



Impacts and constraints on implementing e-certification policies in Indonesia

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Abstract

Electronic certification (e-certification) is an implementation of information technology developed to improve various services, including license issuance, correspondence between agencies, exchange of information, and other public services. In Indonesia, the Electronic Certification Office (ECO) of the National Cyber and Crypto Agency (NCCA) manages e-certification for government agencies. This study aimed to describe the impact and constraints of implementing government policies in e-certification led by ECO. This study adopted the mixed method of qualitative and quantitative approaches. Sources of qualitative data were collected from informants. This study selected the informants based on their relevant knowledge or experience related to the subject. There were six informants from ECO and other offices in NCCA and four informants from other institutions who participated in the interviews. To support qualitative results, quantitative data and information were obtained from other relevant government agencies. The implementation of the e-certification policy has had positive impacts including, the impact on reducing the counterfeiting of information in digital documents, preventing corruption and bureaucratic efficiency. However, the implementation of these policies also had constraints, including limitation of ECO authority in managing the required resources, insufficient human resources, and responsibility overlapping. This study recommends the need for harmonization and synchronization of e-certification policies with other relevant laws and regulations, the need to strengthen organizational capacity, resources, utilize social media for widening the customer base and improve services according to national standards.

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Introduction

This study describes the impacts and constraints in the implementation of the government policy in e-certification led by ECO, NCCA. Currently, the need of organizations for e-certification services has increased rapidly along with the development of integrated information and communication technology supported by the widespread use of the internet (interconnection networking). Information technology has also developed in Indonesia along with the increasing use of the internet by the community and the government. Based on the data in 2018, the internet network users in Indonesia reached 150 million people, or around 53 percent of the total population of Indonesia. With this number, Indonesia is one of the largest internet user countries in the world (Puspitasari & Ishii, 2016).

The information and communication technology has supported various services, including issuing permits, corresponding activity between agencies, exchanging information, and other public services. However, the increase of information and communication technology has elevated the quality and security risks. Various threats to data or information exchanged via the internet require a security solution including e-certification. The National Cyber and Crypto Agency through the ECO manages this task to provide e-certification services in Indonesia. Previous studies on e-certification have focused more on the management and business aspects such as information security risk management planning of digital certificate management (Hermawan, 2019; Sensuse et al., 2020), e-commerce (Setiawan, 2015), and the preparation of Certificate Policy documents and Certification Practice Statements as basic standards in building Indonesia National Public Key Infrastructure (Gandhi et al., 2016). The study related to the implementation of the E-certification policy has never been carried out.

Methodology

This study adopted the mixed method of qualitative and quantitative approaches. The source of the data was received from informants and other relevant sources. The informants were selected based on the established criteria, including having relevant knowledge or experience related to the subject. There were ten informants, six of whom were internal management officers di ECO and NCCA, and four from beneficiary offices. The six internal informants consisted of: (1) Vice Director of Economic Digital Protection Division; (2) Head of ECO; (3) Head of Division of E-certification Technical Affair ECO; (4) Head of Division of Electronic System Management ECO; (5) Head of Administration Affair ECO; (6) Technical Staff; meanwhile, informants from beneficiary offices consisted of; (7) Director General of Treasury, Ministry of Finance; (8) Director of Center for Housing Financing and Fund Management, Ministry of Public Works and Housing; (9) Head of Agricultural Quarantine Agency, Ministry of Agriculture; and (10) Director of Information and Technology Transformation, Directorate General of Taxes, Ministry of Finance. In-depth interviews were conducted with the informants twice, each with a duration of 90 minutes. The interview guidelines are described in [Table 1](#).

To support qualitative data, necessary quantitative data and information were obtained from other relevant government agencies. Based on the results, a focus group discussion with the informants was carried out to discuss and formulate recommendations. This study adopted the triangulation method involving multiple qualitative and/or quantitative methods to verify the data validity. If the conclusions from each of the methods are the same, then validity is established.

Table 1 Problems and obstacles when using e-Certificate License and how to make the E-certificate License Trust

No	Questions
1	What are the views of the leadership of NCCA in bringing direction?
2	What is ECO electronic certification implementation policy that is faced with the strategic potential of electronic certification implementation in the future?
3	Whom are the internal and external actors involved in policy implementation
4	How is implementation of electronic certification carried out?
5	What is the role of each of these involved actors?
6	How are the performance indicators achieved as a result of policy implementation?
7	What targets do you want to achieve with the role of electronic certificates?
8	What is the impact of implementing the policy of electronic certificates?
9	What are the constraint in implementing the policy of electronic certificates?

Results and Discussion

Policy Implementation

There are two classifications of actors responsible for implementing the e-certification policies, namely internal and external actors. The internal actors are representatives of the ECO itself, which includes all personnel of the ECO, while the external actors consist of two parties, namely: (1) other offices inside NCCA and other agencies. Several related offices in NCCA have pivotal role to support ECO business processes. These offices include the Office of Planning and Finance support of ECO programs and budgets, the Office of Public Relations support of cooperation and legal services for ECO, the General Bureau of NCCA support of ECO facilities and infrastructure, Data and Information Center support of ECO infrastructure services, the Bureau of Human Resource Center support of the provision of ECO human resources, as well as the Directorate Deputy II for Digital Economy Protection Center support of the ECO e-certification service policy. Stakeholders outside the ECO include the Parliament, Government and Non-Governmental Organization; and (2) users/beneficiaries parties include agencies or organizations receiving ECO services. The relationship between ECO, units in NCCA and users/beneficiaries parties can be seen in [Figure 1](#).

The customers consist of user and beneficiaries. The user refers to service technical units that utilize electronic certificates. Meanwhile, beneficiaries refer to entities that benefit from the implementation of electronic certificates in services for which they are responsible, such as the Government sector, National Critical Information Infrastructure, and the digital economy. The level of benefits refers to national security such as the obligation to implement an Electronic-Based Government System (EBGS) in the government sector as well as increasing national economic growth in the National Critical Information Infrastructure sector and the digital economy. As seen in [Figure 1](#), customers receive a choice of cooperation services through the Office of Law and Public Relations, or general services from the Office of Customer Services. Furthermore, the administrative bureau processes the needs of service administration. Services can be processed directly by the office of Technical Affairs (ECO) or through General Management ([Figure 1](#)).

The ECO manages the implementation of the policy for e-certification based on several regulations, namely State Crypto Institution Regulation Number 15 of 2016

concerning ECO as subordinate organization, Number 10 of 2017 concerning Implementation of ECO, State Crypto Institution Guidelines Number 3 of 2017 concerning ECO Policy, Law Number 11 of 2008 concerning Information and Electronic Transactions, Government Regulation Number 82 of 2012 concerning the Implementation of Electronic Systems and Transactions, which requires System Operators to have electronic certificates containing electronic signatures and other identities as legal subject status in electronic transactions. The ECO breaks down these policies into several more detailed work programs and involves more actors. Based on Grindle's theory, policy implementation depends on the power, interests, and strategies of the actors (Grindle, 2017). Strategy planning is very influential on the decisions to implement policies. Strategic planning is always thinking about how an organization can live and develop in any context (AlQershi, 2021).

The rules regarding the electronic certificate cycle are contained in Article Number 10 of the Regulation of the Head of the State Crypto Agency Number 10 of 2017 concerning the Implementation of E-certification. The cycle includes the following stages: (1) Electronic Certificate Application; (2) Issuance of Electronic Certificates; (3) Use of Electronic Certificates; (4) Electronic Certificate Renewal; and (5) Revocation of Electronic Certificate.

In its implementation, some generic actors play a role in the management of electronic certificates. Based on Article Number 4 of Number 10 of 2017 regulation, the parties involved in the implementation of e-certification consist of: (1) Electronic Certificate Operators; (2) Electronic Certificate Policy Committee; (3) Registration Authority; (4) Owner of Electronic Certificate; and (5) Security Auditor.

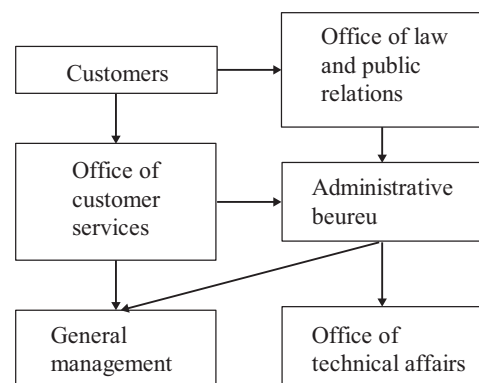


Figure 1 Flowchart of electronic certification business process

Furthermore, in Article Number 6 of Number 10 regulation concerning the implementation of e-certification, which is strengthened in Part I of the Guidelines Number 3 of 2017 concerning the Electronic Certificate Policy (Certificate Policy), the actors involved in the implementation of e-certification by ECO are mentioned also as a participant in public key infrastructure with the following meanings and roles.

The ECO accommodates Digital Transformation Plans and Policies in Indonesia through the EBGs Implementation Policy. Presidential Regulation Number 95 of 2018 stated the government's vision concerning EBGs. In its implementation, the government issued the National EBGs Master Plan as a guide for Central Agencies and Regional Governments to achieve an integrated EBGs. The regulation includes the direction of policies, strategies, and initiatives in the field of EBGs governance, EBGs services, ICT, and human resources to achieve the strategic objectives of the EBGs in 2018–2025 and the development objectives of the state apparatus as stipulated in the National Long-term Development Planning 2005 to 2025 and Grand Design of Bureaucratic Reform 2010 to 2025.

The ECO is a technical implementing unit under the NCCA, that has the authority to administer e-certification. Based on regulations for the operation of electronic systems and transactions, the electronic system operator guarantees the security of information and internal communication facilities held. One of the NCCA strategies in responding to this mandate is by administering electronic certificates for all government agencies led by ECO.

Based on Electronic Information and Transaction Law Number 11 of 2008, everyone has the right to use the services of an electronic certificate provider for the creation of an electronic signature. The electronic certificate operator has confirmed the linkage of an electronic signature with its owner. The system assures the information embedded in the electronic certificate is accurate and certain. Within the scope of compliance with information security in electronic-based government systems, electronic signatures are used as one of the methods applied to government electronic systems.

Electronic signatures are created through public key cryptography mechanisms. Public key cryptography utilizes two different keys but mathematically related, namely the public key and the private key. The public key is accessible by anyone and can be used by other parties to verify/validate the electronic signature. In the Public Key Infrastructure, the public key is embedded in an electronic certificate issued by the Certification Authority. While the private key is only used by the owner of the key.

The implementation of electronic transactions in the public or private sphere using an electronic system for the benefit of public services must use a reliability certificate and/or electronic certificate (Setiawan et al., 2015). The main focus of the NCCA in making policies for the implementation of e-certification is the fulfillment of information security on electronic systems belonging to government agencies. To guarantee the validity of data and information, ECO uses electronic signatures. The use of electronic signatures can improve information security. Users can verify data validity online. This policy is necessary to reduce the potential for misuse and falsification of letters, data and information. This fulfillment is in the context of supporting the interests of public services within the scope of the government sector. The implementation of information security in government agencies has been carried out thoroughly in the electronic system used. The ECO strategy in carrying out the task of administering e-certification is aimed at achieving information security in electronic systems for all government agencies. ECO actively disseminates information to all government agencies, both central and regional. The public requires disclosure of information from both the central and local governments. Decentralization of power allows local governments to have more autonomous policies to ensure accountable and credible governance.

The ECO has run the program for implementing e-certification for three years. Overall, ECO performance achievement in 2019 was excellent (more than 80%) although few achievements fall below expectations based on the stated targets (Table 2). In addition, in November 2019, ECO successfully obtained certification ISO 9001:2015 (Quality Management System) issued by the National Accreditation Committee.

Table 2 Key performance indicators and achievement in ECO

Indicator	2018		2019	
	Target	Achievement	Target	Achievement
Percentage of certification service accomplished	100	93.9	100	90.6
Percentage of customer satisfaction	75	82.8	85	84.8
Degree of reliability and security electronic certification	90	98.9	99	99.8
System Fulfillment Rate Integrated Certification Module Electronic	100	91.1	100	94.2

The number of collaborations with agencies increased significantly during the last three years. The growth rate from 2017 to 2018 reached 241.67 percent, while from 2018 to 2019 it reached 132.92 percent. In addition, by the end of 2019, there were 191 agencies having adopted e-certification. However, when viewed from the trend of realization of service fulfillment level performance indicators experienced inconsistency. The realization of performance indicators in 2017 was 87.50 percent, increasing in 2018 to 93.90 percent, but in 2019 decreasing back to 90.57 percent (Table 2).

Policy Impact

This study identified three main impacts from the implementation of the policy for implementing e-certification, namely, the impact on prevention of information in digital documents from falsification, prevention of mechanism for the procurement of goods/services and licensing from corruption, and improving the efficiency of the work bureaucracy. E-certification can prevent falsification of data and information, such as data on government partners in the procurement of goods and services, such as information on partners' experiences and resources. In addition, serving the issuance of identity cards can be faster. The implementation of e-certification also supports national security through the security of government-owned information. With the existence of an electronic certificate, the operation of an electronic system containing state information can be transmitted or stored securely. Electronic certificates maintain and guarantee the authenticity of public information dissemination.

The authorities may easily get access to the information saved in a database, assuring the security from counterfeiting activities. In general, the use of the digital signature on every document using an electronic certificate has reduced the falsification of information by unauthorized parties. The ECO maintains and guarantees the trust of e-certificate. Another positive impact of e-certification services is to ensure security with faster fraud detection. The Director of Directorate General of Taxes, Ministry of Finance, stated that by using an e-certificate, the Directorate General of Taxes can guarantee that the proper tax invoice issued belongs to the taxpayer concerned. In addition, the office also had a positive impact from the presence of an Electronic Payment Order with e-certification. The service can prevent losses both in assets and financial properties, especially losses associated with national information security.

The second impact is the prevention of corruption. In 2020, the Ministry of State Apparatus Empowerment and Bureaucratic Reform held an appreciation and awarding event for the Integrity Zone towards a Corruption-free Region as well as a Clean and Serving Bureaucratic Region of the government work units, in Jakarta. A total of 763 work units received the awards as the Corruption-free Region and Clean as well as Serving Bureaucratic Region, including ECO and its customers. Among the 191 customers, 40 received awards. The existence of e-certification has encouraged public transparency and reduced opportunities for corruption. With the presence of e-certification, denial of documents issued by agencies or individuals, especially those related to the licensing mechanism, may not occur. This effort reduces the potential for corruption among beneficiaries. In addition to licensing, the benefits of preventing corruption were also experienced by the Electronic Procurement System run by Government Goods and Services Procurement Policy. Application Electronic certificates in the system have succeeded in preventing fraud in the process of procuring goods/services. Management of Agriculture Quarantine Agency of the Ministry of Agriculture stated that Electronic Procurement System improves credibility because the validity of the certificate quarantine issued in Indonesia has been guaranteed. It increases community trust among the beneficiary recipients. In addition, the Director in Directorate General of Taxes, Ministry of Finance, stated that e-certification services reduce public doubts. Credibility is an important aspect for all recipients of the benefits of e-certification because it increases public trust.

Generally, management policy effectiveness and information technology readiness encourage the adoption of e-procurement and simultaneously reduce imperfections and enhance effective procurement in government organizations (Padhi & Mohapatra, 2010). Another study examined the effect of electronic procurement (e-procurement), in India and Indonesia. In India, the author observed that e-procurement improves road quality, while in Indonesia, e-procurement reduces service delays. Regions with e-procurement are more likely to have winners come from outside the region. Overall, the results suggest that e-procurement facilitates entry from higher quality contractors (Lewis-Faupel et al., 2016). A Study in Taiwan also demonstrated that electronic procurement benefits both government bodies and vendors. All of the electronic systems can be integrated easily within most existing information infrastructure (Liao et al., 2002).

The third impact is the efficiency of the work bureaucracy. With the e-certification service, the work bureaucracy experienced by beneficiary agencies becomes more efficient. The utilization of e-certificates for electronic documents can improve performance, especially in terms of the speed of the organization's business processes. An organization may have a long working bureaucracy to complete a document, however, with the application of electronic certificates, the completion time of the document is faster. In the Agricultural Quarantine Agency of the Ministry of Agriculture, Electronic certificates are applied to the quarantine certificate system electronically for the export-import process for agricultural quarantine. Previously, this process took about ten working days. With the implementation of electronic certificates, it was reduced by a day. In the budget search process at the State Treasury Service Office, the budget disbursement process in distant regions can take up to two days. With the application of electronic certificates, the budget disbursement process can be completed within two hours. In the Citizenship and Civil Registration Office process of issuing Identity cards, Family Cards, Birth Certificates and other services usually take five working days. With an e-certification, the process only takes an hour. In the licensing process in Indonesian Regional Investment Boards, which was previously processed manually, with an electronic certificate, the permit can be completed within an hour. In addition, it is easy for the public to get the services because the ECO provides enough to access the Citizenship and Civil Registration Office Information System application from their respective employees. Another positive impact is paper saving because the entire certification service process is paperless.

A study in Kenya revealed that electronic procurement practices had a positive influence on supply chain performance. With the inclusion of the values of the independent variables, supply chain performance is predicted to improve when e-tendering, e-order processing, e-material management goes up and decrease when e-supplier management goes up. The Government should issue policies concerning data safety to enhance the application of electronic procurement practices between the buyers and suppliers in terms of improved electronic payment and application of electronic signature (Oteki, 2019).

Constraints

This study found several obstacles faced by ECO, including insufficiency of human resources, infrastructure and facilities including the main technology infrastructure such as servers and Hardware Security Module, and the limitation of ECO authority in managing the required resources. In terms of policy content, the scope of the implementation of e-certification must conform to the scope of duties of the NCCA. Thus, ECO only handles certification in Government Agencies. The NCCA is responsible to support the implementation of e-certification. Activities carried out include ICT affairs by Data dan Information Center, legal assistance and the process of cooperation with other agencies by the Legal and Public Relations Bureau, research and development on the use of electronic certificates by Center for the Assessment and Development of Cyber and Crypto Technology. To improve the service, ECO has made many efforts through the work programs. However, due to the high dependency on the NCCA, the implementation of policies for e-certification has become more complicated. The ECO also encounters the length of the internal bureaucratic process. The existence of obstacles in conducting certification services between ECO and other work units involved in the bureaucratic flow of ECO services causes the business process of e-certification services to be more time-consuming. This is contrary to the concept of implementing electronic certificates for beneficiaries. Although it has benefits in increasing the efficiency of the work bureaucracy, in its implementation, the NCCA, has not implemented electronic certificates optimally. This certainly affects the effectiveness of ECO's role in disseminating the benefits of e-certification services to all beneficiaries, especially government agencies. This condition becomes an obstacle to the sustainability of ECO in the future. The solution to this problem is the application of electronic certificates in the internal environment of NCCA. In addition, dependency of the ECO server on the NCCA, due to the infrastructure management, reduces the efficiency. Supposedly, ECO can manage the server by relying on its resources so that the work is carried out more efficiently. The other obstacle occurs when there is an unstable electric current in the NCCA office or interference with the provider. In 2018, there was an incident that caused the ECO e-certification service to be temporarily unstable because of a problem with the electricity, hence, interrupting the NCCA provider. This incident resulted in 91 hours of downtime out of

a total of 8760 hours of ECO e-certification services for a year. There were three downtimes caused by disruption to the service provider.

The last problem was due to personnel workload. There is a gap between the needs and existing personnel in the ECO because the number of personnel in the ECO is far below the need in carrying out the current ECO duties. However, due to the demands of the ECO human resource to be able to carry out the overall ECO job description, the focus of the ECO human resource performance has become less controllable. It is important to anticipate this by adjusting the weight of the work following the work entrusted to the ECO only. In its implementation, ECO human resource also participates in doing work outside of the main task in e-certification services. This situation must be anticipated by ECO to further improve human resource efficiency.

Conclusion

The implementation of the e-certification policy has had positive impacts including, impact on reducing the counterfeiting of information in digital documents, preventing corruption and improving bureaucratic efficiency. However, the implementation of this policy also faces obstacles, including a long bureaucracy, insufficient human resources, responsibility overlapping, and limitation of ECO authority in managing the required resources. This study recommends the need for harmonizing and synchronizing of e-certification regulation with other relevant laws and regulations, strengthening organizational capacity, strengthening resources in ECO, utilizing social media for widening customer base and improving services according to national standards.

Recommendations

From the results of the focused discussion, this study recommends the following scenarios. First, strengthening ECO institutions to have greater independence and authority. For this reason, it is necessary to revise regulations to increase the scope of ECO services and authorities to improve it serving the National Critical Information Infrastructure sector and the digital economy of the non-government sector. The capacity and capability of ECO in e-certification services have received recognition from users at the

beneficiary agencies. However, to expand the range of services and professionalism, there is a need for harmonization and synchronization with other relevant laws and regulations. The other study demonstrated that the public procurement law has contributed substantially towards the completion of the projects within the estimated or envisaged duration and costs of the organization. The findings of that study can be generalized to countries with similar economical and organizational structures as Turkey (Erdis, 2013).

Second, as a work unit that provides e-certification services, it is necessary to strengthen ECO resources ranging from infrastructure, human resources, budget, facilities, authority, and organizational structure. ECO needs an adequate budget to strengthen its resources. The limited budget for ECO causes the implementation of policies for the implementation of e-certification to be less optimal, while the opportunity for ECO revenues from services provided to the non-government sector is very large. The budget limitation causes the suboptimal implementation of the e-certification policy. At the same time, ECO has large potential revenues from providing services to the non-government sector. For this reason, the government should design ECO as a Public Service Agency following Government Regulation Number 23 of 2005 concerning Financial Management of Public Service Agencies.

Third, the involvement of actors and improvement of service quality. The strategies in implementing the involvement of actors consist of utilizing social media such for socialization, improving technical guidance, improving information security literacy seminars, and participating in various exhibitions. The ECO must strive to improve its services so that the beneficiary agencies may get excellent service.

Conflict of Interest

There is no conflict of interest.

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