Development of the E-Government Evaluation Model on City Level Through Pattern System Approach

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Abstract. The evaluation process of e-government continues to be investigated in various parts of the world. It becomes an important thing to do an evaluation as a benchmark for the government as a developer of the e-government to find out how the current conditions of e-government with the objectives to be achieved, namely to get a more efficient and effective government process. Many studies tried to develop an evaluation model but only focus on a number of aspects from e-government. Some of them tried to examine the efficiency of e-government through outcomes in the form of services and the impact from using e-government from the perspective of users and providers of e-government services. In this study, evaluation of e-government is based on a systems pattern approach through input-process-output-impact from the development of e-government. In this study will use a case study from the city of Surabaya as one of the cities with a very good predicate by the Indonesian e-Government Ranking (PeGI). The final results of this study are in the form of a comprehensive model for evaluating e-government at the city level.

1. Introduction

E-Government or Digital Government is a form of governance that utilizes ICT resources to improve the governance of a region or country so that citizens can participate in electronic/digital governance [1]. E-government itself continues to evolve in terms of service and governance. There are several stages that occur during an evolving e-government, starting from the initial stage, namely as a platform to get information online, input a two-way interaction or in the form, a transaction or service done online, to a one-stop system -Government which all administrative processes and services are carried out online and are mutually integrated between governmental units/units [2].

Evaluation using the ranking of Indonesian e-government (PeGI) aims to map the conditions and utilization of existing ICT resources in each region. Evaluation using PeGI is not necessarily done by all provinces in Indonesia. In 2011 PeGI ranked 26 provinces, 24 provinces in 2012, 21 provinces in 2013, 22 provinces in 2014, and 20 provinces in 2015 [3]. Measurements using PeGI itself only focus on the readiness of an area in implementing e-government systems in their area. The uneven development of e-government in the regions is certainly the reason why there is a need for a tool or benchmark to find out how the sustainability or success rate of an e-government area with other regions
Research conducted to developed a framework to measure the maturity of an e-government system by combining PeGI, Framework COBIT 5, and Janssen indicators to determine the level of readiness of both resources (input), efficiency of productivity (processes), benefits obtained (output) [5]. Until finally the government through Ministerial Regulation Number 5 of 2018 issued a guideline for evaluating the Electronic-Based Government System (SPBE). The SPBE evaluation itself is expected to be able to produce an index value that is able to describe the maturity level of e-government in this case called SPBE both in central agencies and regional agencies [6].

2. Literature Review

Evaluations of e-government systems need to be carried out with the aim of being able to assess the development of e-government implementation. There are several methods that already exist regarding e-government evaluation methods that have been applied both in the world and in Indonesia itself. The ranking of Indonesian e-government (PeGI) evaluates by measuring the dimensions of policy, institutions, infrastructure, applications, and planning [7], and currently using an Electronic-Based Government System (SPBE) evaluation tool issued by the Government through the Ministry of Administrative Reform Country. The SPBE evaluation tool measures through 3 aspects of government, namely, aspects of policy, governance, and SPBE services from each government organization [6].

In a previous research study, the main focus of the development of an e-government framework was to provide a value for current e-government position. The purpose of getting this value is nothing but to find out the position and know the steps and strategies for developing so that it can become a government system that is transparent, effective, and efficient [8]. Using a system approach used in the evaluation process of the Colombian government on e-government, Cordoba (2009) explains that there are aspects of the input-process-output-impact in the e-government implementation process [8,9]. Previous research focuses on each aspect starting from readiness, process, output, and impact with the aim of being able to improve the efficiency of the use of e-government [9]. Based on the system approach, this study measures the maturity level of implementing e-government at the city level comprehensively through the aspects of input, process, output and impact. Table 1 explains how the mapping of several studies on aspects of the system approach.

| No. | Author               | e-Government’s Aspects | Author               | e-Government’s Aspects |
|-----|----------------------|------------------------|----------------------|------------------------|
| 1   | Cordoba, 2014        | Output, Impact         | Berntzen, 2014       | Usage, Output          |
| 2   | Puron-cid, 2014      | Impact                 | Munoz, et al, 2014   | Impact                 |
| 3   | Inkinen, et. Al, 2014| Output, Impact         | Janssen, 2003        | Input, Usage, Output, Impact |
| 4   | Susanto, 2015        | Input, Usage, Output, Environment |
| 5   | Kim & Grant, 2010    | Input, Process, Output |
| 6   | Osman, et al, 2014   | Impact                 | Evi, 2017            | Input, Process, Output |
| 7   | Joshi & Islam, 2018  | Input, Process, Output, Impact |
3. E-Government Evaluation Models

The model proposed in this study will be explained as a conceptual framework. The conceptual framework in this study was obtained from various previous studies, specifically related to the development of e-government evaluation models. This section examines the evaluation process of e-government and how the development of evaluation models is based on several related studies. The government through e-government will need some input as a basis and support for the implementation of e-government, which can then carry out the implementation process, to produce outputs that can be in the form of public services, so that they can ultimately have an impact on stakeholders from e-government. Based on the previous literature mapping, it is able to explain that in the e-government evaluation process it is necessary to cover from several aspects ranging from input, process, output to the impact of the existence of an e-government. In accordance with Figure 1 this system approach is used to cover all aspects of e-government development starting from the input consisting of readiness in implementing e-government, IT governance processes in e-government, e-government outputs, to the impact of running e-government.

![Proposed E-Government Evaluation Model](image)

Figure 1: Proposed E-Government Evaluation Model.

The approach of this system is also used in research conducted by Wahyuni (2017) using input-process-output aspects which are the result of the development of performance measurement. Based on the system approach, some of the research that has been collected is then mapped based on the aspects discussed or researched for further use as a basis in developing the conceptual framework or conceptual model in this study.

4. Domains and Attributes

4.1. Input

Some research that has been collected explains that in measuring the performance or maturity of an e-government implementation can be seen in several aspects. The input aspects examined by Janssen (2004) explain that with information related to how much readiness or investment of the resources needed in the development of e-government implementation will affect the level of success and influence how decision makers in determining the next steps in e-government development [10]. Furthermore, through several perspectives explained that there is a need for commitment from the
government to be able to support the running of e-government in order to achieve the desired goals [11]. This became the basis for Permenpan No. 5 of 2018 in developing the SPBE Internal Policy domain as a form of commitment of the Indonesian government in developing and implementing SPBE [6]. As a form of support, the existence of adequate infrastructure will be very useful in improving the performance or the performance of e-government services provided [12].

Table 2 Mapping Prior Research Based on Aspects in the System Approach.

| Variable       | Indicator                                                                 | Reference |
|----------------|---------------------------------------------------------------------------|-----------|
| SPBE Governance | Internal Policy of the SPBE Steering Team of Government Agencies,         | [6]       |
| SPBE Internal Policy | Internal Policy Integrated Business Process Innovations,                |           |
|                | Internal Policy of the Government Agency SPBE Master Plan,               |           |
|                | ICT Internal Budgeting and Expenditure Policy,                          |           |
|                | Internal Data Operations Policy,                                         |           |
|                | Internal Application System Integration Policy,                         |           |
|                | Internal Policy on Use of General Applications for Sharing               |           |
| SPBE Service Policy | Internal Policy of Official Script Services                               | [6]       |
|                | Internal Staffing Management Services Policy                             |           |
|                | Internal Planning and Budgeting Management Services Policy              |           |
|                | Internal Financial Management Services Policy                           |           |
|                | Internal Policy on Performance Management Services                      |           |
|                | Internal Procurement Services Policy                                     |           |
|                | Internal Public Complaints Service Policy                                |           |
|                | Internal Documentation Services and Legal Information Services           |           |
|                | Internal Policy for the Whistle Blowing System                          |           |
|                | Internal Government Service Public Policy                                |           |
| Information & Communication Technology Infrastructure | Interoperability                                                          | [12]     |
|                | Interconnectivity                                                        |           |

4.2. Process

Aspects of the e-government process in several previous studies explained at the time of the process the measure is how services are provided [4,10,13]. This was also explained by Kim & Grant (2010) who from the perspective of capability or capability of e-government implementation, which later became the basis of Permenpan No. 5 of 2018 through the Governance domain. Meanwhile another study conducted by Evi (2017) tried to measure how the level of e-government maturity by using COBIT 5 which is the best practice in measuring the performance of IT governance in an organization. COBIT 5 as a framework that can help organizations or companies in ensuring the creation of value and the distribution of these values in order to achieve the goals of the company. Through the capacity model COBIT measures various processes in 37 process domains so that the organization or company can know the level of capability of the organization or company in managing information systems.
4.3. **Output**

The output aspect of e-government in accordance with the approach taken by Cordoba (2009) explains that the output (output) of an e-government system are services available to stakeholders to be used [9]. Various studies also mention the importance of measuring the outcome of e-government systems as a measure of the success of e-government systems [4,10,12,13]. Various indicators of service outcomes are proposed by several studies with the aim of knowing how the services are used, and the level of efficiency of services compared to services before the use of e-government systems. Janssen (2003) explains that service availability is one of the factors that measure the success of e-government [10]. Susanto (2015) also explains how outputs are measured through the ease of use and availability online to be a factor that needs attention in the development of e-government [4].

| Variable | Indicator | Reference |
|----------|-----------|-----------|
| Electronic-based Government Services | Service Script Services | [6] |
| | Staffing Management Services | |
| | Planning Management Services | |
| | Budgeting Management Services | |
| | Financial Management Services | |
| | Performance Management Services | |
| | Procurement Services | |
| Electronic-Based Public Services | Public Complaints Services | [6] |
| | Legal Documentation and Information Services | |
| | Whistle Blowing System service | |
| | Public Service Government Agencies | |

4.4. **Impact**

Impact aspect is one of the aspects that is difficult and complex in measuring the level of efficiency of e-government. Several studies that focus on examining how the impact of implementation on various stakeholder perspectives to find out how the level of success and efficiency of e-government. Berntzen (2014) explains in knowing how the level of e-government implementation needs to be seen through the efficiency achieved [13]. The intended efficiency is obtained from the measurement of several indicators ranging from improving service performance from the point of view of the user, and the government. Indicators that become important points in the assessment of efficiency are seen based on how time, cost, and effort savings from using e-government services [12,13].

| Variable | Indicator | Reference |
|----------|-----------|-----------|
| Impact | Improved service efficiency in terms of time | [8,10,12,14] |
| | Increased service efficiency in terms of cost | |
| | Improved Service Efficiency in terms of business | |
5. Conclusion and Future Work

Evaluation is carried out starting from how the readiness or input that is in the agency to the implementation of e-government, then how the process of governance of the resources in the agency, the output or output of the e-government system, to how the impact or impact of e-government government against stakeholders of e-government itself. With the evaluation through a system approach it is expected to provide optimal and comprehensive measurement and evaluation information so that it can be the basis of government information in determining strategies or next steps in e-government development.

In the system approach, measurement of e-government is seen based on aspects of input, process, output, and impact. More and more studies are developing measurements on each aspect. In the input aspect, measurements were made to focus more on the readiness of e-government implementation, starting from supporting government policies, information technology infrastructure, and data and application readiness in the e-government system that will be used [15]. For aspects in the process that are measured based on the COBIT 5 framework which is the best practices in assessing and measuring the maturity of processes in governance and management of the use of information technology [5]. Output aspect by using how services are provided by using guidelines made by the Indonesian government in Ministerial regulation number 5 of 2018 SPBE, then the impact is to look at the benefits of each service used both from the user's perspective as well as from the perspective of service provider view [9].

The model developed is expected to provide value or level of maturity of e-government at the city level by looking at several aspects ranging from readiness, governance processes, services, and the impact of e-government. In addition, the results of this study can provide advice and recommendations in increasing the level of maturity of e-government so that it can provide optimal and efficient services to each stakeholder through a model or methodology in measuring or evaluating e-government. So it is necessary to do an empirical trial to get results that can represent the value of the maturity level of a city's e-government.

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