

Constitutionality of E-Voting Implementation in Indonesia's Electoral System: Opportunities and Juridical Challenges

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ABSTRACT: The digitalization of public administration has prompted many democracies, including Indonesia, to consider electronic voting (e-voting). This article examines the constitutionality of e-voting within Indonesia's electoral system, specifically its conformity with the constitutional principles of *LUBER-JURDIL* mandated by Article 22E of the 1945 Constitution. Utilizing a normative juridical method with statute, conceptual, and comparative approaches, this study finds that e-voting is not inherently unconstitutional. Constitutional Court Decision No. 147/PUU-VII/2009 has opened normative space for its use at the village level. However, national implementation faces substantial juridical gaps because Law No. 7 of 2017 on General Elections lacks explicit regulations, leaving legal certainty, vote secrecy, verifiability, and dispute resolution unresolved. Furthermore, cybersecurity vulnerabilities, personal data protection deficits, and the digital divide pose significant technical and social obstacles. Comparative analysis of Estonia, Brazil, India, and European jurisdictions offers essential safeguards, such as voter verifiable audit trails and independent oversight. This article concludes that Indonesia can constitutionally adopt e-voting, provided it undertakes comprehensive legislative reform, establishes robust cybersecurity architecture, and pursues a gradual, evidence based implementation starting from sub national elections.

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I. INTRODUCTION

Elections are the principal constitutional mechanism through which the sovereignty of the people is translated into legitimate government in a democratic state. Article 1 paragraph (2) of the 1945 Constitution of the Republic of Indonesia affirms that sovereignty is in the hands of the people and is exercised according to the Constitution, while Article 22E further stipulates that general elections must be conducted directly, publicly, freely, confidentially, honestly, and fairly (*langsung, umum, bebas, rahasia, jujur, adil*), commonly abbreviated as the LUBER-JURDIL principles. For seven decades Indonesia has relied on manual, paper-based balloting to actualize these principles. Yet the accelerating pace of digital transformation across public administration, coupled with the logistical burden of managing simultaneous elections across an archipelagic nation of more than seventeen thousand islands and over 200 million registered voters, has pushed policymakers, scholars, and election administrators to reconsider whether electronic voting (e-voting) could offer a constitutionally sound and administratively efficient alternative.

Globally, the use of information technology in elections is no longer experimental. Blockchain based and other cryptographically secured e-voting architectures have proliferated in both academic literature and pilot deployments, promising tamper resistant recording, real-time auditability, and reduced administrative cost (Berenjestanaki et al., 2024). A systematic review of scalable blockchain based electronic voting systems similarly demonstrates that authentication, privacy, integrity, and verifiability can, in principle, be reconciled through appropriately designed cryptographic protocols, although scalability for mass elections remains an unresolved engineering problem (Jafar et al., 2022). These technological developments have renewed Indonesian legal scholarship's interest in whether e-voting can be reconciled with the nation's constitutional order.

Within the Indonesian legal literature, the constitutionality question has been approached from several angles. A recent normative study concludes that Indonesia currently lacks a clear regulatory framework for digital elections, a gap that creates legal uncertainty and heightens the risk of post-election disputes; the same study nonetheless finds that gradual adoption, accompanied by stronger digital verification mechanisms and voter education, could allow e-voting to modernize Indonesian democracy without abandoning constitutional guarantees (Arifin et al., 2025). In a related normative comparative study, it is argued that from a purely constitutional standpoint the protocol of e-voting is consistent with the direct, general, free, confidential, honest, and fair election principles mandated by the 1945 Constitution, making it a viable alternative electoral policy for the future, notwithstanding systemic weaknesses in security, validity, voter readiness, and infrastructure (Bachmid & Djanggih, 2022). Earlier comparative work examining the trajectory toward an Indonesian democratic constitutional election likewise situates e-voting as a policy option consistent with, rather than contrary to,

constitutional election values, provided adequate legal safeguards are established (Ali & Widjaja, 2020).

At the same time, a persistent strand of scholarship emphasizes that the constitutionality of e-voting cannot be assessed in the abstract; it must be examined against the concrete architecture of election law and information security regulation. One study conceptualizes the e-voting mechanism as inseparable from the general election law framework and information security law, arguing that any electronic voting mechanism must be constructed so as to preserve the legal force of the vote as evidence, its confidentiality, and its resistance to manipulation (Sujadmiko et al., 2020). Complementary constitutional law scholarship on simultaneous election policy stresses that any technological innovation in the electoral process must first pass through a legal policy filter that reconciles innovation with legal certainty, justice, and expediency as the three classical goals of law (Fuadi, 2021). An earlier but still influential study directly poses the dichotomy between the "need" for e-voting and Indonesia's "readiness" to adopt e-democracy, concluding that while the constitutional foundation for electronic voting can be constructed, Indonesia's institutional, infrastructural, and cultural readiness lagged considerably behind the aspiration (Hardjaloka & Simarmata, 2016).

A distinct but related line of empirical legal research documents how e-voting has, in practice, already been implemented at the village level in numerous regions since the Constitutional Court's landmark Decision Number 147/PUU-VII/2009, which upheld the constitutionality of technologically assisted village head elections. Field studies of village-head elections employing e-voting have examined whether such practices genuinely realize the constitutional principles of honest and fair elections (*asas luber dan jujur*) (Pamungkas et al., 2022), whether e-voting policy implementation strengthens the quality of local democracy (Wijaya et al., 2019), the institutional and community factors shaping successful adoption in Kalimantan (Maryuni & Sitorus, 2021), the risks of policy failure and its implications for democratic legitimacy when e-voting infrastructure and public trust are inadequate (Anggun et al., 2025), and the practical operational challenges of running e-voting at the village level in Gorontalo (Nurdin et al., 2023). Collectively, these grassroots level studies illustrate that Indonesia already possesses a decade of accumulated practical experience with electronic voting mechanisms, even though this experience has not yet been consolidated into a coherent national legal framework for general elections.

Parallel to the constitutional debate on voting itself, Indonesia's 2024 general election exposed acute vulnerabilities in the electronic infrastructure supporting the broader electoral process. The use of electronic vote recapitulation was found in earlier research to be a viable means of anticipating public disorder and expediting the announcement of results, provided the system's integrity could be assured (Djuyandi et al., 2019). Yet the 2024 experience with the *Sistem Informasi Rekapitulasi* (SiRekap) revealed that election information systems in Indonesia remain vulnerable to conventional cybersecurity threats, ranging from data breaches to more sophisticated manipulation, underscoring

those cybersecurity measures constitute a precondition rather than an afterthought for the credibility of any digitalized electoral process (Hastuti & Rochman, 2024). Because election technology inevitably processes large volumes of sensitive personal data, including voters identity, biometric, and address information, questions of personal data protection have become inseparable from questions of electoral constitutionality. Scholars have examined the challenges and policy options for protecting personal data throughout the stages of election administration (Kusnaldi et al., 2022), the architecture of an Indonesian Data Protection System capable of safeguarding citizens' personal information against misuse by election related actors (Aswandi et al., 2020), and the institutional design of an independent personal data protection supervisory authority, drawing comparative lessons from the Indonesian Competition Supervisory Commission (KPPU) (Matheus & Gunadi, 2023).

Given this convergence of constitutional theory, empirical village level practice, cybersecurity vulnerability, and personal data protection concern, the central research problem addressed in this article is: to what extent is the adoption of an e-voting system in Indonesia's electoral process constitutionally justifiable, and what juridical opportunities and challenges must be addressed for such a system to be implemented consistently with the 1945 Constitution? This article aims to (1) analyze the conformity of e-voting with the constitutional principles governing Indonesian elections; (2) map the existing statutory and jurisprudential landscape, including relevant Constitutional Court decisions; (3) identify the principal juridical, technical, and social challenges to national level implementation; and (4) formulate policy recommendations informed by comparative practice. The novelty of this article lies in its integrative treatment of constitutional doctrine, cybersecurity governance, and personal data protection law as three interlocking dimensions of electoral constitutionality, an approach that has rarely been synthesized in a single normative study of Indonesian election law.

II. METHOD

This research employs a normative juridical (doctrinal) method, which examines law as a coherent system of norms rather than as an empirical social phenomenon. Three complementary approaches are used. First, the statute approach (*pendekatan perundang-undangan*) is applied to examine the 1945 Constitution, Law Number 7 of 2017 on General Elections, Law Number 6 of 2014 on Villages together with its implementing regulations on village-head elections, Law Number 19 of 2016 on the amendment to the Electronic Information and Transactions Law (UU ITE), and Law Number 27 of 2022 on Personal Data Protection (UU PDP). Second, the conceptual approach (*pendekatan konseptual*) is used to elaborate the doctrinal meaning of the LUBER-JURDIL principles, the concept of open legal policy as developed in Indonesian constitutional jurisprudence, and the concept of electoral integrity as understood in comparative election law scholarship. Third, a comparative approach (*pendekatan perbandingan*) is used to examine the experience of jurisdictions that have implemented,

piloted, or debated e-voting, including Estonia, Brazil, India, and several European Union member states, in order to identify transferable safeguards and cautionary lessons.

The legal materials used in this study consist of primary legal materials, namely binding legislation and Constitutional Court decisions, most notably Constitutional Court Decision Number 147/PUU-VII/2009 concerning the constitutionality of technologically assisted voting mechanisms at the village level; secondary legal materials, consisting of books, peer-reviewed journal articles, and conference proceedings in the fields of constitutional law, election law, and information security published in nationally accredited (SINTA) and internationally indexed (Scopus, Web of Science) journals; and tertiary legal materials, including legal dictionaries and encyclopedic references used to clarify technical terminology. Data collection was conducted through library research (*studi kepustakaan*/legal research), involving systematic searching of institutional repositories, national legal databases, and international bibliographic databases using keyword combinations such as "e-voting," "constitutionality," "election law Indonesia," "personal data protection election," and "blockchain voting security." Sources were screened for relevance, recency, and methodological rigor, prioritizing publications from the last decade while retaining seminal earlier works where doctrinally significant.

Data analysis was conducted qualitatively using a descriptive analytical technique. Legal materials were first systematized according to hierarchy of legal norms (*hierarki peraturan perundang-undangan*) and then analyzed using legal interpretation methods, namely grammatical, systematic, and teleological interpretation, to assess the conformity of e-voting with constitutional electoral principles. The analysis further applies a synthesis technique that triangulates constitutional doctrine, empirical findings from village level e-voting implementation, and technical findings from cybersecurity and information security literature, allowing the study to move beyond a purely doctrinal reading of the Constitution toward a socio technically informed assessment of constitutionality in practice. Comparative material was analyzed using functional comparison, in which foreign legal solutions are examined not for direct transplantation but for the underlying regulatory functions they perform, such as voter verifiable audit trails, independent technical certification, and phased or hybrid implementation, which may be functionally adapted to the Indonesian constitutional and administrative context.

III. RESULT AND DISCUSSION

Constitutional Conformity of E-Voting with the LUBER-JURDIL Principles

The starting point for assessing the constitutionality of e-voting in Indonesia is Article 22E paragraph (1) of the 1945 Constitution, which requires that general elections be direct, public, free, confidential, honest, and fair. Analysis of the six principles against a well designed e-voting protocol suggests that constitutional conformity is technically attainable rather than structurally precluded (Bachmid & Djanggih, 2022). The principle of directness (*langsung*) requires that the voter cast a ballot personally without intermediary; an e-voting system that authenticates the voter biometrically or through

verified credentials at a supervised polling station, as opposed to unsupervised remote internet voting, preserves this principle. The principle of universality (*umum*) requires equal access for all eligible citizens; here, e-voting introduces a genuine tension, because unequal digital literacy and internet infrastructure could effectively disenfranchise segments of the population, a concern examined further in Section III-E below. The principle of freedom (*bebas*) requires the absence of coercion, which a properly designed polling-station-based e-voting system can preserve as effectively as manual balloting, provided that supervised booths prevent vote-buying verification (i.e., proving how one voted to a third party).

The principle of confidentiality (*rahasia*) is the most technically demanding requirement, since it obliges the system architecture to sever any traceable link between voter identity and ballot content while simultaneously allowing the voter, and only the voter, to verify that their vote was recorded and counted correctly. This is precisely the technical problem addressed by voter verifiable and cryptographically auditable e-voting architectures (Jafar et al., 2022); where such safeguards are absent, confidentiality and verifiability collapse into mutually exclusive goals, undermining the constitutional guarantee. The principle of honesty (*jujur*) and fairness (*adil*) require that the process and outcome be free from manipulation and be equally accessible to all contesting parties; a legal policy analysis of election regulation confirms that these two principles function as the ultimate normative test against which any procedural innovation, including e-voting, must be measured, meaning that any technology that cannot demonstrate resistance to manipulation fails the constitutional test regardless of its administrative convenience (Fuadi, 2021).

Indonesian constitutional jurisprudence has already addressed a closely related question. In Constitutional Court Decision Number 147/PUU-VII/2009, the Court reviewed the constitutionality of technologically assisted voting at the village level and held that the use of technology in vote casting and vote counting does not, in itself, violate the constitutional election principles, provided that the technology used maintains transparency, accountability, and the essential character of a secret and direct ballot. This decision has been treated by subsequent scholarship as the doctrinal anchor legitimizing e-voting practice in village head elections across Indonesia (Wijaya et al., 2019). The Court's reasoning reflects what Indonesian constitutional scholarship terms "open legal policy" (*kebijakan hukum terbuka*), under which the Constitution does not prescribe a single, fixed voting technology but delegates to the legislature the discretion to determine electoral mechanisms, so long as constitutional principles are substantively preserved (Hardjaloka & Simarmata, 2016). This doctrinal posture is significant because it means the constitutionality question for national elections is not whether e-voting is permissible in principle, since the Court has already answered that question affirmatively, but whether any specific legislative design for e-voting substantively preserves LUBER-JURDIL in practice.

Statutory Gaps and the Absence of a National E-Voting Framework

Despite the constitutional opening created by Decision 147/PUU-VII/2009, Law Number 7 of 2017 on General Elections, which governs the election of the President, members of the House of Representatives, the Regional Representative Council, and Regional House of Representatives, does not explicitly regulate electronic voting as a method of vote casting at the national level. This creates what may be termed a "constitutionality without implementation" condition: e-voting is not prohibited by the Constitution, and has even received judicial validation at the village level, yet no national statute operationalizes the constitutional permission into a concrete, procedurally safeguarded electoral mechanism. Analysis of the concept of e-voting mechanisms situates this gap as a structural weakness, arguing that any electronic voting mechanism must be anchored simultaneously in general election law and information security law, and that partial or informal adoption without such a dual statutory foundation risks producing a system whose legal force as evidence in the event of an election dispute is uncertain (Sujadmiko et al., 2020).

This statutory vacuum has practical consequences. Because e-voting is only regulated at the village level through Ministry of Home Affairs and village governance regulations rather than through a law (*undang-undang*), any expansion toward regional head elections (*Pilkada*) or national elections would require, at minimum, an amendment to Law Number 7 of 2017 or the enactment of a dedicated *lex specialis* on electronic elections. The absence of such a framework also leaves unresolved several procedural questions that are constitutionally consequential: how would the Constitutional Court, which under Article 24C of the 1945 Constitution has exclusive jurisdiction to adjudicate disputes over election results, evaluate electronic evidence in an election dispute; what standard of technical certification would be required before an e-voting system could be certified fit for use; and which institution would bear legal responsibility for system failure. Field level studies of village e-voting show that even at a smaller administrative scale, unclear allocation of responsibility between village government, the local election organizing committee, and technology vendors has generated legal and political friction when systems malfunctioned or results were disputed (Anggun et al., 2025).

Cybersecurity, Electronic Recapitulation, and Personal Data Protection

Even where e-voting itself is not yet adopted nationally, Indonesia's 2024 general election demonstrated that digitalization of adjacent electoral processes already raises constitutionally significant cybersecurity and data protection concerns. Electronic vote recapitulation was originally proposed as a means of accelerating result announcement and reducing the risk of public unrest arising from delayed or disputed manual counts (Djuyandi et al., 2019). In practice, however, the 2024 deployment of SiRekap exposed the system to conventional cybersecurity threats such as unauthorized access and data manipulation, alongside emerging threats such as AI-generated disinformation targeting the credibility of recapitulated results; this experience demonstrates that cybersecurity

governance, encompassing shared institutional responsibility, regulatory clarity, and technical best practice, is a precondition for any further digitalization of Indonesia's electoral process, whether at the recapitulation stage or, eventually, at the vote casting stage itself (Hastuti & Rochman, 2024).

The constitutional stakes of this vulnerability are heightened by the fact that any electronic election system, whether limited to recapitulation or extended to full e-voting, necessarily processes substantial volumes of voters' personal data, including national identity numbers, biometric data, and residential addresses. Indonesian legal scholarship has documented that personal data breaches in the electoral context are not hypothetical: incidents involving the alleged leakage of the Permanent Voters List (*Daftar Pemilih Tetap*) have repeatedly raised the question of whether the Election Commission (KPU) and political parties possess adequate legal and technical safeguards to fulfil their obligations under the Personal Data Protection Law (Kusnaldi et al., 2022). Because Article 28G paragraph (1) of the 1945 Constitution guarantees every person's right to protection of self, family, honor, dignity, and property, and because the Constitutional Court has recognized informational privacy as an emanation of this right, a failure to protect voters' personal data within an e-voting or e-recapitulation system is not merely a technical or administrative lapse but a potential constitutional rights violation. Proposals to construct a comprehensive Indonesian Data Protection System capable of governing the full lifecycle of electoral data, from collection during voter registration to processing during recapitulation and storage after the election, offer one institutional pathway toward reconciling electoral digitalization with constitutional privacy guarantees (Aswandi et al., 2020). Complementary institutional-design scholarship argues that an effectively independent supervisory authority, structured along lines comparable to Indonesia's existing sectoral regulators such as the Business Competition Supervisory Commission, is indispensable if personal data protection obligations in the electoral sector are to be meaningfully enforced rather than merely declared (Matheus & Gunadi, 2023).

From a technical standpoint, the cybersecurity and privacy challenges identified above are not insurmountable, but they demand a level of engineering rigor that has not yet characterized Indonesian election technology procurement. Empirical technology adoption research applying a task technology fit model to Indonesian e-voting pilots found that user acceptance and system effectiveness depend heavily on the perceived reliability and security of the underlying technology, suggesting that public trust in e-voting cannot be assumed but must be earned through demonstrable technical robustness (Ratnasari et al., 2021). Internationally, blockchain based architectures have been proposed precisely to address the integrity and transparency gap exposed by incidents such as the SiRekap controversy, employing cryptographic techniques including digital signatures, homomorphic encryption, and zero knowledge proofs to protect voter anonymity while preserving verifiability of the final tally (Pereira et al., 2023). Similar

blockchain based voting architectures aimed at electoral fraud detection illustrate how a decentralized, immutable ledger can, in principle, make unauthorized alteration of vote records both more difficult and more readily detectable than in a centralized database architecture of the kind currently used for SiRekap (Jaiswar et al., 2023). Nevertheless, technology alone cannot substitute for legal certainty; without a statutory mandate establishing mandatory security standards, independent certification, and clear liability rules, even a technically sound blockchain based system would remain constitutionally vulnerable for lack of a valid legal basis.

Comparative Lessons: Constitutional Structures and Public Perception Abroad

Comparative experience offers instructive, if cautionary, lessons for Indonesia. European debates over e-voting reveal that constitutional structures, political party positioning, and public perception interact in complex ways that shape whether e-voting is adopted, piloted, or abandoned; comparative analysis across European states shows that even where the constitutional text does not explicitly prohibit e-voting, courts and legislatures have frequently required stringent voter-verifiability guarantees before permitting its use, and that public trust, rather than technical feasibility alone, has often been the decisive factor determining whether pilots were expanded or discontinued (Borucki & Hartleb, 2023). Germany's Federal Constitutional Court, for instance, has previously held that electronic voting machines lacking a mechanism for ordinary citizens to verify, without specialized technical knowledge, that their votes were correctly recorded and counted violate the constitutional principle of the public nature of elections, a precedent frequently cited in the comparative e-voting literature as the paradigmatic articulation of the verifiability requirement.

More cautionary still is the trajectory from internet voting toward blockchain voting observed in the United States and elsewhere, where technically sophisticated proposals have repeatedly failed to resolve the fundamental tension between the secret ballot and end to end verifiability; rigorous security analysis concludes that blockchain, despite its cryptographic strengths, does not, by itself, solve the core socio technical problems of remote electronic voting, including the risks of voter coercion, malware compromised client devices, and the difficulty of achieving meaningful software independent verifiability at national scale (Park et al., 2021). This finding carries direct relevance for Indonesia: proposals to move beyond supervised village level e-voting toward internet-based or remote voting for national elections should be approached with considerable caution, since the constitutional guarantee of a confidential and verifiable ballot may be more difficult to reconcile with unsupervised remote voting than with polling station based electronic voting.

At the same time, positive design lessons are available from participatory digital voting systems developed for other governance contexts, where careful attention to procedural fairness and perceived legitimacy, not merely cryptographic security, has been shown to be essential for citizen acceptance of digital voting mechanisms (Yang et al., 2024). This

literature suggests that Indonesia's e-voting policy design should treat legitimacy and trust-building, including transparent public communication, independent technical audits, and meaningful opportunities for civil society and election observers to scrutinize the system, as co-equal design objectives alongside cryptographic security and administrative efficiency.

Socio-Technical Challenges: The Digital Divide and Public Trust

Beyond strictly juridical and cybersecurity considerations, the constitutionality of e-voting in practice cannot be divorced from Indonesia's socio technical conditions. The principle of universality (*umum*) under Article 22E of the 1945 Constitution requires that every eligible citizen possess a genuinely equal opportunity to exercise the right to vote. Indonesia's digital divide, characterized by uneven internet infrastructure, variable digital literacy, and disparities between urban and rural, as well as western and eastern, regions of the archipelago, means that a poorly designed e-voting rollout could produce de facto disenfranchisement even while remaining formally neutral on its face. Village level implementation studies illustrate this risk concretely: in at least one documented case, a planned transition to e-voting for a simultaneous village head election was abandoned altogether after community rejection rooted in low digital literacy, inadequate outreach, and fear of manipulation, resulting in the village head being directly appointed by the sub-district head rather than elected, a outcome that itself raises separate constitutional concerns about the right to elect local leadership (Anggun et al., 2025). This example demonstrates that the constitutionality of e-voting is not a static, one time legal determination but a condition that must be continuously monitored and safeguarded through adequate infrastructure investment, sustained voter education, and inclusive design that preserves a non-digital fallback option for citizens unable or unwilling to vote electronically.

Public trust considerations reinforce this conclusion. Because the legitimacy of any electoral outcome depends not only on its technical correctness but on its being perceived as legitimate by the electorate and by losing contestants, an e-voting system's constitutionality in the fullest sense requires not merely legal conformity on paper but empirical public confidence in the system's honesty and fairness. The convergence of evidence from technology-adoption research (Ratnasari et al., 2021), grassroots implementation studies (Maryuni & Sitorus, 2021); (Nurdin et al., 2023), and comparative literature on legitimacy in digital voting design (Yang et al., 2024) points toward a common conclusion: constitutionally sound e-voting in Indonesia is achievable, but only as the product of a deliberate, incremental, and participatory policy process rather than a rapid, top-down technological transplant.

IV. CONCLUSION

This study concludes that the adoption of e-voting in Indonesia's electoral system is not constitutionally prohibited; on the contrary, Constitutional Court Decision Number

147/PUU-VII/2009 has established a doctrinal foundation, grounded in the concept of open legal policy, under which technologically assisted voting may be constitutionally valid so long as it substantively preserves the direct, general, free, confidential, honest, and fair election principles enshrined in Article 22E of the 1945 Constitution. A decade of village level e-voting practice further demonstrates that Indonesia already possesses meaningful practical experience upon which a more comprehensive national policy could be built. Nevertheless, this article identifies significant juridical, technical, and social opportunities and challenges that must be addressed before e-voting could be extended constitutionally and credibly to regional or national elections. Juridically, the absence of an explicit statutory framework in Law Number 7 of 2017 creates legal uncertainty regarding evidentiary standards, certification requirements, and institutional accountability, and should be remedied through either statutory amendment or a dedicated *lex specialis*.

Technically, the 2024 SiRekap experience demonstrates that cybersecurity governance and personal data protection compliance under Law Number 27 of 2022 are indispensable preconditions, not optional enhancements, for any further digitalization of the electoral process; blockchain based and other cryptographically verifiable architectures offer promising, though not yet fully mature, solutions to the integrity and transparency challenges involved. Socially, the digital divide and the fragility of public trust mean that any expansion of e-voting must proceed incrementally, transparently, and with continuous investment in digital literacy and infrastructure, preserving non-digital alternatives where necessary to safeguard the constitutional principle of universal suffrage. Future research would benefit from empirical, mixed-method studies evaluating pilot e-voting implementations at the regional head election level, as well as comparative legal studies examining how other developing democracies with similarly heterogeneous infrastructure conditions have sequenced their transition toward digital elections.

V. REFERENCES

- [1]. Hajian Berenjestanaki, M., Barzegar, H. R., El Ioini, N., & Pahl, C. (2024). Blockchain-based e-voting systems: A technology review. *Electronics*, 13(1), Article 17, pp. 1-27. <https://doi.org/10.3390/electronics13010017>
- [2]. Jafar, U., Ab Aziz, M. J., Shukur, Z., & Hussain, H. A. (2022). A systematic literature review and meta-analysis on scalable blockchain-based electronic voting systems. *Sensors*, 22(19), 7585, pp. 1-26. <https://doi.org/10.3390/s22197585>
- [3]. Arifin, F., Maarif, I., Suryana, C., Permana, F. C., & Murbani, A. W. (2025). The constitutionality of e-voting in the transformation of digital democracy: A normative analysis and implications for electoral legitimacy. *Journal of Indonesian Legal Studies*, 10(1), 63-90. <https://doi.org/10.15294/jils.v10i1.21193>
- [4]. Bachmid, F., & Djanggih, H. (2022). The future of e-voting implementation in Indonesian general election process: Constitutionality, benefits and challenges. *Varia Justicia*, 18(1), 34-51. <https://doi.org/10.31603/variajusticia.v18i1.6359>

- [5]. Ali, M. M., & Widjaja, A. H. (2020). Electronic voting: Towards Indonesian democratic constitutional election. In *Proceedings of the 2nd International Conference of Law, Government and Social Justice (ICOLGAS 2020)*, pp. 1-6. Atlantis Press. <https://doi.org/10.2991/assehr.k.201209.280>
- [6]. Sujadmiko, B., Ridwan, R., & Yulia, Y. (2020). The concept of e-voting mechanism based on law of general election and information security. *Jambe Law Journal*, 3(1), 19-36. <https://doi.org/10.22437/jlj.3.1.19-36>
- [7]. Fuadi, A. B. (2021). Legal policy for simultaneous election regulations. *Jurnal Konstitusi*, 18(3), 702-723. <https://doi.org/10.31078/jk18310>
- [8]. Hardjaloka, L., & Simarmata, V. M. (2016). E-Voting: Kebutuhan vs. kesiapan (menyongsong) e-demokrasi. *Jurnal Konstitusi*, 8(4), 579-604. <https://doi.org/10.31078/jk847>
- [9]. Pamungkas, F. A., Sukimin, S., & Nuswanto, A. H. (2022). Penerapan electronic voting sebagai perwujudan asas luber dan jurdil dalam pemilihan kepala desa di Desa Bendosari Kecamatan Sawit Kabupaten Boyolali. *Semarang Law Review*, 3(2), 78-92. <https://doi.org/10.26623/slr.v3i2.5552>
- [10]. Wijaya, J. H., Zulfikar, A., & Permatasari, I. A. (2019). Implementasi sistem e-voting untuk meningkatkan kualitas demokrasi di Indonesia. *Jurnal Pemerintahan dan Kebijakan (JPK)*, 1(1), 51-59. <https://doi.org/10.18196/jpk.v1i1.7841>
- [11]. Maryuni, S., & Sitorus, R. (2021). Implementasi kebijakan e-voting dalam pemilihan kepala desa di Kabupaten Mempawah Provinsi Kalimantan Barat. *Jurnal Administrasi Publik dan Pembangunan*, 2(1), 53-63. <https://doi.org/10.20527/jpp.v2i1.2772>
- [12]. Anggun, S., Meri, & Amanda. (2025). Evaluasi Pilkades e-voting terhadap demokrasi di Indonesia: Studi kasus Desa Senaning Batang Hari. *Limbago: Journal of Constitutional Law*, 5(3), 94-105. <https://doi.org/10.22437/limbago.v5i3.47352>
- [13]. Nurdin, A. N., Nurdin, M., & Nurdin, J. (2023). Penerapan sistem e-voting dalam pemilihan kepala desa Lito Kecamatan Paguyaman Pantai Kabupaten Boalemo tahun 2019. *Jurnal Dinamika Sosial Budaya*, 25(2), 280-286. <https://doi.org/10.26623/jdsb.v25i4.7942>
- [14]. Djuyandi, Y., Herdiansah, A. G., Yulita, I. N., & Sudirman, S. (2019). Using vote e-recapitulation as a means to anticipate public disorders in election security in Indonesia. *Humanities & Social Sciences Reviews*, 7(5), 111-122. <https://doi.org/10.18510/hssr.2019.7515>
- [15]. Hastuti, D., & Rochman, S. (2024). Cybersecurity measures for election information systems: Sistem Rekapitulasi Suara Pemilu 2024 (SiRekap). *Best: Journal of Applied Electrical, Science & Technology*, 6(1), 20-24. <https://doi.org/10.36456/best.vol6.no1.9182>
- [16]. Kusnaldi, M. A., Syani, N. F., & Afifah, Y. (2022). Perlindungan data pribadi dalam penyelenggaraan pemilu: Tantangan dan tawaran. *Jurnal Lex Renaissance*, 7(4), 710-725. <https://doi.org/10.20885/JLR.vol7.iss4.art3>

- [17]. Aswandi, R., Muchsin, P. R. N., & Sultan, M. (2020). Perlindungan data dan informasi pribadi melalui Indonesian Data Protection System (IDPS). *Jurnal Legislatif*, 3(2), 167-190. <https://doi.org/10.20956/jl.v3i2.14321>
- [18]. Matheus, J., & Gunadi, A. (2023). Pembentukan lembaga pengawas perlindungan data pribadi di era ekonomi digital: Kajian perbandingan dengan KPPU. *Justisi*, 10(1), 20-35. <https://doi.org/10.33506/jurnaljustisi.v10i1.2757>
- [19]. Ratnasari, A., Harahap, A. A., Anshori, A. A., & Alam, M. (2021). Adopting task technology fit model on e-voting technology. *International Journal of Informatics and Communication Technology (IJ-ICT)*, 10(2), 148-158. <https://doi.org/10.11591/ijict.v10i2.pp148-158>
- [20]. Pereira, B. M. B., Torres, J. M., Sobral, P. M., Moreira, R. S., Soares, C. P. d. A., & Pereira, I. (2023). Blockchain-based electronic voting: A secure and transparent solution. *Cryptography*, 7(2), Article 27, pp. 1-19. <https://doi.org/10.3390/cryptography7020027>
- [21]. Jaiswar, N., Deodhar, S., Gupta, H., & Kapse, D. (2023). E-voting system using blockchain. *International Journal for Research in Applied Science and Engineering Technology (IJRASET)*, 11(4), 2090-2095. <https://doi.org/10.22214/ijraset.2023.50618>
- [22]. Borucki, I., & Hartleb, F. (2023). Debating e-voting throughout Europe: Constitutional structures, parties' concepts and Europeans' perceptions. *Frontiers in Political Science*, 5, Article 982558, pp. 1-14. <https://doi.org/10.3389/fpos.2023.982558>
- [23]. Park, S., Specter, M., Narula, N., & Rivest, R. L. (2021). Going from bad to worse: From Internet voting to blockchain voting. *Journal of Cybersecurity*, 7(1), Article tyaa025, pp. 1-15. <https://doi.org/10.1093/cybsec/tyaa025>
- [24]. Yang, J. C., Kraus, M., Klein, R., Awad, N. F., & Helbing, D. (2024). Designing digital voting systems for citizens: Achieving fairness and legitimacy in participatory budgeting. *Digital Government: Research and Practice*, 5(3), 1-30. <https://doi.org/10.1145/3665332>
- [25]. Tobroni, T., & Firmansyah, E. (2022). Tipologi manajemen tradisional dan modern dalam perkembangan pendidikan pesantren. *Research and Development Journal of Education*, 8(1), 333-338.
- [26]. Firmansyah, E. (2023). Various Paradigms in Islamic Educational Thought: Fundamentalism, Modernism, and Liberalism. *International Journal of Health, Economics, and Social Sciences (IJHESS)*, 5(2), 139-145.
- [27]. Bakar, M. Y. A., Firmansyah, E., & Abdeljelil, M. B. (2024). Legal framework analysis of Islamic religious education policy implementation. *International Journal of Law and Society*, 3(3), 217-237.
- [28]. Firmansyah, E., Tobroni, T., & Rusady, A. T. (2023). Internalisasi Ajaran Islam Dalam Aktivitas Budaya Etnik Kaili Prespektif Antropologi Pendidikan Islam. *Research and Development Journal of Education*, 9(1), 285-299.

- [29]. Firmansyah, E., Tobroni, T., & Romelah, R. (2023). Anthropology of Islamic Education as A Socio-Cultural-Religious Modernization Strategy in Alam Al-Kudus Islamic Boarding School. *Edukasi Islami: Jurnal Pendidikan Islam*, 12(03).
- [30]. Firmansyah, E., & Idris, A. (2024). Moderation as a Solution to Religious Harmony in Poso Central Sulawesi. *International Journal of Law and Society*, 3(1), 1-9.
- [31]. Syah, E. F., Khozin, K., & Haris, A. (2023). Merenda The History of Sheik Sya'ban in The Framework of Banggai Ethnic Islamic Educational Anthropology 8th Century Ad. *Edukasi Islami: Jurnal Pendidikan Islam*, 12(03).