Lex Scientia Law Review
Vol. 10 Issue 1 (2026) 259-302
ISSN 2598-9677 (Print) 2598-9685 (Online)
DOI: https://doi.org/10.15294/lslr.v10i1.30905
Online since: June 15, 2026

LEX SCIENTIA LAW REVIEW
https://journal.unnes.ac.id/journals/lslr/index

The Role of Artificial Intelligence in Enhancing the Cyber Notary Concept in the Digital Era: Opportunities, Challenges, and Implications

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Abstract

The rapid advancement of Artificial Intelligence (AI) is reshaping the landscape of legal services, with particular consequences for the practice of notarization. The concept of the Cyber Notary, a digital notarial service enabling remote and secure authentication of legal documents, has emerged as a critical institutional innovation in response to growing demand for efficient digital legal infrastructure. Yet, despite its transformative potential, the integration of AI into Cyber Notary systems continues to generate unresolved tensions between technological capability and legal permissibility. This study examines the role of AI in strengthening the Cyber Notary concept in the digital era, with particular emphasis on Indonesia's normative framework. Through a normative legal

research methodology combining statutory, comparative, and conceptual approaches, this paper identifies a fundamental conflict between the physical-presence requirements embedded in Law Number 2 of 2014 on Notarial Positions (UUJN) and the digitalization imperatives recognized under the ITE Law and Law Number 27 of 2022 on Personal Data Protection (PDPL). Drawing on comparative insights from Japan, the European Union, and the United States, the study demonstrates that the adoption of AI in notarial practice is legally feasible only where supportive regulatory infrastructure exists, a condition that Indonesia has not yet fully met. The findings underscore the necessity of targeted legislative reform, enhanced algorithmic transparency, and formal professional guidance to bridge the current regulatory vacuum. This research contributes to the broader discourse on the responsible integration of AI in civil law jurisdictions, offering concrete recommendations for policymakers, legal practitioners, and technology developers.

KEYWORDS *Artificial Intelligence; Cyber Notary; Digital Legal Services; Legal Technology; Regulatory Frameworks.*

Introduction

The rapid digitization of legal services has fundamentally transformed notarial practice, giving rise to the concept of the cyber notary, a framework in which traditionally paper-based, presence-dependent notarial functions are executed with the assistance of digital tools, the internet, and Artificial Intelligence. Where notaries have historically served as impartial authenticators of legal documents and transactions, the accelerating demands of digital commerce and governance now require the profession to modernize, and AI has emerged as the central instrument of that transformation. Yet its integration into cyber notarial practice is not without consequence: while AI offers meaningful gains in speed, efficiency, and document security, it simultaneously generates complex challenges in the domains of regulation, professional accountability, and data protection that Indonesian law has not yet resolved.[1]

[1] Ani Eva Sujiati et al., 'Cyber Notary Problems in Legal Reform in Indonesia', *Sultan Agung Notary Law Review* 6, no. 3 (December 2024), https://doi.org/10.30659/sanlar.v6i3.31772.

The digital era has introduced new patterns in notarial services, including remote online notarization, the use of electronic signatures, biometric-based authentication systems, identity verification, and the recording of documents on blockchain-based systems. All of these transformations are being accelerated by AI, which promises greater accuracy, automatic fraud detection, and the automation of deed drafting offering significant benefits in terms of efficiency and transparency. However, they also raise concerns regarding legal validity, cybersecurity risks, and the potential displacement of the notary's role as a guardian of integrity and public trust.[2]

This article contributes to the growing but still underdeveloped body of literature on AI and notarial law by offering a normative-doctrinal analysis of the regulatory tensions arising from the intersection of AI-assisted systems, the Cyber Notary concept, and Indonesia's evolving digital legal framework. While prior scholarship has identified the broad contours of this transformation, few studies have examined the internal contradictions within Indonesia's existing legislative architecture with the analytical specificity required to guide legislative reform, particularly the unresolved tension between the physical-presence requirements of Law Number 2 of 2014 on Notarial Positions (UUJN), the electronic evidentiary provisions of the ITE Law, and the data governance obligations imposed by Law Number 27 of 2022 on the Protection of Personal Data (PDPL). This gap is consequential rather than merely academic: in the absence of a coherent normative framework, Indonesian notaries who experiment with AI-assisted tools operate in a zone of legal uncertainty that exposes them to civil and professional liability whose precise contours neither the statute nor any implementing regulation has defined. The urgency of filling this gap is compounded by the pace of technological adoption in Indonesia's legal services sector, which has accelerated significantly since the COVID-19 pandemic created practical demand for remote notarial services that existing law was structurally unprepared to satisfy.[3]

This study adopts a normative legal research methodology, which treats law as an internally structured system of norms, principles, and rules derivable from primary and secondary legal sources rather than from empirical observation or social inquiry. Accordingly, the study does not involve fieldwork, participant interviews, or quantitative data collection; its analytical purchase

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2 Bilqist Izdihar, Ahmad M. Ramli, and Tasya Safiranita, 'Legal Challenges In The Implementation of Artificial Intelligence In The Cyber Notary Process In Digital', *Syah Kuala Law Review* 9 (2025).

3 Tamara Dwi Rizki Amanda dan Wardani Rizkianti, "Urgensi Penerapan Sistem Cyber Notary Ditengah Pandemi Covid 19," *Yurispruden* 4, no. 2 (2021): 144, https://doi.org/10.33474/yur.v4i2.9299.

comes instead from the systematic reading, comparison, and critical evaluation of legal instruments and the scholarly literature that has engaged with them.

Three complementary approaches are applied in combination. The first is a statutory approach, through which this study examines the internal coherence and practical implications of Indonesia's legislative framework governing notarial functions and digital transactions. The primary instruments analyzed are Law Number 2 of 2014 on Notarial Positions (UUJN), Law Number 11 of 2008 as amended by Law Number 19 of 2016 on Electronic Information and Transactions (ITE Law), and Law Number 27 of 2022 on the Protection of Personal Data (PDPL). The statutory analysis pays particular attention to the normative conflict between Article 16 paragraph (1) letter (m) of the UUJN, which requires physical presence, audible reading of the deed, and in-person signing and Article 5 paragraph (4) of the ITE Law, which acknowledges the evidentiary validity of notarial deeds in electronic form. Mapping and critically evaluating this conflict, rather than merely noting its existence, is central to the study's analytical contribution.[4]

The second approach is a comparative approach, through which the study examines how selected foreign jurisdictions, principally Japan, the European Union, and the United States, have addressed the legal challenges of cyber notarization. Japan receives the most detailed treatment owing to the structural parallels between its civil law notarial tradition and Indonesia's, and because its Electronic Notarization Committee model, which has been operational since January 15, 2002, offers the most directly transferable institutional precedent.[5] The EU's eIDAS Regulation and the US Remote Online Notarization (RON) framework are examined to identify the risk-based governance principles and qualified electronic signature standards that inform modern approaches to digital notarial authentication. Comparative analysis in this study is not merely descriptive; it is evaluative, asking not only what other jurisdictions have done but why their models succeeded, and whether the institutional, cultural, and technical conditions for their success are present or replicable in Indonesia.

The third approach is a conceptual approach, which draws on the foundational doctrines of legal certainty, expediency, and quality service, as

4 Ani Eva Sujiati et al., 'Cyber Notary Problems in Legal Reform in Indonesia', *Sultan Agung Notary Law Review* 6, no. 3 (December 2024), https://doi.org/10.30659/sanlar.v6i3.31772.

5 Noval Dwi Kurnia dkk., "Juridical Study of Arrangements for Authentic Deeds through Cyber Notary: Comparative Study with Japan," *Path of Science* 9, no. 1 (2023): 3014–3022, https://doi.org/10.22178/pos.89-16.

articulated in Article 10 paragraph (1) of Law Number 30 of 2014 on Government Administration, to construct a normative standard against which Indonesia's current notarial service system is assessed. These doctrinal reference points enable the study to demonstrate that the existing framework's failure to accommodate AI-assisted notarization is not merely a technical legislative gap but a concrete departure from the governance principles that Indonesian administrative law requires public officials, including notaries, to observe. Primary legal materials consist of statutes, government regulations, and official professional standards. Secondary legal materials include peer-reviewed journal articles, legal commentaries, and policy documents relevant to AI governance, digital identity, and cyber notarization. The analysis is conducted through prescriptive legal reasoning, aimed at identifying normative contradictions and proposing a defensible regulatory pathway for Indonesia.

The intersection of Artificial Intelligence and notarial law has attracted growing scholarly attention in recent years, though the body of literature remains fragmented across disciplinary boundaries and uneven in its analytical depth. Five studies are particularly relevant to the present inquiry, and a critical reading of their contributions alongside their limitations reveals the specific intellectual space that this article occupies and the concrete analytical work it undertakes.

The first foundational contribution is that of Simanjuntak and Santosa, whose conference paper presented at the First International Cyber Law Conference in 2023 and subsequently published by EAI in 2025 constitutes one of the earliest systematic Indonesian-language academic treatments of the AI-notary interface.[6] Their central argument is that AI represents both an opportunity and an existential professional challenge for Indonesian notaries: an opportunity because it can substantially reduce the administrative burden of deed preparation, identity verification, and document archiving; a challenge because the emergence of remote platforms capable of performing these functions threatens to disintermediate notaries from transactions in which their legal role remains constitutionally and statutorily indispensable. Simanjuntak and Santosa are particularly valuable for their mapping of the institutional disruptions already underway in Indonesian notarial practice the informal use

[6] Yoan Nursari Simanjuntak and Teguh Wibisono Santosa, 'Cyber Notary And Artificial Intelligence: Indonesian Notary Challenges In The Future', paper presented at Proceedings of the First International Cyber Law Conference, ICL-C 2023, 11 November 2023, Jakarta, Indonesia, *Proceedings of the First International Cyber Law Conference, ICL-C 2023, 11 November 2023, Jakarta, Indonesia*, 2025, https://doi.org/10.4108/eai.11-11-2023.2351349.

of commercial document software, the growing client expectation of digital service delivery, and the profession documented reluctance to engage with these developments through official channels. However, their analysis does not descend to the level of specific statutory provisions. The normative conflict between Article 16 paragraph (1) letter (m) of the UUJN and the electronic recognition provisions of the ITE Law is noted but not subjected to doctrinal analysis. The practical question of what Indonesian notaries may and may not lawfully do with AI tools under the current legislative framework is left open.

The second relevant study is that of Sujiati, Ifana, Ahimsya, and Listyawati, published in the Sultan Agung Notary Law Review in 2024.[7] These authors document structural contradictions within Indonesia legal framework that obstruct practical implementation of cyber notary services, situating their analysis within the broader context of ongoing Indonesian legal reform. The paper empirical contribution is significant: through qualitative doctrinal research, the authors identify multiple points at which the UUJN formal requirements conflict with the aspirations expressed in the ITE Law and in successive government digital governance strategies. Their findings corroborate the present study diagnosis that Indonesia primary obstacle to cyber notarization is legislative rather than technological. However, Sujiati and colleagues treat the identified contradictions as a uniform problem requiring a uniform solution legislative amendment without distinguishing between contradictions that are genuinely irresolvable through interpretation and those that might be addressed through implementing regulations, professional guidance, or phased pilot frameworks. This analytical flattening produces recommendations that are directionally correct but insufficiently granular to guide the sequenced regulatory action that implementation requires. The present study addresses this limitation by disaggregating the legislative contradictions and prioritizing them according to both legal severity and institutional tractability.

The third study requiring detailed engagement is that of Izdihar, Ramli, and Safiranita, published in 2025, which provides a focused analysis of the legal challenges specifically associated with AI implementation in the cyber notary process.[8] This contribution is notable for its explicit attention to the role of AI as a distinct technological actor rather than treating digitalization generically.

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7 Sujiati et al., 'Cyber Notary Problems in Legal Reform in Indonesia', December 2024.

8 Izdihar, Ramli, and Safiranita, 'Legal Challenges In The Implementation of Artificial Intelligence In The Cyber Notary Process In Digital'.

Izdihar and colleagues identify three principal legal hurdles: the absence of a clear legal basis for AI-assisted deed creation, the lack of regulatory standards for AI system certification in legal contexts, and the evidentiary ambiguity surrounding AI-processed documents. Their analysis anticipates several of the doctrinal difficulties examined in the present study. The significant limitation of their contribution, however, is the absence of critical qualification of AI claimed capabilities. The paper treats potential to ensure compliance and detect anomalies as given, without engaging with the empirical literature on algorithmic bias, domain-specific performance limitations, or the systematic differences between AI performance in high-stakes and low-stakes contexts. The present study addresses this limitation directly, arguing that AI opportunities in the notarial context must be assessed deed-type-specifically and calibrated to the irreversibility of AI error in particular notarial contexts such as land transfer and inheritance certification.

The fourth study of central relevance is that of Amanda and Rizkianti, published in Yurispruden in 2021, whose value derives not from theoretical sophistication but from its documentation of a concrete historical moment in Indonesian legal history.[9] Amanda and Rizkianti examine the urgency that the COVID-19 pandemic created for cyber notarization in Indonesia during 2020-2021, a period during which movement restrictions made in-person notarization practically impossible for significant portions of the population while the UUJN physical presence requirements remained unchanged. Their documentation of the resulting service gap rural communities unable to execute land transfers, businesses unable to complete incorporations, families unable to finalize inheritance arrangements provides the most direct empirical evidence available that Indonesia normative failure to accommodate cyber notarization has measurable and concrete social costs. This evidence is of central significance to the present study analysis of the access-expansion opportunity that AI-enabled remote notarization represents. Amanda and Rizkianti limitation is temporal: their analysis is reactive rather than prospective, focused on documenting the pandemic impact rather than on proposing a durable regulatory framework for digital notarization. The present study takes their empirical documentation as a starting point and builds upon it the regulatory analysis required to convert the access opportunity they identify into a legally viable and institutionally sustainable service model.

[9] Amanda and Rizkianti, 'Urgensi Penerapan Sistem Cyber Notary Ditengah Pandemi Covid 19', June 2021.

The fifth and most technically ambitious contribution in the directly relevant literature is that of Hasyan and Wisnaeni, published in 2024, which explores the specific integration of blockchain technology with AI-assisted notarial deed creation in Indonesia.[10] Hasyan and Wisnaeni provide detailed technical analysis of how blockchain-based smart contracts and distributed ledger archiving can complement AI document automation to create a notarial service architecture that is simultaneously more efficient and more tamper-resistant than the current paper-based protocol system. Their contribution is particularly valuable for demonstrating that the technological prerequisites for AI-assisted cyber notarization already exist and do not require innovation beyond what is currently commercially available. The study limitations are precisely the mirror image of its strengths: its technical richness is not matched by equivalent legal depth. The regulatory framework question whether blockchain-based notarial records can be legally recognized under the UUJN and what statutory amendments or implementing regulations would be required to enable that recognition is treated as a secondary concern, with the authors generally assuming that legislative adaptation will follow technical readiness. The present study contests this assumption, arguing that in civil law jurisdictions such as Indonesia, regulatory authorization must precede technical deployment rather than following it, and that the design of the enabling regulatory framework requires the kind of statutory analysis that Hasyan and Wisnaeni do not provide.

Taken together, these five studies establish the empirical and analytical foundations upon which the present inquiry builds, while collectively revealing three persistent gaps that this article specifically addresses. First, none of these studies provides a systematic normative analysis of the specific statutory conflict between Article 16 paragraph (1) letter (m) of the UUJN and the digital recognition provisions of the ITE Law and PDPL conflict that, as the present study demonstrates, cannot be resolved through interpretive creativity but requires explicit legislative authorization of the kind that Japan achieved through its ministerially supervised cyber notarization framework. Second, none of the five studies subjects AI purported capabilities in notarial contexts to the critical qualification that the algorithmic governance literature requires particularly on the question of how AI performance and error consequences

[10] Daniyah Fadhilah Hasyan and Fifiana Wisnaeni, 'Pemanfaatan Kecerdasan Buatan dan Blockchain dalam Pembuatan Akta Notaris di Indonesia', *Notarius* 17 (2024), https://doi.org/https://doi.org/10.14710/nts.v17i1.43939.

vary across deed types with very different populations of affected parties and very different practical prospects for remediation. Third, none of the five studies proposes a regulatory roadmap that is simultaneously institutionally feasible, legally coherent, and informed by systematic comparative analysis of what has and has not worked in analogous jurisdictions.

The urgency of addressing these gaps is not merely academic. Indonesia notarial services sector is already experiencing the pressures that AI and digital platforms are generating, and the profession response in the absence of regulatory clarity has been predictable: informal technology adoption without professional accountability, continued non-compliance with physical presence requirements in some offices, and avoidance of technology adoption by others who correctly perceive the current legal landscape as providing no safe harbor for digital experimentation. Both responses are institutionally harmful. The informal adoption of AI tools without a regulatory framework creates liability exposure for notaries and legal uncertainty for their clients. The avoidance of technology adoption perpetuates the geographic access inequalities that Amanda and Rizkianti documented and that have deepened since the pandemic, while Indonesia ASEAN neighbors develop increasingly sophisticated digital legal service ecosystems. The urgency of regulatory clarity has, if anything, increased since the enactment of the PDPL in 2022, which imposed new data protection obligations on notaries without providing any guidance on how those obligations interact with the specific data processing requirements of AI-assisted notarization.[11]

This study is guided by three interrelated research questions. First, what concrete opportunities does AI integration offer for Indonesian notarial practice, and under what legal and institutional conditions can those opportunities be realized consistently with the requirements of Law Number 2 of 2014 on Notarial Positions? Second, what are the most critical challenges that AI integration poses to the integrity and legal validity of notarial services in Indonesia, and how do those challenges differ across deed types such as property transfers, commercial instruments, and inheritance certifications? Third, what regulatory, professional, and institutional implications reforms are required to translate the identified opportunities into operational reality while effectively managing the identified risks? Together, these questions form a coherent

[11] Umi Rahmawati Mariyam et al., 'Legal Analysis Related to the Application of Artificial Intelligence in Notarial Practice', *Journal of Law, Politic and Humanities* 4, no. 5 (July 2024), https://doi.org/10.38035/jlph.v4i5.

analytical arc that moves from diagnosis to prescription, positioning this study as a contribution to building a legally sound and institutionally realistic framework for digital notarial services in Indonesia.

The significance of this article contribution lies in three distinct dimensions. Analytically, it provides the first systematic normative mapping of the statutory conflicts that constitute Indonesia primary obstacle to AI-assisted cyber notarization, filling the doctrinal gap that Simanjuntak and Santosa, Sujiati and colleagues, and Izdihar and colleagues all identified but did not fill. Comparatively, it goes beyond the descriptive citation of Japan experience that characterizes prior Indonesian scholarship to provide a structured evaluative analysis of the institutional conditions that made Japan implementation successful and an assessment of whether those conditions are present or replicable in Indonesia. Practically, it proposes a three-phase regulatory roadmap short-term INI professional guidance, medium-term pilot framework legislation, and long-term sector-specific AI governance that translates the analytical findings into a sequenced set of institutional actions with identified actors, instruments, and feasibility conditions. In contributing these three dimensions simultaneously, this article seeks to provide Indonesian legal scholarship with the analytical tools and the institutional design guidance required to move the cyber notary debate from diagnosis to implementation.

Opportunities Provided by Artificial Intelligence in Cyber Notary Services

Any serious assessment of AI's role in cyber notarial practice must begin from an institutional premise rather than a technological one: the legal value of AI's contributions depends entirely on whether those contributions can be integrated into a framework that preserves the notary's constitutive function as a state-authorized guarantor of legal truth, rather than converting the notary into a sophisticated service provider who certifies outputs generated by commercial software. In Indonesia, Article 1 point (1) of Law Number 2 of 2014 on Notarial Positions defines a notary as a public official authorized to draw up authentic deeds, a designation that ties notarial authority not to professional expertise alone but to a delegation of state power. That delegation gives notarial acts the distinctive evidentiary presumption of authenticity that private documents do not carry, and it is that presumption, not efficiency, not

convenience, not cost reduction, that constitutes the social justification for the notarial institution. AI's opportunities in this context are genuine, but they are conditional on preserving that presumption rather than eroding it.[12]

Document automation through natural language processing and machine learning represents the most immediately deployable opportunity for Indonesian notarial practice. AI systems trained on corpora of legally valid deeds can generate standardized templates, flag missing statutory disclosures, and identify internally inconsistent clauses, tasks that currently consume a disproportionate share of notarial working hours in high-volume offices processing land transfer deeds, corporate establishment instruments, and commercial contracts.[13] The empirical record from adjacent legal document processing domains, however, requires that these benefits be stated with precision rather than enthusiasm. Studies evaluating NLP systems applied to contract review in common law jurisdictions, the domain most closely analogous to notarial deed drafting, report accuracy rates on standard clause identification tasks ranging between seventy-two and eighty-eight percent under controlled conditions, figures that degrade substantially when models encounter document types, regional legal formalities, or linguistic conventions outside their training distribution.[14] For Indonesian notarial practice specifically, this degradation risk is structurally guaranteed: any AI system trained predominantly on urban Javanese property deed corpora will encounter systematic out-of-distribution conditions when applied to adat-based land instruments from Kalimantan, agricultural certificates from eastern Indonesia, or waqf deeds with distinctive Islamic property law formalities. No peer-reviewed study has yet evaluated any AI system's performance specifically on Indonesian notarial deed drafting, which means that claims of compliance assurance and anomaly detection in this domain rest on extrapolation from heterogeneous corpora rather than on domain-specific evidence. Until such evidence exists, AI document automation should be treated institutionally as a drafting aid subject to mandatory substantive notarial review, not as an

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12 Jozan Jozan Adolf and Widhi Handoko, 'Eksistensi Wewenang Notaris Dalam Pembuatan Akta Bidang Pertanahan', *Notarius* 13, no. 1 (March 2020): 181–92, https://doi.org/10.14710/nts.v13i1.29313.

13 Hasyan and Wisnaeni, 'Pemanfaatan Kecerdasan Buatan dan Blockchain dalam Pembuatan Akta Notaris di Indonesia'.

14 Brent Daniel Mittelstadt et al., 'The Ethics of Algorithms: Mapping the Debate', *Big Data & Society* 3, no. 2 (December 2016), https://doi.org/10.1177/2053951716679679.

autonomous compliance mechanism whose outputs can be certified without independent professional verification.[15]

Biometric identity verification, encompassing facial recognition, liveness detection, and cross-referencing against government identity databases, offers a second category of genuine but empirically qualified opportunity. In principle, AI-enabled identity verification can exceed the security achievable through conventional in-person document inspection, particularly where identity documents are susceptible to sophisticated forgery and where the notary's visual examination of a document holder is vulnerable to social engineering. Liveness detection systems have demonstrated measurable advantages over human examiners in controlled laboratory conditions, and cross-referencing against Indonesia's National Population Administration (*Dukcapil*) database provides an identity assurance mechanism that document inspection alone cannot match.[16] The empirical literature, however, documents significant demographic variation in facial recognition accuracy. A landmark audit of three commercially deployed facial recognition systems found error rates for darker-skinned women up to thirty-four percentage points higher than for lighter-skinned men, a disparity with direct and serious implications for a jurisdiction such as Indonesia, where the population encompasses substantial ethnic diversity and where identity misattribution in a land transfer deed or inheritance certification is not a correctable data entry error but a potential source of generational property disputes that the legal system may have no practical mechanism to remedy after the *minuta akta* has been sealed.[17] This asymmetry in AI error consequences across demographic groups is not a marginal technical concern; it is a central regulatory design question, and the absence of any Indonesian standard for demographic equity auditing of AI identity verification systems deployed in notarial contexts represents a gap whose practical consequences will compound as AI adoption expands.

Blockchain-integrated archival constitutes a third opportunity whose genuine technical advantages are real but whose legal preconditions have not

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15 Brent Mittelstadt, 'Principles Alone Cannot Guarantee Ethical AI', *Nature Machine Intelligence* 1, no. 11 (November 2019): 501–7, https://doi.org/10.1038/s42256-019-0114-4.

16 Ayei Ibor et al., 'Considerations for Trustworthy Cross-Border Interoperability of Digital Identity Systems in Developing Countries', *AI & SOCIETY* 40, no. 4 (April 2025): 2729–50, https://doi.org/10.1007/s00146-024-02008-9.

17 Sandra Wachter, Brent Mittelstadt, and Chris Russell, 'Why Fairness Cannot Be Automated: Bridging the Gap between EU Non-Discrimination Law and AI', *Computer Law & Security Review* 41 (July 2021): 105567, https://doi.org/10.1016/j.clsr.2021.105567.

been satisfied. Blockchain-based notarial registers provide cryptographic assurance that authenticated documents cannot be altered without detection, and their decentralized architecture eliminates the single-point-of-failure vulnerability inherent in centralized paper protocol archives, a vulnerability that has produced documented losses of notarial protocols in Indonesia through flood, fire, and in some cases fraudulent alteration.[18] The Ethereum-based smart contract system piloted in a 2022 study of land deed archiving demonstrated tamper-evidence rates of effectively one hundred percent in laboratory conditions, with cryptographic timestamp verification achieving sub-second response times across distributed nodes.[19] These are technically impressive results. Their legal relevance in the Indonesian context, however, is currently limited by the absence of any statutory recognition of blockchain entries as official notarial protocol under the UUJN, the undefined evidentiary status of cryptographic timestamps under Indonesian procedural law, and the lack of professional guidance from INI on the obligations that attach to notaries who use blockchain systems for protocol archiving. Technical capability and legal authorization are not the same thing, and the absence of the latter renders the former operationally inert regardless of its laboratory performance metrics.

Geographic access expansion through AI-enabled remote platforms represents the fourth opportunity category, and the one whose social significance is most directly documented by empirical evidence from the Indonesian context. Amanda and Rizkianti's study of notarial service disruption during the COVID-19 pandemic documented concrete and measurable access failures: rural communities in regions with restricted movement were unable to execute land transfers, entrepreneurs were unable to complete corporate incorporations, and families were unable to finalize inheritance arrangements, failures attributable not to technological unavailability but to the UUJN's physical presence requirement operating in conditions that made physical presence impossible.[20] Indonesia's archipelagic geography and the documented concentration of notary offices in urban Java mean that these access failures are not pandemic-specific anomalies but structural features of the current service

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18 Friko Rumadanu, Esther Masri, and Otih Handayani, 'Penggunaan Cyber Notary Pada Akta Autentik Dan Kekuatan Pembuktiannya Dalam Perspektif Undang-Undang Jabatan Notaris', *KRTHA BHAYANGKARA* 16, no. 1 (April 2022): 89–100, https://doi.org/10.31599/krtha.v16i1.1032.

19 Widya Kridawidyani, Yuni Priskila Ginting, and Fajar Sugianto, 'The Legal Advantages of Blockchain Technology For Notary Protocol Archives', *Mulawarman Law Review*, 3 June 2024, 29–42, https://doi.org/10.30872/mulrev.v8i2.1049.

20 Amanda And Rizkianti, 'Urgensi Penerapan Sistem Cyber Notary Di Tengah Pandemi Covid 19'.

model. AI-enabled remote platforms could substantially reduce this structural inequality: a prospective service user in a remote district of Maluku or West Papua currently faces a full-day journey to the nearest notary, at costs that can represent a meaningful fraction of annual household income for the communities most in need of formal legal protection for their land and inheritance rights. The obstacle to realizing this access benefit is not technological. Platforms technically capable of conducting audiovisual remote notarization with biometric verification at a level of security comparable to in-person examination already exist and have been deployed at scale in Virginia, Texas, and Florida.[21] The obstacle is normative: Article 16 paragraph (1) letter (m) of the UUJN requires physical presence, and no implementing regulation currently provides any exception, any pilot authorization, or any pathway toward digital delivery. The access opportunity is real, quantifiable, and socially urgent; its realization requires legislative action calibrated to the civil law authentic deed's constitutive requirements, not merely the technological capability that already exists.

Taken together, these four opportunity categories share a common analytical structure: genuine technical potential, empirically documented limitations, and legal preconditions that the current Indonesian framework has not satisfied. The appropriate institutional response to this structure is not to dismiss the opportunities as illusory or to embrace them as self-evidently beneficial, but to design the regulatory framework that would allow the genuine benefits to be realized while the documented limitations are managed through mandatory oversight requirements, domain-specific performance standards, and liability rules that allocate the residual risk of AI error to the actors best positioned to prevent it.[22]

Challenges and Risks Associated with Implementing AI in the Cyber Notary Concept

The challenges confronting AI integration in Indonesian notarial practice are not equally significant, and treating them as though they are, as

[21] Mireille Hildebrandt, *Law for Computer Scientists and Other Folk*, 1st edn (Oxford University PressOxford, 2020), https://doi.org/10.1093/oso/9780198860877.001.0001.

[22] Brent Mittelstadt, 'Principles Alone Cannot Guarantee Ethical AI', *Nature Machine Intelligence* 1, no. 11 (November 2019): 501–507, https://doi.org/10.1038/s42256-019-0114-4.

much of the existing literature implicitly does by cataloguing liability, privacy, and bias as parallel concerns of equivalent weight, produces an analytically misleading picture that obscures where regulatory effort should be concentrated. This section prioritizes challenges according to two criteria: their centrality to notarial integrity as a legal institution, and the degree to which they manifest differently across the specific deed types that constitute the core of Indonesian notarial practice. That second criterion is one that prior scholarship has systematically neglected, and its neglect matters because the severity, reversibility, and practical remediability of AI-related harm in the notarial context are fundamentally deed-type-dependent. A drafting error in a corporate establishment deed involving legally sophisticated institutional parties is a categorically different problem from the same error in an inheritance deed executed on behalf of an illiterate rural farmer. Regulatory design that fails to capture this distinction will consistently misallocate oversight requirements, imposing burdens where they add little value and failing to impose them where the consequences of AI failure are irreversible.

The foundational challenge is doctrinal, not technological. The internal conflict between Article 16 paragraph (1) letter (m) of the UUJN, which mandates the physical presence of all parties, audible reading of the deed, and simultaneous in-person signing as constitutive requirements of the authentic deed, and Article 5 paragraph (4) of the ITE Law, which acknowledges the evidentiary validity of electronically executed notarial deeds, constitutes a normative contradiction that cannot be resolved by liberal statutory interpretation without producing outcomes inconsistent with each statute's legislative design.[23] The practical consequence of this unresolved conflict is that every AI-assisted notarial act executed under current Indonesian law is legally precarious regardless of how technically competent the underlying system is. A notary who uses an AI drafting tool to prepare a land transfer deed, however accurately that tool performs, and certifies the resulting instrument without satisfying the cumulative procedural requirements of Article 16, risks having the deed classified as a private instrument (*akta di bawah tangan*) rather than an authentic deed, a classification that strips it of the evidentiary presumption of authenticity that is the sole institutional justification for requiring notarial

[23] Friko Rumadanu, Masri, and Otih Handayani, 'Penggunaan Cyber Notary Pada Akta Autentik Dan Kekuatan Pembuktiannya Dalam Perspektif Undang-Undang Jabatan Notaris'.

certification in the first place.[24] This doctrinal challenge is categorically more fundamental than liability, privacy, or bias, because it renders AI integration legally incoherent at its foundation: the other challenges concern how AI should be regulated within a functioning cyber notary framework; this one concerns whether such a framework can legally exist at all under current Indonesian law without explicit statutory intervention.

Algorithmic bias, the second most critical challenge, is deed-type-specific in ways the existing literature has not recognized. Prior studies discuss algorithmic bias and data quality as generic challenges applicable uniformly across AI-assisted legal practice, an analytical framing that systematically obscures the dimensions of the problem most relevant to notarial integrity.[25] AI systems trained on historical Indonesian notarial deed corpora will inherit the structural biases embedded in those corpora: the systematic underrepresentation of eastern Indonesian land tenure arrangements, the historical exclusion of certain ethnic communities from formal titling processes, the urban Javanese documentary conventions that dominate existing digitized deed archives, and the gender disparities in property registration that have characterized Indonesian land administration for decades. The consequences of these inherited biases, however, are not uniform across deed types.

In a corporate establishment deed, where parties are typically legally sophisticated institutional actors with professional legal representation, an AI drafting error is ordinarily identifiable through standard due diligence and correctable through notarial rectification under Article 51 of the UUJN or through court order. The affected parties have the legal knowledge, financial resources, and institutional capacity to detect and pursue correction of the error before it generates irreversible harm. In a commercial contract deed between sophisticated counterparties, the same logic applies: the error's consequences are bounded by the parties' capacity to monitor, identify, and challenge defective instruments through established legal channels.[26]

The risk profile is categorically different for property transfer deeds and inheritance certifications involving economically vulnerable parties. A land

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[24] Mahfuzatun Ni'mah Sona, 'Penerapan Cyber Notary Di Indonesia Dan Kedudukan Hukum Akta Notaris Yang Bebasis Cyber Notary', *Jurnal Officium Notarium* 2, no. 3 (December 2022): 497–505, https://doi.org/10.20885/jon.vol2.iss3.art12.

[25] Mittelstadt et al., 'The Ethics of Algorithms'.

[26] Alidatussadiyah Almuslimah, Mohammad Ryan Bakry, and Chandra Yusuf, 'Kepastian Hukum Dalam Penyelesaian Pelanggaran Etika Rangkap Jabatan Notaris Oleh Majelis Pengawas Daerah', *AdiL: Jurnal Hukum* 12, no. 2 (January 2022), https://doi.org/10.33476/ajl.v12i2.2111.

transfer deed that misattributes ownership, whether because an AI system trained on urban Javanese cadastral records misclassifies an adat communal land arrangement from Papua, or because a biometric verification system with higher error rates for certain demographic groups misidentifies a signatory, creates a title defect whose practical consequences may be irremediable. The affected party may lack the legal literacy to identify that the deed contains an error, the financial resources to engage a lawyer to challenge it, and the evidentiary capacity to reconstruct the transaction after the notary has retired, the original parties have died, or the minuta akta has been sealed. Land disputes arising from defective notarial deeds in Indonesia have demonstrably persisted across multiple generations, generating litigation that consumes judicial resources decades after the original instrument was executed.[27] An AI system that introduces bias into this category of notarial act does not merely produce a suboptimal output, it reproduces structural injustice in a format carrying the full legal force of an authentic deed, and it does so in a manner that the legal system's ordinary error-correction mechanisms may be practically incapable of addressing.

Wills and testamentary deeds present a third distinct risk profile. Here, the party most directly affected by an AI drafting error, the testator whose intention the deed is meant to capture, is by definition absent from any subsequent proceeding to correct that error. An AI system that misinterprets ambiguous testamentary language, imports default clause structures from its training data that do not reflect the testator's actual intentions, or fails to identify the formal requirements for valid testamentary disposition under Indonesian inheritance law creates a dispute whose resolution requires reconstructing the testator's subjective intention from evidence that may be fragmentary, contested, and ultimately unresolvable. The irreversibility of testamentary AI error is thus not merely practical but structural: the person with the most authoritative knowledge of what the deed should have said is permanently unavailable to provide it.[28]

The liability framework challenge is structurally novel rather than merely unsettled. Existing Indonesian civil liability doctrine presupposes individual human agency and traceable causation, a doctrinal architecture that machine learning systems systematically defeat through the opacity of their

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[27] Ikhsan Lubis et al., 'Exploring the Potential of the Cyber Notary Concept in the Framework of International Transaction Settlement', *Acta Law Journal* 3, no. 1 (December 2024): 1–13, https://doi.org/10.32734/alj.v3i1.18891.

[28] Mariyam et al., 'Legal Analysis Related to the Application of Artificial Intelligence in Notarial Practice'.

decision-making processes.[29] When a traditional notary drafts a defective deed, the causal chain from professional judgment to error is in principle traceable: the notary made a specific determination about how to characterize a property boundary, interpret an inheritance instruction, or draft a commercial obligation, and that determination can be examined, challenged, and attributed. When an AI system generates a defective deed, the causal chain runs through a neural network whose intermediate representations are opaque to the notary who certified the output, the developer who trained the model, and the platform operator who deployed it. The affected party faces what the algorithmic governance literature has termed the "black box" problem: harm is demonstrable, but the decision process that produced it is not reconstructible through the evidentiary methods available to Indonesian courts.[30]

This opacity has direct and practical consequences for Indonesian notarial liability. Under current doctrine, the most obvious defendant when an AI-assisted deed is defective is the notary who certified it. But the notary who reviewed and certified an AI-generated output did not, in the same sense as a notary who drafted manually, create the defective content, the AI system did, through processes the notary could not meaningfully audit even if they had wanted to. Holding the notary fully liable for AI system outputs that neither they nor any other human actor could reliably predict or detect creates an incentive structure that will predictably result in one of two responses: notaries who refuse to adopt AI tools at all, preserving existing access inequalities; or notaries who adopt AI tools without genuine oversight, relying on the certification ritual to satisfy regulatory requirements while the AI system operates as a de facto autonomous drafter. Neither outcome is institutionally desirable, and neither is addressed by the current absence of any tiered liability framework specific to AI-assisted notarization.

Data governance in the notarial context presents risks that are more specific and more serious than the PDPL's general framework contemplates. Law Number 27 of 2022 on the Protection of Personal Data establishes general requirements for lawful processing, data minimization, purpose limitation, and data subject rights, requirements that apply to notarial AI systems as they do to

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29 Frank Pasquale, *The Black Box Society: The Secret Algorithms That Control Money and Information* (Harvard University Press, 2015), https://doi.org/10.4159/harvard.9780674736061.

30 Sandra Wachter, Brent Mittelstadt, and Luciano Floridi, 'Why a Right to Explanation of Automated Decision-Making Does Not Exist in the General Data Protection Regulation', *International Data Privacy Law* 7, no. 2 (May 2017): 76–99, https://doi.org/10.1093/idpl/ipx005.

any other personal data processing activity.[31] However, the specific data flows of AI-assisted notarization have characteristics that distinguish them from the general data processing contexts the PDPL's framework was designed to address. Notarial AI platforms simultaneously process biometric identifiers for identity verification, financial information for commercial deed characterization, family composition data for inheritance certification, health status information for power-of-attorney instruments, and property ownership records for land transfer deeds, a combination of data categories that, in the hands of a compromised or inadequately secured platform, represents a comprehensive profile of the most sensitive dimensions of a client's legal and financial life.[32]

The data minimization principle, which requires that only data strictly necessary for the specified processing purpose be collected and retained, is particularly difficult to operationalize in AI-assisted notarization because the training and inference processes of machine learning systems create data retention requirements that may conflict with notarial confidentiality obligations. An AI system that improves its deed drafting performance by retaining and learning from previous transactions is, in effect, processing historical client data beyond the immediate transactional purpose for which it was collected, a practice that the PDPL's purpose limitation principle prohibits but that the PDPL's implementing regulations have not addressed in the specific context of AI-assisted legal services. The absence of sector-specific data governance standards for notarial AI systems is not a gap that will be filled by general PDPL compliance: it requires a dedicated implementing regulation developed in consultation with INI, the Ministry of Law and Human Rights, and the National Cyber and Encryption Agency (BSSN) to translate the PDPL's general principles into operationally specific requirements capable of being audited and enforced in the notarial practice context.[33]

Institutional resistance constitutes the challenge that reform proposals most consistently underestimate. The Indonesian notarial profession's

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31 Lokke Moerel and Corien Prins, 'Privacy for the Homo Digitalis: Proposal for a New Regulatory Framework for Data Protection in the Light of Big Data and the Internet of Things', *SSRN Electronic Journal*, ahead of print, 2016, https://doi.org/10.2139/ssrn.2784123.

32 Andrew D. Selbst and Julia Powles, 'Meaningful Information and the Right to Explanation', *International Data Privacy Law* 7, no. 4 (November 2017): 233–42, https://doi.org/10.1093/idpl/ipx022.

33 Luca Bolognini and Camilla Bistolfi, 'Pseudonymization and Impacts of Big (Personal/Anonymous) Data Processing in the Transition from the Directive 95/46/EC to the New EU General Data Protection Regulation', *Computer Law & Security Review* 33, no. 2 (April 2017): 171–81, https://doi.org/10.1016/j.clsr.2016.11.002.

resistance to AI integration is not irrational or merely conservative, it reflects a rational assessment of the asymmetric risk that current legal uncertainty creates. Under the existing framework, a notary who adopts AI tools bears full professional and civil liability for any resulting defect without any corresponding reduction in the formal procedural obligations that Article 16 imposes. The risk-benefit calculus is structurally adverse: AI adoption creates new categories of liability without creating new categories of legal protection, while the UUJN's physical presence requirements remain unchanged regardless of how capable remote platforms become. Until that structural asymmetry is corrected, through liability frameworks that distinguish AI developer negligence from notarial oversight failure, pilot authorization frameworks that provide legal safe harbor for designated early adopters, and professional guidance from INI that gives individual notaries a principled basis for technology adoption decisions, institutional resistance will remain the rational response to regulatory uncertainty rather than a problem to be overcome through persuasion.[34]

Implications for the Legal Profession and Regulatory Frameworks

The implications of AI integration for Indonesia's notarial legal framework cannot be meaningfully articulated as a list of recommended reforms without a corresponding analysis of why those reforms are feasible, what institutional conditions are required for their success, and what obstacles, legislative, bureaucratic, and professional, stand between the current state of normative vacuum and any operational cyber notary system. Prior scholarship on this question has consistently produced reform recommendations at a level of generality that renders them analytically inert: calls for "updated statutes," "harmonized standards," and "strengthened professional guidelines" identify the correct categories of action without providing the institutional specificity required to distinguish reforms that are achievable within Indonesia's existing governance architecture from those that are aspirational beyond it. This section addresses that deficit by organizing its implications across four dimensions, statutory reform, liability framework design, data governance elaboration, and professional development, and by assessing the feasibility of each dimension

[34] Mittelstadt, 'Principles Alone Cannot Guarantee Ethical AI'.

against Indonesia's specific institutional constraints rather than against the idealized regulatory environments of jurisdictions whose conditions do not obtain in Indonesia.

The statutory reform implication is the most urgent and the most institutionally demanding. The core legislative problem, the irresolvable conflict between Article 16 paragraph (1) letter (m) of the UUJN and the digital recognition provisions of the ITE Law, cannot be addressed through implementing regulations, ministerial decrees, or professional guidance alone. It requires explicit parliamentary intervention, either through a targeted amendment to the UUJN or through a dedicated regulation on electronic notarization that establishes a legally authorized pilot framework operating within defined parameters. The goal of that intervention should not be to dismantle the substantive safeguards of the authentic deed, the requirements of informed party identification, genuine consent, and reliable evidentiary recording that Article 16 paragraph (1) letter (m) embodies, but to decouple those safeguards from the assumption of physical co-presence that the original legislative design built into them for reasons that the digital environment has made contingent rather than necessary.[35]

References to Estonia's e-governance framework and the United States' Remote Online Notarization statutes as models for Indonesian reform, references that appear with some regularity in the comparative literature, require critical scrutiny that prior Indonesian scholarship has not provided. Estonia's digital legal infrastructure was constructed over two decades through coordinated state investment in a unified digital identity system (X-Road), deployed across a population of 1.3 million within a highly administratively cohesive unitary state, and premised on a legal tradition that places substantially fewer formal requirements on the documentary function of notarial acts than Indonesia's UUJN does.[36] These conditions, small and administratively homogeneous population, decades of prior digital governance investment, and a notarial tradition with limited constitutive formal requirements, do not obtain in Indonesia, where more than 270 million people are distributed across seventeen thousand islands, where the administrative capacity of regional governments varies enormously, and where the UUJN's constitutive procedural requirements for authentic deed execution are substantially more demanding

35 Sujiati et al., 'Cyber Notary Problems in Legal Reform in Indonesia', December 2024.

36 Ibor et al., 'Considerations for Trustworthy Cross-Border Interoperability of Digital Identity Systems in Developing Countries'.

than anything Estonia's notarial framework imposes. Estonia's model is instructive as evidence that comprehensive legal digitalization is institutionally achievable; it is not a template that Indonesia can adopt without radical adaptation.[37]

The United States' RON framework is equally non-transferable in its permissive form, for the structural reason analyzed in Section D of this article: the common law notary's testimonial function can accommodate remote audiovisual substitution without doctrinal disruption because it does not depend on physical co-presence as a constitutive element of the legal act. Indonesia's authentic deed doctrine does. Full adoption of the RON model in Indonesia would require reconceptualizing what the authentic deed is, not merely adjusting how it is executed, a reform of a fundamentally different order of magnitude from what the Indonesian legislature has thus far indicated any appetite to undertake.[38] Japan's hybrid ministerial designation model, by contrast, succeeded precisely because it was designed around the institutional realities of a civil law notarial tradition analogous to Indonesia's: it retained physical presence for the testimonial component, digitized only the documentary aspects, built centralized technical infrastructure to eliminate individual notary adoption costs, and proceeded through selective ministerial designation rather than broad legislative permission. The feasibility of adapting this model to Indonesia is analytically demonstrable rather than merely aspirational, and its central design choices, selectivity, professional association co-ownership, centralized infrastructure, phased expansion, directly address the institutional constraints that Indonesia's reform environment presents.[39]

The liability framework implication requires a tripartite structure that current Indonesian law does not provide. Any implementing regulation for AI-assisted notarization must clearly distinguish between three categories of AI-related error: errors attributable to system malfunction or inadequate AI system design, for which liability should fall primarily on the AI developer or platform operator; errors attributable to the notary's inadequate oversight of AI outputs, for which liability should fall on the notary as the certifying professional; and errors attributable to defective training data or systematic algorithmic bias, for which liability should be shared between the developer and

37 Hildebrandt, *Law for Computer Scientists and Other Folk*.

38 Izdihar, Ramli, and Safiranita, 'Legal Challenges In The Implementation of Artificial Intelligence In The Cyber Notary Process In Digital'.

39 Kurnia, Sood, and Hirsanuddin, 'Juridical Study of Arrangements for Authentic Deeds through Cyber Notary'.

the institution that commissioned or deployed the system.[40] This tripartite structure creates functionally appropriate incentives across all actor categories. Notaries have incentives to exercise genuine substantive oversight rather than treating AI certification as a rubber-stamping exercise. AI developers have incentives to build systems that are accurate and auditable in the specific domain of Indonesian notarial deed processing rather than optimizing for generic legal document tasks. Platform operators have incentives to deploy only systems that have been validated against Indonesian notarial deed corpora rather than general contract analysis benchmarks.

Without this structure, the incentive landscape produces predictable and institutionally harmful outcomes. A notary who bears full liability for AI outputs that neither they nor any other human actor could reliably audit has a rational incentive to avoid AI adoption entirely, preserving existing service access inequalities. A notary who bears no meaningful liability for AI outputs has a rational incentive to adopt AI without genuine oversight, delegating the substance of professional judgment to a commercial system while retaining only the formal certification ritual. Both outcomes undermine the public interest that notarial authentication is designed to serve, and both are direct products of regulatory inaction rather than inherent features of AI technology.[41]

The data governance implication requires sector-specific elaboration that goes significantly beyond what the PDPL's general framework provides. Law Number 27 of 2022 establishes data minimization, purpose limitation, and data subject rights as general obligations applicable to all personal data processing, obligations that apply to notarial AI systems as they do to any other data controller. What the PDPL does not provide, and what a sector-specific implementing regulation must address, is the operational translation of those general principles into the specific data processing contexts of AI-assisted notarization: the retention periods appropriate for biometric identity verification data processed in the course of deed execution; the consent management requirements applicable to AI systems that improve their performance by learning from historical deed corpora; the data protection impact assessment standards specific to AI systems that simultaneously process biometric, financial, familial, and property ownership data for single clients; and

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40 Lilian Edwards and Michael Veale, 'Slave to the Algorithm? Why a Right to Explanationn Is Probably Not the Remedy You Are Looking For', *SSRN Electronic Journal*, ahead of print, 2017, https://doi.org/10.2139/ssrn.2972855.

41 Pasquale, *The Black Box Society*.

the cross-border data transfer restrictions applicable when AI platform providers store Indonesian notarial data on foreign servers.[42]

This implementing regulation should be developed through a structured tripartite process involving INI as the representative of the professional community that will bear the operational obligations, the Ministry of Law and Human Rights as the competent regulatory authority for notarial practice, and the National Cyber and Encryption Agency (BSSN) as the technical body with the expertise to translate legal data governance principles into auditable security requirements. The absence of any such process to date is itself an implication of the current legislative vacuum: without statutory authorization for AI-assisted notarization, there is no regulatory anchor for sector-specific data governance development, and without sector-specific data governance, there is no credible framework for the responsible AI adoption that statutory authorization would permit.[43]

The professional resistance implication is the one that reform proposals most consistently underestimate, and it requires direct engagement rather than rhetorical dismissal. Indonesian notaries who have built their professional practices on the procedural architecture of the UUJN, physical office infrastructure, support staff for manual deed processing, established client relationships premised on personal consultation, face a rational and not merely sentimental set of objections to AI integration. Automation of document drafting threatens to commoditize the most time-intensive component of notarial service delivery, eroding the fee structures that sustain notarial offices, particularly in smaller cities and rural areas where client volumes cannot support the overhead of technological infrastructure investment. AI-enabled remote platforms threaten to enable larger urban notarial offices to compete for clients in geographic markets they currently cannot reach, concentrating notarial practice in ways that reduce professional diversity and geographic distribution. The absence of a clear liability framework means that notaries who adopt AI tools bear uncertain downside risk without commensurate regulatory protection. These are substantive objections, not resistance to modernization in principle, and they will not be overcome by persuasion alone.[44]

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42 Bolognini and Bistolfi, 'Pseudonymization and Impacts of Big (Personal/Anonymous) Data Processing in the Transition from the Directive 95/46/EC to the New EU General Data Protection Regulation'.

43 Selbst and Powles, 'Meaningful Information and the Right to Explanation'.

44 Simanjuntak and Santosa, 'Cyber Notary And Artificial Intelligence'.

The comparative evidence from Japan's successful implementation is directly instructive on this point. The Japan National Notaries Association's co-ownership of the Electronic Notarization Center, its role not merely as a passive recipient of government-mandated reform but as an active co-designer and operator of the technical infrastructure, was not an incidental feature of Japan's implementation strategy but a central condition of its success. Notaries who participated in the designation process did so voluntarily, within a framework that provided professional association backing, centralized technical support, and a clear regulatory safe harbor. The reform did not ask individual notaries to assume technological risk without institutional support; it built the institutional support before asking individual notaries to participate.[5] Indonesia's reform pathway must replicate this logic: INI must be engaged not as a consultee in a legislative process that has already determined its outcomes but as a co-designer of the pilot framework, the technical standards, and the professional certification requirements that will govern AI-assisted notarization. That engagement requires political will from the Ministry of Law and Human Rights and institutional commitment from INI's leadership, neither of which can be assumed, but both of which are achievable if the reform is structured to address the profession's substantive objections rather than to override them.

The regulatory roadmap implication organizes these four dimensions into a sequenced and feasibility-grounded implementation pathway. In the short term, prior to any legislative action, INI should issue formal professional guidance confirming that AI tools may be used for drafting assistance and preliminary compliance review, that the formal requirements of Article 16 paragraph (1) letter (m) remain in full force, that any electronic signature must satisfy the qualified standard of Government Regulation Number 71 of 2019, and that notaries using AI platforms are data controllers under the PDPL bearing obligations that cannot be delegated to platform providers' terms of service. This guidance requires no legislative authorization and can be issued on INI's existing professional authority, but it requires institutional leadership that INI has not yet exercised.[45] In the medium term, the government should enact a targeted UUJN amendment or dedicated Peraturan Pemerintah authorizing a pilot cyber notary framework modeled on Japan's ministerial designation system, limited initially to deed categories where parties are legally sophisticated and error consequences are practically remediable, corporate establishment

[45] Ni'mah Sona, 'Penerapan Cyber Notary Di Indonesia Dan Kedudukan Hukum Akta Notaris Yang Bebasis Cyber Notary'.

deeds, commercial contracts between institutional parties, and real property transactions between organizations with professional legal representation. Inheritance deeds, testamentary instruments, and transactions involving unrepresented individuals should be excluded from the pilot phase until the system has demonstrated reliable performance across the initial deed categories.[46] In the long term, Indonesia should develop a sector-specific AI governance framework for legal services that establishes mandatory transparency requirements, accuracy documentation standards disaggregated by deed type and demographic group, algorithmic impact assessment requirements calibrated to the irreversibility of potential harm, and a professional certification regime for AI-ready notaries administered through INI with Ministry of Law and Human Rights oversight. This long-term framework should be designed in explicit dialogue with Indonesia's ASEAN digital governance commitments and with the UNCITRAL Model Law on Electronic Transferable Records to ensure that domestic reforms are consistent with emerging international standards for cross-border legal transaction recognition.

Comparative Study of Cyber Notary Concepts in Various Countries

The digitalization of legal services has given rise to the concept of the Cyber Notary, a system that enables secure, remote notarization processes through advanced technology. This part compares the development and implementation of Cyber Notary systems in the various countries. Through a comparative legal analysis, this study highlights the regulatory frameworks, technological infrastructure, and challenges each country faces, offering recommendations for harmonization and transnational cooperation.

1. Indonesia

Indonesia's current legal framework for notarial practice is governed primarily by Law Number 2 of 2014 on Notarial Positions (UUJN), which imposes cumulative formal requirements for deed execution under Article 16 paragraph (1) letter (m): physical presence of all parties, audible reading of the

[46] 'Aligned with Whom?: Direct and Social Goals for AI Systems', in *The Oxford Handbook of AI Governance*, 1st edn, by Anton Korinek and Avital Balwit (Oxford University Press, 2023), 65–85, https://doi.org/10.1093/oxfordhb/9780197579329.013.4.

deed by the notary, and simultaneous in-person signing. No statutory provision currently authorizes AI-assisted or remote notarization, and no implementing regulation has established a legal pathway for electronic deed execution. The normative conflict between these requirements and Article 5 paragraph (4) of the ITE Law, which acknowledges the evidentiary validity of electronically executed notarial deeds, remains unresolved, creating a zone of legal uncertainty that exposes any notary who experiments with digital tools to civil and professional liability whose precise contours neither the statute nor any implementing regulation defines.[47]

From a technological infrastructure perspective, Indonesia possesses the foundational elements of a functional digital notarization system: Government Regulation Number 71 of 2019 establishes a qualified electronic signature standard, and the National Population Administration's digital identity database provides a biometric verification resource against which AI identity systems can cross-reference. However, these elements have not been integrated into a sector-specific notarial framework, and no certification standard exists for AI tools used in legal document processing. The Indonesian Notary Association (INI) has not issued formal guidance on permissible AI use, leaving individual notaries without professional support for technology adoption decisions.[48]

From a legal culture perspective, Indonesia's civil law notarial tradition assigns the notary a documentary function, the creation of the authentic deed as a constitutive legal act, rather than the testimonial witnessing function of common law notaries. This tradition creates a higher barrier to digital reform than common law jurisdictions face, because the formal requirements embedded in the UUJN are not procedural conveniences but constitutive elements of the authentic deed whose modification requires explicit legislative authorization. Professional resistance within the notarial community is significant: notaries who have built their practices on the procedural architecture of the UUJN have rational economic and professional reasons to resist reforms that would commoditize deed preparation through automation. The absence of any judicial precedent on AI-assisted notarial instruments means that the practical evidentiary standing of such instruments remains entirely untested in Indonesian courts.[49]

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47 Ni'mah Sona, 'Penerapan Cyber Notary Di Indonesia Dan Kedudukan Hukum Akta Notaris Yang Bebasis Cyber Notary'.

48 Widya Kridawidyani, Ginting, and Fajar Sugianto, 'The Legal Advantages of Blockchain Technology For Notary Protocol Archives'.

49 Simanjuntak and Santosa, 'Cyber Notary And Artificial Intelligence'.

2. Japan

Japan offers the most directly transferable comparative reference point for Indonesia because its success rested on institutional design choices that are explicitly replicable rather than on cultural or technological conditions unique to Japan. Japan's civil law notarial tradition shares Indonesia's continental European origins and assigns the notary the same documentary function, the creation of the authentic deed, that the UUJN establishes in Indonesia. When Japan moved to implement cyber notarization in 2002, it resolved the doctrinal tension between physical presence requirements and digital delivery through explicit legislative authorization under the Notary Act, establishing a ministerially supervised framework that operated alongside, rather than replacing, the existing physical notarization system. Authorization was selective: only notaries designated by the Ministry of Justice under Article 7 paragraph 2(1) of the Notary Act, after satisfying defined eligibility criteria, could perform electronic notarization, a design choice that ensured quality control and generated an institutionally supervised environment in which technical problems could be identified and remediated before propagating across the entire profession.[50]

From a technological infrastructure perspective, Japan's system is centralized and standardized through the Electronic Notarization Center operated by the Japan National Notaries Association, which provides uniform security protocols, electronic deed archiving systems, and technical support to designated notaries. This centralized model eliminates the need for individual notary offices to independently maintain full cyber-notarial IT infrastructure, dramatically reducing adoption costs and ensuring consistent security standards across the designated practitioner pool. Critically, the physical appearance requirement was retained for the testimonial component of the notarial act, Japanese cyber notarization requires the client to appear in person before the designated notary, with digitization applied to the documentary aspects of the process, a hybrid approach that preserved the substantive safeguards of traditional notarization while achieving meaningful efficiency gains from digital processing and archiving.[51]

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50 Kurnia, Sood, and Hirsanuddin, 'Juridical Study of Arrangements for Authentic Deeds through Cyber Notary'.

51 Kurnia, Sood, and Hirsanuddin.

From a legal culture perspective, Japan's successful implementation reflects the importance of professional engagement as a precondition for institutional reform. The Japan National Notaries Association played an active role in designing and operating the Electronic Notarization Center, ensuring that the profession had institutional ownership of the transition rather than experiencing reform as externally imposed disruption. The Ministry of Justice's selective designation model also managed professional resistance by limiting early-phase participation to notaries who had specifically volunteered for the program and demonstrated technical readiness, a phased approach that generated positive professional experience with digital notarization before any broader mandate was contemplated. Japan's experience confirms that professional buy-in, not merely legislative authorization, is a necessary condition for successful implementation in civil law jurisdictions.[52]

3. European Union

The European Union's regulatory architecture for AI-assisted notarization operates through two complementary instruments that together constitute the most sophisticated available model for risk-based AI governance in legal authentication contexts. The eIDAS Regulation (EU No. 910/2014) establishes a three-tiered electronic signature classification, simple, advanced, and qualified, with mandatory cross-border mutual recognition of qualified electronic signatures across all member states. For notarial purposes, the qualified electronic signature tier is most relevant, requiring a qualified signature creation device and a certificate from a trust service provider on a national trusted list, a standard that provides a legally certain evidentiary foundation for electronically executed legal instruments while remaining technologically neutral with respect to the specific AI systems used to generate those instruments.[53]

The EU AI Act (Regulation 2024/1689), which entered into force in 2024, complements eIDAS by establishing a risk-based governance framework for AI systems used in high-consequence contexts. AI systems used in legal authentication, including notarial identity verification and AI-assisted deed drafting, would likely qualify as high-risk systems under the Act's Annex III classification, triggering mandatory requirements for transparency, accuracy

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52 Simanjuntak and Santosa, 'Cyber Notary And Artificial Intelligence'.

53 Sridharan Sankaran, 'Enhancing Trust Through Standards: A Comparative Risk-Impact Framework for Aligning ISO AI Standards with Global Ethical and Regulatory Contexts', version 1, preprint, arXiv, 2025, https://doi.org/10.48550/ARXIV.2504.16139.

documentation, human oversight, conformity assessment before deployment, and registration in the EU's AI database. This risk-based architecture is the EU model's most instructive feature for Indonesia: rather than regulating all AI systems identically, it calibrates regulatory requirements to the severity of potential harm, imposing stringent obligations only where the consequences of AI error are most serious and irreversible, precisely the analytical approach that the deed-type-specific analysis in Section B of this article recommends for Indonesian notarial AI governance.[54]

From a legal culture perspective, the EU's member states span both civil law and common law notarial traditions, and the eIDAS framework's success reflects its deliberate design as a technology-neutral, tradition-agnostic interoperability standard rather than a substantive reform of notarial doctrine. This design choice makes eIDAS applicable across diverse national legal traditions but also means that it does not resolve the specific doctrinal questions arising from civil law authentic deed requirements. Indonesia cannot adopt the eIDAS framework wholesale, but the risk-based governance architecture of the EU AI Act, and the qualified electronic signature standard of eIDAS, provide directly applicable models for the sector-specific AI governance framework recommended in Section E of this article.[55]

4. United States

The United States presents the most permissive model of AI-assisted notarization and the one with the most limited direct transferability to Indonesia's civil law context. More than forty states have enacted Remote Online Notarization (RON) statutes permitting fully remote notarization through audiovisual platforms, dispensing entirely with the in-person presence requirement. RON frameworks in Virginia, Texas, and Florida, the pioneering jurisdictions, have been operationally successful in maintaining notarial integrity while substantially expanding service access, particularly for rural populations, cross-border transactions, and property transfers in interstate commerce. The National Notary Association's model RON standards have further harmonized platform security requirements across participating states, addressing the fragmentation that characterized early-phase implementation.[56]

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54 Wachter, Mittelstadt, and Russell, 'Why Fairness Cannot Be Automated'.

55 Ibor et al., 'Considerations for Trustworthy Cross-Border Interoperability of Digital Identity Systems in Developing Countries'.

56 Hildebrandt, *Law for Computer Scientists and Other Folk*.

The structural preconditions for the U.S. model's success, however, do not map onto Indonesia's civil law context. In common law jurisdictions, the notary's primary function is testimonial, witnessing a signing event and attesting to the signatory's identity and apparent willingness, a function that can be performed through audiovisual means without fundamental doctrinal disturbance because it does not depend on the physical co-presence of parties as a constitutive element of the legal act itself. In Indonesian notarial law, by contrast, the authentic deed is constituted by the simultaneous physical presence of all parties, the notary's audible reading, and the immediately following in-person signatures, requirements whose satisfaction through audiovisual substitution would require reconceptualizing the authentic deed itself, not merely amending a procedural provision of the UUJN. The U.S. RON model is therefore structurally non-transferable to Indonesia in its permissive form, though its evidence on platform security standards and its demonstration that fully remote notarization can maintain evidentiary integrity in appropriate legal contexts inform the long-term aspirations of Indonesian cyber notary reform.[57]

From a legal culture perspective, the U.S. model's rapid adoption across more than forty states reflects the common law notary's more limited documentary function and the professional association's proactive rather than resistant orientation toward technological modernization. Neither condition currently obtains in Indonesia, where the notarial profession's documentary function is constitutively more demanding and where INI has not yet exercised the professional leadership role that the National Notary Association has played in the United States. The U.S. experience does confirm, however, that when the appropriate legal and institutional conditions are in place, AI-enabled remote notarization can be implemented at scale without loss of evidentiary integrity, a finding that supports the long-term feasibility of the Indonesian reform roadmap proposed in Section E.[58]

Toward a Regulatory Roadmap for Indonesia

A regulatory roadmap for AI integration in Indonesian cyber notarial practice is only analytically useful if it is organized around institutional feasibility rather than technological aspiration. Indonesia's primary obstacle to cyber notarization is not technological, the technical prerequisites already exist,

[57] Hildebrandt.

[58] Amanda And Rizkianti, 'Urgensi Penerapan Sistem Cyber Notary Ditengah Pandemi Covid 19'.

but legislative, professional, and political: the absence of a coherent statutory authorization framework, the lack of sector-specific professional guidance, and the rational skepticism of a notarial profession that has no incentive to adopt reforms that expose it to new categories of liability without commensurate legal protection. The roadmap proposed here therefore organizes its priorities into three sequential phases, short, medium, and long term, each calibrated to what is institutionally achievable within its specific constraints, and each building on the preceding one: short-term actions create the professional conditions that make medium-term legislative reform politically viable, and the medium-term pilot generates the operational evidence that long-term sector-specific governance requires.[59]

1. Short-Term Priorities: Establishing the Professional and Institutional Foundation Without Legislative Action

The most consequential short-term actions require no parliamentary authorization and can be initiated immediately on existing institutional authority, their significance lying precisely in their capacity to reduce the legal uncertainty that currently makes AI adoption professionally irrational for Indonesian notaries without waiting for a legislative process whose timeline cannot be assumed. INI's issuance of formal professional guidance is the single most immediately impactful of these actions. This guidance should resolve four specific questions that individual notaries currently cannot answer with legal confidence: that AI tools may be used for drafting assistance and preliminary compliance review, but that the cumulative formal requirements of Article 16 paragraph (1) letter (m) of the UUJN, physical presence, audible reading, and in-person signing, remain in full force and cannot be waived through technological substitution; that any electronic signature in notarial-adjacent processes must satisfy the qualified standard under Government Regulation Number 71 of 2019, and that commercially available unqualified signatures do not satisfy this standard regardless of their technical sophistication; that notaries using AI platforms that process client personal data are operating as personal data controllers under Law Number 27 of 2022, bearing obligations, including lawful basis for processing, data minimization, purpose limitation, and data subject rights, that cannot be delegated to a platform provider's terms of service; and that a professional registry of AI tools reviewed against minimum

[59] Sujiati et al., 'Cyber Notary Problems in Legal Reform in Indonesia', December 2024.

compliance standards covering cybersecurity protocols, data governance practices, and accuracy documentation should be established, reducing individual due-diligence burdens on adopting notaries and creating an institutional basis for identifying systemic performance problems before they generate widespread professional liability.[60] This guidance does not resolve the underlying legislative gaps. What it does is give Indonesian notaries a principled and professionally backed basis for technology adoption decisions in the interim, converting the current state of individual legal uncertainty into a state of institutionally managed professional discretion.

The establishment of a joint technical working group between INI, the Ministry of Law and Human Rights, the National Cyber and Encryption Agency (BSSN), and the Ministry of Communication and Digital Affairs represents the second critical short-term action. This working group should be tasked with three specific deliverables within a defined timeline: a technical feasibility assessment of AI-assisted notarization under existing Indonesian infrastructure, including an audit of the Dukcapil digital identity database's suitability for biometric cross-referencing in notarial contexts; a draft sector-specific data governance standard for notarial AI systems that translates the PDPL's general principles into operationally specific and auditable requirements; and a comparative implementation report evaluating Japan's Electronic Notarization Center model against Indonesia's specific institutional constraints, identifying the design choices that are directly transferable and those that require adaptation.[61] The working group's outputs would serve a dual function: they would provide the technical and comparative evidence base required to design the medium-term pilot framework with institutional specificity rather than legislative generality, and they would demonstrate to the legislature and to the notarial profession that the government is approaching cyber notary reform with analytical seriousness rather than technological enthusiasm.

Judicial education and awareness constitutes the third short-term priority, and the one most consistently overlooked in reform proposals focused exclusively on legislative and professional dimensions. Indonesian courts will ultimately determine the evidentiary standing of AI-assisted notarial instruments, a determination that existing evidentiary doctrine provides no

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60 Ni'mah Sona, 'Penerapan Cyber Notary Di Indonesia Dan Kedudukan Hukum Akta Notaris Yang Bebasis Cyber Notary'.

61 Widya Kridawidyani, Ginting, and Fajar Sugianto, 'The Legal Advantages of Blockchain Technology For Notary Protocol Archives'.

specific guidance for, and that individual judges will be required to make without the benefit of precedent or specialized training in the specific technical and legal characteristics of AI-generated legal documents. The Supreme Court's Judicial Training Center should develop specialized modules on AI in legal document processing, covering the technical characteristics of machine learning outputs, the evidentiary questions raised by algorithmic opacity, and the comparative jurisprudence from jurisdictions, including Japan and EU member states, where courts have begun developing doctrine on AI-assisted legal instruments. This educational investment does not require legislative authorization and will generate institutional readiness for the evidentiary questions that medium-term pilot framework implementation will inevitably raise.[62]

2. Medium-Term Priorities: Legislative Authorization and Pilot Framework Implementation

The medium-term phase is defined by its dependence on legislative action, action that the short-term institutional foundation is designed to make politically viable by demonstrating professional readiness, generating technical evidence, and building the inter-ministerial coordination that parliamentary processes require. Its central objective is the enactment of explicit statutory authorization for a pilot cyber notary framework, whether through a targeted UUJN amendment or a dedicated Peraturan Pemerintah on electronic notarization, designed following Japan's ministerial designation model rather than the U.S. RON framework's broad permissive approach. Authorization should be selective: only notaries satisfying defined eligibility criteria, completion of a certified AI-readiness training program, registration of their AI tool stack against the INI professional registry, and execution of a data processing agreement with a BSSN-certified platform provider, should be designated to perform electronic notarization within the pilot. This selectivity simultaneously ensures quality control, creates a supervised environment in which technical problems can be identified and remediated before propagating across the entire profession, and generates the performance data required to

[62] Václav Janeček, 'Rethinking Law, Regulation, and Technology by Roger Brownsword', *International Journal of Law and Information Technology* 30, no. 4 (December 2022): 512–14, https://doi.org/10.1093/ijlit/eaad003.

design the long-term governance framework on an evidence basis rather than a theoretical one.[63]

The pilot's subject-matter scope should be deliberately narrow in its first phase, limited to deed categories where parties are legally sophisticated and AI error consequences are remediable through ordinary legal channels, corporate establishment deeds, commercial contracts between institutional parties, and real property transactions between organizations with professional legal representation. Inheritance deeds, testamentary instruments, family law instruments, and transactions involving unrepresented or legally unsophisticated parties should be explicitly excluded, not because AI cannot assist with these deed types in principle, but because the consequences of AI error in these contexts are irreversible in ways that early-phase quality control mechanisms cannot reliably prevent. The pilot should also retain the physical appearance requirement consistent with Japan's hybrid model, with AI assistance applied to document drafting, identity verification cross-referencing, and digital archiving rather than to substituting remote delivery for in-person attendance, an approach that preserves the substantive safeguards of the authentic deed while delivering meaningful efficiency gains within a degree of reform that the UUJN's existing architecture can accommodate without requiring the reconceptualization of the authentic deed that full remote notarization would demand.[64]

A centralized technical infrastructure for the pilot, modeled on Japan's Electronic Notarization Center but adapted to Indonesia's institutional architecture, should be established under INI's operational management with BSSN's technical oversight. This centralized model eliminates the need for individual notary offices to independently maintain full cyber-notarial IT infrastructure, dramatically reducing adoption costs for designated notaries and ensuring uniform security standards across the pilot pool. The infrastructure should include a standardized AI tool certification process, a centralized electronic deed register with cryptographically secured timestamps, a real-time performance monitoring system that flags accuracy anomalies for human review, and a professional liability insurance framework that covers designated notaries for AI-related errors that satisfy defined due diligence standards,

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63 Kurnia, Sood, and Hirsanuddin, 'Juridical Study of Arrangements for Authentic Deeds through Cyber Notary'.

64 Mariyam et al., 'Legal Analysis Related to the Application of Artificial Intelligence in Notarial Practice'.

removing the asymmetric liability exposure that currently makes AI adoption professionally irrational.[65]

A tiered liability framework specific to the pilot must be enacted as part of the authorizing legislation rather than deferred to subsequent regulation. This framework should distinguish between errors attributable to AI system malfunction or defective design, for which primary liability falls on the AI developer or platform operator, errors attributable to the notary's inadequate oversight of AI outputs despite available monitoring tools, for which liability falls on the notary, and errors attributable to defective training data or systematic algorithmic bias, for which liability is shared between the developer and the institution that commissioned the system. This tripartite structure creates appropriate incentives across all actor categories and provides designated notaries with the legal clarity required to exercise genuine oversight rather than pro forma certification.[66]

3. Long-Term Priorities: Sector-Specific AI Governance and Systemic Integration

The long-term phase builds on operational evidence from the medium-term pilot to develop a comprehensive and institutionally durable AI governance framework for Indonesian legal services, one developed through a structured multi-stakeholder process led by the Ministry of Law and Human Rights in consultation with INI, BSSN, the Ministry of Communication and Digital Affairs, and academic institutions. This framework should establish five core governance requirements: mandatory transparency obligations requiring AI systems to disclose training data sources, performance metrics disaggregated by deed type and demographic group, and known limitations; mandatory human oversight requirements ensuring that AI outputs are reviewed by a qualified designated notary before incorporation into any formal legal instrument, with the oversight process documented as part of the notarial record; mandatory algorithmic impact assessments before any AI system is deployed in notarial contexts involving sensitive personal data or high-value transactions; accuracy documentation standards disaggregated by deed type reflecting the deed-type-specific severity of AI error consequences established in this study's analysis; and a professional certification regime making AI-readiness

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65 Vikram Kulothungan, 'A Blockchain-Enabled Approach to Cross-Border Compliance and Trust', version 1, preprint, arXiv, 2025, https://doi.org/10.48550/ARXIV.2501.09182.

66 Edwards and Veale, 'Slave to the Algorithm?'

a recognized and periodically renewed notarial competency administered through INI with Ministry of Law and Human Rights oversight.[67]

Fourth, accuracy documentation standards disaggregated by deed type: separate performance benchmarks should be established for corporate deeds, commercial instruments, property transfer deeds, and inheritance certifications, reflecting the deed-type-specific severity of AI error consequences that the analysis in Section B has established. Fifth, professional certification requirements: AI-readiness should be established as a recognized and periodically renewed notarial competency, administered through INI with Ministry of Law and Human Rights oversight, covering both the technical characteristics of AI systems used in notarial practice and the legal obligations that their deployment creates under the UUJN, PDPL, and sector-specific governance framework.[68]

Indonesia's integration into international digital governance frameworks, including the ASEAN Digital Economy Framework Agreement, the ASEAN Data Management Framework, and the UNCITRAL Model Law on Electronic Transferable Records, should be pursued in parallel with domestic long-term reform rather than treated as a subsequent harmonization objective, since designing for international compatibility from the outset is institutionally less costly than retrofitting a domestically designed framework to external standards after the fact. Simultaneously, expansion of the pilot framework's subject-matter scope to include inheritance deeds, testamentary instruments, and transactions involving legally unsophisticated parties should occur only after the pilot has generated sufficient operational evidence of reliable AI-assisted notarization outcomes across the initial deed categories, the algorithmic impact assessment framework has been specifically applied to the expanded deed types, and the professional certification program has established a sufficiently large pool of AI-ready designated notaries across diverse regional legal contexts, conditions that together ensure that the full realization of AI-enabled access expansion for Indonesia's geographically underserved populations rests on the institutional foundation that the short and medium-term phases are designed to construct rather than on technological optimism alone.[69]

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67 Sankaran, 'Enhancing Trust Through Standards'.

68 Mittelstadt, 'Principles Alone Cannot Guarantee Ethical AI'.

69 Ibor et al., 'Considerations for Trustworthy Cross-Border Interoperability of Digital Identity Systems in Developing Countries'.

Conclusion

This study examined three interrelated questions about AI integration in Indonesian notarial practice, the opportunities it genuinely offers, the challenges it generates within Indonesia's normative and institutional context, and the regulatory implications that follow, and the analysis converges on answers more empirically grounded and institutionally specific than existing scholarship has provided. On opportunities, AI offers four categories of genuine benefit: document automation, biometric identity verification, blockchain-integrated archival, and geographic access expansion through remote platforms, each responding to a documented structural deficiency in Indonesia's current notarial service model. On challenges, the foundational obstacle is doctrinal rather than technological, the unresolved conflict between Article 16 paragraph (1) letter (m) of the UUJN and the ITE Law renders every AI-assisted notarial act legally precarious under current law regardless of how technically competent the underlying system is, while the second most critical challenge is algorithmic bias whose consequences are deed-type-specific in ways prior studies have not recognized: a drafting error in a corporate establishment deed is a categorically different problem from the same error in an inheritance deed executed on behalf of a legally unsophisticated rural party whose title defect may be practically irremediable. On implications, the analysis produces a three-phase regulatory roadmap grounded in comparative evidence and institutional feasibility: in the short term, INI should issue formal professional guidance defining permissible AI-assisted practice under current law without requiring legislative authorization; in the medium term, the government should enact a targeted UUJN amendment or dedicated Peraturan Pemerintah authorizing a pilot framework modeled on Japan's ministerially supervised hybrid model; and in the long term, Indonesia should develop a sector-specific AI governance framework establishing transparency requirements, accuracy documentation standards, and algorithmic impact assessments calibrated to deed-type-specific harm severity.

The central finding, and the one that resolves the internal contradiction characterizing prior Indonesian scholarship, is that cyber notary implementation in Indonesia is legally feasible only where supportive regulatory infrastructure exists. Indonesia already possesses the foundational prerequisites: a qualified electronic signature infrastructure under Government Regulation

Number 71 of 2019, a national digital identity database through the Dukcapil system, and a professional association with the institutional capacity to co-design implementation frameworks. What it lacks is the legislative clarity and professional guidance required to assemble these prerequisites into a coherent and legally authorized architecture, a gap that Japan's successful hybrid cyber notary implementation within a structurally analogous civil law tradition demonstrates is tractable rather than insurmountable. Theoretically, this study contributes to regulatory design scholarship by confirming that governing AI in legally consequential contexts requires active construction of normative frameworks adequate to machine learning's distinctive accountability challenges; to comparative law by demonstrating that the documentary versus testimonial distinction in notarial function is more decisive than technological capability in determining the transferability of digital notarization reforms across jurisdictions; and to algorithmic governance by providing a concrete sectoral case study establishing that general AI ethics principles are operationally meaningful only when translated into domain-specific regulatory requirements. Three directions for future research are most urgent: empirical performance evaluation of AI systems applied specifically to Indonesian notarial deed corpora across all deed types and demographic characteristics; judicial reception studies examining how Indonesian courts characterize AI-assisted instruments under existing evidentiary doctrine; and political economy analysis of professional resistance identifying which transitional support mechanisms have most effectively managed analogous resistance in comparable civil law jurisdictions. Realizing this agenda, and converting Indonesia's institutional unpreparedness into operational readiness, requires deliberate and coordinated collaboration among the Ministry of Law and Human Rights to provide statutory authorization, INI to exercise professional leadership and co-design pilot framework standards, the National Cyber and Encryption Agency (BSSN) to translate governance principles into auditable security requirements, the Ministry of Communication and Digital Affairs to integrate existing electronic certification infrastructure into the pilot framework, academic institutions to produce the empirical evaluations that evidence-based standard-setting requires, and technology providers to engage constructively with regulatory design rather than treating normative uncertainty as an invitation to deploy AI tools without governance, none of whom can accomplish this transition alone, and all of whom must act in the coordinated sequence the three-phase roadmap specifies.

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Acknowledgment

None.

Funding Information

None.

Conflicting Interest Statement

The authors state that there is no conflict of interest in the publication of this article.

Publishing Ethical and Originality Statement

All authors declared that this work is original and has never been published in any form and in any media, nor is it under consideration for publication in any journal, and all sources cited in this work refer to the basic standards of scientific citation.

Generative AI Statement Statement

N/A