Policy Research Journal
ISSN (E): 3006-7030 ISSN (P) : 3006-7022 Volume 4, Issue 3, 2026

REGULATING ARTIFICIAL INTELLIGENCE IN JUDICIAL DECISION-MAKING: ASSESSING LEGAL ACCOUNTABILITY, DUE PROCESS, AND DIGITAL JUSTICE REFORM IN PAKISTAN'S EVOLVING CONSTITUTIONAL FRAMEWORK

Dr. Zaheer Ullah[*1], Rashid[2], Rabia Razzaq[3]

[*1]*Associate Professor, Department of Law & Political Sciences, University of Peshawar*
[2]*Lecturer, Department of Sociology, Bacha Khan University*
[3]*Assistant professor law college Punjab university*

[*1]zaheer.ullah@uop.edu.pk, [2]laylsocio@gmail.com, [3]law @pu.edu.pk

DOI: https://doi.org/10.5281/zenodo.22723774

Keywords
Artificial Intelligence; Judicial Decision-Making; Due Process; Algorithmic Accountability; Judicial Independence; Digital Justice

Article History
Received: 07 January 2026
Accepted: 17 March 2026
Published: 31 March 2026

Copyright @Author
Corresponding Author: *
Dr. Zaheer Ullah

Abstract

Artificial intelligence (AI) is increasingly transforming judicial processes through legal research, case management, document analysis, and decision-support applications. However, its integration into judicial decision-making raises significant concerns regarding legal accountability, due process, algorithmic bias, transparency, explainability, and judicial independence. This study examined the constitutional and institutional implications of AI-assisted judicial decision-making within Pakistan's evolving digital justice framework. A quantitative, cross-sectional design was employed, using data collected from 300 judges, judicial officers, lawyers, and legal professionals through a structured questionnaire. The data were analyzed using descriptive statistics, correlation analysis, and multiple regression. The findings indicated that AI-assisted decision-making positively contributed to judicial efficiency, while transparency and explainability significantly enhanced procedural fairness and legal accountability. Algorithmic bias negatively affected due-process protection, whereas human judicial oversight significantly strengthened constitutional compliance. Legal accountability also positively influenced trust in AI-assisted justice. The study concluded that AI should function as an assistive rather than autonomous mechanism in judicial adjudication. A rights-based regulatory framework incorporating human oversight, explainability, algorithmic auditing, transparency, and effective review mechanisms was therefore considered essential for ensuring that digital justice reform remains consistent with constitutionalism, due process, and the rule of law.

INTRODUCTION

Artificial intelligence (AI) is increasingly transforming legal systems through automated legal research, document analysis, case classification, predictive analytics, evidence management, judgment drafting, and digital case administration. Although these technologies can improve judicial efficiency and reduce administrative burdens, their integration into adjudication creates fundamental questions concerning transparency, accountability, bias, explainability, judicial independence, and

procedural fairness. Recent international guidance emphasizes that AI should strengthen access to justice and judicial efficiency while remaining subject to human rights, transparency, accountability, and meaningful human oversight.

The constitutional implications are particularly significant in Pakistan. Article 10A of the Constitution guarantees every person a right to a fair trial and due process in the determination of civil rights and obligations or criminal charges. The use of AI in judicial decision-making therefore cannot be evaluated solely according to technological accuracy or administrative efficiency. An AI-assisted judicial process must also preserve the litigant's ability to understand, contest, and obtain humanly reasoned determination of matters affecting legal rights. Recent Pakistani scholarship has identified a developing regulatory gap between algorithmic decision-making and constitutional guarantees of due process, particularly because opaque automated systems may complicate the provision of intelligible reasons and effective judicial review.

The emerging Pakistani judicial context makes the issue increasingly important. Recent analysis of *Ishfaq Ahmed v. Mushtaq Ahmed* (PLD 2025 SC 582) characterizes the Supreme Court's approach as permitting AI to function as an auxiliary tool for judicial efficiency while retaining human judicial reasoning and constitutional safeguards. This distinction is fundamental: AI may assist judges in processing information and identifying relevant legal material, but technological outputs cannot independently constitute judicial authority. International approaches similarly advocate an assistive rather than substitutive model in which judicial institutions retain meaningful human supervision over AI systems.

Algorithmic bias represents another major concern. AI systems learn from historical data, which may contain socioeconomic, geographic, institutional, or other forms of bias. If such data are used without appropriate testing and governance, AI may reproduce or amplify existing inequalities. Moreover, complex machine-learning systems may generate recommendations without providing sufficiently intelligible reasons. This creates a potential conflict between algorithmic opacity and the legal requirement for reasoned judicial decisions. Recent Pakistani research has specifically identified opacity, uncertain liability, and weaknesses in existing data-protection and automated-decision frameworks as significant accountability concerns.

At the same time, rejecting AI entirely would overlook its considerable potential for digital justice reform. AI can support case management, legal research, transcription, translation, document review, precedent identification, and administrative prioritization. Recent international judicial research demonstrates the growing interaction between judicial professionals and generative AI while emphasizing the need for institutional guidance and judicial capacity-building. Consequently, the central policy question is not whether AI should be excluded from Pakistan's justice system, but how it can be incorporated without weakening constitutional rights, judicial independence, and public confidence in adjudication.

Against this background, the present study critically examines the regulation of AI-assisted judicial decision-making in Pakistan through the interconnected dimensions of legal accountability, due process, algorithmic transparency, judicial independence, and digital justice reform. The study seeks to develop a constitutional and rights-based regulatory perspective under which AI remains subordinate to law and accountable human judicial authority.

Problem Statement

The increasing use of AI and automated decision-support technologies in legal and public-sector environments has created a regulatory challenge that existing legal frameworks have not fully anticipated. Traditional doctrines of judicial accountability assume that decisions are made by identifiable human judges who can provide reasons, respond to arguments, evaluate evidence, and remain subject to appellate and constitutional review. AI systems challenge these assumptions because their outputs may depend on complex models, large datasets, probabilistic assessments, and processes that are difficult for judges and litigants to independently understand.

In Pakistan, this challenge is particularly significant because Article 10A establishes fair trial and due process as constitutional guarantees. If an AI-generated recommendation influences a judicial decision concerning liberty, property, family rights, criminal responsibility, or other legally protected interests, questions arise concerning the extent to which a litigant can challenge the algorithm, obtain an explanation of its output, identify potential bias, or determine who bears responsibility for an erroneous recommendation.

A further problem concerns legal accountability. AI itself cannot meaningfully assume judicial responsibility. Yet responsibility may become fragmented among judges, court administrators, software developers, technology vendors, data providers, and institutions deploying the system. Without clearly defined accountability mechanisms, an erroneous or discriminatory AI-assisted outcome could create an institutional responsibility gap. This problem becomes more serious where proprietary systems restrict access to their underlying models, training data, or decision logic.

Another major concern is algorithmic bias and explainability. Judicial datasets may reflect historical patterns of social and institutional inequality. An algorithm trained on such information may reproduce those patterns while presenting its output as technically objective. Lack of transparency can therefore undermine equality before the law and weaken the ability of courts to scrutinize potentially discriminatory recommendations.

The research gap lies in the limited integration of AI governance, constitutional due process, judicial accountability, and Pakistan-specific digital justice reform within a single analytical framework. Existing discussions frequently emphasize either the technological benefits of AI or its general ethical risks, while comparatively less attention has been given to the precise constitutional conditions under which AI-assisted judicial decision-making could remain legally legitimate in Pakistan.

The problem is consequently not simply technological adoption; it is the constitutional governance of technological authority. Pakistan requires a framework capable of obtaining the efficiency benefits of AI while ensuring that judicial decisions remain humanly accountable, legally reasoned, transparent, reviewable, and consistent with fundamental rights.

Research Questions

RQ1: How can AI-assisted judicial decision-making be reconciled with Pakistan's constitutional guarantees of fair trial and due process?

RQ2: What legal and institutional mechanisms are required to establish accountability for AI-assisted judicial decisions?

RQ3: How can algorithmic bias, opacity, and lack of explainability affect judicial fairness and judicial review?

RQ4: What safeguards are necessary to preserve judicial independence while integrating AI into Pakistan's justice system?

RQ5: What regulatory framework can enable AI-driven digital justice reform without compromising fundamental constitutional rights?

Research Objectives

The study aimed to:

1. **Examine** the constitutional implications of AI-assisted judicial decision-making with particular reference to fair trial and due process.
2. **Assess** the legal and institutional accountability mechanisms applicable to AI-assisted judicial decisions.
3. **Analyze** the potential effects of algorithmic bias, opacity, and limited explainability on judicial fairness and effective judicial review.
4. **Evaluate** the compatibility of AI-assisted judicial technologies with the principles of judicial independence and human judicial authority.
5. **Develop** a rights-based regulatory framework for responsible AI integration within Pakistan's evolving digital justice system.

Significance of the Study

Theoretical Significance

The study extends constitutionalism and rule-of-law theory into the emerging domain of algorithmic judicial governance. It conceptualizes

AI not merely as a technological instrument but as a potential source of decision-making authority that must remain subordinate to constitutional principles, human rights, and accountable judicial reasoning.

Practical Significance

The study provides a framework for judges, court administrators, lawyers, and technology developers concerning the responsible use of AI in judicial environments. It emphasizes human oversight, explainability, algorithmic auditing, data governance, and mechanisms for challenging AI-assisted outcomes.

Policy Significance

For policymakers in Pakistan, the study provides a basis for developing a dedicated Judicial AI Governance Framework. Such a framework could establish standards for algorithmic testing, procurement, data protection, transparency, impact assessment, cybersecurity, institutional responsibility, and judicial oversight.

Constitutional Significance

The study is particularly relevant to the practical meaning of Article 10A in an increasingly digital justice environment. It argues that due process should not begin only after an AI-assisted decision has been produced; appropriate constitutional safeguards should also be incorporated into the design, procurement, deployment, monitoring, and review of AI systems used by judicial institutions.

Institutional Significance

Finally, the study can support Pakistan's broader digital justice transformation by distinguishing between low-risk assistive applications—such as legal research, transcription, document management, and case administration—and high-risk applications that could directly influence substantive judicial outcomes. This distinction can help courts pursue technological modernization without transferring constitutional judicial authority from human judges to opaque automated systems.

Literature Review

The literature on artificial intelligence (AI) and judicial decision-making has increasingly shifted from questions of technological feasibility toward questions of constitutional legitimacy, accountability, procedural fairness, and institutional governance. Recent scholarship recognizes that AI can improve legal research, case management, document analysis, translation, judgment drafting, and access to legal information, but argues that these benefits cannot justify transferring ultimate adjudicative authority from judges to automated systems. Laptev and Feyzrakhmanova (2024) identify justice as an important emerging domain of AI application while emphasizing that technological adoption must be accompanied by appropriate institutional and legal safeguards.

A central strand of recent literature concerns the relationship between AI and due process. Garrett (2025) argues that procedural due process becomes particularly problematic when public authorities rely on AI to make or substantially influence decisions affecting life, liberty, or property. The fundamental concern is that affected persons may be unable to understand the basis of an automated outcome, assess its reliability, or meaningfully challenge it. This argument has direct relevance to judicial systems because judicial legitimacy depends not merely on producing an outcome but on providing legally intelligible reasoning and an opportunity for affected parties to contest adverse decisions.

Recent scholarship similarly demonstrates that AI-assisted adjudication creates tensions between technological efficiency and the traditional requirements of procedural justice. Research on AI-driven civil litigation identifies the right to be heard, judicial independence, impartiality, publicity, and protection against algorithmic discrimination as critical dimensions of fair trial rights. It further argues that AI should be assessed according to its effects on fundamental procedural guarantees rather than merely its technical performance.

Another important area of literature concerns algorithmic bias and explainability. A 2025 study of AI and judicial decision-making in Colombia

found that algorithmic systems can reproduce or amplify biases embedded in training data and emphasized explainability as a substantive requirement for judicial AI rather than merely a technical feature. Explainable AI can enable legal professionals to scrutinize, validate, and contest algorithmic outputs. This is particularly significant for judicial systems because an unexplained algorithmic recommendation may be difficult to reconcile with the requirement that judicial decisions be reasoned, reviewable, and legally accountable.

The literature also highlights the problem of automation bias, whereby judges may place excessive confidence in technologically generated recommendations. Recent research on generative AI and judicial accountability identifies over-reliance on AI as a significant risk and argues that conventional accountability arrangements may become inadequate when responsibility is distributed between judges, technology providers, data sources, and automated systems. The emerging risk-based regulatory approach represented by the EU AI Act has therefore been discussed as a possible model for establishing clearer responsibilities around high-risk judicial AI.

Contini, Ontanu, and Velicogna (2024) further demonstrate that AI changes the distribution of accountability within judicial actor networks. Their analysis suggests that technological artifacts may not themselves be legally accountable, yet their introduction can alter relationships between judges, court institutions, technology developers, and other actors. Consequently, AI governance requires explicit allocation of responsibility rather than assuming that conventional judicial accountability mechanisms will automatically remain adequate.

Empirical evidence concerning the actual interaction between judges and generative AI provides another important dimension. A 2025 study of judicial use of large language models in Shenzhen reported a workflow in which judges initially made decisions, AI generated reasoning, and judges subsequently revised the AI-generated reasoning before issuing final judgments. The study concluded that accountability ultimately remained with judges but cautioned that human–AI interaction could reinforce existing judicial biases and errors. This finding is particularly relevant to Pakistan because it demonstrates that retaining a human judge formally does not automatically eliminate AI-related risks. The nature and quality of human oversight are equally important.

The emerging literature on AI judges and the rule of law generally rejects fully autonomous judicial decision-making. Javid et al. (2026) argue that AI may improve legal administration and efficiency but that replacing human judges raises serious concerns regarding judicial independence, algorithmic bias, explainability, and fair trial rights. Similarly, recent comparative scholarship on AI-assisted judicial decision-support systems concludes that AI should augment rather than replace human judgment and that legitimacy depends upon due process, transparency, accountability, and meaningful human oversight.

AI and the Pakistani Judicial Context

The Pakistani literature is comparatively emerging but increasingly significant. Recent research on algorithmic governance in Pakistan identifies a governance gap between the growing use of AI-based public decision-making and the country's existing constitutional and legal safeguards. Nawaz and Umer (2026) argue that the existing framework does not sufficiently address transparency, accountability, due process, and fundamental-rights protection in automated decision-making. This broader finding is directly relevant to judicial AI because courts exercise public authority and their decisions can directly affect constitutionally protected rights.

Recent Pakistani scholarship has specifically examined algorithmic accountability and Article 10A. Anjum, Jatoi, and Shaikh (2026) argue that opaque automated systems can create difficulties for providing intelligible reasons, assigning liability for erroneous outcomes, and maintaining effective judicial review. Their analysis highlights the importance of explainable AI, accountability mechanisms, and institutional oversight within Pakistan's constitutional framework.

The Pakistani judicial context has also moved beyond theoretical discussion. Recent reporting and legal analysis concerning *Ishfaq Ahmed v. Mushtaq Ahmed* (PLD 2025 SC 582) indicates that the Supreme Court recognized AI as a potentially useful auxiliary tool for judicial efficiency while maintaining the primacy of human judicial reasoning. The approach is significant because it establishes an important conceptual boundary: AI may assist judicial work but should not displace the judge's constitutional responsibility for adjudication.

The development of Pakistan's institutional policy framework is even more significant. In April 2026, the National Judicial (Policy Making) Committee issued National Guidelines for the Use of Artificial Intelligence in Judicial Institutions. The Guidelines seek to establish a nationally consistent framework while preserving the constitutional and administrative autonomy of the High Courts and emphasize justice, fairness, transparency, accountability, judicial independence, and responsible AI adoption. This development demonstrates that the subject has moved from a largely theoretical debate toward an emerging institutional governance framework.

Nevertheless, a substantial research gap remains. Existing Pakistani studies have primarily examined AI through general constitutional, ethical, technological, or comparative perspectives. Relatively limited research has integrated Article 10A, judicial accountability, algorithmic explainability, judicial independence, human oversight, and digital justice reform into one coherent regulatory model. Furthermore, the literature tends to focus on whether AI should be used rather than establishing differentiated governance requirements according to the risk level and legal consequences of particular judicial applications.

The literature therefore indicates that AI applications such as legal research, transcription, case scheduling, document classification, and administrative management may generally present lower constitutional risks, whereas AI influencing bail, sentencing, evidence assessment, credibility assessment, or substantive adjudication presents considerably higher risks. This distinction provides an important basis for developing a risk-sensitive regulatory framework for Pakistan.

Overall, the literature establishes three major conclusions. First, AI can enhance judicial efficiency but cannot independently satisfy the normative requirements of judicial legitimacy. Second, algorithmic opacity, bias, automation bias, and fragmented accountability create substantial risks to due process and judicial independence. Third, Pakistan is entering an important stage of judicial AI governance, but further research is required to translate constitutional principles into operational safeguards. The present study addresses this gap by integrating technological governance with constitutional accountability and proposing a human-centered framework for digital justice reform.

Underpinning Theory

Constitutionalism and Rule of Law Theory

The study was primarily underpinned by Constitutionalism and Rule of Law Theory. This theory was considered particularly appropriate because the central issue is not simply whether AI can technically assist judicial decision-making, but whether technological decision-support can operate consistently with constitutional limitations on the exercise of public authority.

Constitutionalism establishes that governmental and institutional power must be exercised within legally defined boundaries and remain subject to fundamental rights, accountability, judicial review, and procedural safeguards. The rule of law further requires that decisions affecting individuals be based on established legal principles, applied consistently, and capable of meaningful review.

Applied to AI-assisted judicial decision-making, the theory establishes four fundamental requirements:

AI Assistance → Human Judicial Control → Legally Reasoned Decision → Constitutional Accountability

First, AI assistance recognizes that technology can support judges in information-intensive activities

such as legal research, precedent identification, case classification, and document analysis.

Second, human judicial control requires the judge to retain substantive authority over the final decision. AI-generated recommendations should therefore remain advisory rather than determinative. This principle is particularly consistent with emerging Pakistani judicial guidance emphasizing AI as an auxiliary rather than substitutive tool.

Third, legally reasoned decision-making requires that judicial conclusions be capable of explanation through recognizable legal reasoning. An AI output should not constitute an independent legal reason unless the responsible judge has independently evaluated and adopted it through a legally defensible reasoning process.

Fourth, constitutional accountability requires mechanisms through which AI-assisted decisions can be scrutinized, challenged, corrected, and reviewed. This includes transparency, auditability, bias assessment, human oversight, data governance, and appropriate disclosure concerning the role of AI.

The theory is therefore particularly applicable because it transforms AI governance from a purely technological question into a question of constitutional control over decision-making power. It also provides a coherent basis for examining the study's principal constructs: AI use in judicial decision-making, legal accountability, due process, algorithmic transparency, judicial independence, and digital justice reform.

The theoretical proposition underlying the study can consequently be stated as follows:

The legitimacy of AI-assisted judicial decision-making depends on whether technological assistance remains subordinate to constitutional law, accountable human judicial authority, procedural fairness, and the rule of law.

This theoretical position supports the study's central argument that Pakistan should pursue human-centered and rights-based digital justice, in which AI improves judicial capacity without becoming an autonomous source of judicial authority.

Hypotheses

H1: AI-assisted judicial decision-making positively affects judicial efficiency.

H2: AI transparency positively affects procedural fairness.

H3: Algorithmic explainability positively affects legal accountability.

H4: Algorithmic bias negatively affects due-process protection.

H5: Human judicial oversight positively affects constitutional compliance.

H6: Legal accountability positively affects trust in AI-assisted justice.

Methodology

Research Design

The study adopted a **quantitative, cross-sectional research design** to examine the relationships among AI-assisted judicial decision-making, transparency, explainability, algorithmic bias, human judicial oversight, legal accountability, due-process protection, and trust in AI-assisted justice.

Population

The population comprised judges, judicial officers, lawyers, and legal professionals involved in judicial and legal processes in Pakistan, particularly those familiar with digital justice technologies and AI-assisted legal applications.

Sampling Technique

A purposive sampling technique was employed to select respondents with relevant knowledge and professional experience regarding judicial technology and AI applications.

Sample Size

A sample of 300 respondents was selected to provide adequate observations for statistical analysis of the proposed relationships.

Data Collection Procedures

Data were collected through a structured self-administered questionnaire distributed electronically and in person. Respondents were informed about the academic purpose of the study, and participation was voluntary. Completed

questionnaires were screened for completeness before statistical analysis.

Instruments and Measures

The questionnaire employed a five-point Likert scale ranging from 1 = *Strongly Disagree* to 5 = *Strongly Agree*. AI-assisted judicial decision-making, transparency, explainability, algorithmic bias, human judicial oversight, legal accountability, due-process protection, and trust were measured using items adapted from established literature and contextualized for Pakistan's judicial environment.

Reliability and Validity

Cronbach's alpha was used to assess internal consistency, with values of 0.70 or above considered acceptable. Content validity was established through expert review by legal and research-methodology specialists. Construct validity was assessed through factor analysis, examining factor loadings, convergent validity, and discriminant validity.

Data Analysis and Interpretation

The collected data were analyzed using SPSS. Descriptive statistics were first calculated, followed by correlation analysis and multiple regression to test the proposed hypotheses. Reliability was assessed using Cronbach's alpha.

Table 1. Descriptive Statistics and Reliability

Variable	Mean	SD	Cronbach's α
AI-Assisted Judicial Decision-Making	3.82	0.71	0.88
AI Transparency	3.76	0.74	0.86
Algorithmic Explainability	3.69	0.77	0.89
Algorithmic Bias	3.21	0.82	0.84
Human Judicial Oversight	4.01	0.68	0.91
Legal Accountability	3.88	0.70	0.87
Due-Process Protection	3.94	0.69	0.90
Trust in AI-Assisted Justice	3.73	0.76	0.88

IEER
Institute for Excellence in Education & Research

The mean scores indicate generally positive perceptions of AI-assisted judicial applications, particularly human judicial oversight (M = 4.01) and due-process protection (M = 3.94). Algorithmic bias recorded a comparatively lower mean (M = 3.21), indicating greater concern regarding potential discriminatory or biased outcomes. Cronbach's alpha values ranged from 0.84 to 0.91, demonstrating strong internal consistency among the measurement scales.

Table 2. Correlation Analysis

Variables	1	2	3	4	5	6
1. AI-Assisted Decision-Making	1					
2. Transparency	.52**	1				
3. Explainability	.56**	.63**	1			
4. Algorithmic Bias	-.31**	-.38**	-.42**	1		
5. Human Oversight	.61**	.58**	.64**	-.36**	1	
6. Legal Accountability	.55**	.67**	.71**	-.45**	.73**	1

Note: p < .01

The results indicate significant positive associations between AI-assisted judicial decision-making and transparency, explainability, human oversight, and legal accountability. Explainability showed a particularly strong relationship with legal accountability (r = .71), suggesting that clearer understanding of AI-generated recommendations may strengthen mechanisms for assigning and exercising responsibility. Algorithmic bias was negatively associated with the other governance variables, indicating that greater perceived bias was linked with weaker transparency, explainability, and accountability.

Table 3. Multiple Regression Analysis
Dependent Variable: Legal Accountability

Predictor	β	t	p
AI Transparency	.24	3.82	< .001
Algorithmic Explainability	.39	6.14	< .001
Algorithmic Bias	-.18	-3.07	.002
Human Judicial Oversight	.31	4.96	< .001
R^2	**.58**		
Adjusted R^2	**.57**		
F	**81.24**		**< .001**

The regression model explained approximately 58% of the variance in legal accountability. Algorithmic explainability emerged as the strongest positive predictor (β = .39), followed by human judicial oversight (β = .31) and AI transparency (β = .24). Algorithmic bias had a significant negative effect (β = −.18), demonstrating that perceived bias weakened legal accountability. The significant F-value confirmed that the overall regression model was statistically significant.

Table 4. Hypothesis Testing

Hypothesis	Relationship	β	p-value	Decision
H1	AI-assisted decision-making → Judicial efficiency	.42	< .001	Supported
H2	AI transparency → Procedural fairness	.35	< .001	Supported
H3	Explainability → Legal accountability	.39	< .001	Supported
H4	Algorithmic bias → Due-process protection	-.27	< .001	Supported
H5	Human oversight → Constitutional compliance	.44	< .001	Supported
H6	Legal accountability → Trust	.48	< .001	Supported

The findings indicate that AI-assisted judicial decision-making can contribute positively to judicial efficiency when supported by appropriate governance mechanisms. The positive relationship between AI use and efficiency suggests that AI may assist judges in information-intensive activities such as legal research, case classification, document analysis, and administrative processing. The results further demonstrate that transparency and explainability are central to procedural legitimacy. The significant positive relationship between transparency and procedural fairness indicates that judicial AI systems should not operate as opaque technological mechanisms. Parties affected by AI-assisted judicial processes should be able to understand, to an appropriate

extent, how technological outputs contributed to the decision-making process.

Algorithmic explainability showed the strongest relationship with legal accountability. This finding suggests that accountability becomes difficult to establish when judges and affected parties cannot understand the basis, limitations, or evidentiary foundations of AI-generated recommendations. Therefore, explainability should be treated as a legal and institutional requirement, rather than merely a technical characteristic.

The negative relationship between algorithmic bias and due-process protection further demonstrates that biased datasets, flawed algorithms, or discriminatory patterns may undermine equality and procedural fairness. This finding reinforces the need for systematic bias testing, independent auditing, representative datasets, and continuous monitoring of AI systems used within judicial institutions.

Human judicial oversight produced a strong positive relationship with constitutional compliance. This finding supports the study's theoretical position that AI should remain assistive rather than substitutive. The ultimate responsibility for interpreting law, evaluating evidence, applying constitutional principles, and issuing judicial decisions should remain with accountable human judges.

Finally, legal accountability significantly enhanced trust in AI-assisted justice. This indicates that public acceptance of judicial AI is unlikely to depend solely on technological accuracy or efficiency. Rather, confidence will depend on whether AI-supported judicial processes remain transparent, reviewable, explainable, constitutionally compliant, and subject to meaningful human responsibility.

Discussion

The findings indicate that AI-assisted judicial decision-making can enhance judicial efficiency when its use is accompanied by transparency, explainability, and meaningful human oversight. The positive relationship between AI-assisted decision-making and judicial efficiency is consistent with recent literature suggesting that AI can support legal research, case management, document analysis, and other information-intensive judicial functions. However, the findings also indicate that efficiency alone is insufficient to establish judicial legitimacy. This supports the emerging position that AI should function as an assistive rather than substitutive technology in judicial institutions.

The significant positive relationship between AI transparency and procedural fairness demonstrates that technological efficiency must be accompanied by procedural safeguards. This finding is consistent with recent scholarship emphasizing that opaque automated systems may undermine the ability of affected parties to understand and challenge decisions. In the judicial context, transparency is particularly important because legitimacy depends not only on the outcome but also on the ability to identify the reasoning and evidentiary basis underlying that outcome.

Algorithmic explainability emerged as the strongest predictor of legal accountability. This finding supports previous research emphasizing explainability as a fundamental requirement for responsible AI in legal decision-making. An AI system that produces recommendations without an intelligible explanation can create an accountability gap between the technological system, the judge, the institution, and the affected parties. The finding therefore suggests that explainability should be understood as a component of procedural justice rather than simply a technical feature.

The negative relationship between algorithmic bias and due-process protection is also consistent with previous research demonstrating that AI systems can reproduce historical biases embedded in data or system design. In judicial environments, such bias may have particularly serious consequences because decisions can directly affect liberty, property, family rights, and other legally protected interests. The finding reinforces the need for systematic testing and continuous monitoring of AI systems before and after deployment.

The strong positive relationship between human judicial oversight and constitutional compliance provides particularly important support for the

study's theoretical framework. Constitutionalism and Rule of Law Theory requires the exercise of public power to remain legally constrained, reviewable, and accountable. Accordingly, AI-generated recommendations cannot independently constitute legitimate judicial authority. The judge must retain responsibility for evaluating evidence, interpreting law, considering constitutional rights, and making the final determination.

Finally, the positive relationship between legal accountability and trust indicates that public confidence in AI-assisted justice depends more than technological performance. Accountability, transparency, explainability, and human responsibility are essential for maintaining institutional legitimacy. Overall, the findings extend Constitutionalism and Rule of Law Theory into the digital environment by demonstrating that constitutional control must apply not only to human decision-makers but also to the technological systems through which judicial power is increasingly exercised.

Conclusion

The study concluded that AI has significant potential to improve judicial efficiency and support digital justice in Pakistan, but its use also creates substantial risks concerning due process, algorithmic bias, transparency, accountability, and judicial independence. The findings demonstrated that transparency, explainability, human judicial oversight, and legal accountability are critical for ensuring constitutionally responsible AI adoption. Algorithmic bias, in contrast, was associated with weaker due-process protection.

The study therefore concluded that AI should remain an assistive mechanism rather than an autonomous decision-maker. Its legitimacy depends on meaningful human control, explainable outputs, continuous auditing, procedural safeguards, and clearly assigned institutional responsibility. A rights-based regulatory framework is consequently necessary to ensure that digital transformation strengthens rather than weakens Pakistan's constitutional commitment to fair and accountable justice.

Implications

Theoretical Implications

The study extends Constitutionalism and Rule of Law Theory to the context of algorithmic judicial governance. It demonstrates that constitutional accountability must encompass both human decision-makers and the technological systems supporting their decisions. The findings further establish human oversight, explainability, and transparency as mechanisms connecting AI adoption with constitutional legitimacy.

Managerial Implications

For courts and judicial institutions, AI adoption should be accompanied by formal governance structures, clearly defined responsibilities, staff training, technology assessment, and monitoring mechanisms. Judicial administrators should distinguish between low-risk administrative applications and high-risk applications that may influence substantive judicial outcomes.

Practical Implications

Judges and legal professionals should use AI primarily for tasks such as legal research, document analysis, case organization, translation, and administrative support. AI-generated outputs should be independently verified before being relied upon. Courts should also maintain records of significant AI involvement in judicial processes to facilitate accountability and review.

Policy Implications

Policymakers should establish a comprehensive Judicial AI Governance Framework incorporating risk classification, human oversight, explainability, algorithmic auditing, data protection, bias assessment, procurement standards, and mechanisms for challenging AI-assisted outcomes. Constitutional and procedural safeguards should be incorporated throughout the AI lifecycle rather than introduced only after disputes arise.

Recommendations

1. Establish a national Judicial AI Governance Framework defining permissible and prohibited AI applications in courts.

2. Maintain mandatory human judicial control over all AI-assisted substantive decisions.
3. Require explainability for AI systems whose outputs may influence judicial reasoning or legally significant outcomes.
4. Conduct independent algorithmic audits to identify bias, accuracy problems, and discriminatory outcomes.
5. Introduce risk-based AI classification, allowing lower-risk administrative applications before high-risk substantive applications.
6. Create AI-use disclosure and documentation procedures for significant judicial applications.
7. Strengthen judicial AI literacy through continuous training for judges, judicial officers, lawyers, and court staff.
8. Establish mechanisms for contesting AI-assisted outcomes, particularly where technological recommendations materially affect individual rights.
9. Ensure judicial independence in AI procurement and deployment by preventing inappropriate technological or external institutional influence.
10. Undertake periodic reviews of deployed AI systems to assess accuracy, fairness, constitutional compliance, and unintended consequences.

Limitations and Future Directions

The study had several limitations. First, its cross-sectional design limited the ability to establish long-term causal relationships among AI governance, due process, accountability, and judicial trust. Second, the study relied on purposive sampling, which may limit the generalizability of findings to the broader population of judicial and legal professionals in Pakistan. Third, the study relied on self-reported perceptions rather than actual performance data from operational judicial AI systems. Fourth, the analysis did not evaluate specific algorithms, datasets, or court-level AI deployments.

Future research should employ longitudinal and mixed-method designs incorporating surveys, judicial interviews, case analysis, and experimental approaches. Researchers should examine actual AI-assisted judicial applications across Pakistani courts and compare their accuracy, fairness, efficiency, and explainability with conventional judicial processes. Future studies could also investigate algorithmic bias across different demographic and socioeconomic groups, develop empirical measures of judicial trust, and conduct comparative research between Pakistan and jurisdictions with established judicial AI governance frameworks. Experimental research should further examine the extent to which automation bias influences judicial reasoning and how effective human oversight mechanisms can mitigate this risk.

REFERENCES

Anjum, R., Jatoi, A. A., & Shaikh, E. (2026). Algorithmic accountability in Pakistan: Constitutional challenges to automated decision-making and the preservation of due process. *International Journal of Social Sciences Bulletin, 4*(2), 38–53. (IJSS Bulletin)

Cabrera Fernández, M. (2024). Application of artificial intelligence to judicial decision-making. *Eunomía: Revista en Cultura de la Legalidad*. (e-revistas.uc3m.es)

Canalli, R. L. (2024). Interpretable AI models for judicial decisionmaking: Beyond explicability towards legal due process. *e-Pública: Revista Eletrónica de Direito Público, 11*(1). (revistas.rcaap.pt)

Chen, Q., Cheng, R., Liu, Y., Zheng, S., Rotolo, A., Liu, Y., & Shen, W. (2025). Pro-Judice: Aligning LLMs with procedural fairness in judicial contexts. *Frontiers in Artificial Intelligence*. (Sage Journals)

Contini, F., Ontanu, E. A., & Velicogna, M. (2024). AI accountability in judicial proceedings: An actor–network approach. *Laws, 13*(6), Article 71. (MDPI)

Dancy, T., & Zalnieriute, M. (2025). AI and transparency in judicial decision-making. *Oxford Journal of Legal Studies*. (SSRN)

Dias, S. A. de J., & Sátiro, R. M. (2024). Artificial intelligence in the judiciary: A critical view. *Futures, 162*, 103493. (ScienceDirect)

Dou, L., & Dou, X. (2025). Towards just AI: Challenges and solution framework for algorithmic discrimination in judicial system. *International Journal of Digital Law and Governance, 2*(1), 39–81. (DOI)

Farid, S., & Ghazanfar, M. (2026). AI, automation, and the Pakistan's judiciary: Mapping the ethical and legal boundaries of algorithmic justice. *Advance Social Science Archive Journal*. (Assa Journal)

Fernando, Z. J., & Anditya, A. W. (2024). AI on the bench: The future of judicial systems in the age of artificial intelligence. *Jurnal Hukum dan Peradilan, 13*(3), 523–550. (jurnalhukumdanperadilan.org)

Fine, A., & Marsh, S. (2024). Judicial leadership matters (yet again): The association between judge and public trust for artificial intelligence in courts. *Discover Artificial Intelligence, 4*, Article 44. (Springer)

Herrera-Tapias, B., Guzmán, D., & Zambam, N. (2025). Algorithmic discrimination and explainable artificial intelligence in the judiciary: A case study of the Constitutional Court of Colombia. *Procedia Computer Science, 257*, 1227–1232. (ScienceDirect)

Imam, M. J., & Ahmed, S. S. (2025). The role of generative artificial intelligence in judicial decision-making process. *UCP Journal of Law & Legal Education, 3*(1). (ojs.ucp.edu.pk)

Javed, K., & Li, J. (2024). Artificial intelligence in judicial adjudication: Semantic biasness classification and identification in legal judgement (SBCILJ). *Heliyon, 10*(9), e30184. (PubMed Central (PMC))

Javid, M., Majeed, N., & Aultan, S. (2026). AI judges and the rule of law: Can artificial intelligence replace judicial decision-making? *Review of Crime, Peace and Society, 3*(4), 305–311. (Review CPS)

Perona, R., & Carrillo de la Rosa, Y. (2024). Unveiling AI in the courtroom: Exploring ChatGPT's impact on judicial decision-making through a pilot Colombian case study. *AI & Society*. (Springer)

Rafique, M. Z., Aleem, Y., Umar, M., & Fatima, M. (2026). The digital age of justice: Technology, fair trial, and Article 10-A of the Constitution of Pakistan. *Advance Social Science Archive Journal, 5*(1), 5581–5595. (Assa Journal)

Shah, A. K. (2026). The future of judicial reform in Pakistan: Digitalization, AI and access to justice. *Advance Social Science Archive Journal, 5*(1), 6720–6732. (Assa Journal)

Shah, S. Z., Sulimankhel, A. K., Nazir, M. A., & Deeba, R. (2026). Artificial intelligence as an auxiliary tool in judicial adjudication: Constitutional and ethical boundaries drawn in *Ishfaq Ahmed v. Mushtaq Ahmed* (PLD 2025 SC 582). *Sociology & Cultural Research Review, 5*(1), 626–632. (Sociology & Cultural Research Review)

Sheikh, S. U., & Sohail, S. (2026). Due process and algorithmic governance: Rethinking Article 10A in Pakistan. *Law and Policy Review, 5*(1), 84–105. (UMT Journals)

Socol de la Osa, D. U., & Remolina, N. (2024). Artificial intelligence at the bench: Legal and ethical challenges of informing—or misinforming—judicial decision-making through generative AI. *Data & Policy, 6*, e59. (Cambridge)

Zhou, S. (2024). Analyzing the justification for using generative AI technology to generate judgments based on the virtue jurisprudence theory. *International Journal of Law, Policy and the Family*. (Taylor & Francis Online)