Factors Influencing e-Government Adoption (A Case Study of Information System Adoption in PPATK)

Faktor-faktor yang Memengaruhi Adopsi e-Government (Studi Kasus Adopsi Sistem Informasi di PPATK)

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Abstract

Information Communication Technology (ICT) has encouraged e-government implementation to improve government institution performance in society, business and fellow government institutions. Many Information Systems (IS) are created and used, but not all of them are successful. This is contrary to the expectations that were mentioned earlier. Therefore, it is necessary to conduct research to identify factors that influence e-government adoption. This paper presents a case study of information system adoption in a government institution. The study was conducted using TOE methods. Data were collected using qualitative method and subsequently processed using Qualitative Data Analysis tools. Results indicated that all factors analyzed in TOE framework influenced IS adoption. However, not all factors were properly conducted. Therefore, they need to be developed to address difficulties in IS adoption so it will meet the e-government implementation expectation.

Keywords: *TOE method, e-government adaption, information systems, e-government*

Abstrak

Teknologi Informasi dan Komunikasi (TIK) telah mendorong implementasi e-government untuk meningkatkan kinerja lembaga pemerintah di masyarakat, bisnis, dan sesama lembaga pemerintah. Banyak Sistem Informasi (SI) dibuat dan digunakan, tetapi tidak semuanya dapat dikatakan berhasil. Hal ini bertentangan dengan harapan yang disebutkan sebelumnya. Oleh karena itu, perlu dilakukan penelitian untuk menemukan faktor-faktor yang memengaruhi adopsi e-government. Penelitian ini merupakan studi kasus adopsi sistem informasi di salah satu lembaga pemerintah. Penelitian dilakukan dengan metode TOE. Data dikumpulkan melalui metode kualitatif. Kemudian, data diproses dengan bantuan aplikasi Analisis Data Kualitatif. Hasil yang diperoleh menunjukkan bahwa semua faktor yang dianalisis menggunakan kerangka TOE memiliki pengaruh dalam adopsi IS. Namun, belum semua faktor terlaksana dengan baik sehingga perlu ditingkatkan untuk mengatasi kesulitan dalam adopsi IS, guna memenuhi harapan implementasi e-government.

Kata kunci: *metode TOE, sistem informasi, e-government, adopsi e-government*

INTRODUCTION

Developments in Information Communication Technology (ICT) have encouraged various organizations to adopt technology to enhance their competitive advantages. In recent years, ICT, especially Information System (IS), has played a vital role in the global economy, as ICT products and services are increasingly incorporated into the daily operations of public and private sector enterprises worldwide (Al-Sharafi, Arshah, and Abu-Shanab 2017; Panda et al. 2014).

Laudon and Laudon (2016) explained that Information System is a set of interconnected elements that collect, process, store and distribute the information to support decision making and supervision in an organization. Information system contains information about people, places, and important things in the organization and surroundings. Information means data that has been formed into a meaningful and useful thing for humans. Data are a set of raw facts representing events that occur in an organization or the physical environment of an organization. Data are usually not arranged into a form that can be understood by humans (Irawan et al. 2017).

Ward and Peppard (2005) argued that the concept of Information Systems in every organization has appeared before the development of Information Technology. Information Technology is related to hardware, software, and telecommunications networks. Information System is defined as a person or organization using technology to collect, process, store, use, and disseminate the information. Today, the information system has been fully automated with Information Technology so that the use of terms of Information Systems and Information Technology is often used together or used interchangeably to describe the same purpose (Irawan et al. 2017).

In public sector, many government institutions also take part in the adoption of this technology. E-government is the process of converting government transactions that previously were done traditionally into electronically using modern information communication technology to provide easy access to government services for all beneficiaries such as citizens, businesses, and government agencies. Some benefits of e-government to citizens are cost savings, time savings, different multichannel accessibility, and transparency. Some benefits of e-government adoption for businesses include more business opportunities with the government, enhanced quality of services for government and business sectors, and simplified marketing process and supply chain management. E-government benefits for government itself comprise enhanced efficiency and effectiveness or better use and management of information, increased accuracy and power of service delivery, improved government organization's performance and information sharing (Kurdi et al. 2016). Furthermore, e-government is one of the components of smart cities development. In other words, a smart city will be well established if the government consistently implements the principles of e-government (Widiyastuti 2019).

E-government can be categorized into 8 types: (1) Government-to-Citizen (G2C), it provides online public services with electronic services to provide information and communication. (2) Citizen-to-Government (C2G), it provides online public services with electronic services for information and communication exchanges. (3) Government-to-Business (G2B), it improves e-transaction initiatives, such as e-procurement and the development of electronic marketplaces for purchasing government needs and conducting government procurement tenders electronically. (4) Business-to-Government (B2G), it improves e-transaction initiatives, such as e-procurement and the development of electronic marketplaces for purchasing government needs and conducting government procurement tenders electronically for the sale of goods and services. (5) Government-to-Employee (G2E), it starts initiatives to facilitate civil service management and internal communication with government employees by developing e-

career applications and services by reducing the use of paper with e-office systems. (6) Government-to-Government (G2G), it provides online communication and collaboration between other departments in government to increase efficiency and effectiveness. (7) Government-to-Non-profit (G2N), the government provides information and communication to non-profit organizations, such as political parties, social organizations, and others. (8) Nonprofit-to-Government (N2G), it exchanges information and communication between government and non-profit organizations, such as political parties, social organizations, and others (Al-Balushi, Bahari, and Rahman 2016; Yanqing 2010).

Pusat Pelaporan dan Analisis Transaksi Keuangan (PPATK) or Indonesian Financial Transaction Reports and Analysis Center (INTRAC) is a focal point that coordinates the implementation of efforts to prevent and eradicate money laundering in Indonesia. Internationally, PPATK is a Financial Intelligence Unit (FIU), whose duty and authority are to receive financial transaction reports, to conduct analysis of financial transaction reports, and to forward the results of the analysis to law enforcement agencies. The legal basis for PPATK is Law No. 8 of 2010 concerning Prevention and Eradication of Money Laundering Crimes. The law reinforces the existence of PPATK as an independent institution that is free from interference and influence from any power. In this case, everyone is prohibited from doing any forms of interference towards PPATK's duties and authorities. In addition, PPATK must refuse and/or ignore any interferences from any parties when performing its duties and authorities. PPATK is directly responsible to the President of the Republic of Indonesia. As a form of accountability, PPATK prepares and submits reports on the implementation of its duties, functions and authorities periodically every 6 (six) months to the President and the House of Representatives. In carrying out its duties, PPATK uses the Anti-Money Laundering Approach, which complements the conventional approach that has been carried out in the fight against crime. This approach has several strengths and breakthroughs in exposing crime, pursuing crime proceeds and proving it in court. The existence of PPATK and the Anti Money Laundering Regime has helped maintain financial stability and integrity and support law enforcement efforts to reduce crime rates.

PPATK also adopts e-government in carrying out its duties and functions. As an institution responsible for preventing and eradicating money laundering, PPATK becomes a reference for other institutions in resolving cases related to money laundering. This makes PPATK often provide expert statements related to the settlement of money laundering cases. PPATK has an Advocacy Information System that aims to simplify the process of making expert statements and speed up the process of delivering expert statements in court. Advocacy Information System is used by the Directorate of Law, who is responsible to compile expert statements requested by other institutions.

However, the application of this information system sometimes even hinders the business process of PPATK, especially the Advocacy Group of the Directorate of Law as the direct user, due to several problems such as system downtime, double data, and the lack of users' smoothness in operating the system. In fact, there a lot of failure in e-government adoption (Choi et al. 2019). This certainly contradicts the expected results of ICT adoption in an organization.

Therefore, the purpose of this study is to investigate factors that influence the ICT adoption in PPATK, specifically those related to the adoption of IS. Advocacy Information System is selected to measure these factors because Advocacy Information System is one of the critical IS in PPATK. By understanding factors affecting the adoption of IS in PPATK, it is expected that some recommendations can be made. Thus, in the future PPATK can optimize the role of IS in carrying out its duties so that it becomes more effective and efficient.

Given the above explanation, this paper aims to answer the following questions: (1) What

are factors influencing the adoption of ICT, especially IS, in PPATK? (2) What are recommendations that can be provided to help PPATK optimize the role of IS in carrying out its duties in the future?

There are various frameworks to measure factors influencing ICT adoption, for example Technology Acceptance Model (TAM), Diffusion of Innovation (DoI), Unified Theory of Acceptance and Use of Technology (UTAUT), Technological Organizational Environmental (TOE), etc (Omer Khater 2018). TOE framework structure was introduced in 1990 by Tornatzky and Fleischer to explain technology adoption (Ali et al., 2015). Many studies have successfully applied TOE framework in diverse domains, such as Radio Frequency Identification (RFID), tele-care, e-signature, and e-health services. This framework has also been applied to investigate the adoption of IT innovations at the country level (Larosiliere, Meske, and Carter 2015; Sulaiman and Magaireah 2015). TOE framework consists of three contexts, i.e. technological, organizational and environmental. Technological context describes the attributes of innovation. This context refers to the technologies applications, whether internal or external, to the organization. Organizational context describes the attributes of an organization, for example (but not limited to) top management support, size, the degree of organizational structure complexity, centralization, and human resources. Environmental context refers to issues surrounding the organization such as competition, government intention or policy, and the nature of the industry (Ali et al. 2015; Sulaiman and Magaireah 2015).

Research related to the adoption of e-government has been widely undertaken. One of them is a study by Kurfali et al. (2017), which examined the adoption of e-government services in Turkey. In this research, they investigated factors behind citizen's decision to use e-government services. They adopted Unified Theory of Acceptance and Use of Technology (UTAUT) framework and quantitative approach through survey to conduct the research. The results were then processed with Structural Equation Modeling (SEM) technique. The findings demonstrated that performance expectancy, social influence, facilitating conditions and trust of internet have a positive effect on behavioral intention to use e-government services. On the other hand, effect of effort expectancy and trust of government were insignificant on behavioral intention (Kurfalı et al. 2017).

Other research related to e-government adoption was carried out by Lallmahomed et al. (2017), who studied factors that influence the adoption of e-government services in Mauritius. In this study, they discussed the antecedents of e-government adoption in a small island developing country, using Unified Theory of Acceptance and Use of Technology 2 (UTAUT 2) combined with e-Government Adoption Model (GAM) framework and collected quantitative data through survey. The results showed that performance expectations, facilitating conditions, and perceived values have positive relation to behavioral intention. Computer self-efficacy is proven to have a significant negative relationship with behavioral intention and resistance to change. The results further indicated that trust can be inversely associated with resistance to change (Lallmahomed et al. 2017).

Verkijika and De Wet (2018) also conducted a research about e-government adoption in a sub-Saharan Africa country. In this research, they attempted to find factors that influenced the adoption of e-government services using Unified Model of Electronic Government Adoption (UMEGA) and an extended version of UMEGA using data from quantitative research through survey. The results showed that performance expectancy, social influence, perceived risk and computer self-efficacy significantly influenced attitudes, while attitudes, facilitating conditions, trust in government and trust in the Internet had a direct significant influence on behavioral intention (Verkijika dan De Wet 2018).

Successful adoption of e-government is often measured by the public or the user as the

research object. Public satisfaction usually signals successful implementation of e-government. Therefore, unlike the other studies that previously mentioned, this research focuses on e-government implementation in a government agency. It attempts to identify factors influencing e-government success from a different point of view. By understanding what factors affecting e-government adoption from divergent perspective, it is expected that the failure of e-government adoption can be reduced.

METHOD

As explained in the introduction section, the first research question of this study is what are factors influencing the adoption of IS in PPATK. Thus, this study attempts to identify factors affecting e-government adoption in PPATK, especially on Advocacy Information System, using TOE framework. TOE was chosen because it provides a strong analytical tool not only from the technical perspective, but also distinguishes between the inherent qualities of an innovation and the motivations, capabilities, and broader environmental context of the adopting organization (Sulaiman dan Magaireah 2015).

This study adopted qualitative method research to gain a deep understanding in IS adoption. Document observation and interview technique were used to collect data. Document observation was conducted by investigating policies, regulations, SOPs and e-government related documents. The interview was conducted verbally with Advocacy Group Leader, Project Manager and Administrator. The three informants were selected based on their thorough understanding of Advocacy Information System. It began with an explanation of the purpose of the interview, followed by open-ended questions regarding research model. Previous research conducted by Sulaiman and Magaireah (2015) and Nugroho et al. (2017) also used qualitative research to measure the level of readiness in ICT adoption.

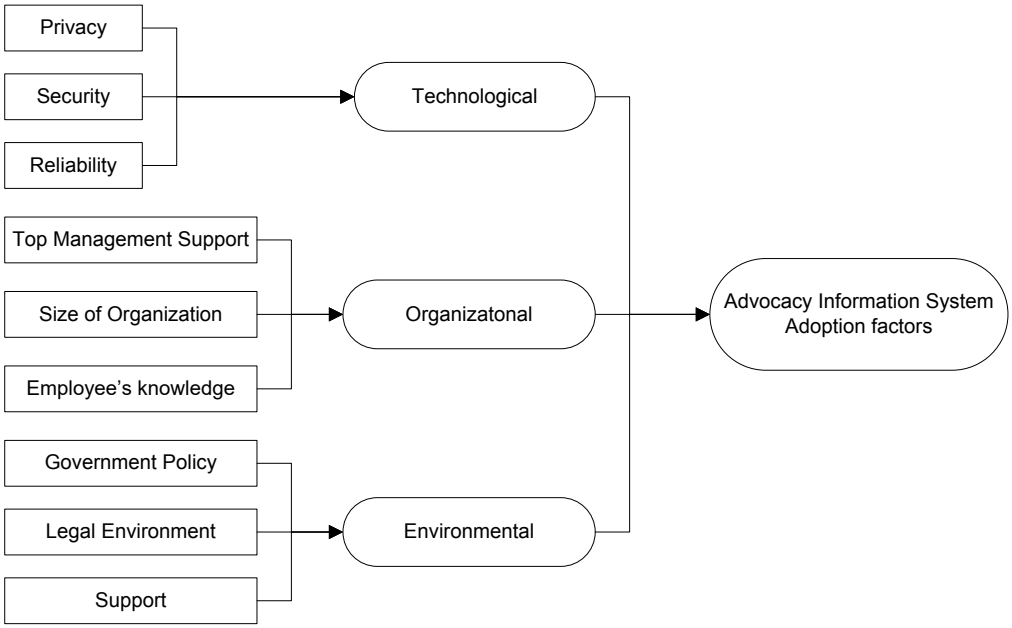

Figure 1. Research Model (Source: Research Analysis 2019)

From three contexts in TOE framework, several factors were compiled and then measured to determine what factors influencing the adoption of Advocacy Information System. This study adopted factors found in similar studies (Ali et. al. 2015 and Sulaiman and Magaireah, 2015) and

then used them as a reference for interview questions and document observations (for factors contained in official PPATK documents).

Information obtained from this study was subsequently processed using Qualitative Data Analysis software called QDA Miner Lite. QDA Miner Lite is an open source software to process qualitative data. This software processed research data (interview transcript) by mapping and filtering research data based on the contexts and factors developed earlier to gain information or evidence related to TOE factors.

DISCUSSION

This section will provide detailed explanation about each context and its factors based on the concept found in the methodology section, using TOE framework. To facilitate elaboration, this section will be composed of technological, organizational and environmental sub-sections. In each sub-section, each factor will be discussed by examining the interview results and observing the documents. Then, the adoption of Information Systems will be analysed based on the elaborated factors.

Interview data were processed and analyzed by means of QDA Miner Lite software. Firstly, the codes generated from transcripts were written using TOE framework. Subsequently, data display was developed to allow the researcher to draw conclusions. A similar approach has been applied by Ali et al. (2015) using Leximancer software and Widiyastuti (2019) using NVivo software. From the results of the analysis using QDA Miner Lite, we provide the following explanation.

Technology

Based on the concept elaborated in the methodology section, technology context has three factors, i.e., privacy, security and reliability. To find the result of each factor, this study conducted interview with Project Manager of Advocacy Information System and document observation.

The interview stated that privacy is a crucial issue to consider before adopting Advocacy Information System, which then resulted in the use of user authentication and authorization. User must log in to the Advocacy Information System and he can only carry out activities according to his role. Privacy issue has brought up data security concern, which becomes the responsibility of confidential experts. Opening confidential information is a violation of the code of ethics for experts. Document observation also found concerns over confidentiality, as can be seen in user requirement document, suggesting that users can only see activities and documents related to him. Security factor has also been considered when adopting Advocacy Information System as can be seen from network access limitation. Not all PPATK employees can access Advocacy Information System. Only certain users, especially advocacy members, are allowed to access Advocacy Information System via their Personal Computers (PCs). Based on interview, reliability factor was measured by some sub-factors. These sub-factors are server, server configuration, application, database and network.

Server is regarded important and has been considered before adopting Advocacy Information System. Server is prepared during development process. After the Advocacy Information System has been developed using development server, Information System is subsequently tested by tester and user to determine its feasibility. After the system is considered acceptable or feasible, the production server gets prepared for live production.

Application is important and has been considered when adopting Advocacy Information System. Advocacy information systems have been developed in accordance with the principles of application systems in PPATK, i.e., user requirements, system design, programming, testing and implementation.

Database is also important and has been considered when adopting Advocacy Information System. This can be seen from the Relational Database Management System (RDBMS), which is installed on the development and the production server and is ready to use. The developer only need to export Advocacy Information System Database into the RDBMS.

The drawback of Advocacy Information System is lack of measurements related to non-functional requirements, especially those related to infrastructure (server configurations and network sub-factors). The server and network configuration, which are used for the development and implementation of Advocacy Information System, is the default form provided to developers, whose focus is primarily to develop Advocacy Information System features in accordance with user requirements. This might not be a problem if the application is still under development, because the number of users accessing the Advocacy Information System are still limited. However, when the system has already been adopted by many people, the system often goes down. When the system is temporarily broken, users often call IT center to fix the problem. After the system is restarted, users will be asked to refresh their web browsers. This causes the system executed twice and so do the inserted data. Ultimately, it will result in redundancy. It can be said that reliability factor is partially prepared. Measurement result of each sub-factor in reliability factor can be seen in Table 1.

Table 1. Reliability factor

No	Sub-factor	Status
1.	Server	Yes
2.	Server Configuration	Insufficient
3.	Application	Yes
4.	Database	Yes
5.	Network	Insufficient

(Source: Research Analysis 2019)

Given the above description, it can be concluded that each factor in technology context plays an important role and most factors in technology context have been considered prior to the adoption of Advocacy Information System. Similar to research conducted by Ali et al. (2015) and Sulaiman and Magaireah (2017), technology has a positive influence on ICT adoption. In this study, privacy and security factors have been well considered, but reliability factor seems to lack consideration.

Organizational

Organizational context has three factors (top management support, size of organization, and employee's knowledge). To obtain the results of each factor, this study used document observation and interview with Advocacy Group Leader, Project Manager and Administrator.

Based on the interview, top management support is an important factor and has been considered in developing and implementing Advocacy Information System. The results indicated that top management has provided support related to the development of Advocacy Information

System. It can be seen from budget allocations and approval for procurement for the development of this system. There are two units directly involved, i.e., Information Technology Center and Law Directorate. The Head of IT Center has provided IT facilities for this system. The Director of Law is responsible to provide directions for using this system in his work environment.

Based on interview and document observation, the size of organization factor influences decisions for ICT adoption. PPATK only has one office in Indonesia with 300 employees, which is located in Jakarta for now and no branch offices in other cities. However, PPATK working area is nationwide. PPATK often holds international cooperation with fellow FIUs from other countries discussing money laundering and cross-border terrorism financing. If a PPATK expert handles two cases that makes him provide his expertise opinion, usually it will take around one week to complete the task. If the case handled happens to be a high profile case, it will take a month to solve it. This has made PPATK employees take on heavy workload, especially those in the Advocacy Group. The presence of Information System is significant to manage employee workload. The amount of workload handled by Advocacy Groups is explained in a document T.0.1, containing the background and reasons to adopt Advocacy Information System.

Employee's knowledge factor plays an important role in the adoption of IS. The lack of smoothness in user experience in operating Advocacy Information System has lessened successful implementation of the Advocacy Information System. This is due to the heavy workload of Advocacy Group personnels. Besides Advocacy Information System, there are other Information Systems for different business processes that must be used by PPATK's employee. The presence of a new Information System has brought up a fear that it will add employee workload and pose more difficulties for them to learn the operation of the Information System. Employees are reluctant to memorize lots of usernames and passwords for many information systems. This factor is positively correlated with the previous factor (size of organization). Employees of a relatively small organization with a broad scope of work will face a great difficulty to understand their work.

From the description above, it can be concluded that each factor in organizational context plays an important role, yet most of it haven't been considered yet in adopting Advocacy Information System. Top management support have been thoroughly thought, but size of organization and employee's knowledge were less considered. Human factor plays a significant role in e-government adoption success. In TOE framework, human factor is accommodated in the organizational context. This is in line with studies conducted by Kurfali et al. (2017), Lallmahomed et al. (2017), and Verkijika and De Wet (2018).

Environmental

Environmental context has three factors, i.e., government policy, legal environment, and support. To analyze each factor, this study conducted interview with project manager and document observation.

Government policy is an important factor and has been considered when developing and implementing Advocacy Information System. Direct observation showed that PPATK has already had procedures and guidance for developing and implementing P3SA (Pedoman Pengajuan, Pengembangan dan Pemeliharaan Sistem Aplikasi) or Submission, Development and Maintenance Guidelines for Application Systems.

Based on document observation, legal environment plays an important role in the successful development and implementation of Advocacy Information System. Legal environment provides guidance, which specifies what is regarded violations in carrying out their duties and functions. This was stated in the Decree of the Head of PPATK no KEP 1/1.01/PPATK/01/08 regarding PPATK Good Government Guidelines.

IT support is also an important factor and has been provided by the Information Technology Center as the unit responsible for resolving problems found during the implementation of Advocacy Information System, such as system downtime, double data and heavy employee workload that makes it difficult for them to operate the system. The Information Technology Center has prepared a channel to handle complaints or requests for IT technical assistance via helpline email or helpline application, which is related to the Advocacy Information System. Some employees in Information Technology Center and Law Directorate have been appointed to be persons in charge to troubleshoot Advocacy Information Systems.

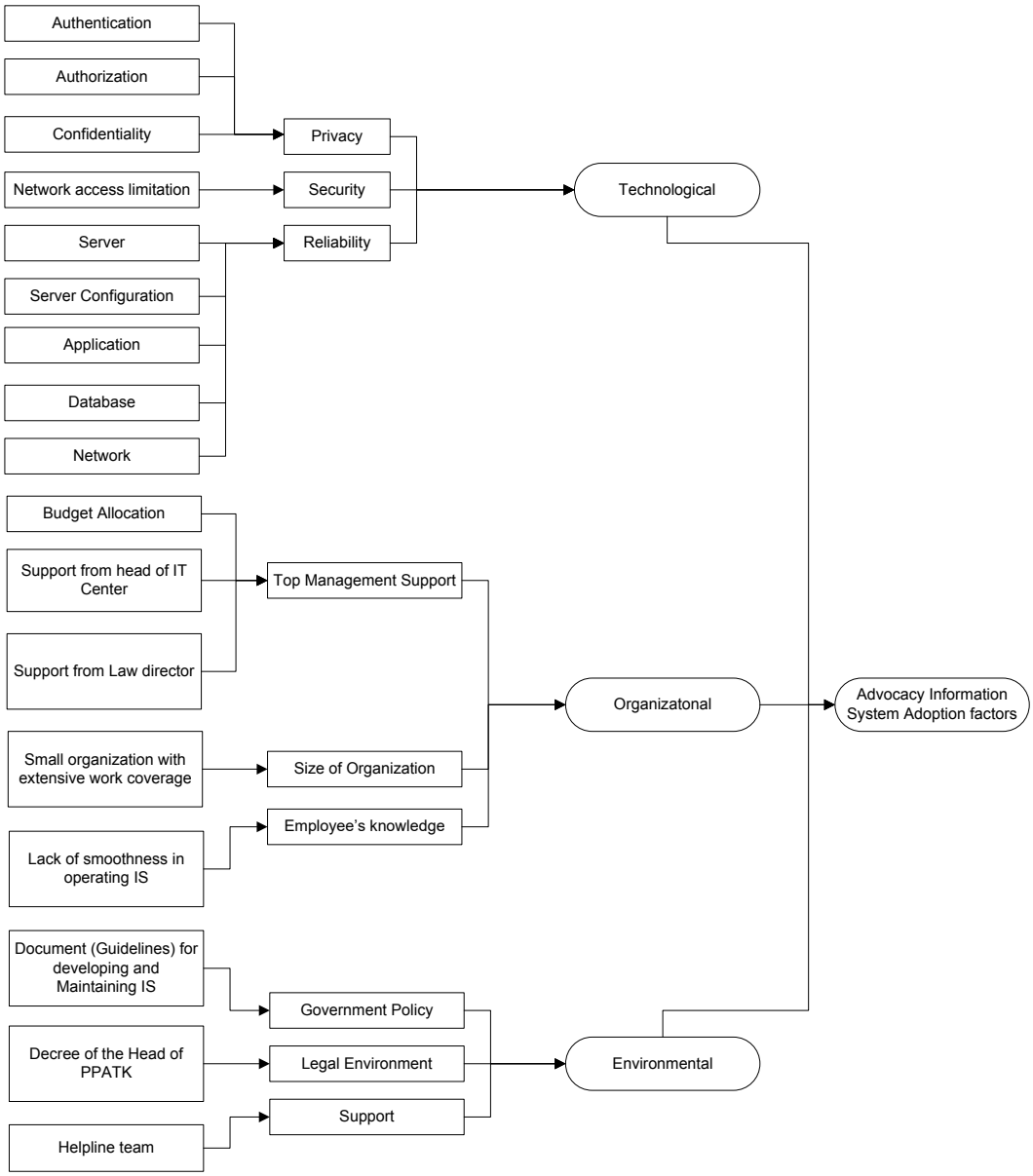

Figure 2. Detailed TOE Framework (Source: Research Analysis 2019)

From the description above, it can be concluded that all factors in environmental context play an important role, as suggested by Sulaiman and Magaireah (2017), and all factors in environmental context have been considered in adopting Advocacy Information System. Environmental context is well prepared among others. Environment also plays an important role in the successful adoption of ICT.

Results of the study indicated that each factor in TOE framework has evidence or sub-

factors explaining these factors. The detailed TOE framework used to analyze the case study of Advocacy Information System in PPATK, can be seen in Figure 2.

Analysis of the results demonstrated that these factors influence the adoption of IS (specifically the Advocacy Information System) in PPATK based on TOE framework. The more thoughtful these factors are considered, the better the adoption of IS will be. The findings were in line with those of Widiyastuti (2019) suggesting that development should not only prioritize technology, but also embrace several other aspects to achieve the desired goals. It can be seen from e-government adoption in PPATK, where the technological aspects are sufficiently considered, but this does not guarantee the successful implementation of e-government. Organization and environment also play an important role in the successful adoption of ICT (Sulaiman and Magaireah. 2015). In case of Advocacy Information System adoption in PPATK, most factors have been considered in adopting IS. However, there are some factors that received less attention in the adoption of IS, namely reliability, size of organization and employee's knowledge.

Table 2. Summary Result

Context	Factor	Evident	Considered
Technology	Privacy	● Authentication ● Authorization ● Confidentiality	● Yes ● Yes ● Yes
	Security	● Network access limitation	● Yes
	Reliability	● Server ● Server Configuration ● Application ● Database ● Network	● Yes ● No ● Yes ● Yes ● No
Organizational	Top Management Support	● Budget Allocation ● IT facilities prepared by head of IT Center ● Law director orders his staff to always input into IS	● Yes ● Yes ● Yes
	Size of Organization	● Small organization with extensive work coverage	● No
	Employee's knowledge	● Lack of smoothness in operating IS	● No
Environmental	Government Policy	● Document (Guidelines) for developing and Maintaining IS	● Yes
	Legal Environment	● Decree of the Head of PPATK	● Yes
	Support	● Helpline team	● Yes

(Source: Research Analysis 2019)

CONCLUSION

Results of this study showed that all factors described in TOE framework have influenced Advocacy Information System adoption. Factors influencing the adoption of IS in PPATK included

privacy, security, reliability, top management support, size of organization, employee's knowledge, government policy, legal environment, and general support. However, some other factors should be improved to have a better IS adoption in the future and avoid failure in IS adoption.

With regard to reliability factor, it is necessary for PPATK to include non-functional requirements containing an explanation of server and network requirements when implementing ICT or IS. Non-functional requirement measurement was important to avoid the emergence of technical issues such as system downtime or data redundancy.

Concerning size of organization and employee's knowledge, PPATK also needs to review its whole business processes undertaken by each work unit to increase collaboration and reduce redundancy at work. By doing this, PPATK might reduce the number of IS or unnecessary applications, thus users do not need to operate too many IS.

This study is limited to the adoption of IS. For further research, it is recommended to investigate the application of e-government with a broader scope of ICT, using quantitative and mixed methods.

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