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The Smart Islands Vision: Towards Smart City Readiness in Local Government of Archipelagos

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Abstract. Today, the smart city has become a trend in the world and in the city's governments in Indonesia. The typical geographic condition of the city, municipality and district government in Indonesia is more directed to the governance of island governments that have own factors, challenges and opportunities. One of the visions of the archipelago's government is the Smart Islands vision, which is to make the islands become a smart city with connected islands, integrated, collaborations between stakeholders and improved public services with own local wisdom. However, the readiness level, the actual problems found in the existing conditions are not yet evaluated and measured. In this study, we conducted a smart city readiness assessment with the adoption of the Nusantara Smart Government Model (NS-GM), which was combined with the Model SPBE instrument on Presidential Regulation No. 95 on 2018 as the official regulation of the Indonesian government. We choose 2 case studies as an example of an archipelago's government in Indonesia, namely Ternate City and district's government of Southern Halmahera because the area has the criteria as a government of an island region that has a vision of smart islands. Smart cities readiness assessment results show that 2 case studies that are measured in readiness, are generally still in the pilot stage with values in the 2 towards 3 phase model that we used.

Keywords: Smart Islands, Smart City Readiness, Local Government, Archipelagos.

1. Introduction

In recent years, the amount of urbanization in the world is growing rapidly[1]. Projections for urbanization growth in 2045 in Indonesia will reach 300 million people and most of the 65% will live in the urban area[2]. This will certainly add to the complex problems typical of urban areas such as reduced availability of residential land, congestion on the highway, difficulty in getting a parking space, swelling energy consumption levels, garbage accumulation, increasing crime rates, decreasing water and air quality, and certainly decreasing quality of public services[3], [4].

The smart city is a concept about the ability of a city or city's government to provide smart solutions to solve his own city's problem, with innovation and improve the quality the public services. Generally, experts define the concept of a smart city as the use of ICT and all city resources (human, nature/environment, facilities, etc.) effectively and efficiently to improve the quality of life in the city. To drive Citizens engagement into the main concern of smart city services (participation, service innovation, integration, collaborations, and sustainability)[5]–[7].



In 2018, the Indonesian government issued presidential regulation no. 95 concerning electronic-based government systems or called Sistem Pemerintahan Berbasis Elektronik (SPBE)[8]. The objective of this regulation is to encourage the improvement of government public services in Indonesia. However, the readiness level by government institutions often differs from one another. Therefore, in 2017, the ministry of ICT a policy called 100 Smart Cities Program or called Gerakan 100 Kota Cerdas di Indonesia[9]. Since then the city/district governments throughout Indonesia are competing to become smart cities. The ministry of ICT is inaugurating 25 smart cities pioneer in Indonesia in the first phase. Then in 2018 launched the 50 Smart Cities 2nd stage. However, the proportion of the spread of smart city development is not evenly distributed in three regions, in Western, Middle, and Eastern Indonesia. This is as shown in figure 1.



Figure 1. The Presentations Pilot Smart Cities in Indonesia.

Based on [10] data from the Indonesian Ministry of Internal Affairs has 514 city and district governments and from a comparison of smart cities awards launched by the Ministry of ICT, in 2017 and 2018 (stage 1 and 2). The number of presentations on the distribution of smart cities in Indonesia is as shown in Figure 1 above. Based on the graph, the number of presentations on smart cities development in Indonesia is concentrated mostly (76% and 84%) in Western Indonesia. After that only 16% and 20% in Middle Indonesia. And the least even not at all is in the part of Eastern Indonesia (4% and 0%).

The eastern region of Indonesia, especially the islands of North Maluku with a total of 13,000 islands with a large population of concentrated cities/districts located in Ternate city (70%) and southern Halmahera district (62%)[11][12]. These two regions, the city of Ternate and the regency of South Halmahera are the regions with the largest number of residents in North Maluku province that have the Smart Islands Vision. This study tries to measure and evaluated the case study in these two case governments.

Nusantara Smart Government Model (NS-GM) is a model to assess maturity and readiness in the process of islands government task in smart city context[13]. In this research, we combine model NS-GM with SPBE, because based on regulations and standards that apply in this country. Furthermore, to assess smart city maturity in local government of archipelagos of we conduct some methods. The procedures carried out in this study are explained in section 3, while the results and discussion obtained will be presented in section 4. In section 5, there will be conclusions from this study.

2. Literature Review

2.1. Smart City Definitions

Smart City concept is still fuzziness, because there is no consensus on the fuzziness of smart city as a concept. Giffinger [14] one of the most cited authors in the smart city field of study the most cited

definitions “A Smart City is a city well performing built on the ‘smart’ combination of endowments and activities of self-decisive, independent and aware citizens”. In [15] make the definitions as “city to be smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance”. The Smart city is defined by IBM as the use of information and communication technology to sense, analyse and integrate the key information of core systems in running cities”. And in Dimetri, et al defined “A smart city is a well-defined geographical area, in which high technologies such as ICT, logistic, energy production, and so on, cooperate to create benefits for citizens in terms of well-being, inclusion and participation, environmental quality, intelligent development; it is governed by a well-defined pool of subjects, able to state the rules and policy for the city government and development”. From these various definitions, the point is to have similarities, the use of ICT and citizen engagement in improving the quality of life in cities[3].

2.2. *Smart Government Definitions*

The smart government appears to be the next step of e-government[16], with the use of technology and innovation by governments for better performance transformation in smart city, smart cities can be defined as the domain of intelligent government programs to their city because smart or intelligent governments run smart city governments, which manage and implement policies by used technological and non-technological factors by engaging and collaborating with stakeholder’s and its environment.

The other definition is the extensive use of smart technology to perform governmental tasks and A creative mix of emerging technologies and innovation in the public sector[17]. Meanwhile, there is a definition of Smart Government as Interoperability / Implementation of business processes and capabilities that enable seamless information across government agencies and programs, to become intuitive in providing high quality government services and activity domains[17]–[19].

2.3. *Smart Islands Definitions*

The Smart Islands is the insular territory that embarks on a climate resilient pathway, combining climate change mitigation and adaptation efforts, in order to create sustainable local economic development and a high quality of life for the local population by implementing smart and integrated solutions to the management of infrastructures, natural resources and the environment as a whole, supported by the use of ICT, all while promoting the use of innovative and socially inclusive governance and financing schemes[20].

2.4. *Maturity and Readiness Concepts*

In general, the maturity model is a model used to assess process maturity in organizations and to identify key factors needed to improve the maturity of the process[21]. The maturity model in smart government is a model designed to show the stages of progress or growth of the Smart Government process. This maturity model is very useful to provide guidance or guidance in the process of developing Smart Islands Government (SIG) implementation.

The concept of maturity is different from readiness in the context of e-Government where readiness describes how ready or capable a country or organization uses technology in government[13]. While the readiness model measures how well the foundation of the readiness of the organization / institution or community in exploiting opportunities provided by ICT, where ICT infrastructure, human capital, regulation, policy and internet penetration are all other important components.

3. Methodologies

In order to achieve the purpose of this research, we do a literature review about maturity model in smart city. Then, we search study about the comparison between known model of smart city maturity model and processes. From this step, we select a model to be used in study case. The model we select according to review is NS-GM by Arief et al[13]. The method of selecting the object of research is

carried out with a qualitative approach with the purposive sampling method, which is to determine for themselves certain criteria in accordance with the objectives of the research previously formulated.

3.1. Research Approach

Figure 2 show the blended methodologies of the theoretical framework that was compiled based on the literature review. This study aims to assess the maturity level of Smart Islands Government (SIG) so that recommendations can be made to improve smart city implementation in local government level. In this study, the authors assessed the maturity level of SIG using the combinations of NS-GM and SPBE model.

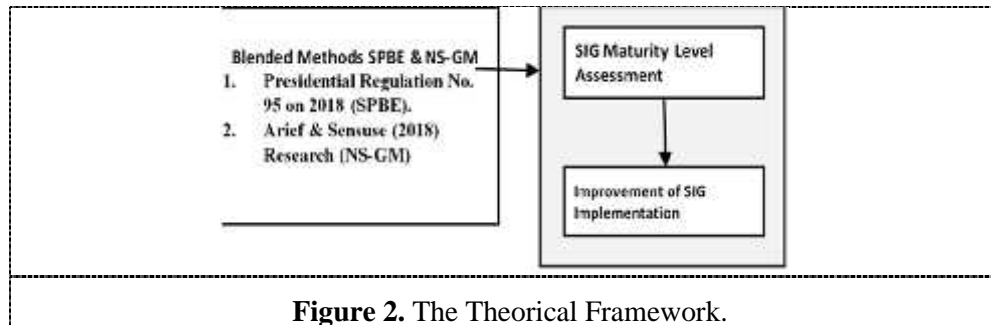


Figure 2. The Theoretical Framework.

3.2. The Questionnaire Design

In order to answer the research question, a questionnaire was created to capture the respondent's opinion related to Smart Islands Government (SIG) maturity model. The questionnaire design contains 40 indicators based on NS-GM and SPBE Model, with five different levelling choices for every question. Each choice represents the level of maturity for subdomain represented. The answer choice scale of 1 to 5 level according to the maturity level of SPBE was listed in Table I.

3.3. Data Collection

In this study, data collection used three approaches data collection methods. There are a deep interview, questionnaire, and observation. The subject matters in this research are some subject matter expert in the ICT Department or called Dinas Komunikasi dan Informatika (Diskominfo), the structural functions who are involved in SIG implementation in this local government. In the interview stage, we give some questions related to the SIG from the respondent perspective to identify the SIG implementation issues. After that, we give a blended questionnaire based on the NS-GM and SPBE to measure the maturity level of SIG. The answers are used to calculate organization SIG maturity. We also conducted some observation about SIG business processes in this institution to compare with the questionnaire results to approve their validity. The last step is to validate the answers to the SIG questionnaire to expert judgment to be the final answer. The results analysis of the interview, questionnaire, and observation will be discussed in the next section.

The selection of two objects of our study is based on the criteria of regional governments that have a vision of Smart Islands. Then next consider the geographical conditions with the head office of government administration in the island or the coast. Then we chose Ternate City is the first object in this case study because it is an island city of the first provincial city capital since 1999-2010 (11 years) and almost all city facilities in this province are far more crowded compared to nine other districts and cities in North Maluku. The second case study is the local government of Southern Halmahera. The Chosen based consideration of island areas with the largest area and population in North Maluku province. In addition, South Halmahera Regency is an area with the smallest islands in Indonesia, more than around 13 thousand islands[11].

4. Result and Discussion

As explained in the previous chapter, the research approach used is blended methods using the NS-GM and SPBE models. The study adopts the SPBE questionnaire and adds NS-GM Readiness layer.

There are 40 indicators with 5 levels of maturity in process capability. The detailed discussion of each domain is as follows:

4.1. SPBE Perspective

4.1.1. Internal Policy Domain

The maturity level of the SPBE is a model that measures the level of development of SPBE in terms of the stages of process capability and capability of the technical functions of SPBE. Maturity levels direct the development of SPBE at better outputs and impacts. Low maturity levels show low capability and success, while high maturity levels show higher capability and success. The maturity level of the process capability consists of five levels, namely pilot, managed, standardized, integrated and measurable, optimum. While the level of maturity on the capabilities of technical functions consists of five levels, namely information, interaction, transaction, collaboration, and optimum. Each level has its own characteristics that can clearly distinguish between levels one to another level. Characteristics at higher levels include characteristics at lower levels. Figure 3 showed the SPBE Index assessment with 3 Domains, 7 Aspect and 35 Indicators[22].

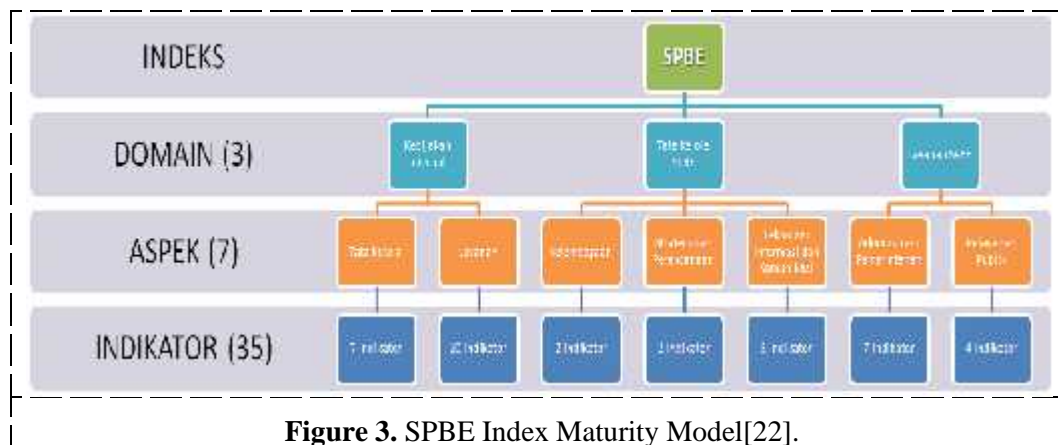


Figure 3. SPBE Index Maturity Model[22].

The internal policy domain has two aspects namely governance and services. Governance aspects have 7 indicators and aspects of services have 10 indicators. Each indicator is used in questionnaires to measure the level of process capability and function capability, which consists of level 1 - 5.

4.1.2. SPBE Governance Domain

The SPBE Governance domain has 3 aspects namely institutional, strategy and planning, and ICT. Institutional aspects have 2 indicators, strategy and planning have 2 indicators and the last one has 3 indicators. Each indicator is used in questionnaires to measure the level of process capability and function capability, which consists of level 1 to 5. Of course, all assessments of choice from level 1 to 5 must include valid evidence data.

4.1.3. SPBE Services Domain

SPBE Services domain has 2 aspects namely government administration and public services. The government administration aspects have 7 indicators, and the public services has 4 indicators. Each indicator is used in questionnaires to measure the level of process capability and function capability, which consists of level 1 to 5. Of course, all assessments of choice from level 1 to 5 must include valid evidence data.

4.2. NS-GM Perspective

4.2.1. Infrastructure Readiness

The infrastructure readiness is a measurement of infrastructure readiness both physical and internet networks that support the integration and collaboration of services between the internal government units and external governments (G2G), between government and business (G2B) and between government and citizen (G2C). This infrastructure readiness is a critical component that must be in place to achieve the goals of Smart Islands Government (SIG).

4.2.2. Structural Readiness

The structural readiness is a critical component of the structural readiness of government organizations to carry out process capability and public service functions (G2G, G2B, G2C). This illustrates the readiness of human resources to support the optimization of the public service process. Structure readiness is also related to leadership capabilities, management, and governance of human resource assets and funding support.

4.2.3. Superstructure Readiness

Superstructures readiness is a critical component related to the non-structural or umbrella aspects of legal regulations and policies that support culture and a conducive environment to enable the process and function of the government to improve the quality of public services. The overall foundation/readiness layer of the adoption of the NS-GM model by Arief[13].

4.3. Mapping NS-GM to SPBE (Blended Methods)

Next steps are mapping the NS-GM Model readiness layer to SPBE Instrument. The method of mapping by adding sub-indicators that are not in the SPBE sub-indicator of the NS-GM readiness factors used. As mixed from NS-GM to SPBE instruments as shown in Table 1.

Table 1. Mapping the NS-GM layer to SPBE instrument.

<i>NS-GM Readiness Layer</i>	<i>SPBE Aspect</i>	<i>SIG Index Assessments</i>
Indonesia Regulation Standards (SPBE)	Internal Policy of SPBE Governance	7 Indicators
	Internal Policy for SPBE Services	10 Indicators
	Institutional	2 Indicators
	Strategy and Planning	2 Indicators
	Information and Communication Technology	3 Indicators
	Electronic-Based Government Administration Services	7 Indicators
	Electronic Based Public Services	4 Indicators
	Islands Infrastructure Readiness	
Islands Structure Readiness	Local Wisdom of Archipelagos	3 Indicators
Islands Superstructure Readiness		3 Indicators

4.4. The Assessment Results

The assessment results in the form of SIG Index used the NS-GM and SPBE blender methods with two case studies for local/city's governments with the Smart Islands vision showed in Figure 4 and Figure 5.

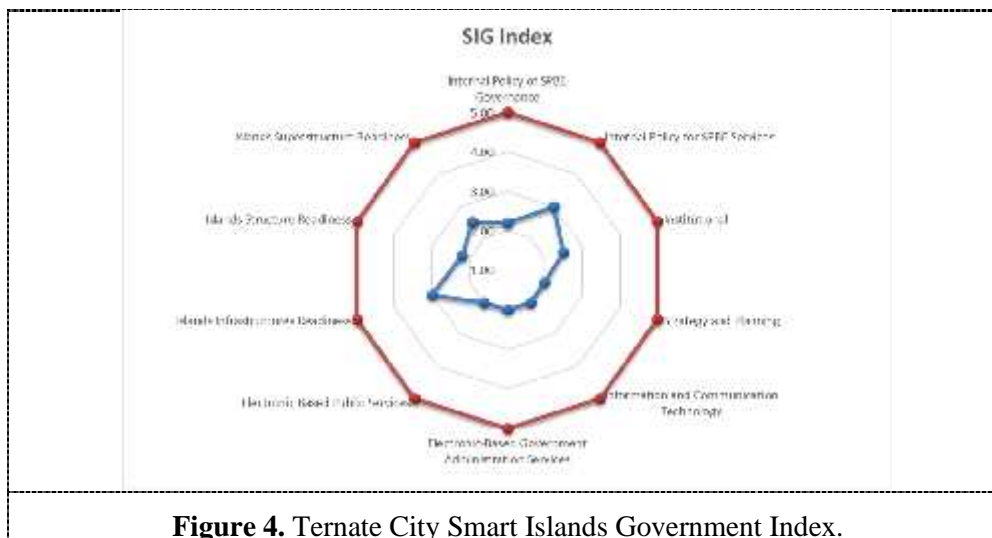


Figure 4. Ternate City Smart Islands Government Index.

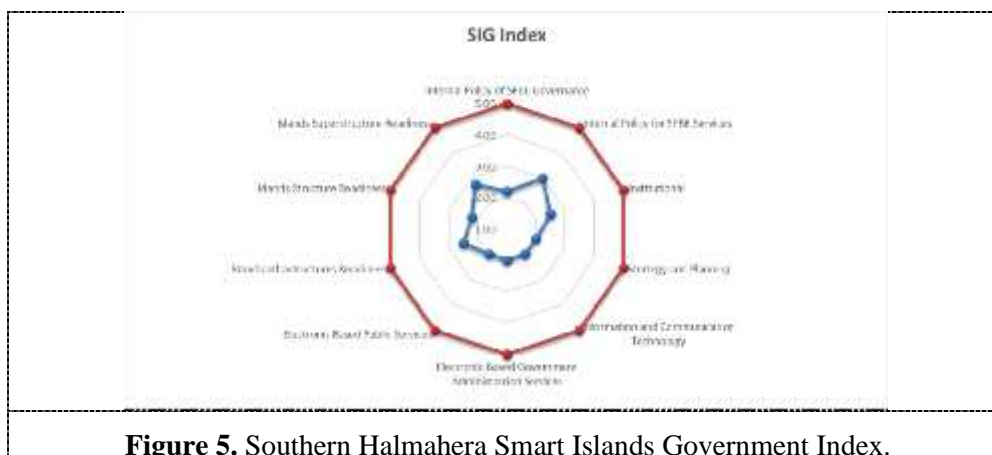


Figure 5. Southern Halmahera Smart Islands Government Index.

The assessment results with the blended methods approach of NS-GM Readiness and SPBE Aspect instruments result in averages in measured indicators of Ternate City's government is 2.34 and Southern Halmahera's Government is 2.34. This score means that it has begun to be managed by meeting the government's needs towards the next level, namely standardized.

5. CONCLUSION AND FUTURE WORK

This study has been evaluated the maturity level of Smart Islands Government Index (SIG) in North Maluku, Indonesia. Measurement of the maturity level referring to NS-GM and SPBE as a framework or model that contain three domain such as Infrastructure Readiness, Structural Readiness and Superstructure Readiness. On average, the maturity level both in Ternate City Government is 2.34 and Southern Halmahera is 2.34, which is Existing Capacities. This means that on the Islands Government Vision have prepared towards the right direction of smart island.

For further research on measuring SIG that used the new framework have a special indicator in Islands Indicators or Aspect, it would be particularly interesting to observe using a different method. That research may be conducted by carried out by Forum Group Discussion (FGD) or Minutes of Meeting (MoM) with several related stakeholders. This is intended to reduce the bias towards the data generated, due to the personal researcher interested.

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