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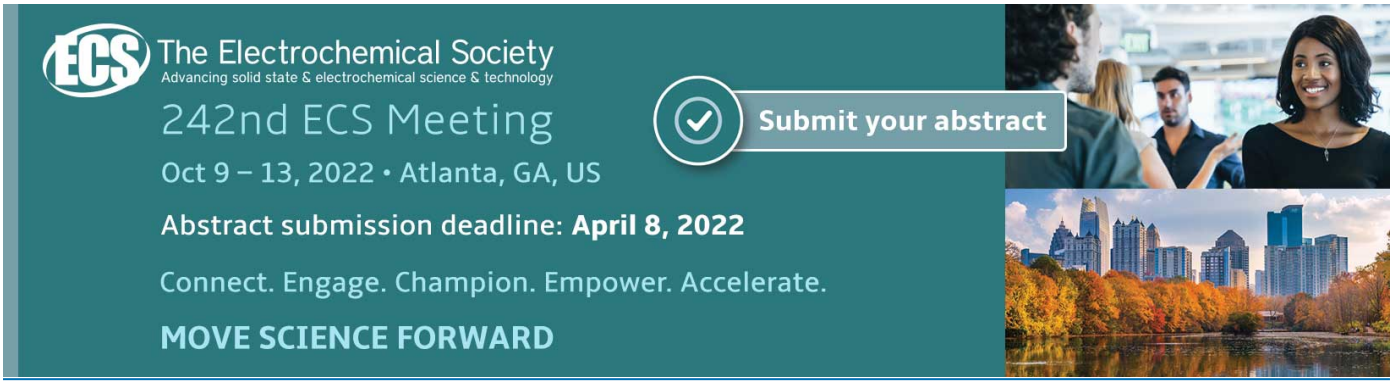

Smart City Development Innovation Strategy and Challenges for the Government of Jember Regency

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Abstract. Technological development has helped the local governments to provide information and services to the community, one of which is Smart City, a comprehensive and integrated application system which can be accessed quickly by the public and improves the duties and functions of local governments. Smart City has been implemented in various cities in the world and has proven to be able to solve various problems quickly. This information system should be able to be used by local governments to create effectiveness and efficiency in performance by analyzing organizational data for further policies. This paper aims to obtain an overview of the concept of smart city strategy and its implementation in Jember Regency. This research used literature review methodology through the concept of a model of implementing GSCM in smart government by paying attention to the artificial intelligence aspects. The conclusion of this paper is that the smart city development strategy is pursued by adjusting the potential and conditions in Jember Regency, which is of course, by analyzing some of the challenges and readiness for innovation through the GSCM concept.

Keywords: Strategy, Inovation, Smart City, Government Technology

1. Introduction

Cities are entities that attract the attention of many researchers. It is not only because cities have a dynamic and rapid population growth and change, but also many predictions are based on research results that nearly 50% of the world's population will populate cities [1]. This increase in the human population has an impact on government bureaucratic services from manual to digitalization systems. The more the human population, the more difficult it is to provide services quickly and precisely because of the limitations and lack of facilities and infrastructure for government organizations. The increase in population from year to year and limited natural resources have made city management increasingly complex. This condition requires the Regional Government to be able to maximize the potential of its resources and minimize the obstacles or problems faced. Giffinger, et al, [2] stated that a smart city is a city that is able to apply flexibility, transformability, synergy, and individuality. Other figures explained that the concept of a smart city is a city that shows an instrumented, interconnected, and intelligent society [3]. Thus, a smart city is a city which is capable of uniting the technology, government, and society with these following characteristics: 1. smart economy 2. smart mobility 3. smart environment 4. smart people 5. smart life 6. smart government.

Some big cities in Indonesia that have implemented the Smart City concept innovation include Bandung and Bogor [4]. In East Java, there are also several cities which have implemented the Smart City concept innovation; they are Surabaya City, Malang City, and Banyuwangi Regency. Likewise, Jember Regency, as one of the big and dense cities in East Java, has also applied this concept. This can be seen from the effort of the Jember Regent to implement the “Jember One Data” policy as the basic core of the Smart City concept in Jember Regency. Also, the policy of integrating this data is included in the strategic plan in the 2016-2021 Regional Medium Term Development Plan (*Rencana Pembangunan Jangka Menengah Daerah*/RPJMD) of Jember Regency which contains the vision and mission of making a professional government system based on technology and information systems [5].

In 2018, Jember Regency was selected in the Movement Towards 100 Smart Cities program initiated by the Ministry of Communication and Information of the Republic of Indonesia. The implementation of the Movement Towards 100 Smart Cities in Jember Regency was based on the Memorandum of Understanding between the Regent of Jember and the Director-General of Information Applications of the Ministry of Communication and Information of the Republic of Indonesia which was signed on May 8, 2018. The implementation of the Movement Towards 100 Smart Cities produced output in the form of a Smart City Masterplan document for the Jember Regency and was expected to implement smart development programs and concepts in the regency [6]. To change a manual city into a smart city, it is necessary to know in advance some important factors to understand and develop the innovative concept of Smart City through several strategies and innovations. These factors are used to design a

strategic framework in initiating the Jember One Data concept. The strategy for developing a framework needs to be done so that the concept of innovation in Smart City development can be successful, including analyzing the potential of the region in Jember Regency. Regional potential can be used as the initial basis for how a Smart City can be applied to an area by seeing all the potential it has so that its implementation can run well.

2. Literature Review

a. Smart City Definitions

Some of the definitions of Smart City are as follows:

- Smart City is the development and management of a city by utilizing information and communication technology (ICT) for sensing, understanding, and controlling the various resources in the city more effectively and efficiently to maximize services to its citizens. and supporting sustainable development.
- A city that connects physical infrastructure, information technology infrastructure, social infrastructure, and business infrastructure to take advantage of city intelligence collectively [3].

b. Innovative Smart City Strategies

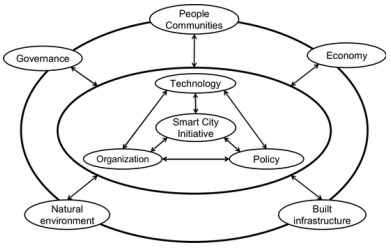
To understand the concept of a smart city, it is necessary to understand the conceptual model first. Even though it is limited in scope, the theoretical framework for developing a smart city must be understood by city planners. This framework design is used to develop an innovative smart city as a whole. According to Metcalfe in Muchlas, an innovation is a system that brings together different institutions that contribute, collectively and individually, to the development and diffusion of new technologies and provide a framework in which the government forms and implements policies to influence the innovation process. In general, innovation can be concluded that innovation has attributes that can be used as a measure to assess the implementation of innovation [7].

Another framework was proposed by Chourabi. This integrative framework consists of eight factor clusters: management and organization, technology, governance, policies, people & communities, economy, infrastructure development, and the natural environment [1]. This integrative framework was then used by Alawadhi to understand the innovative smart city of four cities, namely: Philadelphia, Seattle, Quebec City, and Mexico City [8]. The results revealed the characteristics and challenges in implementing innovative smart cities in each of the cities surveyed. In Indonesia itself, Supangkat developed the Garuda Smart City Model (GSCM) to measure the maturity level of smart city development with the target of developing existing conditions, development recommendations, roadmaps, and ratings [9].

c. Garuda Smart City Model (GSCM)

GSCM is a concept or initial method developed to measure the maturity level of a smart city development. This GSCM model is the parent of E-Government. The GSCM model can be seen in the image below:

Figure 1. Garuda Smart City Model (GSCM)



Source: Smart City Innovative

GSCM measures the maturity level of a city in implementing smart city through measurements of three main clusters and three enabler parameters with the target of achieving several conditions for each character. The three main clusters include smart economy, smart society, and smart environment. As for the enabler parameters in GSCM, there are three components which include: information and communication technology (ICT), smart governance, and people. In this study, three GSCM enabler parameters were used as indicators to measure the readiness of the city to apply the innovative smart city

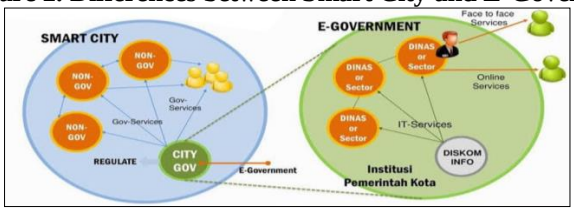
concept. This enabler parameter covers important aspects that can transform a city into a smart city. Based on the integrative smart city framework, technology is one of the main keys in an innovative smart city [1]. The integration of information and communication technology in project development can change urban spatial planning [10]. Another parameter is smart governance. According to Forrester, smart governance is a core component of an innovative smart city [11]. The last parameter is people both individually and in groups have an important role in smart governance [8]. The parameters in the GSCM are suitable for use and application in Indonesia, especially in areas that have very diverse supporting infrastructure, governance, and human resources.

There are many studies that reviewed smart cities, several studies conducted, for example Chourabi et al. [1] believe in the effectiveness of "smart" cities as a strategy to reduce the problems generated by urbanites due to rapid population growth. Meanwhile, Kanter, R. M., & Litow examined the creation of smart cities by utilizing the industrial potential of large cities. The research emphasizes other aspects, such as the emphasis on smart cities by using technology infrastructure and cloud computing [12] or Dirks, S., et. al [11] who reviewed information transparency by making smart cities.

Not much different from research in developed countries in examining smart cities, local researchers in Indonesia also conducted smart city research by emphasizing various points of view. For example, Utami [13] who examined smart cities with the development of Smart Parks in Surakarta, Purnomowati & Ismini [4] conducted a study in Malang. This study measured the smart city from six aspects, namely smart economy, smart society, smart mobility, smart environment, smart life, and smart government. Apart from the two researchers, Pongsapan, Rindengan, & Najoan [14] described their studies in the design of the communication and information network architecture of the city of Manado. In the study, it was stated that the modeling of the eight areas of information and communication technology networks is expected to support Manado as a smart city. Because at that time, Manado City did not yet have any information and communication network that connected all agencies within the scope of its city government.

In the Law of the Republic of Indonesia Number 25 of 2009 concerning Public Services it is also stated that the state is obliged to serve every citizen and population to fulfill their basic rights and needs, within the framework of public services which is the mandate of the 1945 Constitution. Building public trust in public services is absolutely necessary with the hopes and demands of all citizens and residents about improving public services. Therefore, the authors think that smart governance is the main key in the formation of a smart city. A smart government is a government that cares and is transparent to its people. This is an effort to increase the trust and willingness of the people towards their government.

Figure 2. Differences between Smart City and E-Government



Source: Authors' compilation

d. Smart Government

Smart Government is the management of business processes related to government and administration with the help of information and communication technology. Information system governance which is interconnected and integrated aims to improve performance in performing tasks and functions of public services more effectively and efficiently. This includes the e-government and open government portfolios, embracing big data and open data. In essence, it is about sustainable government and administrative action in the era of the Internet of Things. This definition includes the local or municipal level, regional or provincial level, national level as well as international and global levels. This includes the entire public sector, which consists of the legislature, executive and judiciary as well as public companies [15].

Governments use e-Governance to increase the efficiency and effectiveness of public administration systems and service delivery. The dynamic digital nature provides opportunities for developing countries to fully accept e-Governance, which in turn will contribute to meeting the needs and serving their citizens [16]. The development of digitalization of government or what is called e-

Government involves different components that tend to be interrelated. Ignoring the linkages of these components can lead to failure of other components, so integration is needed. It is important to note that in the absence of effective integration of e-Government development, monitoring and evaluation cannot be carried out. Therefore, the formation of the right integration is very important because the data are collected during the integration phase and used for evaluation purposes [17].

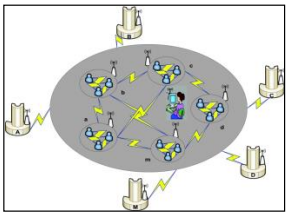
e. Artificial Intelegence (AI)

Artificial intelligence (AI) can be defined as a branch of computer science that deals with the automation of intelligent behavior [18]. Another definition of AI is a computer programming to perform tasks that normally require human intelligence [19]. This includes the ability to perceive and monitor information visually or spatially, audibly, reason, make predictions, interact with humans and machines, and continuously learn and improve. Meanwhile, regional data and analysis can be used to complete some of the same tasks automatically. One scenario where machine learning can be valuable in a government context is when there is a lot of data but not enough people to manage and analyze it. Another scenario is a routine process that the machine can perform automatically while improving over time. Through applications in government, AI can significantly reduce administrative burdens, help address resource allocation issues, and perform complex tasks significantly.

f. Internet of Things

To get data from local conditions, internet of things technology is used to communicate with each other [20]. Internet of Thing (IoT) is a concept where an object has the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. Another definition of IoT is connecting detection and activation tools that provide the ability to share information across platforms through a unified framework. This can be achieved in government organizations by analyzing data with real-time information speed in a unifying framework in smart government [21].

Figure 3. Description of information across government organizations



g. Big Data

Recent technological advances through large-scale networks have enabled the smart application of new applications to adapt to urban ecosystems [22]. In real time, organizations can collect data from various sources, including financial transaction data, social media and other information for government purposes. The variety of data collected has different formats. Starting from structured, numerical data in traditional databases, text-structured document data, email, video, audio, financial transactions and others [23]. When government organizations are able to combine the large amount of data they have with the analysis of regional potential and conditions, they can complete tasks related to development interests in their regions.

3. Writing Method

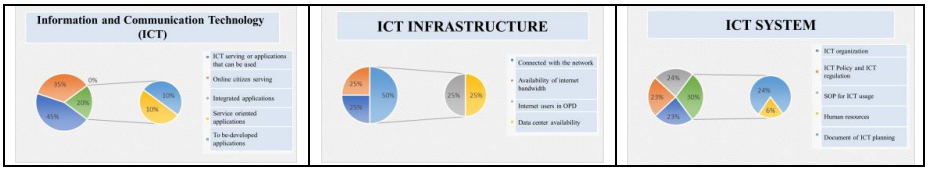
This study used a literature review methodology to build a local government strategy, especially in Jember Regency, through the concept of a model of implementing GSCM in smart government by paying attention to the artificial intelligence aspect. This research study applies three GSCM enabler parameters used as indicators to measure the readiness of the city to apply the innovative smart city concept, including information and communication technology (ICT), smart governance, and people. The result of this concept is the extent to which the Jember Regency Government is ready to apply the innovative smart city concept. These parameters include strategic aspects that are able to transform a city into a smart city.

4. Results and Discussions

a. Data Analysis

From the data that has been obtained, the authors showed some of the achievements of Jember Regency Government indicators in implementing innovative smart cities based on three enabler components using the Garuda Smart City Model (GSCM) in the following table :

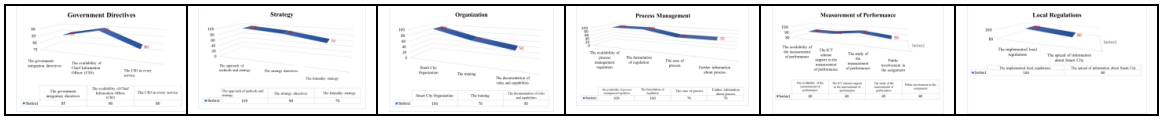
Figure 4. Information and Communication Technology (ICT)



Source: Diskominfo (The Office of Communication and Informatics) Jember Regency Government, 2020 (Authors processed)

Technology is one of the main keys in an innovative smart city (Chourabi, et al., 2012). The integration of information and communication technology in a project development can change urban spatial planning (Vasseur, 2010). In an innovative smart city, ICT is the backbone of Jember Regency Government's services to maximize and simplify services to its people. Of the 14 sub-indicators for the ICT enabler component above, Jember Regency has not met the 10 existing indicators. It means that the achievement of the ICT component is 35%. It can be said that in terms of ICT, both in the form of ICT services and infrastructure, it is not sufficiently ready to implement innovative smart cities. However, in terms of ICT governance, the achievements of the Jember Regency Government are very good on the indicators of ICT governance. Policies and regulations, SOPs, and planning documents on ICT governance are owned by the Jember Regency Government.

Figure 5. Smart City Management (SC)



Source: The Office of Communication and Informatics Jember Regency Government, 2020

Management is defined as how Jember Regency Government manages the implementation of innovative smart cities. Good management is needed to regulate the implementation of an innovative smart city according to plan [1]. According to Forrester's research, smart management is a core component of an innovative smart city [24]. In the smart city management enabler component, out of 19 sub-indicators and 15 sub-indicators are achieved as shown in the graph above. This means that the performance is 90%. The Jember Regency's smart city management already exists and the central government through the Ministry of Communication and Information (*Kementrian Komunikasi dan Informatika/*Kemenkominfo) has also issued regulations on smart city management in Indonesia. Therefore, with the support of the central government, Jember Regency Government has completed the smart city management component even though there are only 4 sub-indicators left and not all of them have been achieved. The administration of a smart city is owned by Jember Regency Government, this governance will provide boundaries and guidelines for Regional Apparatus Organizations or OPD and smart city organizations in making decisions regarding the development of innovative smart cities.

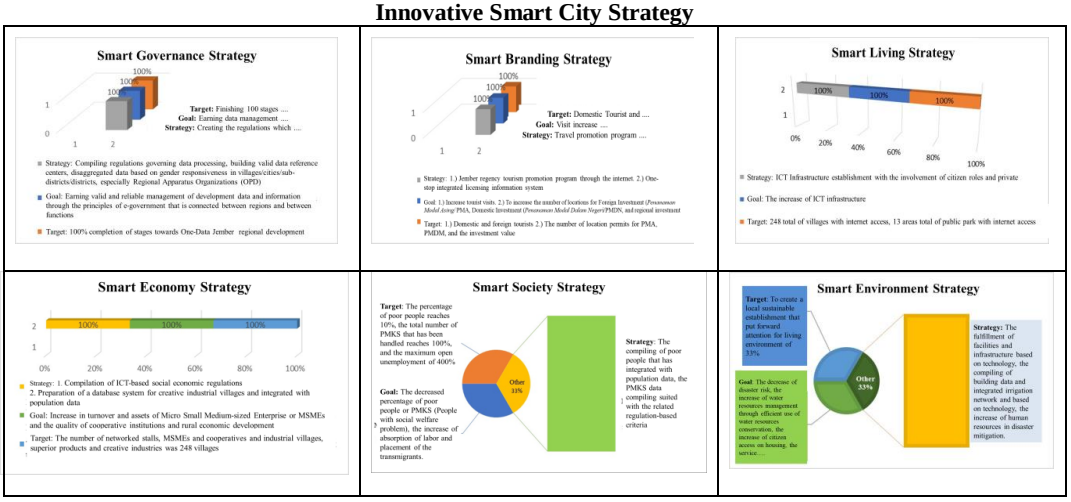
Human resources have an important role in an innovative smart city management [8]. Humans are resources that function as users, managers, and operators of smart city applications or services. To develop a city into a smart city requires a lot of professionals in the field of ICT. The effectiveness of management public services requires quality human resources [4]. In this enabler component, from three

indicators, all indicators have been met by Jember Regency, the achievement in this component is below 50%. This shows that in terms of human resources, either as a smart city user, operator, or manager of the district government, they are not ready to implement innovative smart cities.

b. Jember Regency's Innovative Smart City Development Strategy

Taking into account the current regional conditions by referring to the Regional Medium-term, Development Plan (Rencana Pembangunan Jangka Menengah Daerah/RPJMD of Jember Regency and the results of measuring regional readiness using the GSCM concept and 6 (six) The Ministry of Comunication and Informatics on Indonesia Republic of smart city indicators discussed in the previous sub-chapter, the authors analyzed the concept of strategy to realize an innovative smart city in Jember Regency. The six concepts in question are governance, technology, policy, society, and the environment. The authors described this strategy in the diagram as follows:

Innovative Smart City Strategy



5. Conclusion

Based on the measurement result on the readiness of the Jember Regency Government in using the enabler factor, it is known that the governance factor is ready to implement an innovative smart city, while the ICT and HR factors are still lacking. Authors also concluded that the strategy in smart city development was pursued by adjusting all the potentials, circumstances and conditions of each region. In addition, the challenges of implementing a smart city in Jember Regency Government include: artificial intelligence of human resources, availability of data and information, security and privacy policies, IT facilities and infrastructure, social adaptation of the community and development of application systems. These challenges are important aspects to improve in order to ensure that the smart city development runs well.

6. Acknowledgment

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