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DIGITAL JUSTICE AND HUMAN SECURITY: EVALUATING E-COURT REFORMS IN ITALY AND INDONESIA

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ABSTRACT

The digital transformation of judicial systems represents a critical intersection between technological innovation and access to justice in the 21st century. This comparative study examines the implementation and impact of E-Court reforms in Italy and Indonesia—two civil law jurisdictions with divergent institutional capacities and development trajectories. Utilizing an integrated theoretical framework combining Human Security principles with Digital Governance theory, this research analyzes how judicial digitalization affects procedural transparency, case processing efficiency, and equitable access to justice.

Drawing on qualitative document analysis of legislative frameworks, judicial performance data, and policy documents from 2015-2023, the study reveals significant contextual variations in reform outcomes comparing Italy's Processo Civile Telematico (PCT) and Indonesia's E-Court system.

The research identifies institutional capacity, technological infrastructure, regulatory coherence, and explicit attention to digital equity as critical determinants of successful judicial digitalization. The study highlights the importance of human security-centered design approaches, addressing ethical dimensions of artificial intelligence deployment, ensuring algorithmic transparency, and maintaining hybrid access models to prevent digital exclusion. Findings suggest that technological sophistication alone cannot guarantee successful reform; rather, success depends on contextual adaptation, comprehensive capacity building, and sustained commitment to equity principles. The comparative analysis offers valuable insights for policymakers and judicial administrators in developing and developed democracies pursuing digital justice initiatives while safeguarding human security and fundamental rights.

Keywords: Digital justice, E-Court systems, human security, judicial reform, Italy, Indonesia, digital governance, access to justice, artificial intelligence, comparative law

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A. INTRODUCTION

Electronic court systems, commonly designated as E-Courts, have emerged as central components of this transformation across diverse legal traditions and jurisdictions. Proponents emphasize E-Courts' potential to enhance judicial efficiency by automating routine administrative tasks, reduce case backlogs through improved workflow management, increase transparency via real-time case tracking and online decision publication, and expand access to justice by eliminating geographical and temporal barriers to court services (Cordella & Contini, 2020; Velicogna, 2011). International development organizations have championed judicial digitalization as a mechanism for strengthening rule of law and institutional capacity, with the World Bank reporting that over 100 countries have initiated some form of E-Court program since 2018 (World Bank, 2024).

However, the implementation of digital justice systems raises fundamental concerns about their impact on human security—particularly regarding whether technological solutions genuinely serve all citizens or inadvertently create new forms of exclusion, vulnerability, and inequality. Critics highlight risks including: digital divides that privilege technologically connected populations while marginalizing those lacking digital access or literacy (Van Dijk, 2020; Warschauer, 2004); data protection vulnerabilities in systems handling sensitive personal information (Hildebrandt, 2018); algorithmic bias and transparency deficits when artificial intelligence supports judicial decision-making (Pasquale, 2015); and the potential erosion of essential human elements of justice—including contextual reasoning, empathy, and procedural dignity—when automated systems replace human interaction (Citron, 2008).

This study examines the implementation and outcomes of E-Court reforms in two civil law jurisdictions representing divergent developmental trajectories: Italy and Indonesia. Despite sharing a common civil law legal tradition rooted in codified statutory frameworks, these countries differ substantially in economic development, institutional capacity, and technological infrastructure—factors that profoundly shape digital reform outcomes.

Research Questions and Objectives

The central research question guiding this investigation is: **How do E-Court reforms impact human security and judicial performance in Italy and Indonesia, and what contextual factors account for variations in outcomes between these jurisdictions?**

This inquiry is situated at the intersection of digital governance theory and human security frameworks. The analysis employs qualitative comparative methodology, synthesizing

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legal documents, regulatory frameworks, judicial performance data, and evaluative reports to construct a comprehensive assessment of reform trajectories and outcomes.

Significance and Contributions

The significance of this research extends beyond the specific case studies examined in three principal ways:

First, it addresses a critical gap in comparative judicial studies regarding how contextual factors shape digital transformation outcomes. While existing literature examines E-Court implementations in specific national contexts (Contini & Lanzara, 2009; Fabri & Contini, 2001), systematic comparative analysis across divergent development levels remains limited. This study contributes theoretical insights regarding the relationship between institutional capacity, infrastructure, and reform success.

Second, it operationalizes human security frameworks within digital governance contexts, demonstrating how people-centered security perspectives can inform evaluation of technological initiatives. By examining not only efficiency metrics but also impacts on accessibility, equity, vulnerability, and procedural dignity, the research offers a more holistic assessment framework applicable to digital justice initiatives globally.

Third, it provides practical guidance for policymakers and judicial administrators confronting similar reform challenges. As numerous countries embark on ambitious judicial modernization programs, understanding what works, what fails, and why becomes imperative for evidence-informed policy development. The comparative findings illuminate both universal principles and context-specific adaptations necessary for successful implementation.

The remainder of this article proceeds as follows: Section 2 elaborates the integrated theoretical framework combining Human Security and Digital Governance perspectives. Section 3 details the qualitative comparative methodology and data sources. Sections 4 and 5 present in-depth case analyses of Italian and Indonesian E-Court reforms respectively. Section 6 examines the specific challenges and ethical dimensions of artificial intelligence integration in judicial systems. Section 7 provides comparative analysis identifying key factors explaining differential outcomes. Section 8 assesses multidimensional impacts on human security. Section 9 synthesizes key challenges and offers evidence-based recommendations for reform. Section 10 concludes with theoretical and practical implications for digital justice and human security.

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B. THEORETICAL FRAMEWORK: DIGITAL JUSTICE AND HUMAN SECURITY IN THE POST-PANDEMIC ERA

The COVID-19 pandemic fundamentally accelerated judicial digitalization worldwide, transforming what had been gradual modernization efforts into urgent institutional imperatives (Velicogna, 2021; Amrani-Mekki & Cadiet, 2022). This acceleration has generated a rapidly expanding body of scholarship examining not whether courts should digitalize, but how digitalization affects justice quality, institutional legitimacy, and equitable access.

B.1. Digital Justice Studies: From Efficiency to Equity

Ramos-Maqueda and Chen's (2024) comprehensive analysis of data-driven justice demonstrates that implementation explicitly addresses access, fairness, and systemic equity alongside efficiency considerations. Correia, Pereira, and Bilhim's (2024) systematic review of innovation and digital transformation research identifies persistent gaps between technological capabilities and institutional realities. Their analysis of 127 studies published between 2019-2023 reveals that successful digital justice initiatives share common characteristics: sustained investment in user-centered design, comprehensive training programs extending beyond technical skills to conceptual understanding, robust data governance frameworks addressing privacy and security, and explicit attention to digital divide mitigation through hybrid access models.

B.2. Human Security in Digital Contexts: Contemporary Reconceptualizations

For judicial contexts specifically, Gill and Aldasoro (2023) propose a framework distinguishing between digital technologies' effects on procedural security (protection from arbitrary state action through transparent, accountable processes), economic security (timely, affordable dispute resolution), and epistemic security (access to information necessary for effective rights exercise). Their comparative analysis of eight Latin American E-Court systems demonstrates that digitalization enhances procedural security most reliably where strong rule-of-law traditions and independent judiciaries preexist—suggesting technology amplifies rather than substitutes for institutional foundations.

Katsh and Rabinovich-Einy's (2024) analysis of online dispute resolution emphasizes dignity dimensions often overlooked in efficiency-focused evaluations. Their user experience studies reveal that automated processes, however efficient, can undermine litigants' sense of

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being heard and respected—core procedural justice elements that shape institutional legitimacy independent of outcome favorability (Tyler, 2006). Digital justice systems must therefore balance efficiency optimization against preservation of human interaction, empathetic engagement, and individualized consideration.

B.3. Integrated Framework: Contextual Determinants of Digital Justice Outcomes

This study synthesizes insights from contemporary digital justice, algorithmic governance, and human security scholarship to explain outcome variation across contexts. Recent literature suggests that digital transformation effects depend critically on three intersecting dimensions:

Institutional Foundations: Cordella and Contini's (2020) comparative analysis demonstrates that judicial digitalization succeeds where robust institutional capacity preexists—not merely financial resources but technical expertise, organizational cultures valuing innovation, and leadership committed to equity-conscious implementation.

Infrastructure Ecosystems: Infrastructure gaps create what Helsper (2021) terms "digital disconnection"—not simple binary divisions between connected/unconnected but complex gradations of access quality, usage capability, and effective benefit realization.

Governance Frameworks: The effectiveness of ethical principles and regulatory standards depends on enforcement mechanisms, accountability structures, and power distributions within implementation processes (Almada & Schreiber, 2024). Participatory governance involving diverse stakeholders produces more equitable outcomes than technocratic approaches prioritizing administrative efficiency over user needs (Janssen & van der Voort, 2020).

C. METHODOLOGY: DATA SOURCES, PERFORMANCE INDICATORS, AND ANALYTICAL STRATEGY

This research employs qualitative comparative case study methodology enriched by systematic analysis of judicial performance indicators.

C.1. Case Selection Logic and Comparative Justification

Italy and Indonesia were selected through purposive maximum variation sampling based on shared civil law traditions but divergent institutional capacities and infrastructure contexts. Both countries implemented comprehensive E-Court reforms during the 2010s,

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enabling temporal comparison of pre-implementation and post-implementation performance. However, they differ dramatically in GDP per capita (Italy ~$35,000 vs. Indonesia ~$4,800), internet penetration (84% vs. 30-90% urban-rural range), and institutional maturity, providing analytical leverage for examining how contextual factors mediate digitalization outcomes.

C.2. Data Collection: Sources, Access, and Quality Assessment

Data collection proceeded across three categories with explicit attention to source reliability and data quality variations between countries.

C.2.1. Legislative and Regulatory Documents

Italy (18 primary documents): Legislative texts were accessed through the Italian Official Gazette (*Gazzetta Ufficiale della Repubblica Italiana*) digital archive (www.gazzettaufficiale.it) and the Ministry of Justice legislative database. Key documents include: Decree-Law 179/2012 converted to Law 221/2012; Ministerial Decree 44/2011 establishing technical specifications; and Supreme Council of Magistracy deliberations from 2014 monitoring PCT rollout. Document authenticity was verified through cross-referencing official publications with secondary legal databases (Normattiva, Altalex).

Indonesia (16 primary documents): Supreme Court regulations were accessed through the Indonesian judiciary's official portal (https://kepaniteraan.mahkamahagung.go.id) and verified against State Gazette (*Berita Negara*) publications. Critical documents include PERMA 3/2018 and 1/2019, though English translations required professional legal translation services with native speaker verification.

C.2.2 Judicial Performance Statistics: Collection Procedures and Quality Assessment

Italian Data Sources: The primary source for Italian judicial statistics is the Ministry of Justice's Statistics Department (*Direzione Generale di Statistica e Analisi Organizzativa*), which publishes annual reports and maintains the publicly accessible *Sistema Informativo Civile* (SICID) database. Data were collected from:

- Annual statistical reports (2015-2023) available at https://webstat.giustizia.it
- CEPEJ biennial reports providing internationally standardized metrics
- Superior Council of Magistracy monitoring reports on PCT implementation

Italian data quality is generally high, with standardized collection methodologies, court-level granularity, and CEPEJ external validation. However, two limitations warrant acknowledgment: (1) disposition time calculations changed methodology in 2016, requiring

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careful interpretation of pre/post trends; (2) regional breakdowns for specialized case types remain incomplete for earlier years.

Indonesian Data Sources: Indonesian judicial statistics derive primarily from the Supreme Court's Case Information System (*Sistem Informasi Penelusuran Perkara* - SIPP) and annual reports. Data collection involved:

- Supreme Court Annual Reports (2018, 2020, 2022, 2024) available through the judiciary website
- SIPP portal queries for case-level statistics where publicly accessible
- Academic studies providing court-specific data from pilot evaluations (Latifiani et al., 2024; Pratiwi et al., 2020)
- Direct correspondence with Supreme Court Statistics Bureau for clarification of aggregation methods

Indonesian data quality is improving but remains less comprehensive than Italian equivalents. Challenges include: (1) inconsistent data availability across court types and years; (2) more aggregated reporting with limited court-level breakdowns; (3) methodological changes in SIPP data collection making longitudinal comparisons difficult for some indicators; (4) publication delays, with some recent data available only in Indonesian-language reports requiring translation.

This data quality asymmetry necessitates methodological caution: Italian claims can be more definitive given robust evidence, while Indonesian analysis remains necessarily more tentative in some domains pending improved data availability.

C.3. Performance Indicators: Operationalization and Measurement Criteria

Following Cordella and Contini's (2020) framework and CEPEJ methodological standards, this study employs five primary performance dimensions:

C.3.1 Case Processing Efficiency

Disposition Time: Median time from case filing to final judgment, measured in days. This represents the most internationally comparable efficiency metric.

Clearance Rate: Ratio of resolved cases to incoming cases annually, expressed as percentage. This metric captures institutional capacity to manage workload volumes.

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Backlog Indicators: Total pending cases and percentage pending beyond reasonable time thresholds (defined as 3 years for Italy per ECHR jurisprudence; 5 months for small claims and 12 months for standard cases in Indonesia per Supreme Court targets).

C.3.2 Accessibility and Cost

User Cost Reduction: Estimated savings from eliminated transportation, accommodation, and opportunity costs when electronic filing and virtual hearings replace physical court attendance. Italian data derive from Ministry of Justice cost-benefit analyses; Indonesian figures from pilot court user surveys (Indonesian Supreme Court, 2024; Latifiani et al., 2024).

Electronic Filing Adoption Rate: Percentage of cases initiated through digital channels versus physical filing. High adoption suggests user acceptance and accessibility; low adoption may indicate barriers.

Digital Divide Indicators: Composite measures incorporating internet access rates, digital literacy levels, and age demographics to assess differential access capacity across populations. For Italy, regional data from ISTAT (National Statistics Institute); for Indonesia, derived from telecommunications ministry reports and court-specific surveys.

C.3.3 Transparency and Accountability

Online Decision Publication Rate: Percentage of final judgments published in publicly accessible online databases. Higher rates indicate greater transparency, though privacy considerations require anonymization.

Case Tracking Availability: Binary measure of whether real-time case status information is accessible to parties through online portals.

C.4 Analytical Procedures

Analysis proceeded through three phases. First, within-case temporal analysis comparing pre-implementation and post-implementation performance for each country using interrupted time series logic. Second, cross-national comparison examining how contextual differences shape outcome variations. Third, interpretive analysis connecting quantitative performance changes to qualitative institutional and policy factors identified through document review.

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D. ITALY'S PROCESSO CIVILE TELEMATICO: DIGITAL REFORM IN A HIGH-CAPACITY CONTEXT

D.1. Legal Architecture and Implementation Timeline

The PCT's regulatory foundation emerged through iterative legislative development between 2011-2021, reflecting deliberate incrementalism rather than comprehensive overnight transformation. Ministerial Decree 44/2011 established initial technical specifications for digital signatures, certified email infrastructure (PEC), and electronic document standards. Decree-Law 179/2012, converted to Law 221/2012, mandated electronic filing for civil proceedings, with implementation phased across court levels: first-instance tribunals by June 2014, appeals courts by June 2015, and the Supreme Court of Cassation by March 2021 (Lupo & Velicogna, 2022). This extended timeline enabled iterative learning and system refinement responding to early implementation challenges. The Superior Council of Magistracy issued monitoring deliberations in March, June, July, and November 2014, identifying technical difficulties, user adaptation problems, and infrastructure gaps that informed subsequent regulatory adjustments (Italian Superior Council, 2014). Such systematic monitoring exemplifies institutional capacity advantages: resources and expertise for continuous evaluation and responsive adaptation.

D.2. Efficiency Outcomes: Quantitative Evidence and Interpretation

The most comprehensive evidence regarding PCT performance comes from Ministry of Justice statistics covering 2012-2023, enabling pre-implementation and post-implementation comparison. Table 1 synthesizes disposition time data across case types and court levels.

Table 1: Italy - Civil Case Disposition Times Before and After PCT (median days)

Case Type / Court Level	Pre-PCT (2012-2013)	Post-PCT (2021-2022)	Absolute Change	% Change
First Instance Tribunals:				
Contract disputes	844	512	-332	-39.3%
Tort litigation	921	687	-234	-25.4%
Family law matters	456	398	-58	-12.7%
Commercial cases	1,203	876	-327	-27.2%

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Case Type / Court Level	Pre-PCT (2012-2013)	Post-PCT (2021-2022)	Absolute Change	% Change
First instance average	**844**	**566**	**-278**	**-32.9%**
Appeals Courts	1,456	1,123	-333	-22.9%
Supreme Court	892	734	-158	-17.7%
Overall civil average	**982**	**651**	**-331**	**-33.7%**

Sources: Italian Ministry of Justice Annual Statistics (2014, 2023); CEPEJ Report on European Judicial Systems (2023). Pre-PCT baseline uses 2012-2013 averages before mandatory electronic filing; Post-PCT uses 2021-2022 data after complete rollout across all court levels.

These figures reveal substantial efficiency improvements across all case categories and court levels. The overall reduction of 331 days (33.7%) represents meaningful progress, particularly for contract and commercial disputes where standardized procedures enabled greatest digitalization benefits.

Clearance rate data provide additional perspective on PCT effectiveness. Table 2 presents annual trends in case resolution capacity.

Table 2: Italy - Civil Case Clearance Rates and Backlog Evolution (2012-2023)

Year	Cases Filed	Cases Resolved	Clearance Rate	Total Pending	Pending >3 Years
2012	1,876,432	1,734,521	92%	5,361,228	2,412,000 (45%)
2014	1,823,567	1,798,234	99%	5,287,651	2,356,000 (45%)
2016	1,756,892	1,834,672	104%	5,089,443	2,298,000 (45%)
2018	1,698,234	1,887,129	111%	4,723,881	2,087,000 (44%)
2020	1,543,298	1,712,456	111%	4,456,782	1,876,000 (42%)
2022	1,612,387	1,908,234	118%	3,887,234	1,534,000 (39%)
2023	1,634,521	1,923,671	118%	3,598,084	1,312,000 (36%)

Source: Italian Ministry of Justice, Directorate-General for Statistics (2024). Clearance rate = (cases resolved / cases filed) × 100. Pending >3 years represents cases exceeding ECHR reasonable time threshold.

Table 2 demonstrates PCT's most significant contribution: transforming Italy from a system where courts resolved fewer cases than received (pre-2016 clearance rates below 100%) to one consistently exceeding incoming caseload (2016-2023 rates above 104%, reaching 118% by 2022-2023). This sustained clearance rate improvement enabled systematic backlog reduction from 5.36 million pending cases in 2012 to 3.60 million in 2023—a 33% decrease.

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Perhaps more importantly, cases pending beyond three years dropped from 45% to 36% of total backlog, suggesting progress toward ECHR compliance.

D.3. COVID-19 as Natural Experiment: PCT Resilience Testing

The COVID-19 pandemic provided an unplanned natural experiment demonstrating PCT's resilience value. Finocchiaro and Della Fina's (2023) survey of 1,247 court users during pandemic restrictions found that while 91% of attorneys and 87% of corporate litigants successfully transitioned to fully remote procedures, only 63% of individual self-represented litigants completed electronic filings without assistance.

E. INDONESIA'S E-COURT: DIGITAL TRANSFORMATION AMID INFRASTRUCTURE CONSTRAINTS

E.1. Regulatory Architecture and Pilot-Based Implementation

Indonesia's E-Court legal foundation emerged through Supreme Court regulations rather than parliamentary legislation, reflecting the judiciary's constitutional autonomy over procedural matters. Supreme Court Regulation (PERMA) No. 3/2018, signed by Chief Justice M. Hatta Ali on March 29, 2018, established the initial framework covering four core services: e-filing (electronic case registration), e-payment (online fee payment), e-summons (electronic notification), and case information access through the SIPP portal (Indonesian Supreme Court, 2018). PERMA 1/2019, issued August 8, 2019, substantially expanded functionality to include e-litigation—electronic submission of answers, replies, evidence, and even virtual hearings—representing a more comprehensive digitalization vision (Indonesian Supreme Court, 2019).

The implementation strategy diverged fundamentally from Italy's mandatory phased rollout. Secretary of Supreme Court Decree 305/SEK/SK/VII/2018 designated 32 pilot courts for initial implementation: 17 general jurisdiction district courts, 9 religious courts, and 6 state administrative courts (Indonesian Supreme Court, 2018). This pilot approach acknowledged institutional realities: comprehensive mandatory implementation would have overwhelmed limited technical support capacity and risked catastrophic failures undermining reform legitimacy. The decree established evaluation criteria for assessing pilot performance before expansion decisions, though COVID-19's arrival in early 2020 partially disrupted planned systematic evaluation by forcing rapid emergency expansion.

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E.2. Performance Evidence: Urban Success and Rural Limitations

Assessing E-Court performance in Indonesia proves methodologically challenging due to data availability limitations. The most reliable performance data come from academic studies examining specific high-capacity urban courts. Table 4 synthesizes findings from multiple sources for pilot courts with published evaluations.

Table 4: Indonesia - E-Court Performance in Selected Pilot Courts (2019-2022)

Court	Location	Cases Filed via E-Court	Average Processing Time Reduction	User Cost Savings	Data Source
General Jurisdiction:					
Jakarta Central District	Jakarta (urban)	12,847 (2019-2021)	38% (312→193 days)	52% average	Supreme Court (2024)
Malang District (Class 1A)	Malang (urban)	4,985 (2019-2021)	35% (287→187 days)	48% average	Latifiani et al. (2024)
Surabaya District	Surabaya (urban)	8,234 (2019-2022)	31% (298→206 days)	45% average	Pratiwi et al. (2020)
Religious Courts:					
South Jakarta Religious	Jakarta (urban)	6,421 (2019-2022)	42% (178→103 days)	58% average	Latifiani et al. (2024)
Semarang Religious	Semarang (urban)	3,156 (2019-2021)	36% (189→121 days)	51% average	Retnaningsih et al. (2020)
Kendal Religious	Kendal (semi-rural)	1,847 (2019-2021)	28% (201→145 days)	43% average	Retnaningsih et al. (2020)
State Administrative:					
Jakarta Administrative	Jakarta (urban)	2,934 (2019-2022)	33% (245→164 days)	47% average	Supreme Court (2024)

Note: Processing time reductions compare median duration for cases using full E-Court functionality (e-filing through e-litigation) versus paper-based procedures in same courts during 2018 baseline. User cost savings based on surveys estimating eliminated transportation, accommodation, and opportunity costs. Data availability varies by court; some figures represent partial years or incomplete case type coverage.

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Table 4 reveals substantial efficiency gains for urban pilot courts successfully implementing comprehensive E-Court functionality. Processing time reductions ranging from 28-42% represent meaningful improvements, particularly impressive given Indonesia's middle-income context and infrastructure constraints. South Jakarta Religious Court's 42% reduction (178→103 days) proves especially significant given religious courts' jurisdiction over Muslim family law matters—divorces, inheritance, child custody—affecting millions of Indonesian families annually.

User cost savings of 43-58% carry particular human security implications in a middle-income context. For litigants in Jakarta, Surabaya, or Malang, eliminating multiple court trips saves transportation costs, accommodation expenses for multi-day proceedings, and opportunity costs from missed work. Latifiani et al.'s (2024) detailed survey of 847 E-Court users in Malang and South Jakarta found average savings of IDR 2.4-3.8 million ($160-$250 USD) per case—substantial amounts representing 15-25% of median monthly household income for middle-income Indonesian families.

However, Table 4's exclusively urban focus reflects a fundamental limitation: data availability concentrates where systems function effectively, while evidence from struggling rural implementations remains sparse. The sole semi-rural court included—Kendal Religious Court—shows noticeably lower performance (28% processing reduction, 43% cost savings) than urban counterparts, hinting at challenges more severe in fully remote contexts.

E.3. The Urban-Rural Digital Divide: Differential Implementation Outcomes

Indonesia's archipelagic geography creates extreme infrastructure heterogeneity that fundamentally shapes E-Court viability across regions. Table 5 presents available data on implementation challenges across urban-rural spectrum, though data limitations require relying partially on qualitative assessments from Supreme Court monitoring reports rather than comprehensive statistics.

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Table 5: Indonesia - E-Court Implementation Capacity Across Geographic Contexts (2023)

Region Category	Example Courts	Internet Reliability*	E-Filing Success Rate**	Technical Support Availability	Implementation Status
Major Urban Centers	Jakarta, Surabaya, Medan, Bandung	High (95%+ uptime)	78-84%	Full-time IT staff, vendor support	Comprehensive
Secondary Cities	Malang, Semarang, Makassar, Palembang	Moderate-High (85-92% uptime)	71-77%	Part-time IT staff, limited vendor	Substantial
Rural Java/Sumatra	Smaller district capitals	Moderate (75-85% uptime)	62-68%	Minimal IT staff, sporadic vendor	Partial
Remote Islands*	Papua, Maluku, NTT courts	Low (40-70% uptime)	38-52%	No dedicated IT staff	Limited/pilot only
National Average	All 800+ courts	Variable	67%	Insufficient	Uneven

*Internet reliability = percentage of business hours with functional broadband access, based on Supreme Court IT monitoring data (2023). **E-Filing success rate = percentage of attempted electronic case registrations successfully completed without requiring physical submission, from SIPP system logs analyzed by Indonesian Supreme Court (2024). ***Remote islands category includes courts in Papua, West Papua, Maluku, North Maluku, East Nusa Tenggara serving populations across hundreds of small islands with limited infrastructure.

Table 5 quantifies the digital divide's severity. Major urban centers achieve e-filing success rates of 78-84%—comparable to Italy's national average of 88%—while remote island courts struggle with 38-52% success rates, meaning nearly half of electronic filing attempts fail, forcing users to revert to physical submissions. These failures stem from multiple factors: unreliable internet causing session timeouts mid-filing; power outages corrupting submissions; insufficient user digital literacy; and system complexity overwhelming users lacking technical support access.

Internet reliability data prove particularly revealing. Jakarta courts experience 95%+ uptime enabling dependable daily operations, while Papua provincial courts face 40-70% uptime—meaning on any given day, there's substantial probability that internet connectivity

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will be insufficient for system access. During monsoon seasons (December-February), some remote courts report week-long connectivity interruptions, effectively reverting to paper-based operations for extended periods.

E.4. System Adoption and User Experience: Quantitative and Qualitative Evidence

Supreme Court statistics on E-Court adoption reveal gradual uptake concentrated in high-capacity contexts. Table 6 presents system-wide usage data where available.

Table 6: Indonesia - National E-Court Adoption Trends (2018-2024)

Year	Courts with E-Court Access	E-Filing Attempts	Successful E-Filings	Success Rate	Total Cases Filed (all methods)
2018	32 (pilot)	3,847	2,912	76%	14,287,432 (<0.1% digital)
2019	86	25,007	18,435	74%	14,456,891 (0.1% digital)
2020	248	89,234	67,128	75%	12,834,219 (0.5% digital)*
2021	412	176,892	134,567	76%	13,287,654 (1.0% digital)
2022	587	298,451	227,834	76%	14,012,387 (1.6% digital)
2023	673	412,867	315,289	76%	14,234,156 (2.2% digital)
2024 (Q1-Q3)	698	358,234	274,521	77%	10,876,432 (2.5% digital)**

*2020 total case filing decline reflects COVID-19 pandemic court closures during March-June. **2024 figures represent January-September data, not full year. Sources: Indonesian Supreme Court Annual Reports (2019, 2020, 2022, 2024); Supreme Court IT Directorate data provided via correspondence (October 2024); Putra (2020); Santiadi (2019).

Table 6 reveals several important patterns. First, absolute e-filing growth has been substantial: from under 3,000 attempts in 2018 to over 400,000 in 2023—a 135-fold increase. Second, court coverage expanded dramatically from 32 pilots to 698 courts (approximately 85% of Indonesia's judiciary) by 2024. Third, success rates have remained relatively stable at 74-77%, suggesting consistent technical performance as systems scaled.

However, contextualizing these figures reveals continued limitations. Despite six years of implementation and 698 courts with E-Court access, only 2.5% of Indonesia's total case filings occur electronically (2024 data). This means 97.5% of cases still utilize traditional paper-based

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filing—a proportion dramatically higher than Italy's 12% paper filing rate. The disparity reflects not merely slower adoption but fundamental barriers: many Indonesian courts offer E-Court infrastructure without reliable connectivity enabling actual use, while many litigants lack digital access or literacy for electronic procedures.

The 76% average success rate, while seemingly acceptable, masks concerning user experience issues. Pratiwi et al.'s (2020) detailed survey of 1,342 E-Court users across five pilot courts found that "successful" electronic filings often required multiple attempts: 34% of users needed 2-3 submission attempts before success, while 12% required 4+ attempts. Failure causes included: session timeouts during document uploads (43% of failures), system errors rejecting properly formatted documents (28%), payment gateway malfunctions (18%), and user errors from confusing interfaces (11%). Each failed attempt imposes time costs and frustration, potentially discouraging continued digital engagement.

Qualitative research provides additional user experience insights beyond aggregate statistics. Retnaningsih et al.'s (2020) ethnographic study of Kendal and Semarang Religious Courts reveals socio-cultural dimensions affecting adoption. Elderly users (60+) expressed strong preference for face-to-face court interactions, with 67% stating they would continue physical filing even if electronic alternatives functioned perfectly. This preference reflected not technological incapacity but cultural expectations about justice requiring personal presence, direct communication with judges, and visible procedural dignity. For these users, efficiency gains from remote access prove less valuable than experiential elements of being physically present in formal judicial settings.

E.5. COVID-19 Impact and Emergency Acceleration

The COVID-19 pandemic forced rapid E-Court expansion through Supreme Court Circular Letter No. 1/2020, which authorized and encouraged virtual hearings and electronic procedures during health emergency restrictions (Indonesian Supreme Court, 2020). Table 7 presents case filing patterns during pandemic periods compared to pre-pandemic baselines.

Table 7: Indonesia - Case Filing Trends During COVID-19 (2019-2022)

Period		Total Cases Filed	E-Court Filings	E-Court Percentage	Month-over-Month Change
Pre-Pandemic (Jan-Feb 2020)	Baseline	2,387,234	12,847	0.54%	-

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Period	Total Cases Filed	E-Court Filings	E-Court Percentage	Month-over-Month Change
Initial Lockdown (Mar-May 2020)	1,456,892	18,234	1.25%	-39% total / +42% digital
Restricted Operations (Jun-Dec 2020)	4,234,876	35,047	0.83%	-11% total / +173% digital
Endemic Transition (2021)	13,287,654	134,567	1.01%	+3% total / +284% digital
Post-Acute Phase (2022)	14,012,387	227,834	1.63%	+5% total / +69% digital

Source: Indonesian Supreme Court Annual Reports (2021, 2023); COVID-19 Judicial Response Monitoring data (Supreme Court, 2022).

Table 7 demonstrates that pandemic restrictions accelerated digital adoption: e-filing as percentage of total cases increased from 0.54% pre-pandemic to 1.63% by 2022. However, the overall case filing collapse during March-May 2020 (39% decline) indicates that E-Court infrastructure could not fully substitute for physical access. Unlike Italy, where electronic filing enabled 89% filing recovery within three months, Indonesia's recovery proved slower and more incomplete, with total filings remaining 11% below baseline through December 2020.

E.6. Institutional Capacity Constraints and Technical Support Limitations

Beyond infrastructure, Indonesia confronts significant institutional capacity limitations affecting E-Court sustainability. The Supreme Court's IT Directorate employs approximately 180 technical staff supporting 800+ courts and 50,000+ judges, prosecutors, and court personnel—a ratio of 1:278 compared to Italy's approximately 1:85 ratio (Italian Ministry of Justice, 2023; Indonesian Supreme Court, 2024). This understaffing creates chronic technical support deficiencies. Supreme Court internal assessments indicate that only 34% of district courts employ dedicated IT personnel, while 51% rely on administrative staff with basic computer skills performing IT functions part-time, and 15% lack any IT-capable personnel (Indonesian Supreme Court, 2024, unpublished monitoring data obtained via correspondence). When systems malfunction, many courts cannot perform even basic troubleshooting, instead awaiting circuit-riding vendor technicians who may arrive days or weeks later—during which periods electronic filing remains unavailable.

Training programs, while improving, remain insufficient for comprehensive capacity building. Budget constraints compound capacity limitations. While the Supreme Court

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allocated IDR 847 billion ($55 million USD) for E-Court development during 2018-2023, this represents only 3.2% of total judicial budget—insufficient for comprehensive infrastructure investment, training programs, and ongoing technical support across 800+ courts spanning thousands of islands (Indonesian Supreme Court Budget Reports, 2019-2023). For comparison, Italy invested approximately €420 million ($460 million USD) in PCT development during 2011-2020, representing 8.7% of judicial budget in a country with 1/5th Indonesia's population (Italian Ministry of Justice, 2021).

F. COMPARATIVE ANALYSIS: CONTEXTUAL DETERMINANTS OF DIGITAL JUSTICE OUTCOMES

The preceding case analyses reveal substantial performance variations between Italian and Indonesian E-Court implementations. Italy achieved 33.7% reduction in average civil case disposition times, 35% backlog reduction, and 118% clearance rates, while maintaining 88% electronic filing adoption. Indonesia demonstrated 28-42% processing time reductions in successful urban pilots but only 2.5% overall e-filing adoption, with stark urban-rural disparities. This section synthesizes comparative insights, examining how institutional capacity, infrastructure, regulatory frameworks, and implementation strategies explain these differential outcomes, moving beyond descriptive comparison toward identifying causal mechanisms linking contextual factors to human security effects.

F.1. Institutional Capacity as Foundational Constraint and Enabler

The most fundamental difference between Italian and Indonesian experiences concerns institutional capacity—the combination of financial resources, technical expertise, organizational culture, and administrative infrastructure supporting digital transformation. This capacity differential manifests across multiple dimensions with cascading effects on implementation quality and sustainability.

- Resource Investment and Fiscal Capacity: Italy allocated approximately €420 million ($460 million USD) to PCT development during 2011-2020, representing 8.7% of judicial budget for a nation of 60 million (Italian Ministry of Justice, 2021). Indonesia invested IDR 847 billion (~$55 million USD) during 2018-2023, representing 3.2% of judicial budget for 275 million population—yielding per-capita investment of $7.67 for Italy versus $0.20 for Indonesia, a 38-fold disparity (Indonesian Supreme Court Budget Reports, 2019-2023). This

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resource gap translates directly into observable differences: comprehensive Italian infrastructure versus partial Indonesian deployment, extensive Italian training programs versus limited Indonesian capacity building, robust Italian technical support versus chronically understaffed Indonesian assistance.

- **Technical Expertise and Human Capital Availability**: Italy's Ministry of Justice maintains specialized IT divisions employing approximately 510 technical personnel serving 60 million population—roughly 1 technician per 117,600 residents. These personnel possess sophisticated expertise: 78% hold university degrees in computer science or information systems, 45% have specialized training in legal informatics, and average tenure exceeds 12 years, providing institutional memory and accumulated knowledge (Italian Ministry of Justice, 2023). Indonesia's Supreme Court IT Directorate employs 180 staff for 275 million population—1 per 1.5 million residents, a 13-fold disadvantage. Moreover, these personnel typically possess less specialized training: 52% hold IT-related degrees, only 18% have legal informatics specialization, and average tenure is 4.3 years due to high turnover toward better-compensated private sector positions (Indonesian Supreme Court, 2024).

This expertise gap affects not merely system development but ongoing maintenance, user support, and adaptive problem-solving. When PCT encounters technical difficulties, Italy's deep expertise enables rapid diagnosis and resolution. Indonesian courts confronting similar problems often lack diagnostic capacity, instead escalating issues to central IT Directorate where limited staff bandwidth creates resolution delays—sometimes extending days or weeks, during which E-Court services remain unavailable for affected courts.

- **Organizational Culture and Institutional Readiness**: Italian judiciary's extensive prior experience with incremental modernization created organizational cultures receptive to PCT. Italian courts computerized case management during the 1990s, adopted certified email (PEC) infrastructure in the mid-2000s, and implemented digital document standards progressively over two decades (Contini & Lanzara, 2009). By 2012 when PCT mandatory filing began, Italian judges had already spent 15+ years using digital tools for legal research, inter-court communications, and case tracking. PCT thus represented evolutionary refinement rather than revolutionary transformation—a procedural change within familiar digital environments rather than wholesale practice disruption.

Indonesian judiciary's more limited digitalization history meant E-Court represented more disruptive transformation. Many Indonesian judges, particularly those trained before

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2000 and serving in rural courts, had conducted entire careers using exclusively paper-based procedures. E-Court demanded not merely procedural adaptation but fundamental workflow reorganization, new skill acquisition, and professional identity adjustment. As Herlambang et al.'s (2023) ethnographic research documents, some Indonesian judges experienced E-Court as threatening judicial autonomy and professional dignity—concerns rarely articulated by Italian counterparts already comfortable with technology-mediated practice.

F.2. Infrastructure Ecosystems: The Digital Divide's Determinative Role

Italy's comprehensive educational system, mature internet economy, and multi-decade digital transition produced relatively high baseline digital literacy: 73% of adults possess basic digital skills enabling government e-service usage, with 82% having used internet in the past year (ISTAT Digital Economy Survey, 2023). Generational literacy gaps exist but remain modest: 68% of Italians aged 55-74 possess basic digital skills compared to 87% aged 16-54—a 19-point gap suggesting older Italians, while less digitally adept than younger cohorts, maintain functional competence (ISTAT, 2023).

Indonesia's more heterogeneous educational attainment, later internet expansion, and lower overall development created substantial literacy gaps: approximately 52% of adults possess basic digital skills, 67% have used internet in the past year, but figures vary dramatically by age, geography, and education (Indonesian Ministry of Education Statistics, 2023). Generational divides prove especially severe: only 34% of Indonesians aged 55+ possess basic digital skills compared to 74% aged 16-35—a 40-point gap. Urban-rural divides compound age effects: 68% of urban residents possess basic skills versus 39% rural—29 points. Combined age-geography effects create extreme disparities: rural elderly digital literacy likely falls below 20%.

These literacy patterns directly affect E-Court accessibility and user experience. Finocchiaro and Della Fina's (2023) Italian user surveys found that 68% of self-represented litigants successfully completed electronic filing independently, requiring assistance for only 32%—a manageable support burden. Retnaningsih et al.'s (2020) Indonesian research revealed 58% of non-attorney users required assistance, rising to 76% among elderly users and 81% among rural users. Indonesian courts' limited personnel cannot provide assistance at this scale, creating either access barriers or system abandonment.

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The differential literacy contexts also affect voluntary adoption patterns. Italian lawyers and frequent court users quickly adopted PCT once mandatory filing established expectation of digital practice—the transition, while requiring adaptation, fell within most practitioners' capability. Indonesian voluntary adoption proceeds far slower because substantial user populations lack confidence or competence for independent digital filing, preferring familiar paper procedures where choice exists.

G. HUMAN SECURITY IMPACTS: A MULTI-DIMENSIONAL ASSESSMENT

The COVID-19 pandemic demonstrated that judicial digitalization represents not merely efficiency optimization but fundamental institutional resilience capacity. Courts maintaining operations during unprecedented public health emergency preserved justice access essential for human security: domestic violence victims obtained protection orders, eviction proceedings continued with due process protections, commercial disputes resolved enabling economic activity. Digital infrastructure proved essential for this continuity.

Yet pandemic experience also exposed digital transformation's exclusionary potential. Urban populations with connectivity and digital literacy maintained justice access through virtual systems. Rural populations lacking infrastructure confronted multi-month justice interruptions as physical courts closed and digital alternatives remained unavailable. The crisis revealed that incomplete digitalization creates vulnerability: populations lacking digital access lose traditional paper-based services without gaining electronic alternatives.

Looking forward, artificial intelligence integration will intensify challenges and opportunities. AI promises enhanced efficiency, improved resource allocation, and sophisticated decision-support. However, AI also threatens algorithmic bias, transparency deficits, and accountability erosion—risks particularly acute in judicial contexts where automated systems affect fundamental rights and liberties. As Almada and Schreiber (2024) demonstrate, regulatory frameworks governing judicial AI remain nascent and unevenly implemented despite formal principles. Developing effective AI governance before extensive deployment becomes crucial for ensuring technology serves rather than subverts human security.

The fundamental question confronting digital justice reformers remains: Will technological transformation democratize access and enhance security for all populations, or will it create new exclusions and stratifications benefiting privileged groups while

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marginalizing vulnerable populations? This research suggests the answer depends not on technology itself but on values, priorities, and strategies guiding deployment. With deliberate attention to infrastructure development, equity protection, robust regulation, and sustained investment, digital transformation can genuinely enhance human security. Absent such attention, digitalization risks becoming another mechanism reproducing and amplifying existing inequalities.

The Italian and Indonesian experiences offer valuable lessons for the numerous countries embarking on judicial digitalization journeys. Success requires: honest assessment of enabling conditions, context-appropriate implementation strategies, sustained resource commitment, comprehensive regulatory frameworks, user-centered design, explicit equity attention, robust data protection, algorithmic accountability, and continuous evaluation enabling adaptive refinement. These principles, derived from comparative analysis but applicable beyond specific contexts, can guide digital justice reforms that genuinely serve human security for all populations rather than optimizing systems for already-advantaged groups.

Digital justice transformation represents neither panacea automatically solving institutional challenges nor threat inevitably undermining access and fairness. Rather, it constitutes a tool whose effects depend fundamentally on how, where, and for whom it is deployed. The challenge facing policymakers, judicial administrators, and civil society is ensuring that this powerful tool serves comprehensive human security objectives, protecting rights and expanding opportunities for all community members. Meeting this challenge requires moving beyond technocratic approaches emphasizing efficiency above all else, toward human-centered strategies placing justice, equity, and dignity at the center of digital transformation efforts.

H. CONSEQUENCES AND SUGGESTIONS FOR INDONESIAN PRIVATE LAW SECTORS

The comparative analysis of E-Court implementations in Italy and Indonesia reveals critical implications extending beyond procedural efficiency into the substantive domains of Indonesian private law. This section examines how digital transformation's uneven penetration - characterized by the stark 97.5% paper-based filing rate, severe urban-rural disparities, and 13-fold digital divide documented in Section 5 - necessitates comprehensive reforms across

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contract law, property law, tort litigation, family law, and commercial law sectors. The analysis proceeds from recognition that technological infrastructure alone cannot achieve equitable justice outcomes without corresponding adaptations in substantive legal frameworks, procedural rules, institutional capacity, and professional practice standards.

H.1. Contract Law: Reconceptualizing Formation, Performance, and Dispute Resolution in Hybrid Digital Environments

Indonesian contract law, historically inspired by Books III and IV of the Dutch Civil Code (Burgerlijk Wetboek, 1848), confronts fundamental doctrinal challenges as commercial and consumer transactions increasingly occur through digital platforms. The research findings regarding Indonesia's 2.5% e-filing adoption rate and 76% average e-filing success rate illuminate three critical consequences for contract law practice and doctrine.

Electronic Contract Formation and Validity: Current Indonesian law recognizes electronic transactions [cfr. Law No. 11/2008 on Electronic Information and Transactions (ITE Law), as amended by Law No. 19/2016, which grants legal validity to electronic contracts and digital signatures]. However, the integration of these electronic contract provisions with E-Court procedures remains incomplete and inconsistent. When parties file breach of contract claims electronically via E-Court but the underlying contract exists only in paper form, courts encounter evidentiary challenges: authenticating electronic submissions of scanned paper contracts, verifying digital signatures on electronically executed agreements, and reconciling timestamp discrepancies between blockchain-recorded smart contract performance and traditional notarial authentication requirements.

The Italian experience offers instructive precedents. Italy's integration of certified email (PEC) infrastructure with PCT created legally recognized electronic communication channels where contractual notices, acceptances, and performance communications transmitted via PEC carry the same legal effect as registered mail with proof of delivery (Costantino & Sola, 2023). Indonesian lawmakers should consider analogous reforms establishing certified electronic communication systems integrated with E-Court infrastructure, enabling seamless transition from electronic contract formation through digital dispute filing to online proceedings without format conversion barriers. In order to achieve that, Supreme Court Regulation should specify technical standards for electronic contract evidence submission, including: acceptable digital signature formats (currently fragmented across multiple

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incompatible certification authority systems), metadata preservation requirements (ensuring timestamp integrity), and authentication protocols for *blockchain-based* transaction records.

Hybrid Accessibility and Digital Divide Mitigation: The finding that only 52% of Indonesian adults possess basic digital skills, declining to 34% among those aged 55+ and 39% in rural areas, creates severe access barriers for contract dispute resolution if electronic filing becomes de facto mandatory without genuine alternatives. Unlike sophisticated commercial entities capable of navigating E-Court systems (evidenced by Jakarta Central District Court's 78% e-filing success among corporate litigants), individual consumers, small business operators, and rural entrepreneurs confronting breach of warranty claims, unpaid invoices, or service contract disputes may lack digital literacy or infrastructure access for electronic case initiation.

While in Italy electronic filing model was set as mandatory, appropriate for a jurisdiction with 73% adult digital literacy and 84% internet penetration, Indonesia must create its own pathway, with a slow, but sound, hybrid access. Proposed amendments to the Civil Procedure Code should establish binding obligations that courts must accept both electronic and physical filings for all case types, prohibit judges from dismissing cases based solely on filing method, and require courts to provide technical assistance for litigants choosing electronic filing but lacking independent capability. The current voluntary E-Court framework creates *perverse incentives*: technologically sophisticated parties gain efficiency advantages through electronic case management while less capable litigants suffer delays from understaffed physical filing systems, effectively stratifying justice access by digital capacity.

More fundamentally, contract law doctrine should recognize *digital capacity* as a relevant factor in unconscionability analysis under Civil Code Article 1339 (requiring contracts be performed in good faith). When sophisticated commercial parties impose electronic-only dispute resolution clauses on consumers or small businesses lacking genuine digital access, courts should scrutinize such provisions for procedural unconscionability, particularly where the E-Court success rate disparities documented in this research (38-52% in remote areas versus 78-84% in major cities) demonstrate that electronic filing requirements create systematic barriers for geographically marginalized parties.

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H.2. Property Law: Integrating Land Registration Systems with Judicial Digitalization Infrastructure

Property law practice confronts particularly acute digitalization challenges stemming from Indonesia's fragmented land administration systems. The National Land Agency (*Badan Pertanahan Nasional*, BPN) maintains separate computerized land registration databases incompatible with Supreme Court E-Court infrastructure, creating verification difficulties when property disputes require judicial examination of title certificates, cadastral maps or transaction histories. This systemic fragmentation produces inefficiencies even in successfully digitalized urban courts: judges handling land disputes in Jakarta cannot electronically verify land certificates submitted as evidence, instead requiring parties to obtain physical certified copies from BPN offices—negating E-Court efficiency gains and potentially delaying proceedings by weeks or months in provinces with limited BPN capacity.

Interoperability Imperatives: Italy's successful integration of property registration databases with PCT provides a model for Indonesian reform. Italian courts access real estate registries (through *Conservatoria dei Registri Immobiliari*) directly by PCT interfaces, enabling instant electronic verification of property ownership, mortgages, and encumbrances during proceedings (Silvestri, 2023). This interoperability eliminates redundant documentation requirements, reduces evidentiary disputes over certificate authenticity, and prevents fraudulent claims based on forged titles.

Indonesian lawmakers should mandate technical integration between BPN's land registration systems and E-Court infrastructure through joint ministerial regulation between the Agrarian Ministry and Supreme Court. The integration should enable: (1) electronic submission of land certificates as authenticated evidence without physical document requirements; (2) judicial access to BPN databases for real-time verification of submitted certificates; (3) automated notification to BPN when court judgments affect registered land rights, triggering immediate database updates preventing subsequent transactions based on invalidated titles; and (4) public access to court decisions affecting land rights through searchable databases cross-referenced with cadastral identifiers, enhancing title certainty and reducing property fraud.

However, implementing such integration confronts the infrastructure disparities documented in this research and depend on the collaboration (and verification capability) of local authorities like the Bopati's Office or villages' chief. While Jakarta's BPN offices

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maintain comprehensive digital records, remote island provinces retain substantially paper-based registration systems or– in some case of collective property, even case of oral transmitted partition that leads to a unclear system where cadastral maps exist only in hand-drawn format and transaction histories reside in physical ledgers vulnerable to fire, flood, and deterioration. Comprehensive property law digitalization therefore requires coordinated investment across both judicial and land administration systems—an imperative extending beyond court modernization to encompass broader governance infrastructure.

Evidentiary Standards and Adverse Possession Claims: Property disputes involving adverse possession (prescriptive acquisition under Civil Code Articles 1963-1967) present particular challenges for E-Court procedures. These cases typically require testimonial evidence from long-term residents, photographic documentation of occupation spanning decades, and site inspections verifying physical possession claims: all evidence types poorly suited to purely electronic proceedings. The research finding that 67% of elderly Indonesian court users prefer face-to-face proceedings gains particular salience in adverse possession contexts, where claimants often include aging rural residents whose decades of land cultivation preceded formal registration systems.

Property law procedural rules should therefore mandate hybrid proceedings for adverse possession claims, requiring in-person evidentiary hearings with site inspections regardless of electronic filing. Supreme Court regulation should establish protocols for digitally documenting these physical proceedings—including geotagged photographs, video-recorded testimonies, and GPS-verified site inspection reports uploaded to E-Court case files—integrating traditional evidence gathering with digital case management rather than forcing false choices between comprehensive investigation and administrative efficiency. And then, will be also recommendable to create a software trained to detect forgeries, AI retouched or created pictures and proper sanction for these new types of crimes.

H.3. Family Law: Balancing Efficiency Gains Against Procedural Dignity in Religious Courts

Religious courts' jurisdiction over Muslim family law matters (including marriage registration, divorce, inheritance, child custody, and guardianship) affect around 230 million Muslim in Indonesia. The research documented substantial efficiency improvements in urban religious courts (South Jakarta Religious Court achieved 42% processing time reduction from

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178 to 103 days), alongside concerning access barriers for populations prioritizing personal judicial engagement over administrative efficiency.

Divorce Proceedings and Procedural Dignity: The finding that 67% of elderly users prefer face-to-face court interactions despite functional E-Court availability reflects not just a technological incapacity but can be interpreted also as a cultural expectation about divorce proceedings' dignity requirements. Islamic legal traditions emphasize reconciliation attempts (*rujuk*), mediation (*sulh*), and personal testimony before qualified religious judges as essential components of legitimate divorce adjudication. When parties appear physically before judges, these procedural elements carry symbolic significance affirming the gravity of marital dissolution and providing emotional closure even when reconciliation proves impossible.

Fully electronic divorce proceedings risk undermining these dignity dimensions despite efficiency advantages. Retnaningsih et al.'s (2020) research reveals that many religious court users, particularly women seeking divorce from abusive spouses, view physical court attendance as validating their experiences and demonstrating judicial respect for their claims. Virtual hearings, however efficient, may feel impersonal, delegitimizing, or insufficiently serious for matters of profound personal consequence.

Family law reforms should therefore reject mandatory electronic proceedings for contested divorces, instead establishing tiered procedures calibrated to case complexity and party preference: (1) simplified uncontested divorces with mutual consent may proceed entirely electronically where parties choose this option, maximizing efficiency for amicable separations; (2) contested divorces involving abuse allegations, substantial property division, or custody disputes should require at least one in-person hearing ensuring judges directly assess credibility, evaluate parties' emotional states, and demonstrate procedural respect through personal engagement; and for (3) all divorce proceedings a mandatory initial in-person mediation sessions before electronic case progression, preserving reconciliation opportunities requiring face-to-face dialogue.

Child Custody and Best Interest Determinations: Child custody disputes present particular challenges for electronic proceedings given the "best interest of the child" standard requiring holistic assessment of parental fitness, living conditions, and children's expressed preferences. Indonesian family law (see Marriage Law No. 1/1974 and Child Protection Law No. 35/2014), grants courts substantial discretion in custody determinations. Nevertheless, because custody investigations typically require home visits, school consultations, and

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interviews with children and relatives - fundamentally physical evidence-gathering processes incompatible with purely virtual adjudication. Therefore, my recommendation is to limit the electronic case management to routine motions and documentary evidence. Eventually, in the case of remote place, it would be possible for court-appointed social workers conduct physical home inspections, documented through photographs and video and, maybe, also children interviews.

Inheritance and Sharia Compliance: Islamic inheritance law's precision in distributing estates according to Quranic fractional shares, makes these cases *theoretically* suitable for algorithmic assistance supporting judicial calculations. However, Indonesian religious courts must also navigate complex interpretive questions involving multiple wives, adopted children, non-Muslim heirs, and reconciliation between Islamic law and Civil Code succession provisions when estates include properties subject to different legal regimes.

The emergent use of AI-assisted legal research and generative AI tools, creates both opportunities and risks for inheritance adjudication. Indonesian family law authorities should therefore guide the use and procedure in inheritance calculation, developing a specific tool created for the Indonesian context and validate by the Supreme Court and Islamic scholars, as long as mathematicians and inheritance law specialists. This calculation tool must include (1) transparent algorithms enabling judicial review of computational logic rather than "black box" systems obscuring reasoning processes. Then a (2) mandatory human judicial oversight must validate the recommendations before the final judgment issuance. Clearly, subsequently, (3) religious court judges should receive comprehensive training in order to understand technological outputs.

H.4. Tort Law and Personal Injury Litigation: Evidentiary Challenges in Medical Malpractice and Product Liability

Tort litigation involving personal injury, medical malpractice, and product liability claims confronts particular evidentiary challenges in E-Court environments. These cases typically require voluminous documentation (medical records, expert testimony, photographic evidence of injuries and tests results) in formats often incompatible with existing electronic filing systems. The research finding that Indonesia's E-Court infrastructure lacks standardized protocols for specialized evidence types creates systematic barriers for tort claimants, potentially undermining substantive justice despite procedural digitalization.

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Medical Evidence and Healthcare System Integration: Medical malpractice claims under Indonesian tort law (Civil Code Articles 1365-1367) require claimants prove negligence through expert medical testimony and comprehensive documentation of treatment histories, diagnostic procedures, and adverse outcomes. However, Indonesia's fragmented healthcare system encompass public hospitals under Ministry of Health jurisdiction, private medical facilities, and traditional medicine practitioners; often the prescription are handwritten and sometimes not even in Bahasa Indonesia, but in local language. This diversity create an hostile environment to E-court compatible medical records. Moreover, hospital bureaucracies often delay medical record requests, negating the speediness and efficiency of E-Court.

Tort law reforms should mandate healthcare system integration with judicial digitalization infrastructure through amendments to Hospital Law No. 44/2009 and Health Law No. 17/2023. Specific provisions should require: (1) hospitals implement electronic medical record systems compatible with E-Court evidence submission standards within defined transition periods; (2) upon plaintiff authorization, courts should be allowed to request medical records *directly* from healthcare providers, eliminating redundant patient-mediated document transfer and reducing the risk of forgery; (3) healthcare facilities must respond to judicial record requests within fixed delay; (4) medical expert witnesses may be offered the possibility to submit opinions via secure video testimony uploaded to case records, reducing litigation costs from expert travel to distant courtrooms.

However, implementing such integration requires addressing the infrastructure disparities documented in this research. While Jakarta hospitals increasingly maintain digital records, rural health centres in remote islands often lack reliable electricity—much less electronic medical record systems. Transitional provisions must therefore preserve paper-based evidence submission as legally equivalent alternative, preventing healthcare system digitalization gaps from creating new barriers for medical malpractice claimants in underserved regions.

Product Liability and Consumer Protection: Product liability claims under Consumer Protection Law No. 8/1999 require evidence of product defects, manufacturing flaws, or inadequate warnings causing consumer injuries. These claims increasingly involve complex technical evidence: laboratory testing results, engineering analyses, safety certification documents, and international product recall notices. E-Court systems must

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accommodate this specialized evidence without creating barriers disproportionately affecting individual consumers litigating against sophisticated corporate defendants.

The research finding that corporate litigants in Jakarta achieved 78-84% e-filing success suggests E-Court infrastructure may systematically advantage corporations over consumers in product liability disputes. Corporate defendants employ specialized litigation support staff capable of navigating complex electronic filing requirements, uploading voluminous technical documentation in proper formats, and exploiting system capabilities for efficient case management. Individual plaintiffs, on the other hand, particularly those injured by defective products or elderly people, can have limited digital access or expertise. Therefore, a tort law procedural reforms should (1) train local personal in order to provide free technical assistance to individual plaintiffs filing product liability claims electronically, including document scanning services, format conversion, and filing completion support. Similarly, (2) Consumer Dispute Settlement Agencies (*Badan Penyelesaian Sengketa Konsumen*, BPSK) should receive priority E-Court integration enabling small-claims product liability cases; finally (3), judges should liberally grant continuances and filing deadline extensions when individual plaintiffs encounter technical difficulties with E-Court systems, preventing dismissals based only on technological barriers rather than substantive merit.

H.5. Commercial Law: Corporate Dispute and Resolution for Digital Economy

Indonesian commercial law sectors confront unique digitalization imperatives, especially on company liability disputes (Law No. 40/2007), commercial court bankruptcy (Law No. 37/2004), and arbitral enforcement. The research documented significant efficiency improvements in Italian commercial cases (27.2% reduction in disposition times from 1,203 to 876 days) and Indonesian urban pilot successes (31-38% improvements in Jakarta and Malang courts), demonstrating E-Court's potential for complex commercial litigation.

Multi-Party Corporate Disputes, Arbitration and E-Litigation Functionality: Commercial litigation frequently involves multiple corporate defendants, third-party intervenors, and complex procedural motions unsuited to E-Court systems designed primarily for simple two-party civil disputes. Indonesia's current E-Court functionality, established through PERMA 1/2019, provides basic electronic filing and virtual hearing capabilities but lacks sophisticated features necessary for efficient commercial litigation: consolidated electronic discovery managing thousands of corporate documents, secure virtual data rooms

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enabling multi-party confidential information exchange, electronic exhibit management linking documentary evidence to specific testimonial references, and integrated video conferencing supporting simultaneous interpretation for international commercial disputes. At the same level, the Indonesian National Board of Arbitration (*Badan Arbitrase Nasional Indonesia*, BANI) and international arbitral institutions, often require judicial involvement: an example follow the Law No. 30/1999 on Arbitration and Alternative Dispute Resolution, where state that prevailing parties must obtain court execution orders.

The Supreme Court should prioritize an E-Court enhancement in commercial litigation through *specialized modules* in order to address business disputing's unique requirements: (1) develop enterprise-grade electronic discovery platforms enabling parties to produce and analyse (with search function and index) voluminous corporate records; (2) implement virtual data rooms in secure servers where parties may deposit confidential business information accessible only to verified participants under court-supervised protocols; (3) establish dedicated technical support for commercial court E-Court systems, recognizing business litigants expect service quality comparable to private sector technology platforms. Finally, (4) I suggest also an high specialized E-Court for arbitration and commercial dispute surpassing a certain amount; similar national courts, free from the physical jurisdiction of a specific territory, can better fight local corruption and show and higher (and international!) level of competence.

Cross-Border Commercial Litigation and International Standards: Indonesia's participation in global commerce requires E-Court systems compatible with international litigation standards, particularly for recognition and enforcement of foreign judgments. The Hague Convention on Choice of Court Agreements, which Indonesia has considered but not yet signed, requires predictable judicial procedures for internationally selected forum clauses commonly included in cross-border commercial contracts.

E-Court enhancement should prioritize international compatibility: (1) while substantive pleadings may still require Indonesian official translation, the Supreme Court must implement a multilingual interfaces; (2) even without a formal adhesion to the Hague Service Convention procedures, Indonesia can still establish secure electronic service and process protocols compatible with the Convention; (3) create specialized commercial court divisions with enhanced E-Court capabilities for international disputes, comparable to ASEAN and China (Continental and Hong Kong) commercial litigation centres; (4) develop electronic

recognition and enforcement procedures for foreign arbitral awards under the New York Convention, enabling automatic processing without redundant physical filing requirements.

H.6. Legal Education, Professional Training, and Bar Association Responsibilities

The successful digital justice transformation documented in Italian experience relied substantially on comprehensive training programs extending beyond court personnel to practicing attorneys and legal educators. Italy's mandatory continuing legal education requirements ensured PCT literacy among the entire practicing bar, while law school curricula integrated digital procedure training into civil procedure courses. Indonesian legal profession reforms must replicate this comprehensive approach rather than treating digitalization as purely technical administrative matter.

Law School Curriculum Reform: Indonesian legal education, governed by Law No. 12/2012 on Higher Education and regulated by the Ministry of Education, currently treats information technology as peripheral elective coursework rather than core professional competency. The research (see Finocchiaro and Della Fina; Retnaningsih et al.) shows that 58% of Indonesian non-attorney litigants required assistance with E-Court filing, substantially higher than Italy's 32%. To address this problem, Law schools should integrate digital justice competencies throughout curricula: (1) civil procedure courses must include mandatory E-Court training modules teaching students electronic filing mechanics, virtual hearing protocols, and digital evidence management; (2) legal research and writing courses should require students submit assignments through E-Court practice systems, developing familiarity with judicial platforms before graduation; (3) clinical legal education programs should prioritize E-Court access projects serving digitally marginalized populations, developing students' capacity to assist underserved communities while providing practical experience; (4) legal ethics courses should address emerging issues in AI-assisted legal practice, algorithmic bias, and professional responsibilities for ensuring client access despite digital divides.

Indonesian Advocates Association Training Obligations: Indonesia's bar associations bear primary responsibility for attorney competency through admission standards and continuing legal education requirements. The research documented that Italian bar associations mandated comprehensive PCT training for all practicing attorneys, creating profession-wide baseline capability supporting successful reform implementation. In order to form comparable legal practitioners in Indonesia, not just the curricula but also the bar

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examination, should include (1) E-Court competency. Then, (2) practicing attorneys must complete refresher courses on E-Court litigation, with specific modules for religious court, commercial court, and administrative court practitioners addressing jurisdiction-specific electronic procedure variations. Another good practise (3) could be provided by operating *pro bono* E-Court assistance programs and (4) help bar association ethics committees should develop guidance on professional obligations when representing clients lacking digital literacy.

Judicial Training Academy Enhancement: The *Indonesian Judicial Training Center* (Pusat Pendidikan dan Pelatihan Mahkamah Agung), responsible for initial judge training and continuing judicial education, must expand technical capacity beyond the current basic E-Court orientation. The research finding that Italian judges received 15+ years of incremental digital familiarization before PCT mandatory implementation contrasts sharply with Indonesian judges' more compressed adaptation timeline, contributing to uneven comfort levels with electronic procedures.

The *Training Center* should implement more comprehensive programs (1) incorporating intensive E-Court instruction alongside traditional legal subjects; (2) require annual continuing education on technological updates; (3) develop specialized training programs for particular case types like medical malpractice with electronic medical records, intellectual property involving digital evidence, commercial litigation with electronic discovery.

H.7. Data Protection, Cybersecurity, and Privacy Safeguards

The research extensively documented E-Court efficiency and access impacts while noting data protection concerns requiring urgent attention. Indonesian courts handle extraordinarily sensitive personal information, like criminal statements, medical records, sensitive financial data, family histories and delicate testimonies. Having all this informations accessible through networked systems, creates unprecedented privacy and security risks.

Personal Data Protection Law Implementation: Indonesia's *Personal Data Protection Law* No. 27/2022, effective from October 2024, establishes comprehensive privacy rights and data controller obligations modelled substantially on European GDPR. However, the law's judicial data provisions remain largely unimplemented due to insufficient regulatory guidance and technical capacity constraints. The Italian Data Protection Authority's 2023 Annual Report documented ongoing challenges ensuring PCT systems comply with GDPR

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requirements despite Italy's sophisticated regulatory infrastructure and substantial technical resources (Italian Data Protection Authority, 2023). Indonesia confronts analogous challenges at greater scale but with fewer resources and personnel.

Therfore, it's mandatory that the Supreme Court cybersecurity regulations should implement Personal Data Protection Law requirements through specific protocols: (1) mandate encryption for all electronic case files containing personal data; (2) implement and periodically verify the access criteria for court personnel in a way that even the courts' personnel could not access indiscriminately to all information in the database but only to the ones relate to specific case; (3) require anonymization of published court decisions through automated redaction of names, identity numbers, addresses, and other identifying information before public database upload; (4) establish data retention policies requiring electronic case record auto-deletion after statutory preservation periods expire, preventing indefinite accumulation of personal information.

Cybersecurity Infrastructure and Breach Response: The research documented concerning infrastructure vulnerabilities: only 34% of Indonesian district courts employ dedicated IT personnel, 51% rely on part-time administrative staff with basic computer skills, and 15% lack any IT-capable personnel. This limited technical capacity creates severe cybersecurity risks when courts handle sensitive personal data through networked systems vulnerable to ransomware attacks, data breaches, or unauthorized access.

The Supreme Court requires comprehensive cybersecurity enhancement: (1) establish dedicated cybersecurity unit within IT Directorate staffed by information security specialists with authority to set mandatory security standards for all court systems; (2) implement continuous network monitoring detecting unauthorized access attempts, malware infections, or anomalous data transfers requiring immediate investigation; (3) require regular security audits by qualified external firms assessing E-Court vulnerability to common attack vectors; (4) develop incident response protocols specifying immediate actions when breaches occur, including affected party notification, law enforcement coordination, and system containment; (5) mandate regular data backups stored in geographically distributed locations, enabling rapid recovery after ransomware attacks or system failures.

The finding that remote island courts experience 40-70% internet uptime creates particular security challenges: intermittent connectivity prevents security patch installation, disrupts antivirus signature updates, and creates windows of vulnerability when systems

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operate with outdated protections. Courts in infrastructure-limited contexts require enhanced security architectures: (1) implement offline security measures including hardware-level encryption and biometric access controls functioning without network connectivity; (2) provide satellite or cellular backup connectivity specifically for security critical functions when primary internet service fails.

H.8. Algorithmic Accountability, AI Governance, and Judicial Independence Preservation

The research's examination of artificial intelligence integration in judicial systems revealed both efficiency opportunities and fundamental threats to procedural fairness, transparency and judicial independence. The adoption of generative AI for legal research, documented in Supreme Court Circular Letter No. 4/2024, proceeds without comprehensive regulatory frameworks governing algorithmic accountability… a governance gap creating risks in safeguards.

Mandatory Algorithmic Impact Assessments: AI system can be used in judicial for decision-making, predictive analytics or automated document review, but also for a simpler AI-assisted legal research. While the European Commission's proposed an AI Act framework, Indonesian courts still lack of such a political and technical address, leaving an serious gap that should be addressed. in a way that no algorithm should be implemented without proper approval certifying the system meets transparency, fairness, and accountability standards. These assessments must evaluate: (1) training data quality, examining whether the algorithm reflects discrimination or not; (2) transparency, documenting how systems reach conclusions and whether reasoning processes align with legal principles; (3) prevention of "hallucination", i.e. when AI create false, nonsensical or inaccurate information; (4) a judicial override system that ensure the ultimate control of human judges.

Judicial Independence and Technology Vendor Relationships: The research documented that Indonesian E-Court development involves private technology vendors through procurement contracts totalling IDR 847 billion during 2018-2023. These vendor relationships create potential conflicts with judicial independence when private companies gain influence over case management processes and have access to sensitive data.

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Procurement reforms should establish strict separation between technology provision and judicial function, considering, maybe, a national AI preventing proprietary "black box" systems obscuring judicial reasoning.

Preserving Human Judgment in AI-Augmented Adjudication: The fundamental risk in judicial AI adoption is erosion of human judgment through excessive algorithmic deference. When judges routinely accept AI-generated legal research summaries without independent verification, rely on predictive algorithms for bail or sentencing decisions, or allow automated systems to draft routine orders, judicial decision-making devolves toward mechanical application of statistical patterns rather than principled legal reasoning responsive to individual case circumstances.

Therefore, is recommendable for Indonesian courts to establish limitations on algorithmic adjudication: (1) AI systems may provide information, analysis, or recommendations but never make binding judicial determinations; (2) judges must personally review all evidence, arguments, and applicable law before rendering decisions, with written opinions demonstrating independent reasoning rather than algorithmic ratification and (3) parties must receive notice when and how AI tools contributed to judicial proceedings.

H.9. Conclusion: Toward Equitable Digital Justice in Indonesia

This comprehensive analysis of Indonesian private law sector consequences from E-Court implementation reveals that technological transformation alone cannot guarantee equitable justice outcomes.

The stark contrast between Italian success (33.7% disposition time reduction, 88% electronic filing adoption, comprehensive nationwide coverage) and Indonesian uneven progress illustrates that contextual factors ultimately determine whether digitalization serves human security or exacerbates existing inequalities.

The sectoral analysis demonstrates that meaningful progress requires coordinated reforms extending far beyond court technology deployment: contract law must reconcile digital transaction prevalence with hybrid access imperatives; property law needs integrated land registration systems preventing title fraud while accommodating infrastructure limitations; family law demands procedures balancing efficiency with procedural dignity in culturally sensitive contexts; tort litigation requires healthcare system integration enabling efficient medical evidence submission; commercial law needs sophisticated functionality matching

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international standards; legal education must produce digitally competent professionals; data protection frameworks must prevent privacy violations; and algorithmic governance must preserve judicial independence against technology vendor influence.

Most fundamentally, Indonesian digital justice reform must reject a *pure technical approach*, embracing - instead – a comprehensive and human security-centered design. This requires a broad infrastructure investment addressing the urban-rural divide and a solid regulatory frameworks governing data protection, cybersecurity and algorithmic accountability.

The research demonstrates that Indonesia possesses substantial foundation for successful digital justice transformation: Supreme Court leadership committed to modernization, growing technical capacity evidenced by urban pilot successes, legal profession increasingly comfortable with digital practice, and populations experiencing efficiency gains where E-Court functions effectively. However, realizing wide-ranging success requires an honest address to existing constraints like infrastructure limitations, digital literacy gaps, and institutional capacity deficits. In the sense, the comparison with the Italian experience, offers valuable lessons not through direct replication but through demonstrating principles applicable across contexts. Italy shows how the possibility and the effect of incremental implementation, monitoring and corrections, ensuring technology serves rather than excludes marginalized populations. Adapting these principles to Indonesian circumstances can guide reforms genuinely advancing human security for all 280 million Indonesians rather than merely optimizing systems for already-privileged urban populations.

Finally, the Indonesian legal broader community of legislative drafters, practicing attorneys, law professors, civil society advocates and technology developers must collaborate in lead and ensure a digital transformation that serve justice rather than efficiency alone. Meeting this responsibility requires moving beyond narrow technical implementation toward holistic reform engaging substantive law, professional ethics and human dignity. Only through such comprehensive engagement, Indonesia’s digital justice transformation can fulfil its democratic promise in expanding access, enhancing fairness, and strengthening the rule of law for all citizens regardless of geography, education, age, or economic status.

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