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Analysis of Policy Implementation: Electronic Certificates, Palu City Land Office

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A B S T R A C T

The adoption of electronic land certificates to enhance the effectiveness, transparency, and legal certainty of land administration has been driven by the digital revolution in public services. The purpose of this study is to implementation of electronic certificate policy in Palu City. This study used a qualitative descriptive approach, collecting data from respondents via Likert-scale questionnaires and from users via the Benefit-Cost Ratio (BCR) index. The results show that the electronic certificate policy has generally been implemented in accordance with defined protocols and rules. The National Land Agency (BPN) 's internal officers can provide users with clear explanations of the service and demonstrate sufficient technical proficiency. Additionally, respondents concur that electronic certificates are legally enforceable. However, among the assessed parameters, infrastructure availability—specifically, the stability of internet networks and application systems—shows the lowest score. Despite these drawbacks, respondents say they are highly satisfied with the electronic certificate service and are eager to use and recommend it, as they find it more useful.

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INTRODUCTION

The era of globalisation and the rapid development of information technology require every sector to adapt to the changes and dynamics taking place (Elfaki & Ahmed, 2024). This phenomenon is known as digital transformation, which involves integrating digital technology into society, including land management. In the context of land administration, digital transformation is realised through the implementation of electronic certificates, as regulated by the Ministerial Regulation of the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency No. 3 of 2023 on the Issuance of Electronic Documents in Land Registration Activities (2023). This policy represents a strategic step towards enhancing efficiency, transparency, and security in the administration of land affairs. Through electronic certificates, the processes of issuing, storing, and verifying land ownership data are expected to become faster, more accurate, and capable of minimising the potential for disputes and document misuse (Sukadi et al., 2024).

Analogue certificates have been an integral part of Indonesia's land administration system, but have certain weaknesses that require attention (Adinegoro & Iswahyuni, 2023). However, physical documents are vulnerable to loss, forgery, or damage caused by natural disasters, which could potentially lead to disputes (Dewi et al., 2010). The issuance and management processes are also slow due to excessive bureaucracy, leading to uncertainty for land rights holders. Electronic certificates are seen as an innovative solution offering benefits such as ease of access, reduced administrative costs, and enhanced data security (Pu & Lam, 2023).

Although the potential benefits are significant, implementing the electronic certificate policy is not without challenges. The main obstacle is the varying level of technological infrastructure readiness across Indonesia. Some regions still have limited access to information and communication technology, which may hinder the comprehensive implementation of the electronic certificate system (Amrullah & Bakir, 2024).

The use of electronic certificates also presents its own challenges. Many members of the public do not yet fully understand the benefits and how to use electronic certificates, so they may be hesitant to switch from the conventional system to the digital one (Anggraini et al., 2024). These risks create a divide between those who are tech-savvy and those who are not. Legal protection for holders of electronic certificates is also a key concern (Rahayu & Sesung, 2025). Given the risks of hacking and digital data theft, there must be assurances that the data security systems in place are robust enough to protect personal information and the public's land ownership rights.

The policy on electronic certificates at the regional level, particularly in Central Sulawesi Province, is being implemented gradually, based on the readiness of services at each land office designated as a pilot project. The Regional Office of the National Land Agency in Central Sulawesi Province has begun promoting the digitisation of land data, including converting physical certificates to electronic ones. Implementation at the provincial level also faces challenges similar to those at the national level, such as limited technological

infrastructure in coastal and inland areas and the public's uneven understanding of electronic land-management systems (Fu & Wang, 2025).

The implementation of electronic certificates presents both a challenge and an opportunity. Challenges arise from the readiness of post-disaster infrastructure, the capacity of field-based human resources, and the public's limited awareness of electronic certificates (Anggriani & Rasmi, 2025). The implementation of this policy presents a significant opportunity to accelerate the modern, secure recovery of land administration; consequently, it is crucial to examine how this policy is implemented in the City of Palu, given its strategic position in leading the digital transformation of land administration in the Central Sulawesi region. This study focuses on analysing the implementation of the electronic certificate policy at the Palu City Land Office, whilst identifying local challenges and strategic potential to support optimal implementation.

In the era of digitalisation and public administration reform in Indonesia, the transformation of land administration services is increasingly important to meet public expectations for fast, transparent, secure, and efficient services (Kusmiarto et al., 2021). The electronic certificate policy is part of the modernisation of the land administration system, initiated by the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (ATR/BPN), in response to the challenges posed by conventional services that have hitherto remained manual or paper-based (Afrizal Pratama et al., 2025).

The dynamics of population trends, land ownership patterns, and technological readiness in the city of Palu differ from those in other regions; consequently, an in-depth analysis of the implementation of the electronic land title policy at the local land office is required. This study aims to evaluate how the policy operates in a real-world context, the obstacles encountered, and the extent to which the policy can deliver better services and legal certainty for landowners in Palu. Therefore, based on the reasons outlined, this study aims to analyse the implementation of the electronic certificate policy in Palu.

THEORETICAL REVIEW

Public Policy Concepts

Policy can be understood as a form of action or a decision not to act taken by public authorities to address a specific problem or a set of interrelated issues. Public policy is "whatever governments choose to do or not to do", meaning everything that governments choose to do or not to do (Hoornbeek & Peters, 2017). Public policy is not merely active action, but also a government's decision not to act (policy inaction). The government's silence on a public issue remains a policy. This definition emphasises that public policy is always intrinsically linked to the government as the primary actor (McConnell & 't Hart, 2019). Furthermore, the absence of regulations, programmes, or interventions does not imply the absence of policy. This opens up scope for analysing state negligence or deliberate non-action. Public policy is a series of actions with clear objectives, not random or incidental actions. Policy arises because of a public issue that needs to be resolved. Public policy is rational and goal-oriented. Policy is a continuous process, not a single decision (Mueller, 2020).

Public policy is understood as a series of rational actions oriented towards specific objectives, not actions that arise randomly or incidentally. Policy emerges in response to public problems that demand systematic and sustained resolution (Anyebe, 2018). Public policy can be defined as a process encompassing the formulation of objectives, the selection of courses of action, and continuous implementation and evaluation (Anyebe, 2018). This understanding positions policy not as a single decision, but as a series of interrelated decisions and actions over a specific period. The success or failure of a policy is determined not only by its initial formulation but also by the consistency of its objectives, the quality of its implementation, and the government's ability to adapt the policy to the evolving dynamics of public issues (Mettler et al., 2024).

Analysis of the Public Policy Implementation Process

Policy analysis is an applied social science discipline that utilises various research methods and reasoning to generate and disseminate policy information useful in the political process for resolving policy problems (Cairney, 2023). In the process of public policy formulation (policy problem formulation), the crucial initial stage is problem formulation. According to Hermawan et al. (2024) The phase illustrating the problem formulation process is presented in Figure 1.

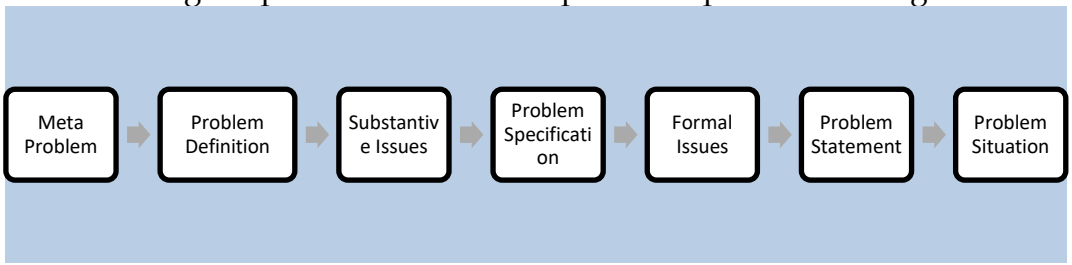

Figure 1. Problem Formulation Phase

The process of analyzing public policy formulation can be illustrated diagrammatically, as shown in Figure 2.

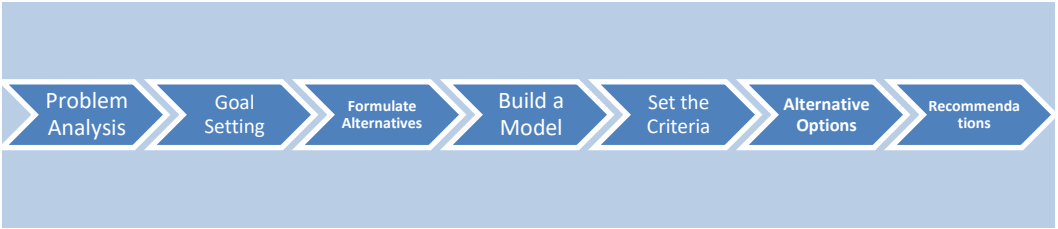

Figure 2. Analysis of the Public Policy Formulation Process

Policy implementation is a process that involves the utilization of various resources, including human, financial, and institutional capacities, carried out by both government and non-government actors, either individually or collectively (Hermawan et al., 2024). This process aims to realize the goals and objectives set by policymakers. In a broader sense, policy implementation can be viewed as a stage for transforming normative and abstract policy decisions into concrete operational actions (Khan, 2016). Through this implementation process, it is

expected that outputs, outcomes, benefits, and impacts will emerge, felt directly or indirectly by target groups.

Analysis of the Public Policy Performance Evaluation Process

Public policy evaluations can be categorized into two main types. First, outcomes-based evaluations (of public policy implementation) are a form of evaluative research focused on policy objectives. The measure of success is determined by the extent to which the program's or policy's objectives are achieved in accordance with the established targets. Second, process evaluation (the process of public policy implementation) is research that focuses on policy implementation based on operational guidelines, such as implementation guidelines (juklak) and technical guidelines (juknis) (Whitsel et al., 2024). In this type, policy success is measured by the degree of alignment between the implementation process and the pre-determined guidelines. The policy evaluation model based on Nugroho (2018) is outlined in Table 1.

Table 1. Policy Evaluation Model

Type Criteria	Questions	Illustration
Effectivity	Have the results met the objectives?	Service Unit
Efficient	How much of the resources are being used?	Cost, net benefit, ratio, cost and benefit
Adequacy	To what extent can policy measures solve the problem?	Constant cost, effectiveness
Equity	Have the costs and benefits arising from the implementation of the policy been distributed fairly amongst the various target groups?	The Pareto criterion, the Kaldor-Hicks criterion, and the Rawls criterion
Responsivity	Do the outcomes of these policies truly reflect and meet the needs, preferences, and values of specific groups within society?	Consistency with the public opinion survey
Accuracy	And finally, do the policy's objectives or expected outcomes offer any real benefit to the public?	Public programmes must be equitable and efficient

Legal Basis for Electronic Certificates in Indonesia

Law No. 1 of 2024 on Electronic Information and Transactions

The operation of electronic systems is regulated by Law No. 1 of 2024, the second amendment to Law No. 11 of 2008 on Electronic Information and Transactions. The amendment to this law is intended to provide certainty and a sense of fairness to the public, as its implementation has continued to give rise to multiple interpretations and controversy. Article 5 (Law No. 1 of 2024 on the Second Amendment to Law No. 11 of 2008 on Electronic Information and Transactions, 2024) also stipulates that the operation of electronic systems is protected and legally recognized under the Law on Electronic Information and Transactions. Electronic information, electronic documents, and their printed versions are recognized as valid legal evidence and are considered an extension of the types of evidence regulated under the applicable procedural laws in Indonesia.

Government Regulation No. 18 of 2021 on Management Rights, Land Rights, Apartment Units, and Land Registration

Government Regulation No. 18 of 2021 on Management Rights, Land Rights, Apartment Units, and Land Registration serves as the basis for Regulation of the Minister of Agrarian Affairs and Spatial Planning/Head of the National Land Agency No. 3 of 2023. This regulation stipulates that land registration may be conducted electronically, whereby the results of such registration consist of data, electronic information, and/or electronic documents possessing legal force as valid evidence, as provided for in Article 84 (Government Regulation (GR) No. 18 of 2021 on Management Rights, Land Rights, Apartment Units, and Land Registration, 2021).

Regulation of the Minister of Agrarian Affairs and Spatial Planning/Head of the National Land Agency No. 3 of 2023 on Electronic Certificates

In 2021, the Ministry of Agrarian Affairs and Spatial Planning/Head of the National Land Agency (ATR/BPN) issued a regulation on electronic certificates, namely Regulation of the Minister of Agrarian Affairs and Spatial Planning/Head of the National Land Agency No. 1 of 2021 on Electronic Certificates. This Ministerial Regulation was established to implement the provisions contained in Article 84 of Government Regulation No. 18 of 2021 on Management Rights, Land Rights, Apartment Units, and Land Registration. However, due to public concerns that the transition from analog certificates to electronic certificates could create issues regarding existing land ownership, and the issuance of this regulation was deemed to violate several higher-ranking regulations regarding land registration and land rights, adjustments were necessary (Kartika, 2021). Consequently, Ministerial Regulation ATR/KBPN No. 3 of 2023 was issued to revoke the previous regulation and to optimize electronic land services, taking into account public feedback and on-the-ground conditions.

METHODOLOGY

Data Collection

The researcher employed a descriptive research method, which is an approach aimed at describing or explaining an ongoing condition or phenomenon by applying scientific procedures to obtain factual and up-to-date answers to research questions (Bullock et al., 2021). The descriptive research approach was chosen because policies are generally complex, involving many aspects, including technology, law, society, and the economy (Bullock et al., 2021). The city of Palu was selected as the research location because it is one of the regions that has implemented an electronic certificate policy issued by the Palu City Land Office as part of the digital transformation program for land services launched by the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (ATR/BPN). The research object is the implementation of the electronic certificate policy issued by the Palu City Land Office as a manifestation of public policy. Data collection was conducted through four methods: observation, interviews, documentation, and literature review.

Data Analysis

The analysis employs the value clarification technique, a procedure designed to identify and categorize value premises aligned with policy objectives. Further details are provided in Table 2.

Table 2. Indicators and Measurement Tools for Question 1

Research Questions	Values Under Examination	Indicators/Aspects Analysed	Methods/Measuring Instruments
What is the availability of technological infrastructure and human resources to support the implementation of electronic certificates in the city of Palu?	➢ Effectiveness: the extent to which infrastructure and human resources can support the achievement of policy objectives. ➢ Efficiency: how optimally technological and human resources are utilised to generate maximum output. ➢ Adequacy: whether the quantity and quality of infrastructure and human resources are sufficient to meet the needs of policy implementation.	➢ Network quality and access speed for electronic systems. ➢ Availability of supporting equipment and data security systems. ➢ Competence of BPN staff in operating digital systems. ➢ Ratio of staff numbers to the workload of electronic services.	➢ Inspection of ICT facilities at the Land Office. ➢ Interviews with BPN staff regarding human resource readiness. ➢ Analysis of internal data on network capacity.

Table 3. Indicators and Measurement Tools for Question 2

Research Questions	Values Under Examination	Indicators/Aspects Analysed	Methods/Measuring Instruments
What is the current situation regarding the implementation and application of the public policy on electronic certificates in the city of Palu?	➢ Effectiveness: the degree to which policy implementation achieves regulatory objectives. ➢ Efficiency: the speed and accuracy of electronic public service processes. ➢ Equity: the extent to which electronic certificate services are accessible to all sections of society. ➢ Responsiveness: the ability of agencies to respond to the needs and complaints of the public.	➢ The speed of the electronic certificate issuance process. ➢ The level of public awareness and accessibility to digital services. ➢ The availability of services in remote areas. ➢ Staff responsiveness to technical and administrative issues.	➢ Survey of service users. ➢ Focus group discussions with BPN stakeholders and the public. ➢ Analysis of policy documents (Ministerial Regulation of the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency No. 3 of 2023).

Research Questions	Values Under Examination	Indicators/Aspects Analysed	Methods/Measuring Instruments
	➢ Appropriateness: the alignment of policy implementation with local social, economic, and technological conditions.	➢ Adaptation of policies to local conditions.	

Table 4. Indicators and Measurement Tools for Question 3

Research Questions	Values Under Examination	Indicators/Aspects Analysed	Methods/Measuring Instruments
To what extent has the applicant benefited from the electronic certificate public policy programme?	➢ Effectiveness: the extent to which the public feels the benefits of the policy in line with the original objectives. ➢ Efficiency: cost savings and time savings experienced by applicants. ➢ Adequacy: the extent to which the benefits meet the community's needs regarding land administration services. ➢ Equity: the distribution of benefits across various social groups and regions. ➢ Responsiveness: public satisfaction with the services provided. ➢ Appropriateness: the alignment of benefits with the context of the needs and capabilities of the community in Palu City.	➢ A comparison of time and cost between manual and electronic certificates. ➢ Applicants' levels of satisfaction and sense of security. ➢ Perceptions of benefits across different regions. ➢ The level of use of electronic certificates by the public. ➢ Public perceptions of the policy's benefits.	➢ In-depth interviews with certificate applicants. ➢ Analysis of service data (secondary data).

Cost – Benefit Analisis (CBA)

Since the research objective involves calculating and analyzing the benefits that applicants derive from the public policy on electronic certificates in the City of Palu, the CBA approach was employed. The CBA approach is used to compare the total benefits (TB) received by applicants with the total costs (TC) incurred as a result of the implementation of electronic certificates (Rowe et al., 2012). The basic formula in the CBA approach is presented in Formula 1.

$$\text{Net Benefit (NB)} = \Sigma \text{ TB} - \Sigma \text{ TC}$$

atau

$$\text{Benefit Cost Ratio (BCR)} = = \frac{\Sigma TB}{\Sigma TC}$$

Decision criteria:
NB > 0. Therefore, the policy provides a net benefit
BCR > 1 A fair and beneficial policy for applicants

RESULTS

Clarification of the Implementation of the Electronic Certificate Policy in Palu City

The implementation of the electronic certificate policy in Palu City represents an effort to transition from a rigid analog system to a transparent and secure digital system. The value clarification technique reveals how each policy actor—including staff, supervisory officials, and the public—responds to these changes in values.

Table 5. Clarification of Policy Implementation Scores

No	Evaluation Criteria	Expected Value	Actual Value
1	**Effectiveness**	The realisation of a stable, fast, and uninterrupted service system through full automation.	The system significantly speeds up the work, but its effectiveness is hampered by network stability and technical issues with the electronic signature module.
2	**Efficiency**	Minimising the use of resources (time and costs) for both government agencies and the public.	It is highly efficient in reducing transport costs and public waiting times, although staff workload increases during the data validation phase.
3	**Adequacy**	The availability of adequate IT infrastructure and technical support to ensure service continuity.	Support facilities are available, but network capacity and alternative procedures for system disruptions are considered in need of further improvement.
4	**Equity**	Services are accessible on an equitable basis to all sections of the public without discrimination.	It is not yet fully equitable; elderly people and those with low digital literacy still rely on physical assistance from staff/PPATs.
5	**Responsiveness**	Staff are responsive and prompt in addressing enquiries, complaints, and providing technical guidance.	Staff are considered very proactive in providing explanations, but the speed of IT technical support from the centre can sometimes be slow when the system encounters errors.
6	**Accuracy**	Service outcomes (e-certificates) align with policy	The public feels secure as the risk of document loss is drastically reduced and data validity is

No	Evaluation Criteria	Expected Value	Actual Value
		objectives, namely ensuring data security and validity.	maintained through the digital encryption system.

Implementation of the Electronic Certificate Policy

Table 6. Implementation of the Electronic Certificate Policy

No	Statement	BPN staff (n=3)	Public Notary (n=3)	The public (n=3)	Average
1	The procedure for issuing electronic certificates is carried out in accordance with regulations	4.7	4.3	3.7	4.2
2	The electronic certificate service process is easy to understand	4.3	4.3	3.3	4.0
3	The service is delivered consistently	4.7	4.0	3.7	4.1
4	Service completion times meet the standards	4.3	3.7	3.0	3.7
5	There is No. difference in service quality compared to physical certificates	4.3	3.7	3.3	3.8
	Average	4.5	4	3.4	4.0

Availability of Technology Infrastructure

Table 7. Availability of Technology Infrastructure

No	Statement	BPN staff (n=3)	Public Notary (n=3)	The public (n=3)	Average
6	The internet supports electronic services	3.7	3.7	3.7	3.7
7	The application system rarely experiences disruptions	3.3	3.0	3.3	3.2
8	Technological equipment is available and in good working order	4.0	3.7	3.7	3.9
9	The system can be accessed reliably	3.3	3.3	3.3	3.3
10	Technical support is available in the event of problems	4.3	4.0	3.3	3.9
	Average	3.7	3.5	3.5	3.6

Human Resource Readiness

Table 8. Human Resource Readiness

No	Statement	BPN staff (n=3)	Public Notary (n=3)	The public (n=3)	Average
11	Staff can operate electronic systems	4.7	4.3	4.0	4.3
12	Staff have undergone relevant training	4.7	4.0	3.7	4.1
13	Staff can explain services clearly	4.7	4.3	4.3	4.4
14	Staff adapt quickly to new technology	4.3	4.3	3.7	4.1
15	There are sufficient staff	3.7	3.3	3.0	3.3
Average		4.4	4.0	3.7	4.0

Policy Dissemination and Implementation

Table 9. Policy Dissemination and Implementation

No	Statement	BPN staff (n=3)	Public Notary (n=3)	The public (n=3)	Average
16	Information about the policy is effectively communicated	4.3	4.3	3.0	3.9
17	The communication materials are easy to understand	4.3	4.3	3.0	3.9
18	Communication is carried out on an ongoing basis	4.3	4.3	3.0	3.9
19	The public understands the benefits of the policy	4.3	4.3	3.7	4.1
20	Officials actively provide explanations	4.7	4.7	4.0	4.5
Average		4.4	4.4	3.3	4.0

Legal Protection and Data Security

Table 10. Legal Protection and Data Security

No	Statement	BPN staff (n=3)	Public Notary (n=3)	The public (n=3)	Average
21	Electronic certificates are legally binding	5.0	5.0	4.0	4.7
22	Land data is well protected	4.7	4.3	3.3	4.1
23	The system is secure against data misuse	4.7	4.3	3.3	4.1
24	Data protection regulations are clear	5.0	4.3	3.3	4.2
25	I feel safe using this service	5.0	4.7	3.3	4.3
Average		4.9	4.5	3.4	4.3

Public Reception

Table 11. Public Reception

No	Statement	BPN staff (n=3)	Public Notary (n=3)	The public (n=3)	Average
26	I am willing to use electronic certificates	5.0	5.0	4.7	4.9
27	This service is more convenient	4.7	5.0	4.7	4.8
28	This service has increased my confidence	4.7	4.7	4.0	4.5
29	I would recommend this service	5.0	5.0	4.0	4.7
30	I am satisfied with the service	4.7	4.7	4.0	4.5
Average		4.8	4.9	4.3	4.7

Total Benefits

Table 12. Total Benefit

No	Statement	BPN staff (n=3)	Public Notary (n=3)	The public (n=3)	Average
31	Processing times are shorter	4.7	5.0	4.7	4.8
32	Processing costs are lower	4.7	4.7	4.7	4.7
33	The risk of losing documents is reduced	5.0	5.0	4.7	4.9
34	Access to services is easier	4.7	4.7	4.7	4.7
35	Overall, the service offers benefits	5.0	5.0	4.7	4.9
Average		4.8	4.9	4.7	4.8

Total Cost

Table 13. Total Cost

No	Statement	BPN staff (n=3)	Public Notary (n=3)	The public (n=3)	Average
36	Affordable service charges	4.7	4.3	4.7	4.6
37	Charges commensurate with service quality	4.7	4.3	4.7	4.6
38	No hidden costs	5.0	5.0	4.7	4.9
39	Cost-effective overall	4.7	4.3	4.7	4.6
Average		4.8	4.5	4.7	4.7

Cost Benefit Analisis (CBA)

Table 14. Cost Benefit Total

No	Respondent Group	Benefit	Cost
1	Internal Staff BPN	4.8	4.7
2	Public Notary	4.9	4.3
3	Public	4.7	4.7
Average		4.8	4.6

Benefit Cost Ratio (BCR) = $\frac{\Sigma TB}{\Sigma TC}$

BCR = $\frac{4.80}{4.60}$

BCR = 1.04

DISCUSSION

Table 5 presents the criteria for evaluating public policy according to Dunn (2015) and serves as a reference for the results of the questionnaire and interviews conducted at the Palu City Land Office. Regarding the implementation and application of the electronic certificate policy using the Value Clarification Technique, the system effectively accelerates verification and data entry by reducing physical bureaucratic barriers. However, this "effectiveness" often clashes with the reality of infrastructure in Palu City, where unstable networks and application glitches are major obstacles for officials in providing consistent services. The efficiency aspect indicates that the efficiency value for the people of Palu City is very high, as they can significantly reduce transportation costs and processing time. Internally, the efficiency of resource use (such as paper and archive space) is beginning to be felt. However, during this transition period, officials are experiencing a "double workload" as they validate old data for entry into the electronic system.

In terms of adequacy, it has been clarified that while the regulation (Ministerial Regulation ATR/KBPN No. 3 of 2023) is already quite sufficient as a legal guide, on-the-ground technical support still needs strengthening. The availability of alternative procedures in the event of system disruptions is a critical requirement that must be met to ensure services do not come to a complete halt when technology fails (Schrijvers et al., 2021).

In terms of equity, this policy upholds fairness by not discriminating among applicants. However, on-the-ground observations reveal a "digital divide." Residents with low digital literacy (older people) in Palu City feel that access remains uneven without direct digital assistance from staff or PPATs (Land Deed Officers). The responsiveness of staff at the Palu City Land Office is considered effective in providing guidance and addressing complaints regarding the new system. This level of responsiveness serves as a counterbalance to the technical difficulties faced by the public, with good personal communication compensating for shortcomings in the application interface that may be difficult for the general public to understand.

Appropriateness is the most evident value with respect to legal protection. Electronic certificates are regarded as an appropriate solution for minimising the risk of document loss and land mafia practices in Palu City. The public is beginning to appreciate the value of digital data security, which is considered more reliable and secure than physical formats, which are prone to damage. The implementation of the policy in Palu City indicates that the public has well received the utility value. However, there is a conflict of values regarding the effectiveness and adequacy of the infrastructure, which demands continuous system improvements so that the benefits of digitalisation promised in the regulations can be fully realised by all sections of society.

Furthermore, policy implementation is measured by five key indicators that reflect the extent to which this digital transformation is occurring on the ground. Based on **Table 6**, the data shows that BPN's internal staff have a very high level of confidence that the procedures for issuing electronic certificates have been carried out in accordance with applicable regulations. Internal staff assesses that

the service workflow is very easy to understand and is consistently implemented in daily operations. They consider that the service completion time standards have been met in accordance with the agency's time norms. As strategic partners, PPATs/Notaries provide a positive yet critical assessment, particularly regarding service consistency. They acknowledge that procedures are in line with regulations, but often encounter challenges with completion times exceeding standards due to technical factors.

The public/applicants gave the lowest ratings or tended to rate the implementation on the ground as "Undecided" (scale 3) to "Agree" (scale 4). There is a perception that the electronic service workflow is not yet fully understandable to the general public. The public still perceives a difference in quality or speed between electronic certificate services and conventional physical certificates. In general, the implementation of electronic certificate policies falls into the "Good" category with an average total score of 4.0. However, there is a significant perception gap between "Service Providers" (BPN) and "Service Users" (the Public).

Based on the data in Table 7, the variable on the availability of technological infrastructure receives the most critical evaluation. This variable measures aspects such as network connectivity, application stability, device availability, accessibility, and technical support. Internal BPN staff tend to give moderate ratings, particularly regarding the functionality of the technological devices available at Land Offices. There is acknowledgment that the application system still experiences periodic disruptions (downtime) and maintenance, which hinder task completion. Internal technical support is considered sufficiently available when system issues arise, but it does not always provide an immediate solution.

In addition, PPATs/Notaries gave a fairly low rating due to the high intensity of system use for their professional work. The main complaint concerns the application system, which is perceived as frequently experiencing disruptions during peak hours. PPATs feel that system access is not consistently stable, which directly impacts the reliability of service delivery to their clients. On the other hand, the public/applicants rate the stability of system access as still at the "Uncertain" level. User experience indicates that the internet connection does not always provide a smooth connection when users attempt to access the system independently. There is a perception that the system is not yet fully stable for general public use without staff assistance. Consequently, the technology infrastructure variable has an average score of 3.6, making it the indicator with the weakest performance in implementing this policy.

Table 8 presents variables that assess staff technical proficiency, training history, communication skills in explaining the system, adaptability to technology, and adequate staffing levels. Data analysis results indicate that internal BPN staff have a very high level of confidence in their ability to operate electronic systems. Staff have undergone adequate training and orientation regarding electronic certificate policies, enabling them to adapt quickly to technological changes. Internal staff feel highly capable of providing comprehensive explanations to service users regarding these new procedures.

In addition, the PPAT assessed that BPN staff possess strong technical competence in handling electronic files. As frequent users of the system, the PPAT appreciated the speed with which BPN staff adapted to administrative challenges arising in the new system. However, the PPAT noted that the staff's workload appears to be very high (relative to the number of personnel), which sometimes affects the responsiveness of coordination efforts. The public/applicants also assess that the staff is sufficiently capable of assisting, though their evaluation is lower than the staff's self-assessment. There is a perception that the number of available staff is sometimes insufficient to handle the volume of applicants, which could potentially lead to queues despite the system being digital. The public finds the quality of staff explanations quite good, though there is still room to improve friendliness and the speed of providing technical solutions. Based on the questionnaire data, the Human Resource (HR) Readiness variable received a fairly solid rating, with an average of 4.0 (Good Category).

The variables in **Table 9** measure the effectiveness of information dissemination, the ease of understanding the communication media, the sustainability of the program, public understanding of the benefits, and the staff's proactiveness in providing explanations. There is a fairly stark difference in perception between service providers and the general public regarding this dimension. Internal BPN staff assess that policy information has been disseminated very well and that the media used are very clear. They feel that they have conducted ongoing outreach and that field staff are very active in providing direct explanations to applicants. Internally, BPN feels that educational efforts have been maximized to support this digital transition.

Land Registration Officers (PPATs) and Notaries provided very positive feedback, as they are partners directly involved in the electronic land services ecosystem. They feel that policy information is very clear and consistent due to regular coordination with the Land Office. PPATs also appreciate BPN staff's responsiveness in providing technical explanations when challenges arise in the field. In contrast, the public/applicants gave the lowest ratings in this dimension, indicating barriers to information uptake. Many respondents felt that existing outreach materials remain difficult to understand or have not reached them widely. The public rates their understanding of the concrete benefits of the electronic certificate policy as "Undecided," indicating that outreach has not addressed their practical needs. Based on the questionnaire data, the variables of Outreach and Policy Implementation received an overall average of 4.0 (Good Category).

The other variables described in **Table 10** are crucial because they measure the legal validity of digital certificates, the protection of land data, system security against misuse, regulatory clarity, and user confidence. Staff members have nearly absolute confidence in the legal validity of electronic certificates. Officials believe that the ministry's internal security system very well protects land data. Staff assess that the data protection regulations are very clear and provide a strong sense of security when delivering services.

As legal practitioners, PPATs place a high value on the system because they understand the regulatory framework underpinning electronic certificates. They

feel sufficiently secure using this service because the system is considered to have adequate security layers for professional transactions. PPATs view legal certainty as the primary selling point of the transition to this electronic system. However, the general public exhibits attitudes ranging from "Undecided" to "Agree" regarding data security. There is moderate concern regarding the potential for data misuse in digital systems. The sense of security among the public when using electronic services is lower than that among the professional group, indicating a need for cybersecurity education. Based on the tabulated data results, the variables of legal protection and data security received an average total score of 4.3 (Good category).

The aspects in **Table 11** measure willingness to use, perceived practicality, increased trust, willingness to recommend, and overall user satisfaction with electronic certificates. These variables show very positive results across the board, indicating that this digital transformation is generally well-received by stakeholders. Internal BPN employees are highly confident that this system will be widely accepted because they have firsthand experience of the convenience it offers. They are very satisfied with this transition as it is seen to reduce manual workloads and the potential for errors in physical documents. Employees are highly willing to recommend this system as the new standard for land administration services.

The PPAT/Notary group gave the highest score in the acceptance dimension. As professional users, they feel that electronic services greatly simplify the property transaction process. PPATs are very satisfied because these services reduce in-person bureaucracy and provide certainty that the process is carried out systematically. They are the most active group in recommending electronic services to their clients. Additionally, the public/applicants demonstrate a high willingness to switch to electronic (digital) certificates. Although they initially had reservations about the "Infrastructure" dimension, they agree in principle that this service is far more practical than handling physical certificates, which risk being lost or damaged. Public satisfaction is at the "Good" level. However, some respondents still gave a neutral rating for the "increased trust" aspect, indicating that full trust will be established as the system's reliability is demonstrated over time. Based on the tabulated data, the Public Acceptance dimension received an overall average of 4.7 (Very Good category). The Public Acceptance dimension serves as a positive signal that the market and the public are ready for digital migration in the land sector.

The public and PPATs consider protection against physical risks (fire, flooding, termites) an invaluable benefit. PPATs have experienced a significant acceleration in the process from verification to issuance, which indirectly boosts their economic productivity. A cost score of 4.60 indicates that respondents perceive the costs incurred for this electronic service as proportional and affordable. Non-tax revenue (PNBP) costs for the electronic service are considered more cost-effective because they eliminate transportation costs and other unforeseen expenses. Although there is an initial investment in technology, long-term operational costs (such as paper procurement and physical archive space) are drastically reduced. Cumulatively, the Cost-Benefit analysis shows that the

transition to electronic certificates is not merely the digitization of documents, but a policy investment that benefits all parties. With a BCR of 1.04, this policy yields positive economic and social value, with time savings and enhanced data security as the dominant benefits.

CONCLUSIONS AND RECOMMENDATIONS

Based on the study's results, the implementation of the electronic certificate policy has been in accordance with established procedures and regulations. BPN internal staff were assessed as having the necessary technological competence and being able to explain the services effectively. All parties agreed that electronic certificates possess valid legal standing. However, infrastructure availability, particularly the stability of the application system and the internet network, is the dimension with the lowest score. Nevertheless, overall, respondents expressed high satisfaction and a strong willingness to use and recommend the electronic certificate service because it is considered more practical. Based on the Benefit Index (Likert Scale), the perceived Benefit-Cost Ratio (BCR) exceeds the costs incurred.

Recomendations

Based on the above conclusions, the researchers offer the following recommendations:

1. Top priority should be given to increasing server capacity and network stability to ensure stable 24-hour system access.
2. Conduct and publish the results of data security audits regularly to strengthen digital trust among the public.
3. Notaries/PPATs are expected to continue playing an active role as a bridge of information between the National Land Agency (BPN) and the public in educating clients about the legal aspects and security of electronic certificates.

FURTHER STUDY

This study has limitations in terms of access to technology; therefore, future research could develop more accessible visual and interactive outreach content for the general public to bridge the information gap.

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