Public Service Digital Application Risk Assessment using Symantec-cobit 5 Framework: Case Study in Sidoarjo Online Parking System Application

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Abstract: One of the main strategies in implementing information technology in government is the digitalization of public services. Digitalization of public services is carried out through the development of information technology infrastructure networks, management of electronic-based government information systems and increasing the ability of public officers to use them. The application of information technology risk management analysis includes identification, measurement and management of risks. Assessment of risk is a combined process consisting of risk analysis and risk evaluation. This study implements a public service digital application risk assessment by classifying risks based on the COBIT 5 definition and risk classification according to the Symantec model framework. The framework is applied to the risk assessment related to the technical capabilities of the online parking system in the Sidoarjo Regency in Indonesia. Currently, in the alpha development stage, the risk assessment of the digital parking application is carried out to evaluate and estimate the level of each identified risk. Based on the framework, risk management analysis of the digital application shows a total of 54% of risk items are at a medium-high risk level related to human resource criteria, infrastructure and data information flow.

1 INTRODUCTION

In many countries, there are many challenges and problems in delivering satisfactory public services—no exception in Indonesia. Public satisfaction index surveys of various state institutions have proven that deficiencies in the delivery of public services in Indonesia still occur.

Therefore, innovation in every aspect of public service must be carried out. Good public services will certainly support faster growth of the community's standard of life from an economic, social and educational perspective. Alternative solutions to simplify the service process include time, cost, facilities, even procedures and requirements.

One of them is by utilizing the concept of digitization. The digital transformation since the early 2000s has made the world change so fast. Moreover, the Covid-19 pandemic forces everyone to switch from conventional services to social or physical distancing by being more digital.

The government is also required to carry out a digitalization system in all lines of public services. The government is obliged to build an e-government system from the command centre and strengthen their communication technology in order to generate efficiency, effectiveness and productivity while adhering to the principles of accountability and transparency in delivering quality public services.

Various legal laws and regulations have been issued so that the digitalization of public services in Indonesia can be optimally implemented. The leading example of digital technology implementation for public services is reflected in the implementation of e-Procurement, or the electronic immigration system.

However, it cannot be denied that the process of digitizing public services in Indonesia is complicated. Government organizations need to realize that the application of digital public service technology has a negative or positive impact, which is caused by internal and external factors of the organization. The application of digital public service technology requires a risk management framework as a

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systematic approach that includes processes, measurements, structures and culture to determine the best actions related to risks. Standard risk management methods are no longer suitable for the specific requirements of public service digitalization. Therefore, the research question of this paper is: how can risk be assessed to ensure a successful digital public service implementation?

The paper is then organized as follows: In Chapter 2, the literature review of digital application and risk analysis are explained. Chapter 3 deals with the framework development of risk analysis of digital public service implementation. In Chapter 4, an exemplary application of the framework is conducted. Chapter 5 summarizes the paper and identifies additional research needs.

2 RESULTS AND DISCUSSION

2.1 Risk Analysis in Digital Public Service System

The basis of the risk analysis framework development should meet the specific requirements for digitalization in public services. The risks lists for software development and maintenance, information and communication technology, ICT, and projects do not completely fit the digital public service system because the common frameworks are very general and do not consider various challenges in public services organizations. Therefore, it is necessary to create a framework to measure risks in the digital public service system.

2.1.1 Innovation in Public Services

Efforts to reform the bureaucracy through innovation in public services are carried out to create a better government by the needs of society and the dynamics of the progress of the times. It is important because the dynamics of change must be adequately addressed to create an orderly state and society. The task of the bureaucracy is to carry out state obligations to its people.

One form of innovation is information technology to facilitate, accelerate and increase transparency, namely the concept of e-government. As seen in innovative city development projects in Bandung and Surabaya, the concept of a smart city cannot be separated from information and technology facilities (Wijaya, et al., 2019). It takes regulation and good cooperation between elements by prioritizing innovative city principles in providing public services to the community.

The main triggers for the growth of e-government can be traced from the history of global development (Silalahi, et al., 2015), namely: First, the era of globalization which came earlier than expected has created many issues such as democratization, human rights, law, transparency, corruption, civil society, good corporate governance, free trade, open markets, and so on need attention; Second, advances in information technology, computers and telecommunications occur very rapidly in which data, information, and knowledge can be created very quickly and distributed to all levels of society; Third, the increase in the quality of life of the people due to the improved performance of the private industry. These three factors trigger the growing need for the use of information technology in government.

2.1.2 Digital Public Service System

The main issue in this innovation era in government administration and public services. The main principles and strategies for innovation in government include (Sururi, 2017): integrating services, decentralizing service delivery, leveraging partnerships, involving citizens and utilizing ICT. Those five characteristics of utilizing information and communication technology are necessary along with global developments, with the so-called disruption era. The disruption era brings various impacts on the government (Schwab, 2017):

a. Technology increasingly enables citizens, providing new ways to voice their opinions, coordinating their efforts and possibly circumventing government scrutiny.
b. Governments become public service centres evaluated on their ability to provide comprehensive services most efficiently and individually.
c. The government's ability to adapt to their competitiveness, so that the government needs to be transformed into a leaner and more efficient one.

Two main strategies in implementing ICT in public services are direct services and digitalization of governance. Direct services are carried out through the socialization of new systems and procedures to realize open government. There is an openness of public information, transparency, public participation, communication and absorption of public aspirations. The digitalization of government is carried out through the development of information technology infrastructure networks, management of electronic-based government information systems, e-

government, and increasing the ability of government officials to use them.

Hopefully, the development of digital public services will realize a complete system of government administration application services. The digital system will contain various information and complaint services, such as agency or service programs, up to the budget amount. The application system is also expected to be able to monitor the performance of government devices. The community can also carry out direct supervision through the system. This innovation is expected to increase budget effectiveness and efficiency, increase supervision, and minimize corruption. A more transparent system, tighter and real-time controls, and changes in work patterns must be carried out by government officials.

However, the migration process from offline to online encountered various obstacles in terms of system and equipment readiness, human resource readiness, and data readiness. The thing that is most often encountered is the tendency of resistance from government apparatus (Choi, et al., 2016). It occurs because of the change in performance patterns from manual to electronic-based, which requires many adjustments. There are still many officials who are not ready to use digital systems due to technical incompetence. In addition, non-technical obstacles such as the employee mindset, disturbed particular interests, and work habits hinder this migration process. Thus, in the early stages, there were shocks for the officials who carried out government activities or tasks, which when viewed from the choked up the process of digitizing public services (Maulana, et al., 2019).

This constraint theoretically is closely related to the mentality of the apparatus, which still has the characteristics of the old public administration. The bureaucracy tends to work in a secure manner, is slow and is not responsive to the needs of society. Apart from constraints on the operator side, there were also obstacles on the digital application and its infrastructure development side. The digital application has not been able to anticipate changes or dynamics in budgeting and its implementation, as is the manual system. There was also a weakness in the network on the infrastructure side that supports the need for data flow.

2.2 Risk of Digital Public Service System

The risk analysis of digital application development can be carried out from various types of classifications. Risk classification in digital applications is mostly carried out on user, communication, market, resource, financial, technical, managerial risk, application performance, maintenance, and external factors. In the analysis, the risk assessment process can be carried out as follows (Kushagr, et al., 2013):

- A risk classification framework based on the impact on the organization which is divided into security risk, availability, performance and risk of regulatory compliance, requirements and policies.
- A scale assessment that shows gaps between controls needs, technical issues, and business risks. The risks identified in this framework are applications, information, infrastructure and human resources.

In addition, governance requires innovation in governance and human resource development as the driving force of government. The competence of human resources is regarded as an essential point to encourage a country to innovate. Apart from the need for investment and technology, skilled human resources are also prepared to welcome Industry 4.0 (Hecklau, et al., 2017). The risks of implementing digital systems in public services can be adequately mitigated and impact various aspects of life, including the government sector.

2.3 The Framework of Risk Analysis in Digitalisation of Public Services

This study employs a digital system risk management by classifying risks based on the COBIT 5 definition (ISACA, 2019) and risk classification according to the Symantec model framework (Fauzi, et al. 2018). The application of information technology risk management analysis includes identification, measurement and management of risks related to technical capabilities. The Symantec framework used in this paper classifies risk in 4 terms, namely:

a. Performance - where the performance is less than the system, application, personnel, or IT as a whole, can reduce productivity or business value.
b. Availability - where information or applications cannot be accessed due to system failure or natural disaster, including the recovery period.
c. Compliance - where the handling or processing of information fails to comply with regulatory, IT or business policy requirements

d. Security - where information can be changed, accessed or used by irresponsible parties.

Once the classification is obtained, the analysis continues by giving a value for each identified risk based on the frequency of occurrence of an event and its impact on a system. The likelihood assessment is use to predict the likelihood of the risk being analyzed. The impact assessment is employed to determine the size of the risk to the system.

2.4 Exemplary Application of the Framework

The framework is implemented to assess the risks in the online parking system application, SPON, in Sidoarjo Regency, Province of Jawa Timur, Indonesia. Risk assessment is a combination process of risk analysis and risk evaluation. Risk assessment of the risks that occur in SPON is carried out to evaluate and estimate the level of risk of each identified risk.

The framework above is used to assess the risk of SPON in improving the quality of public services in Sidoarjo. However, based on the literature study above, the SPON application can pose risks to stakeholders and users of parking facilities in Sidoarjo. To anticipate this risk, it is necessary to analyze SPON technology's risk management, which includes hardware, software, and brain ware.

After determining the values for likelihood and impact, an assessment is carried out on each risk classification defined in the previous process. Table 1 shows the scores given to the SPON application based on the defined likelihood and impact levels of risk.

Table 1: Likelihood and Impact Assessment of SPON pre-Alpha build

Risk	Risk Identification	Occurrence	Impact
Digital application	Threat from external apps	Rare	Medium
	Malicious code	Rare	High
	Network congestion	Likely	High
	Crashed system	Likely	High
Information	Database failure	Possible	High
	Data forgery and fraud	Possible	Medium
Infrastructure	Physical damage	Rare	Medium
	Hardware failure	Rare	Low
	Electricity outage	Rare	Medium
	Force Majeure	Rare	High
Users	Unauthorized access	Unlikely	High
	Authorization position abuse	Rare	High
	Human resources competencies	Likely	High

Risk evaluation is carried out by applying the x and y graph mapping process that illustrates the relationship between the likelihood or frequency of events and the impact caused by each risk that occurs. The value obtained from table 1 is used for the risk distribution mapping process of the SPON application. The spread of risk based on the measured likelihood and impact can be seen in the following graph:

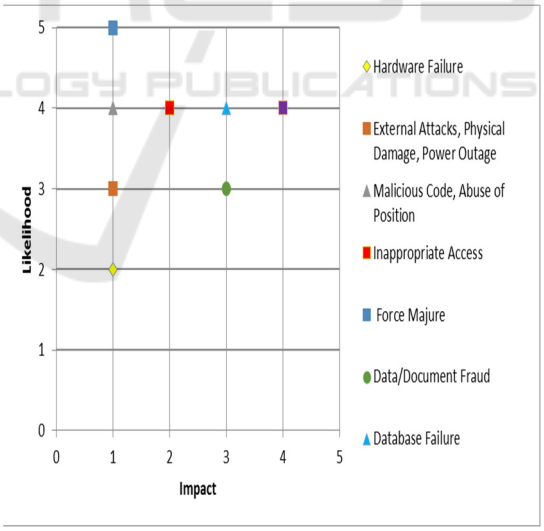

Figure 1: Risk Distribution Graph from Applications based on Likelihood and Impact values

The results of the risk distribution mapped in the graph above are classified according to the risk evaluation matrix, which can be seen in Figure 2.

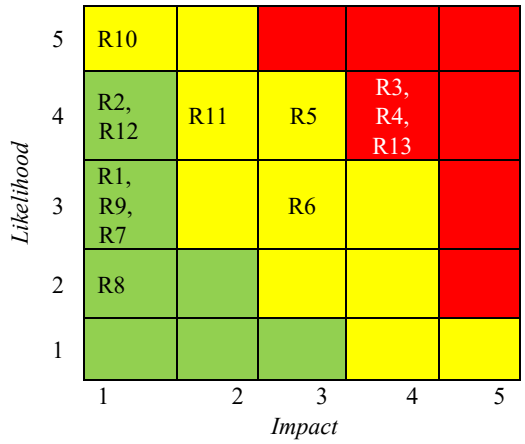

Figure 2: Risk Evaluation Matrix of SPON Application

Table 2 below shows the converted matrix based on the results of risk identification.

Table 2. Evaluation of Risk Level of SPON Application alpha build version

Risk	Risk Identification	Risk level
Digital application	Threat from external apps	Low
	Malicious code	Low
	Network congestion	High
	Crashed system	High
Information	Database failure	Medium
	Data forgery and fraud	Medium
Infrastructure	Physical damage	Low
	Hardware failure	Low
	Electricity outage	Low
	Force Majeure	Medium
Users	Unauthorized access	Medium
	Authorization position abuse	Low
	Human resources competencies	High

The risk analysis results from table 2 show that of the 13 risk groups in the SPON application, 23% of the identified risks have a high-risk level, while 31% of the risks have a moderate level, and 46% of the risks have a low level. From the results of the overall risk analysis, the application has a high implementation risk. Therefore, it is necessary to improve all application components, including hardware, software, and brain ware, to minimize the SPON's risk of implementation and ensure SPON security and sustainability.

The risk management analysis study shows that a total of 54% of risk items are at medium-high risk levels related to the criteria for human resources, infrastructure and data/information flow. Therefore, the chances of the successful implementation of SPON at this time depend on the commitment to develop further aspects of Hardware, Software and Brain ware.

3 CONCLUSIONS

The current version of the SPON application is technically still far from feasible. Assessment of the level of risk that tends to be high requires more attention from the developer and related stakeholders. Meanwhile, the preferences of the Sidoarjo people who tend to accept SPON applications as a substitute for conventional parking services should be a trigger for developers to improve the convenience of using the application. All these aspects must be fulfilled to improve and provide high-quality public services, especially the services provided by the Transportation Agency of Sidoarjo Regency

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If any, should be placed before the references section without numbering.

REFERENCES

Choi, H., Park, M. J., Rho, J. J., & Zo, H., 2016, Rethinking The Assessment of E-government Implementation in Developing Countries from The Perspective of The Design–reality Gap: Applications in The Indonesian E-procurement System, Telecommunications Policy, Vol. 40, No. 7, 644-660.

Fauzi, R., Supangkat, S. H., Lubis, M., 2018, The PDCA Cycle of ISO/IEC 27005: 2008 Maturity Assessment Framework, *International Conference on User Science and Engineering*, Springer, 336-348.

Hecklau, F., Orth, R., Kidschun, F., Kohl, H, 2017, Human Resources Management: Meta-study-analysis of Future Competences in Industry 4.0, *Proceedings of the International Conference on Intellectual Capital, Knowledge Management & Organizational Learning,* 163-174.

ISACA, 2013, *COBIT 5 for Risk*, ISACA, Illinois.

Kakkar, K., Shah, R., Kakkar, M, 2013, Risk Analysis in Mobile Application Development, *Confluence 2013: The Next Generation Information Technology Summit (4th International Conference)*, IET, 429-434.

Maulana, R. Y., Bafadhal, F., Firmansyah, A., 2019, *E-Government Implementation: The Concept of Innovative Transformation of Leadership and Public Officials' Capacities in Indonesian Open Government (The Case of Evaluating E-Government Utilization in Government Information Management in Jambi Province)*, SSRN 3497307.

Schwab, K., 2017, *The Fourth Industrial Revolution,* Currency.

Silalahi, M., Napitupulu, D., Patria, G., 2015, Kajian Konsep dan Kondisi E-Government di Indonesia. *Jupiter*, Vol. 1, No. 1.

Sururi, A., 2017, *Inovasi Kebijakan dalam Perspektif Administrasi Publik Menuju Terwujudnya Good Public Policy Governance,* https://osf.io/preprints/inarxiv/6djph/download.

Wijaya, A. A. M., Sa'ban, L. A., Mayunita, S., 2019, Collaborative Governance to Evolve Smart City in Local Governments, *Proceeding of ICOGISS 2019*, 275-286.