

Digital Court Systems and E-Justice Transformation in Pakistan Using Artificial Intelligence and Smart Governance Models

Mudassir Maqsood ^{*1}, Dr. Sana Younas²

^{*1} Civil Judge Ist Class-cum-Judicial Magistrate Section-30, District Judiciary, Lahore High Court, Lahore; Punjab, Pakistan; 16-Digit ORCID <https://orcid.org/0000-0003-0660-2398>; Email: dr.m.malik@live.com

² PhD, Government College University, Faisalabad 38000, Punjab, Pakistan; 16-Digit ORCID <https://orcid.org/0000-0001-8087-9956>, Email: sanimalik.5@gmail.com

DOI: <https://doi.org/10.70670/sra.v4i1.2545>

Abstract

Pakistan's judicial system faces critical challenges of severe case pendency, procedural delays, and institutional bottlenecks that undermine constitutional guarantees of expeditious justice. This review paper examines the transformation of court systems through digital technologies, artificial intelligence, and smart governance models within the Pakistani legal framework. The study analyzes how Electronic Case Management Systems (ECMS) and Case Flow Management Information Systems (CFMIS) are modernizing judicial workflows across provincial jurisdictions, including Punjab, Sindh, Balochistan, Khyber Pakhtunkhwa, and Azad Jammu & Kashmir, through features such as automated diary allocation, real-time case tracking, and integrated identity verification systems. The paper explores the statutory architecture governing e-justice, evaluating the Qanun-e-Shahadat Order (1984), Electronic Transactions Ordinance (2002), and Prevention of Electronic Crimes Act (2016) in light of emerging technological capabilities. Furthermore, it investigates AI applications in operational logistics, legal research automation, and human rights oversight through systems like the Human Rights Information Management System (HRIMS). Despite significant progress, the analysis identifies persistent barriers including digital infrastructure disparities, limited legal tech literacy, administrative silos restricting inter-agency interoperability, and data security vulnerabilities. The paper proposes strategic imperatives centered on unified data standardization, procedural legislative updates, judicial capacity building, human-centered AI safeguards through independent Algorithmic Accountability Boards, and sustained infrastructure investment. This comprehensive review contributes to understanding how technology-mediated judicial reforms can enhance transparency, accessibility, and efficiency while preserving constitutional rights protections in Pakistan's evolving legal landscape.

Keywords: E-Justice, Digital Court Systems, Artificial Intelligence, Smart Governance, Case Management Systems, Judicial Reform, Pakistan, Electronic Evidence, Legal Technology, Algorithmic Accountability

1. Introduction and Operational Context

The administration of justice in Pakistan operates under the systemic weight of severe case pendency, procedural latency, and institutional bottlenecks. Historical reliance on paper-based case registers, physical service of process, and manual docketing has created procedural friction, leading to protracted litigation cycles across district judiciary tiers, provincial High Courts, and the Supreme Court. In response to this operational paralysis, judicial technology initiatives have increasingly shifted from localized administrative

automation toward holistic e-justice transformation ([Imran et al., 2024](#)). The scale of the problem is stark: Pakistan's superior and district judiciary carries a backlog of nearly 2.144 million pending cases, while 4.06 million cases were instituted during 2021 alone ([Anjum, 2024](#)).

E-justice transformation represents a structural re-engineering of judicial workflows, public administration, and evidentiary evaluations through Information and Communications Technology (ICT), Artificial Intelligence (AI), and smart governance frameworks. Rather than treating digitalization as a mere technical infrastructure update, international and domestic legal frameworks emphasize e-justice as a fundamental rights-protection strategy. By centering citizen accessibility and institutional accountability, modern court systems aim to operationalize the constitutional guarantee of inexpensive and expeditious justice ([Borgesano et al., 2025](#)).

The structural mandate of e-justice extends beyond digital record-keeping to encompass end-to-end case lifecycle tracking, online dispute resolution, automated scheduling, and data-driven judicial oversight. Global development frameworks emphasize that sustainable e-justice adoption requires an iterative, human-centered approach that adapts to localized legal cultures before scaling across complex judicial hierarchies ([Sharma, 2026](#)). In Pakistan, this trajectory is governed by a dynamic intersection of state IT policy, judicial practice directions, and statutory amendments aimed at validating electronic evidence and virtual proceedings. The integration of smart governance models further introduces predictive analytics, workload balancing algorithms, and cross-departmental data synchronization between courts, law enforcement, correctional facilities, and forensic institutions ([Soomro et al., 2024](#)).

Despite the pace and scale of these developments, most studies of court digitalization concentrate on high-income countries, leaving the Pakistani experience — like that of many lower- and middle-income jurisdictions — comparatively under-studied ([Reayat, 2025](#)). This review therefore aims to make three contributions. First, it consolidates the scattered provincial record into a single cross-jurisdictional account, tracing how the Sindh-developed case flow system was transplanted into Balochistan, how its adoption was contested and later completed in Punjab, and how the AJ&K and KP digitization drives scaled court automation down to the tehsil level, with sustained attention to Punjab and Sindh, where judicial IT and AI investment has been most intensive. Second, it maps the existing statutory framework — the Qanun-e-Shahadat Order, the Electronic Transactions Ordinance, and the Prevention of Electronic Crimes Act — onto emerging AI capabilities, pinpointing the precise points where the law falls short. Third, it advances reform instruments specific enough to be operationalized, including the Technical Disclosure Statement, an independent Algorithmic Accountability Board, and a seven-step implementation pathway.

2. Review Methodology

This review adopts a qualitative, narrative synthesis approach, which is appropriate for a field whose primary sources are legislative texts, official court records, and a still-small body of scholarship. We searched Google Scholar, HeinOnline, JSTOR, and the official websites of the Law and Justice Commission of Pakistan, the Supreme Court of Pakistan, and the provincial high courts, as well as the official portals and published case statistics of the Lahore High Court and the Sindh High Court, using keyword combinations such as "e-justice," "electronic case management," "case flow management information system," "digital evidence," and "judicial automation." Peer-reviewed articles, legislation, and official reports were included; commercial commentary was excluded. The retrieved material was analyzed thematically under five headings — infrastructure, statutory frameworks, AI applications, systemic challenges, and strategic imperatives — and every factual claim was traced, as far as possible, to a source that could be independently verified. Where that was not possible, for example in the case of certain court-level statistics, the limitation is flagged in the text so that readers and reviewers can judge the strength of the evidence for themselves.

3. Archival Modernization and Digital Infrastructure

The foundational layer of judicial digital transformation in Pakistan relies on replacing paper-heavy registries with electronic Case Flow Management Information Systems and unified Electronic Case Management Systems. Legacy paper-based court operations required physical presentation of complaints to court clerks, manual allocation of diary numbers, hand-written order sheets, and physical archiving in insecure storage facilities. This environment created severe information asymmetry, vulnerability to document tampering, and significant delays in tracking case progression.

Under a modern ECMS framework, a case entering the judicial system moves through a standardized digital lifecycle that begins at the Presentation Branch. At this entry point, complaints, petitions, and supporting affidavits are scanned, evaluated for procedural defects, and assigned a unique Case Number Record alongside basic metadata. The case is subsequently processed by the Roster Branch, where automated algorithms assess judge availability, subject-matter specialization, and existing docket density to allocate the matter and generate daily cause lists ([Poshai & Vyas-Doorgapersad, 2023](#)). Following court proceedings, the Judicial Branch records directions digitally; order sheets are transcribed, uploaded, and made accessible online while automated triggers notify administrative staff to issue formal summonses or notices. Once a final judgment is rendered, the Record Branch archives the file into encrypted digital repositories, ensuring long-term record preservation and transparent public access.

Institutional implementations across provincial jurisdictions demonstrate varied architectural strategies designed to meet local operational demands. The High Court of Balochistan, in collaboration with the Sindh High Court, introduced CFMIS to computerize its presentation, judicial, roster, copying, and record branches, extending real-time case tracking to remote circuit benches such as Sibi ([Investigating Procedural, Institutional & Circumstantial Impediments Leading to Delay in Dispensation of Justice, n.d.](#)). Identity verification against duplicate and fake-name filings is an established policy objective: the National Judicial Policy directs the High Courts to curb false, frivolous, and vexatious litigation, including through identity verification of deponents and parties at the attestation stage, such as capturing a deponent's photograph on the file and requiring proof of identity before affidavits are attested ([Chaudhry, 2009](#)). Extending such verification to district case-management databases would prevent multi-forum shopping and duplicate filings within the district judiciary.

In Khyber Pakhtunkhwa, by contrast, automation proceeded gradually and remains partial: the province adopted the Case Flow Management System for District Courts only partially, and the Law and Justice Commission of Pakistan's report on the application of information technology in the justice sector records that Khyber Pakhtunkhwa's district judiciary had adopted only some automated functions, even as the superior courts — the Supreme Court, the Federal Shariat Court, and the High Courts — each operate their own automated systems covering the case flow and case management processes ([Investigating Procedural, Institutional & Circumstantial Impediments Leading to Delay in Dispensation if Justice, n.d.](#)). The province has nonetheless been comparatively forthcoming in making court records available in digital form: in a study of order sheets drawn from Rawalpindi, Lahore, Swabi, and Islamabad district courts, scanned copies were readily supplied by the KP courts, whereas digital record-keeping remained patchy in the Punjab and Islamabad districts ([Investigating Procedural, Institutional & Circumstantial Impediments Leading to Delay in Dispensation if Justice, n.d.](#)). Given this uneven landscape, the National Judicial Policy Making Committee has prioritized automation and constituted the National Judiciary Automation Committee, chaired by a sitting Supreme Court judge, to implement and monitor IT initiatives across the courts ([Shafique, 2022](#)). Centralized data collection transforms basic administrative logs into operational metrics, allowing court leadership to analyze disposition velocities, rationalize judicial resource allocation, evaluate bench performance, and redirect suitable cases toward alternative dispute resolution mechanisms.

Punjab and Sindh — the two provinces where judicial IT and AI initiatives have been most intensive — illustrate both the promise and the friction of this transformation. The Sindh High Court was the first mover:

it developed the Case Flow Management System for District Courts in 2011, a platform later adopted by Balochistan and Islamabad, partially adopted by Khyber Pakhtunkhwa, and initially resisted in Punjab, whose leadership was reported to harbour reservations that case data would be stored on servers located in Sindh; the province nonetheless eventually implemented its own case management system ([Investigating Procedural, Institutional & Circumstantial Impediments Leading to Delay in Dispensation of Justice, n.d.](#)). Today, the Lahore High Court, the Sindh High Court, and the Islamabad High Court operate Case Management Systems with companion mobile applications that keep litigants informed of case updates and records in near-real time ([Anjum, 2024](#)). The Lahore High Court's CMS is accessible to judges, court staff, and officers through an official portal and incorporates e-filing of documents, e-registration of advocates and cases, a Queue Management System for courtroom attendance, and video-conferencing channels for virtual hearings ([Ashraf, 2025](#)). The apex courts' case-management infrastructure already includes modules such as Online Court Proceedings, the Case Law Management System, the Case Record Management System, and a Case Information Desk that alerts advocates by SMS and email, with the Sindh High Court among the principal users ([Shafique, 2022](#)). The caseload these systems carry is formidable: the Sindh High Court adjudicated 31,000 cases in a single year yet still confronted 84,000 pending cases, while the Lahore High Court disposed of 149,362 cases in the same period against a backlog of 187,255 at the start of 2022 ([Anjum, 2024](#)). Experts have estimated that full-fledged eCourts could be established in at least 36 districts of Punjab at a cost of less than 10 million rupees — a fraction of what the legacy paper system absorbs each day ([Anjum, 2024](#)).

Table 1: Comparative Framework of Judicial Digital Transformation Across Pakistani Jurisdictions

Jurisdiction / Initiative	Primary System Deployed	Core Modules & Key Technical Features	Systemic & Operational Impact
High Court of Balochistan & Quetta District Judiciary	Case Flow Management System (CFMIS) / District Case Management Software	CNIC, POR, and POC verification integration; automated diary allocation; computerized roster generation; Sibi circuit bench real-time linking.	Elimination of duplicate multi-forum case filings; real-time public access via interactive court kiosks; automated reporting to NJPMC.
Peshawar High Court & KP District Judiciary	Multi-Bench CFMIS & District Judiciary Evaluation Policy (2020-2025)	Dual-language (Urdu/English) judicial interface; digital cause list generation; online order-sheet publishing; integration with regional Forensic Science Laboratories.	Streamlined bench-to-district tracking; improved judicial monitoring and evaluation metrics; reduced transit requirements for under-trial prisoners via video link.
Azad Jammu & Kashmir (AJ&K) & KP Digitization Project	Integrated Judicial MIS & Digital Modernization Framework	High-speed document digitization (110,000+ judgments); 80+ automated court processes across 32 Tehsils; IVR, online portals, and kiosk endpoints.	Eradication of physical record vulnerability; unified tracking across lower, high, and supreme court branches; improved public transparency for rural litigants.
Lahore High	LHC Case Management	Official portal access for	Mobile case tracking for

Court & Punjab District Judiciary	System + Mobile Application	judges, staff, and officers; e-filing; e-registration of advocates and cases; Queue Management System; video-link hearings; feasibility estimate for E-Courts across 36 Punjab districts	litigants; reduced registry footfall; virtual hearing capacity; cost-efficient rollout potential
Sindh High Court & Sindh District Judiciary	CFMS-DC and SHC Case Management System + Mobile Application	First-mover district-level case flow system; Online Court Proceedings, Case Law Management and Case Record Management modules; SMS/email Case Information Desk	Served as the inter-provincial adoption model for CFMS; improved case transparency and real-time court-progress display
Human Rights Info Management System (HRIMS)	National/Provincial Human Rights Data Platform	Disaggregated human rights violation tracking; international legal obligation reporting alignment; inter-provincial decentralized data synthesis.	Enhanced data granularity for policy planning; evidence-based human rights intervention tracking; alignment with international treaty reporting standards.

3. Statutory Frameworks and Procedural Adaptation

The legal validity of e-justice operations relies on the alignment of procedural jurisprudence with emerging technological capabilities. In Pakistan, digital court procedures operate through an evolving combination of statutory enactments, specialized electronic legislation, and provincial practice rules ([Khan & Ahmed, 2024](#)). The primary evidentiary legal framework remains the Qanun-e-Shahadat Order, 1984, which was originally designed around physical, paper-based evidence. Subsequent legislative amendments and judicial rulings have interpreted Article 164 of the QSO as an expansive gateway, allowing courts to receive evidence generated by or derived from modern devices and scientific techniques ([Contini & Cordella, 2016](#)).

The reception of digital evidence is complemented by the Electronic Transactions Ordinance, 2002, which grants legal recognition to electronic documents, e-signatures, and digital communications, explicitly defining electronic technologies across optical, magnetic, digital, and electromagnetic spectrums. Furthermore, the Prevention of Electronic Crimes Act, 2016 expanded the investigative apparatus for cyber offenses, providing statutory definitions for digital information systems and establishing formal cross-border cooperation mechanisms under Section 42 for retrieving electronic evidence held in foreign jurisdictions.

Despite these statutory developments, procedural friction persists within evidentiary practice. For example, Article 38 of the QSO renders confessions or admissions made before police officers inadmissible to prevent custodial abuse. However, the introduction of modern policing tools, such as police body-worn cameras and digital forensic video recordings, requires nuanced judicial guidelines to balance chain-of-custody requirements against digital tamper-vulnerability ([Yong, 2024](#)). Similarly, while Article 84 of the QSO authorizes judges to visually compare disputed signatures, verifying complex digital signatures and secure cryptographic hashes necessitates technical expert testimony and standardized chain-of-custody documentation ([Y.R., 2020](#)).

In commercial and civil litigation, procedural rules governed by the Code of Civil Procedure, 1908 have

been modernized through specialized provincial enactments. Statutory provisions such as the Punjab Commercial Courts Ordinance, 2021, alongside practice directions under the Sindh High Court Commercial Litigation Corridor, mandate accelerated timelines, electronic service of process, and mandatory pre-filing dispute resolution procedures. Additionally, the Trade Dispute Resolution Rules establish preliminary conciliation requirements and fast-track electronic filing protocols for mercantile disputes.

As advanced machine learning tools and automated decision-support platforms enter judicial administration, current statutory frameworks reveal technical gaps. Article 164 of the QSO offers limited guidance regarding the assessment of opaque, black-box algorithmic outputs. To prevent errors resulting from algorithmic bias or flawed automated logic, emerging jurisprudential models advocate for the implementation of a mandatory "Technical Disclosure Statement" ([Felicity et al., 2024](#)). Under this framework, any party seeking to introduce algorithmic or AI-generated evidence bears the burden of establishing software reliability, training dataset integrity, and system auditability prior to judicial admission ([Grossman & Grimm, 2025](#)).

Table 2: Statutory and Legislative Architecture Regulating E-Justice and Electronic Evidence

Enactment / Statutory Source	Core Provisions Relating to E-Justice	Impact on Evidence & Court Procedure	Legal Gaps & Systemic Challenges
Qanun-e-Shahadat Order, 1984 (QSO)	Article 164 (Modern Devices), Article 84 (Signature Comparison), Article 38 (Police Inadmissibility).	Legal authorization for admitting CCTV, call detail records (CDRs), e-mails, and audio/video recordings.	Lack of explicit standards for algorithmic accountability, machine learning outputs, and automated evidence scoring.
Electronic Transactions Ordinance, 2002 (ETO)	Legal recognition of electronic forms, digital signatures, electronic communications, and certified repositories.	Grants electronic documentation parity with physical paper records; enables lawful e-filing and e-notices.	Inconsistent application across lower district courts lacking certified digital signature verification authorities.
Prevention of Electronic Crimes Act, 2016 (PECA)	Section 42 (Transnational Legal Assistance), definitions of information systems and cyber forensic procedures.	Facilitates formal cross-border data requests for digital evidence; empowers law enforcement forensic units.	Complex chain-of-custody requirements often result in acquittals due to improper digital evidence preservation by police.
Trade Dispute Resolution Rules (SRO-552)	Mandates pre-filing dispute resolution, digital claim assessment, fast-track electronic filings.	Reduces institutional docket congestion by enforcing preliminary mediation windows for commercial disputes.	Requires complete synchronization with local High Court rules and CPC amendments across provincial jurisdictions.

4. Artificial Intelligence Integration and Smart Governance Models

Smart governance models integrate advanced technologies, big data analytics, and administrative automation to convert traditional public sector institutions into data-driven, citizen-centric administrative systems. Within the judiciary, smart governance extends beyond digitization by incorporating predictive policy tools, workload-balancing logic, and automated case management into court administration ([Kaiser,](#)

[2024](#)).

Artificial Intelligence applications within Pakistan's judicial system operate across three core domains: operational docket logistics, legal research automation, and systemic human rights oversight. In operational logistics, AI tools embedded within an ECMS monitor real-time court dockets, calculate historical case processing velocities, and predict trial durations. These predictive analytics allow court administrators to rebalance workloads dynamically among available judges, addressing localized pendency spikes ([Qureshi et al., 2025](#)). Furthermore, algorithm-driven evaluation tools assess dispute profiles upon filing, automatically recommending low-complexity or highly negotiable commercial and civil claims for diversion to court-annexed Alternative Dispute Resolution centers ([Ahmad et al., 2024](#)).

Docket-level automation has already gained a foothold in the superior judiciary: under the direction of the IT Admin Judge, the Lahore High Court shifted all pending cases into chronologically ordered dockets assigned to special and constitutional benches, bringing long-stalled matters back into the mainstream ([Lahore High Court, 2015](#)). At the national level, the National Judicial Policy Making Committee has prioritized automation and constituted the National Judiciary Automation Committee, chaired by a sitting Supreme Court judge, to implement and monitor IT initiatives across the courts ([Shafique, 2022](#)). Smart scheduling platforms can extend this docket logic into evening sittings for time-sensitive, high-impact cases — family law matters, rent disputes, juvenile proceedings, and minor criminal offenses — maximizing facility utilization and expediting relief for vulnerable litigants without compromising judicial thoroughness. In legal research and document drafting, Natural Language Processing engines trained on digitized Pakistani case law enable semantic analysis across judicial precedents. Integrated drafting systems automatically extract relevant case metadata from an ECMS to populate standardized document templates such as writs, formal summonses, standard interlocutory orders, and notification notices, reducing manual clerical entry and minimizing typographical errors. Advanced analytics platforms also assist judges by synthesizing jurisprudential patterns and summarizing extensive case records ([Siino et al., 2025](#)).

At the systemic policy level, the Human Rights Information Management System represents a key application of smart governance principles. HRIMS synthesizes decentralized human rights data across national and provincial jurisdictions, mapping case trajectories, legal interventions, and state compliance against international human rights treaties and Sustainable Development Goals ([McQuide et al., 2023](#)). The scale of this rights-based processing is documented in the Supreme Court of Pakistan's Annual Report, which records that between June 2018 and May 2019 the Human Rights Cell received 97,885 new applications and disposed of 105,617, leaving 3,109 still in process ([Supreme Court of Pakistan Annual Report June 2017 - May 2018, n.d.](#)). This network of digital case-processing provides empirical data to inform judicial policy formulation and legal aid allocation. (Note: an official source using the proper noun "HRIMS" itself — NJPMC minutes or LJCP reports — should be attached; if none exists, treat "HRIMS" as a descriptive label for digital human-rights case-processing platforms.)

At the data layer, Punjab and Sindh again lead — and their experience cautions against treating digitization as automatically equivalent to data quality. A computational audit of the online case-management portals of the Sindh High Court and the Lahore High Court, built on more than 11,000 web-scraped entries from the former and roughly 1,000 from the latter, found persistent inconsistencies including missing values, redundant information, and limited historical coverage, and concluded that both portals lack the standardization necessary to support reliable legal research and evidence-based policymaking ([Pasta et al., 2026](#)). These findings matter for the AI ambitions of this paper: the predictive and analytical value of any algorithmic tool is only as sound as the docket data beneath it, so data governance must advance in step with algorithmic capability, particularly in the two provinces carrying the heaviest digital caseloads.

However, the expansion of AI models within judicial decision-making introduces legal and theoretical challenges. Public administration literature warns against the uncritical transition toward "cybercratic governance," wherein opaque, automated algorithms undermine human judicial discretion, democratic

oversight, and constitutional accountability (Scherer, 2019). Automated tools trained on unrefined historical court records risk inheriting and amplifying past systemic biases, presenting discriminatory patterns under the label of statistical neutrality. Preserving constitutional integrity requires that AI deployments in the justice sector incorporate Explainable AI architectures, independent algorithmic accountability boards, and continuous auditing to ensure full alignment with fundamental fair trial guarantees (Serra, 2026).

Figure 1: Responsible Artificial Intelligence Governance Framework for Smart Judicial Systems

Figure 1: Responsible AI Governance Framework for Pakistan’s Judiciary

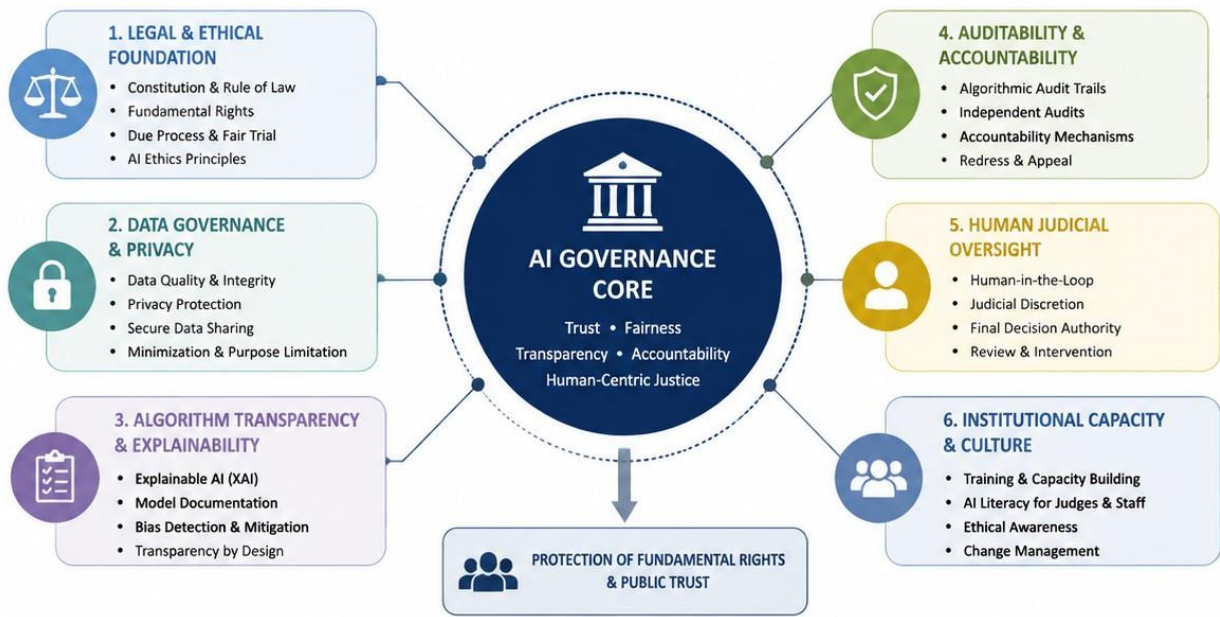


Table 3: Smart Governance Models and AI Functional Applications in the Judiciary

Governance Pillar	AI / Smart Tech Application	Technical Mechanism	Strategic Operational Benefit	Governance & Ethical Risk
Operational Efficiency	Automated Workload Balancing & Scheduling	Real-time docket analytics; predictive trial duration modeling; auto-assignment logic.	Equalizes judge workloads; reduces pendency; optimizes courtroom usage under Double Docket regimes.	Risk of rigid scheduling failing to accommodate unexpected case complexities or attorney availability.
Litigation Support	Natural Language Processing (NLP) & Draft Auto-Fill	Machine learning search across judgment databases; ECMS metadata extraction.	Rapid legal research; automated generation of writs, summonses, and standardized orders.	Over-reliance on auto-generated orders leading to formulaic judicial reasoning without individualized review.
Dispute	Predictive ADR	Classification	Diverts low-complexity	Potential coercion of

Resolution	Redirection	algorithms mapping claim characteristics against historic settlement data.	commercial/civil disputes from trial dockets to mediation centers.	litigants into ADR, limiting access to formal judicial determination.
Rights Oversight	Human Rights Info Management System (HRIMS)	Decentralized data aggregation; SDG alignment mapping; violation analytics.	Evidence-based human rights policy formulation; automated international reporting compliance.	Data privacy risks; potential misuse of sensitive personal data in the absence of robust data sovereignty laws.
Algorithmic Oversight	Explainable AI (XAI) & Audit Boards	Model interpretability frameworks; bias detection algorithms; independent transparency audits.	Mitigates black-box opacity; ensures algorithmic compliance with constitutional rights.	High compliance cost; technical gap in public sector AI auditing capacity.

5. Systemic Challenges, Operational Bottlenecks, and Institutional Readiness

The implementation of e-justice transformation across Pakistan encounters significant operational, technical, and cultural obstacles. A theoretical framework for understanding these bottlenecks is provided by the concept of the digital divide, which differentiates between basic access barriers and deeper institutional disparities ([Saleem, 2025](#)). While early judicial modernization initiatives sought to bridge "Digital Divide 1.0," which focuses on hardware procurement, basic broadband expansion, and fundamental software installations, the transition toward AI-driven smart governance introduces "Digital Divide 2.0". This second-tier divide involves challenges related to algorithmic equity, data justice, technological autonomy, and meaningful legal tech literacy across the judicial hierarchy ([Ajuzieogu, 2025](#)).

At the physical infrastructure level, pronounced regional disparities exist between appellate courts and district courts. High-speed fiber connectivity, dedicated server hardware, and robust electrical back-up architectures remain largely concentrated in provincial capital seats, while peripheral district courts frequently experience power disruptions and limited bandwidth, severely impeding the reliability of online cause lists and virtual court hearings.

Compounding infrastructural limits is cultural inertia within the legal sector. A considerable proportion of judicial officers, court administrative staff, and practicing advocates exhibit limited digital literacy, preferring legacy paper-based filing and physical record books ([Shahbaz & Zafar, 2025](#)). Members of bar associations have periodically expressed concern regarding e-filing systems, virtual court proceedings, and automated scheduling, citing fears of professional displacement, reduced procedural access for marginalized clients, and system failures during urgent ex-parte hearings. Without comprehensive change-management programs and continuous technical training, technological adoption remains fragmented across judicial districts ([Tayal, 2024](#)).

Furthermore, administrative silos severely restrict inter-agency interoperability. Court case flow management systems frequently operate in isolation from external public sector software platforms. The lack of synchronized, real-time data exchange between court registries, police First Information Report systems, prison management portals, and Forensic Science Laboratories introduces delays, transcription errors, and administrative backlogs ([Schöll, 2005](#)). Expanding structural coordination initiatives such as the Offenders Management System promoted by Khyber Pakhtunkhwa's Provincial Justice Committee is

essential to establishing a unified, cross-departmental criminal justice data network ([Ali et al., n.d.](#)). Finally, the digitization of judicial archives, biometric records, identity details, and sensitive evidence introduces significant data security vulnerabilities. In the absence of a unified national data protection statute aligned with international benchmarks like the GDPR, centralized judicial databases face risks related to cyber-attacks, unauthorized access, and identity theft. Upholding constitutional privacy guarantees under Article 14 of the Constitution of Pakistan requires integrating Privacy by Design principles, Privacy-Enhancing Technologies, and strict role-based data encryption into all public-facing e-court platforms ([Bangladesh & Khan, 2023](#)).

6. Strategic Imperatives and Future Trajectory

Achieving a resilient, transparent, and rights-respecting e-justice framework in Pakistan requires a comprehensive, multi-dimensional policy strategy. First, the National Judicial Committee must establish unified data standardization rules and a mandatory Case Number Record taxonomy across all provincial High Courts and district judiciaries. Standardizing data entry formats and developing secure Application Programming Interfaces will enable seamless, real-time data sharing between court registries, law enforcement agencies, correctional systems, and forensic institutes ([Haque & Khan, n.d.](#)). Second, legislative assemblies must enact targeted procedural updates to modernize the legal framework governing digital proceedings and evidence. Amendments to the Qanun-e-Shahadat Order and Code of Civil Procedure should establish clear rules for maintaining digital chain-of-custody, regulating video-link cross-examinations, and requiring mandatory Technical Disclosure Statements whenever AI tools or complex algorithmic models are introduced as evidence. A statutory presumption of evidentiary reliability should only be granted to algorithmic models that have undergone independent technical audits.

Third, federal and provincial judicial academies must redesign their training curricula to build sustainable institutional capacity. Mandatory training programs for judges, prosecutors, and administrative personnel should cover legal informatics, cyber forensics, AI ethics, and data management. To reduce cultural resistance, judicial leadership should actively engage leadership from bar associations in co-designing electronic portals, ensuring that e-filing platforms and ODR tools remain accessible, user-friendly, and inclusive for all legal practitioners ([Legal Vice Presidency The World Bank Initiatives in Legal and Judicial Reform, 2002](#)).

Fourth, AI deployments in court administration must adhere to human-centered safeguards that preserve human judicial discretion. Machine learning applications must function strictly as supportive analytical tools, leaving core judicial choices such as evaluating witness credibility, granting bail, weighing evidence, and issuing final judgments exclusively to human judges. Establishing independent Algorithmic Accountability Boards comprising judges, legal scholars, technical experts, and civil society representatives will provide essential oversight to audit algorithms, detect automated bias, and protect fundamental rights ([Cheng, 2025](#)).

Finally, federal and provincial governments must commit long-term capital investments toward upgrading court ICT infrastructure, prioritizing reliable broadband connectivity, continuous solar power systems, and secure cloud storage across lower district tehsils. Concurrently, digital court systems must incorporate Privacy-Enhancing Technologies and robust cybersecurity frameworks to ensure that judicial modernization strengthens fundamental constitutional rights, enhances institutional transparency, and delivers accessible justice for all citizens ([Akula, 2026](#)).

Figure 2: Integrated Seven-Step Framework for Judicial Legal and Ethical Implementation

Figure 2: Seven-Step Implementation Framework for AI Governance in Pakistan’s Judiciary



Conclusion

The transformation of Pakistan's judicial system through digital technologies and artificial intelligence represents a pivotal opportunity to address systemic inefficiencies while strengthening constitutional guarantees of access to justice. This review has demonstrated that e-justice initiatives, ranging from Electronic Case Management Systems to AI-driven operational logistics, are progressively modernizing court workflows across provincial jurisdictions. The integration of smart governance models, including predictive analytics and automated scheduling, offers promising pathways to reduce case pendency and enhance institutional transparency. However, the successful realization of these benefits depends on overcoming critical challenges: pronounced digital infrastructure disparities between urban appellate courts and rural district tehsils, cultural resistance and limited digital literacy among legal practitioners, administrative silos restricting inter-agency data sharing, and significant data security vulnerabilities in the absence of comprehensive privacy legislation. The statutory framework, while evolving through enactments like the Electronic Transactions Ordinance and Prevention of Electronic Crimes Act, requires targeted amendments to address the evidentiary and procedural complexities introduced by AI-generated evidence and algorithmic decision-support tools. Future progress necessitates a holistic strategy encompassing unified data standardization across all judicial tiers, legislative updates establishing clear rules for digital chain-of-custody and algorithmic accountability, sustained investment in ICT infrastructure for underserved districts, and mandatory judicial training programs covering legal informatics and AI ethics. Critically, AI deployments must adhere to human-centered safeguards that preserve judicial discretion, with independent Algorithmic Accountability Boards providing essential oversight to detect bias and protect fundamental rights. Ultimately, e-justice transformation must be pursued not as technological determinism but as a rights-protection strategy that strengthens institutional accountability, enhances public trust, and delivers accessible justice for all Pakistani citizens.

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