoji (1981) and Mazey & Richardson (2020) outline that implementation is the critical phase of public policy making. It is even more important than the policy-making itself, because no matter how well the making process, without proper implementation, the policy would only be a document to be archived. Gaetani et al. (2021) explained the same thing, stating that a public policy would only become notes for the elites – those who have power in making the policy if the policy could be executed properly in its implementation.

According to Winarno (2018), in a wider sense, policy implementation can be seen as a phase of the policy-making process after the law has been formulated. Therefore, policy implementation can be regarded as the implementation of laws where all actors, organizations, procedures, and techniques work together to achieve the goals. However, in the other sense, policy implementation is a complex phenomenon – it is a process of generating output and outcomes.

Edwards III (1980) and Torres-Pereda et al. (2020) explained that the successful implementation of public policy depends on the following four factors/variables: *communication*, *resources*, *disposition*, and *bureaucratic structure*. Meanwhile, Van Meter & Van Horn (1975) and Arundel et al. (2019) identified six variables contributing to the implementation of public policy. They are basic measures and goals of the policies, policy resources, communication among organizations and implementers, characteristics of the implementing agencies, economic, social, and political conditions, and trends at the implementation level. At the same time, Wahab (2021) described four factors supporting the implementation of public policy; they are environmental conditions, inter-organizational relationships, resources for program implementation, and the characteristics of implementation agencies.

2.2. Smart City Concept

The smart city concept was born from the impact of technological and information developments and changing people's lifestyles that demand integration, speed and sophistication (Pereira et al., 2017; Hardi & Gohwong, 2020). A smart city is a new form of city or regional management based on future orientation and digitalization (Pereira et al., 2017). Therefore, the smart city concept combines government, technology and society using technological enablers such as the internet of things (IoT) and artificial intelligence (AI).

The smart city concept will certainly impact various sectors including transportation, communication, education to politics (Vanolo, 2014; Oberg et al., 2017). Smart city development not only requires technology enablers but also requires a new way of thinking from the community (Ruohomaa et al., 2019; Pereira et al., 2017).

Giffinger and Suitner (2015) described several dimensions of the smart city concept that include smart economy, smart mobility, smart governance, smart environment, smart living and smart people. A smart economy includes business innovation, technology-based entrepreneurship, and business transformation. Then smart mobility includes the existence of modern, sustainable and safe transportation systems.

Smart governance includes government transparency, community involvement in policy making and modern and easy public services. A smart environment includes attractiveness of natural conditions, lack of pollution and sustainable resource management. Furthermore, smart living includes quality of live, cultural and educational practice, social cohesion, tourist attractions, healthy environment and safety and housing. The last factor is smart people, which includes qualified and well-qualified people, creative, tolerant and participatory people (Giffinger & Suitner, 2015).

3. Research Method

This study was conducted using the qualitative method. It is a method that consists of collecting and describing qualitative data in the form of written texts and spoken by the participants (Moleong, 2006).

Specifically, the researchers used a case study to conduct the research. A case study is a research method where researchers investigated a program, event, activity, process, or a group of people in a certain period and place (Moleong, 2006).

This study collected data using documentary study, fieldwork and observation, and interviews. The data were then analyzed using the strategies of data reduction, data display, data verification, and drawing a conclusion. The data were then triangulated to ensure validity and member checking (Creswell, 2014).

4. Findings and Discussion

4.1. The Smart City Policy in Cirebon

The policy of Cirebon Smart City was initiated in 2017 with the vision to develop the City of Cirebon into a creative, innovative, and synergetic city that has competitive edges in 2028. The policy assumes the following missions:

1. Implementing local government administrations that are effective, efficient, and communicative;
2. Enhancing the city's competitive power at the local, national, and international levels;
3. Developing an ecosystem that supports economic activities in the community;
4. Developing a livable, comfortable and safe environment;
5. Developing a humanist and dynamic socio-technical ecosystem;
6. Creating a sustainable living environment.

Cirebon Smart City consists of six divisions with thirty-five applications:

1. Smart Governance (15 applications)
2. Smart Branding (2 applications)
3. Smart Economy (5 applications)
4. Smart Living (6 applications)
5. Smart Society (6 applications)
6. Smart Environment (1 application)

Out of thirty-five applications, thirteen offer services in the local Cirebonese language:

1. *KANTOR KULA* (Integrated works without pen and paper).
2. *CIREBON BROJOL AJA KLALEN* (Apps for registering birth certificate).
3. *CIREBON JEH* (Legal education networks).
4. *SEDULUR* (Villages electronic digital system).
5. *SAMPEAN* (One stop human resources system).
6. *CIREBON SEGA JAMBLANG* (Staffing and performance evaluation system).
7. *WISTAKON* (Cirebon City Tourism).
8. *CIREBON MELET* (Cirebon Internet services).
9. *CIREBON LENGKO* (Online health services).
10. *ANTI NOISE* (Emergency line) later changed into *CIREBON SIAGA 112*.
11. *CIREBON WADUL BAE* (Cirebon care for women and children).
12. *CIREBON LUNGA* (Cirebon Job Openings).
13. *CIREBON KUDU ELING* (Citizenship and environmental care).

The use of local language as the application name is not something new. Many other cities' governments have used their local language as the name of the applications in their smart city system. The purpose is to make the smart city system more familiar and easier to be recognized by the community.

However, our study found that the use of the local Cirebonese language as the name of the application seemed to be improper. We found many application names that are too much longer and difficult to be remembered by the users. For example, *CIREBON BROJOL AJA KLALEN* (Apps for registering birth certificate). The name is too long. It would be easier to recognize if the name is shortened to be a birth certificate online. The need to include local wisdom in the smart city system has made the system difficult to recognize.

4.2. The Implementation of the Smart City Cirebon System

The successful of this policy can be seen from two sides. First, the successful from the innovation of regional government. Second, the successful of users of the Cirebon Smart City application or community.

Viewed from the regional government side, Cirebon Smart City is optimal because the government have an achievement in IGA (Innovative Government Award) 2020 form Ministry of Home Affair of the Republic of Indonesia as one of the most innovative cities in Indonesia in 2020. Six applications from 35 achieved the recommendations of the IGA 2020. Those are:

1. ONE DATA FOR CIREBON (sectoral statistical data portal for Cirebon City)
2. KANTOR KULA (e-office)
3. CIREBON "MATA HATIKU" (monitoring the happy city with CCTV)
4. GEMBIRA DI CIREBON (the movement in building community participation in the development planning in Cirebon City)
5. CIREBON SIAGA 112 (it's like 911 in USA)
6. KONTES CURHAT CIREBON (counselling of everything: online and offline sharing media).

While from the users' sides or community, the implementation of Cirebon Smart City system is not optimal because:

1. Many communities have not known Cirebon Smart City at all.
2. Few communities have known Cirebon Smart City and they have used the apps of Cirebon Smart City for any purposes.
3. Few communities downloaded the apps but then they uninstalled the apps because they did not know how to operate or they thought the apps was not beneficial.

4.3. The Factors That Cause the Non-Optimal Implementation of the Cirebon Smart System

The factors that cause the implementation of Cirebon Smart System not optimal can be analyzed by the theory of the implementation of public policy from

Edwards III (1980), such as:

4.3.1. Communication

Communication in implementing the Cirebon Smart City System is in the form of transmitting or socializing the policy to the community. The socialization of the Cirebon Smart City System is done by Local Government Work Unit (SKPD) such as the Department of Communication, Statistics and Information in Cirebon City (DKISKC). Besides, there is also a team to implement the Cirebon Smart City System (TPCSC).

The socialization of the system by DKISKC and TPCSC was done through the web of Cirebon Smart City (https://smartcity.cirebonkota.go.id) and social media like Facebook and Instagram with the name Cirebon Smart City followed by 1.375 members. The Instagram account (@cirebonsmartcity) has posted 175 posts and it has 173 followers and is following 129 people. From that description, the member of Facebook and Instagram is relatively little. This indicates that the socialization of the Cirebon Smart City System and social media (Facebook and Instagram) has not been done massively.

The socialization of the Cirebon Smart City is also done through direct socialization or offline. The officials attend community events such as community meeting, regular social gathering and others. The DKISKC designed the format of socialization in the form of quiz "Kudu Pinter". This quiz is completed in an online format to find the best person. The content of the quiz is inserted with the theme of socialization. The quiz is designed in an educated, fun and interesting format.

That socialization is first done in the event of reaccreditation of Pegambiran Public Health Center on February 5, 2020. The quiz was conducted at the monthly social gathering by PKK RW 02 in Kalijaga Village. The quiz questions referred to the programs of the Cirebon Smart City, such as Cirebon 112, Wistakon, tagline of Cirebon City, hoax news and others. The socialization using the new format has been a positive response from the community. According to the community, the socialization is not boring. It is interesting and educated because it gives important information. The regular social gathering is interactive and the community is happy because there is a gift for the winner. Unfortunately, the format of this socialization, attending communities is not done massively due to the limited budget.

4.3.2. Resources

One of the important resources in implementing the Cirebon Smart City System is human resources. It can be in the form of an apparatus as the service provider or the community as the user. In relation to the human resources of the apparatus, the implementation of the Cirebon Smart City System has been supported by adequate number and competency of operators. However, in communities of Cirebon City, they are not familiar with online services.

Another important resource in implementing the Cirebon Smart City System is the budget. The implementation of the Cirebon Smart City System relatively requires a huge number of budgets. However, there is a relatively minimum budget of socialization, so the socialization cannot be conducted massively among the communities. It is the same as the budget for operation, infrastructure and maintenance.

To save the budget, TPCSC socialize the system through web and social media (Facebook and Instagram) because this socialization requires a minimum budget. On other aspects, the socialization through an offline format, such as attending community events, is rarely done because it requires several budgets. Besides, the socialization through visiting communities is more effective.

4.3.3. Disposition

In terms of disposition, it is found that some of the apparatus in the government of Cirebon City are not optimal in digital literacy. This is especially the case among senior officials. Additionally, there is an attitude of formality in working among some officials that the important thing is that there are applications in Cirebon Smart City, while whether these applications are used and beneficial for the community is not too important.

Another disposition related to the lower knowledge of digital literacy among the community in Cirebon. Whereas Cirebon is a developed city. It can be seen from the infrastructure to be complete and modern. The Internet is an integral part of the community, especially for the youth. It is a big opportunity to implement the Cirebon Smart City System that brings online service or digital. However, many communities are not familiar with online or digital services.

Changing the community habit from offline to online service is not easy. One of the examples is the student admission (PDB). Although the system of student admission is run through an online system, many communities attend the schools to register their children using an offline system. Another example is the low participation of the communities in the population census, which is conducted through an online system. Thus, 30% of communities preferred to use the online system in the population census. Therefore, the census officials visited the community from one home to another to register them in the offline system. The last example is in the population administration service in Cirebon City. Although the system has adopted an online system for processing identity card, family card, birth certificate, many communities preferred to process the administrative documents in the offline system.

Another aspect of the disposition is related to the motivation of operators along the front line in implementing the Cirebon Smart City System. They have low motivation because they have few incentives due to a limited operational budget.

4.3.4. Bureaucratic Structure

To implement the Cirebon Smart City System, the operator is created with the main tasks as follows:

a. Along with the board of the Cirebon Smart City make the master plan to develop the Cirebon Smart City.

b. Making an evaluation draft of the target in implementing the plan to develop the Cirebon Smart City from the government side with its sector.

c. Making a draft of the analysis result and recommendations to achieve the target of work in the future.

d. Pushing and guiding the officials to implement the development concept of the Cirebon Smart City.

e. Doing evaluation and monitoring toward the implementation of the Cirebon Smart City.

f. Making a creative and innovative step to sustain the development of the Cirebon Smart City.

The structure of the Cirebon Smart City operator consists of the governing board (Cirebon Mayor), Person Responsible (Local Secretary), Advisor (Local Assistants), Chief (chief of DKISKC), vice chairman (chief of BP4D), Secretary I (Secretary of DKISKC), Secretary II (Secretary of BP4D), Six Groups of Work and supporting unit. The group work includes smart governance, smart branding, smart economy, smart living, smart society, and smart environment. Those working groups are coordinated by the head of the local government unit. The membership in the working group is held by the Heads of Divisions/Sections and Heads of Sections/Sub-Sections of the related local government units. Meanwhile, the supporting units are held by DKIS Cirebon City officials and employees.

The weaknesses of the Cirebon Smart City operator are:

a. The number of team or operator members is too high, including 180 people, therefore, it is difficult to consolidate and coordinate actions among the members.

b. The coordinators of the working groups are the officials who have the same position as the heads of divisions/sections; therefore, it can be a psychological obstacle to coordination among the members of the working group.

c. The achievement of the members is not optimal because they are busy with real own duty or they are also the members of other teams created by the government of Cirebon City.

d. The team seldom makes a coordinating meeting either internally or externally.

e. There is sectoral ego among the members of the team coming from different departments.

f. A low frequency of socialization was reported for the Cirebon Smart City System.

5. Conclusions

Based on the description above, it can be summarized as follows:

1. The Cirebon Smart City System consists of six divisions with thirty-five applications, such as Smart Governance (15 applications), Smart Branding (2 applications), Smart Economy (5 applications), Smart Living (6 applications), and Smart Society (6 application). Some applications adopt local wisdom, as it can be seen from the name of applications that use the Cirebonese Language.

2. From the government side, the implementation of Cirebon Smart City is optimal because the government has achieved Innovative Government Award (IGA) 2020 as one of the innovative cities. However, in communities' side as the users, the implementation of Cirebon Smart City is not optimal because they do not know and do not use the apps.

3. The factors that cause the implementation of the Cirebon Smart System not optimal are:

a. Communication: the socialization of the Cirebon Smart City has not been done massively to community. Consequently, a few people know and use the various applications of the Cirebon Smart City.

b. Resources: human resources or communities as the users have low knowledge of digital literacy and minimum budget for operating and maintaining the apps of Cirebon Smart City.

c. Disposition: Digital literacy in not optimal among the officials of government and communities and the low motivation from the operators due to limited incentive.

d. Bureaucratic structure: the achievement of the operators of the Cirebon Smart City is not optimal.

4. This study analyzed the implementation of smart cities with different perspectives and objects from the previous studies. Several novelties were revealed by this research, namely the first finding of differences in the evaluation results between the government and the community regarding the implementation of smart cities, where the government states that the implementation of smart cities is successful while the community says it has not. These findings can fill the existing research gap. Furthermore, this study also found that there were inhibiting factors for smart city implementation which were also rarely analyzed by previous research.

5. This study also has several limitations, including the object of research, namely, the implementation of smart cities in Cirebon in 2017. It is hoped that further research will be able to explore and analyze more deeply the implementation of smart cities in the following years. The limitations of further research from the aspect of the research concept framework that has not explored further the evaluation of smart city implementation from the technological aspect include the suitability of the community with the technology provided in the smart city program and whether the technology is user friendly with the community.

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