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DECENTRALISED JUSTICE: HOW KLEROS EMPOWERS JURORS IN ONLINE DISPUTE RESOLUTION

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ABSTRACT: This paper argues that decentralised justice, as exemplified by Kleros, offers complementary model to judicial AI by combining partial automation with transparent, human-centred decision-making. While not a substitute for courts, decentralised systems highlight how transparency, proportionality, and visible human oversight can mitigate risks of opacity, bias and legitimacy loss in digitally enabled justice.

KEYWORDS: decentralised justice; kleros; judicial artificial intelligence; digital dispute resolution.

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1. INTRODUCTION

In recent years, judicial systems worldwide have undergone an unprecedented transformation driven by advances in digital technology[1]. Courts have increasingly embraced remote hearings, e-filing systems, and digital case management tools to streamline proceedings and improve accessibility[2]. This shift, often referred to as *digital justice*, represents both a pragmatic response to long-standing inefficiencies and a broader movement toward modernising public institutions[3]. The COVID-19 pandemic accelerated these developments[4], compelling even the most traditional jurisdictions to adopt online platforms to ensure continuity of justice. Beyond convenience, digitalisation has been heralded as a means of reducing procedural delays[5], minimising administrative costs, and expanding access to justice, particularly for low-income and self-represented litigants who often find traditional processes costly, opaque, and intimidating[6].

Yet, this transformation also exposes profound tensions at the intersection of technological innovation, judicial legitimacy, and fairness[7]. While digitalisation promises efficiency and inclusion, the automation of judicial functions introduces novel risks that may erode public trust in the courts. The deployment of algorithms to assist or, in some cases, replace human decision-

[1] Henckel, K. (2023). Issues of conflicting laws – a closer look at the EU's approach to artificial intelligence. *Nederlands Internationaal Privaatrecht*, *2023*(2), 199-226. Article NIPR 2023-12.

[2] Donoghue, J. (2017). The rise of digital justice: Courtroom technology, public participation and access to justice. *The Modern Law Review*, *80*(6), 995-1025.

[3] Sela, A. (2019). e-Nudging justice: the role of digital choice architecture in online courts. *J. Disp. Resol.*, 127.

[4] Bannon, A. L., & Keith, D. (2020). Remote court: principles for virtual proceedings during the COVID-19 pandemic and beyond. *Nw. UL REv.*, *115*, 1875.

[5] Waseem; Sharma, Anupam; Kumar, Akhil. (2023). Transforming Access to Justice in the Digital Age: The Role of E-Courts. *NUJS J. Regul. Stud.*, *8*, 43.

[6] Prescott, J. J. (2024). Next Steps in Online Courts: Accelerating Access to Justice Through Court Technology. *Alaska L. Rev.*, *41*, 93.

[7] Kozlova, M. Y., & Davydova, M. L. (2024). Digital Technology in Courts as a Tool for Smart Regulation: Opportunities and Risks. In *Ecological Footprint of the Modern Economy and the Ways to Reduce It: The Role of Leading Technologies and Responsible Innovations* (pp. 207-211). Cham: Springer Nature Switzerland.

makers raises concerns of *algorithmic opacity*, bias replication, and accountability gaps[8]. When litigants cannot understand how a digital system reached a conclusion, or when proprietary algorithms conceal their decision-making logic, the fundamental principle of transparency is undermined[9]. Similarly, automated systems trained on historical data may perpetuate existing structural inequalities, disadvantaging groups already marginalised within legal systems. These issues are compounded by uneven levels of digital literacy among citizens and practitioners, creating new forms of inequality in access to justice. Thus, the digital turn in judicial governance, while promising greater efficiency, simultaneously threatens core values of fairness, equality before the law, and due process.

Artificial intelligence (AI) has become the most consequential frontier of this digital justice transformation. Judicial and administrative bodies have begun experimenting with AI tools to predict case outcomes, assess sentencing consistency, and support judges in decision-making[10]. In Europe, several pilot initiatives in Germany[11] and Spain[12] have explored how AI might be used to reduce backlogs and assist judges in routine procedural tasks. The European Union's *Artificial Intelligence Act* (EU AI Act) acknowledges both the promise and peril of such applications, classifying AI systems used in the administration of justice as "high-risk" technologies. This designation reflects a cautious recognition that the judicial sphere occupies a unique ethical and constitutional position—one where the legitimacy of decisions depends not only on accuracy and efficiency but also on perceived fairness, impartiality, and human oversight[13]. As empirical evidence from European jurisdictions suggests, AI tends to perform best when used as a *supporting instrument* for judges rather than as a replacement for them[14]. Human judgment, interpretive reasoning, and moral accountability remain indispensable components of adjudication that no algorithm can replicate.

Against this backdrop, a new paradigm is emerging: decentralised justice. Built upon blockchain technology, decentralised dispute resolution (DDR) mechanisms propose an alternative approach to the centralisation and opacity of traditional judicial and algorithmic systems[15]. Instead of concentrating authority in a single institution or algorithm, decentralised justice dis-

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[8] Engstrom, D. F. (2021). Digital civil procedure. *U. Pa. J. Const. L.*, *23*, 2178.

[9] [*ibid*.] p. 2189

[10] McKay, C. (2020). Predicting risk in criminal procedure: actuarial tools, algorithms, AI and judicial decision-making. *Current Issues in Criminal Justice*, *32*(1), 22-39.

[11] Dhungel, A. K., & Beute, E. (2024). AI systems in the judiciary: amicus curiae? Interviews with judges on acceptance and potential use of intelligent algorithms.

[12] Capasso, V. (2024). For an…«Artificially Intelligent» Process: When Access to Justice and Efficient Court Management go Hand in Hand. *International Journal of Procedural Law*, *14*(2), 245-272.

[13] Langbroek, P. M. (2019). Why judges should be in control: IT's and Artificial Intelligence may improve courts services but are no panacea for backlogs and speeding up proceedings. *The Court Administrator*, *5*, 22-25.

[14] [*ibid*.] pp.23-25

[15] Poncibò, C., Gangemi, A., & Ravot, G. S. (2024). Blockchain justice: Exploring decentralising dispute resolution across borders. *JL, Mkt. & Innovation*, 14.

tributes decision-making across a community of participants governed by transparent, code-based rules. These systems—sometimes referred to as *Lex Cryptographia*, in contrast to the state-centric *Lex Informatica*—employ smart contracts to enforce outcomes automatically and immutably. The most prominent example of such an approach is *Kleros,* an open-source platform that leverages blockchain and crowd-sourced jurors to adjudicate online disputes[16]. Through a system of token-based incentives and random selection, Kleros enables ordinary users to serve as jurors in resolving small claims, digital commerce conflicts, and token certification disputes. Its model exemplifies a form of *partial automation* that combines algorithmic coordination with human judgment, aiming to enhance transparency, efficiency, and accessibility while maintaining fairness and oversight.

Kleros thus offers a compelling case study in the evolving landscape of digital justice. It demonstrates how decentralised technologies can complement, rather than replace, traditional judicial systems by fostering trust, procedural integrity, and inclusiveness. Unlike fully automated AI models, Kleros retains a human element at its core—jurors whose collective reasoning forms the basis of each decision, guided but not dictated by technology[17]. In doing so, it provides valuable lessons for courts seeking to integrate digital tools responsibly, without compromising the principles that underpin the rule of law. At the same time, Kleros's experience exposes new challenges, including potential biases in juror selection, speculative participation driven by financial incentives, and accessibility barriers arising from technical complexity and cryptocurrency volatility. These limitations underscore that technological innovation in justice must always be accompanied by careful design, human oversight, and ethical reflection[18].

This paper argues that decentralised justice, as embodied by Kleros, represents a complementary model to judicial AI—one that balances efficiency and innovation with fairness, accountability, and public confidence. By examining Kleros as both a technological and socio-legal experiment, the paper seeks to illuminate how decentralised systems can mitigate the risks associated with judicial automation while expanding the possibilities for accessible, legitimate, and transparent dispute resolution. The goal is not to propose a wholesale replacement of courts, but to explore how decentralised governance models can inform the responsible digital transformation of justice systems worldwide.

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[16] Zhuk, A. (2023). Applying blockchain to the modern legal system: Kleros as a decentralised dispute resolution system. *International Cybersecurity Law Review*, *4*(3), 351-364.

[17] [*ibid*.] pp.355-360

[18] Gabuthy, Y. (2023). Blockchain-based dispute resolution: insights and challenges. *Games*, *14*(3), 34.

2. LITERATURE REVIEW: DIGITAL JUSTICE AND AI IN COURTS

2.1. Digital Justice as Institutional Modernisation and Access-to-Justice Reform

The digital transformation of courts has been widely analysed in the literature as both an efficiency-driven reform and a normative project aimed at improving access to justice. Early scholarship conceptualised judicial digitalisation primarily as an administrative modernisation effort, focusing on electronic filing systems, digital case management, and the online publication of judgments[19]. More recent work, however, situates these initiatives within broader concerns about procedural proportionality, affordability, and inclusiveness, particularly for low-income and self-represented litigants[20].

International and European policy frameworks have strongly influenced this shift. The Council of Europe's work through CEPEJ frames digital tools as instruments for reducing backlogs, increasing transparency, and strengthening public trust, provided that they respect fair trial guarantees and judicial independence[21]. Similarly, EU-level initiatives on e-Justice and cross-border digital procedures emphasise the potential of technology to lower transaction costs and facilitate access to courts, especially in small claims and uncontested matters. The COVID-19 pandemic is widely identified as a critical accelerant, transforming optional digital tools into systemic necessities and embedding remote hearings and online procedures into mainstream judicial practice[22].

At the same time, socio-legal scholarship cautions that digital justice cannot be assessed solely through metrics of speed or cost reduction[23]. Courts are not neutral service providers but constitutional institutions whose legitimacy depends on participation, transparency, and perceived fairness[24]. Empirical studies indicate that digitalisation can unintentionally exclude users lacking technological resources or digital literacy, thereby reproducing inequalities under the guise of efficiency[25]. As a result, the literature increasingly frames digital justice as a governance challenge requiring careful institutional design rather than a purely technical upgrade.

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[19] Contini, F., & Lanzara, G. F. (2014). The circulation of agency in e-justice. *Interoperability and Infrastructures for European*.

[20] Assy, R., & Higgins, A. (Eds.). (2020). *Principles, Procedure, and Justice: Essays in Honour of Adrian Zuckerman*. Oxford University Press.

[21] Novaković, M. (2022). A review of the efficiency of justice and other elements of the 2022–2025 CEPEJ action plan:"Digitalisation for a better justice".

[22] Fabri, M. (2021). Will COVID-19 accelerate implementation of ICT in courts? In *IJCA* (Vol. 12, p.1).

[23] Reiling, D., & Contini, F. (2022). E-justice platforms: Challenges for judicial governance. In *IJCA* (Vol. 13, p. 1).

[24] [*ibid*.] pp.1-5

[25] Ilchyshyn, N. (2025). Impact of digitalisation on the justice system: Challenges of administrative justice. *Social and Legal Studios*, *2*(8), 238-247.

2.2. Artificial Intelligence in Courts: Efficiency Gains and Structural Constraints

Artificial intelligence occupies a central place within contemporary debates on digital justice. Legal scholarship distinguishes between relatively uncontroversial applications—such as document classification, legal research assistance, and workflow optimisation—and more contentious uses involving predictive analytics or decision-support in adjudication[26]. Proponents argue that AI can enhance consistency, reduce human error, and assist courts in managing growing caseloads, particularly in routine or repetitive tasks[27].

European experiences, particularly in Germany and Spain, are frequently cited as illustrative of a cautious, incremental approach. In Germany, doctrinal and constitutional scholarship strongly resists automated adjudication, emphasising that judicial decision-making is inseparable from interpretive reasoning, discretion, and constitutional accountability[28]. Consequently, AI initiatives have focused on supporting judges through research tools, case allocation systems, and administrative optimisation, rather than attempting to replace human judgment.

Spanish literature reflects a similar orientation. While policy initiatives have explored algorithmic tools to streamline judicial administration and reduce delays, scholars consistently stress the need to preserve judicial autonomy and ensure that AI outputs remain advisory rather than determinative[29]. Across both jurisdictions, empirical assessments suggest that AI delivers its greatest value when embedded within a "human-in-the-loop" model, reinforcing rather than displacing judicial responsibility[30].

These findings support a broader consensus in the literature: while AI may contribute to procedural efficiency, it cannot replicate the normative and relational dimensions of adjudication. Judicial legitimacy derives not only from accurate outcomes but from the manner in which decisions are reached, explained, and contested – features that remain fundamentally human.

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[26] Surden, H. (2022). Values embedded in legal artificial intelligence. *IEEE Technology and Society Magazine*, *41*(1), 66-74.

[27] Costabel, A. M. (2023). The Future of Online Justice According to Susskind: From COVID-19 Emergencies to Global Platforms. *Journal of Multidisciplinary Research*, *15*(1), 79-86.

[28] Landfried, C. (1992). Judicial policymaking in Germany: The federal constitutional court. *West European Politics*, *15*(3), 50-67.

[29] Galindo Ayuda, F. (2025). Literacy, Judicial Justice and Artificial Intelligence. *Revista Democracia Digital e Governo Eletrônico, Florianópolis*, *1*(24), 2-30.

[30] Toohey, L., Moore, M., Dart, K., & Toohey, D. (2019). Meeting the access to civil justice challenge: Digital inclusion, algorithmic justice, and human-centred design. *Macquarie LJ*, *19*, 133.

2.3. Risks of Automation: Bias, Opacity, and Accountability Deficits

Despite its potential benefits, the literature identifies significant risks associated with the automation of judicial functions. Algorithmic bias is among the most extensively documented concerns. Scholars have demonstrated that AI systems trained on historical legal data may encode and amplify existing structural inequalities, particularly where past practices reflect discriminatory patterns[31]. In the judicial context, such bias directly threatens equality before the law and non-discrimination.

Many AI systems, particularly those based on machine learning, operate as "black boxes", producing outputs without intelligible explanations[32]. This poses a direct challenge to core procedural principles, including the right to a reasoned decision and effective appellate review. When litigants cannot understand how a conclusion was reached, transparency and trust are undermined, regardless of the system's technical accuracy.

Accountability represents a further unresolved issue. Hybrid decision-making environments, where judges rely on algorithmic recommendations, complicate traditional responsibility structures. Scholars question who bears legal and moral accountability when AI-informed decisions produce harm: the judge, the court administration, the software developer, or the state[33]. These concerns are amplified by the use of proprietary systems that are shielded by trade secrecy, limiting scrutiny by litigants, lawyers, and the public.

Importantly, legitimacy emerges as a unifying theme in this critical literature. Studies in procedural justice demonstrate that perceptions of fairness and participation are central to public acceptance of legal decisions. Automation that appears opaque, impersonal, or unchallengeable risks provoking resistance from legal professionals, civil society, and citizens alike, thereby gradually eroding confidence in judicial institutions.

2.4. The EU AI Act: High-Risk Classification and Unresolved Normative Gaps

By AI systems used in the administration of justice as "high-risk", the EU AI Act acknowledges the unique constitutional and ethical stakes of judicial decision-making. It imposes obligations relating to data quality, transparen-

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[31] Barocas, S., & Selbst, A. D. (2016). Big data's disparate impact. *Calif. L. Rev.*, *104*, 671.

[32] Fomin, V. V., & Astromskis, P. (2023). The Black Box Problem. *Future Law, Ethics, and Smart Technologies*, 112-125.

[33] Von Eschenbach, W. J. (2021). Transparency and the black box problem: Why we do not trust AI. *Philosophy & technology*, *34*(4), 1607-1622.

cy, human oversight, and risk management, reflecting a clear preference for supportive rather than substitutive uses of AI in courts.

Scholarly assessments generally welcome this approach as an important safeguard for fundamental rights and the rule of law[34]. The emphasis on human oversight aligns with empirical findings from European jurisdictions and reinforces the normative consensus that adjudication cannot be fully automated. However, the literature also highlights significant limitations. The AI Act's horizontal, technology-neutral design limits its capacity to address the institutional particularities of courts, such as judicial independence, procedural autonomy, and constitutional traditions[35].

Moreover, the regulatory framework focuses primarily on risk mitigation rather than on alternative institutional models for digital justice. It does not engage with questions of legitimacy, participation, or trust beyond compliance requirements, nor does it address decentralised or non-state dispute resolution mechanisms. As a result, scholars argue that the EU AI Act, while necessary, is insufficient to resolve the deeper normative tensions highlighted by judicial automation[36].

This regulatory and conceptual gap has prompted increasing scholarly interest in experimental models of dispute resolution that seek to combine technological efficiency with transparency and human judgment. It is within this context that decentralised justice mechanisms—such as blockchain-based dispute resolution platforms—have begun to attract attention as potential complements to both traditional courts and centralised AI-driven systems. Against this backdrop of efficiency-driven reform, technological risks, and unresolved normative gaps, the analysis now turns to a conceptual framework that understands digital justice through two competing paradigms: centralised models grounded in institutional control and optimisation, and decentralised approaches emphasising transparency, participation, and distributed trust.

3. THEORETICAL FRAMEWORK: CENTRALISED *VERSUS* DECENTRALISED JUSTICE

3.1. Centralised Justice and Institutional Control: Lex Informatica

The dominant model of digital justice adopted by states and judicial institutions can be conceptualised through the lens of *Lex Informatica*[37]. Applied

[34] Greenstein, S. (2022). Preserving the rule of law in the era of artificial intelligence (AI). *Artificial Intelligence and Law*, *30*(3), 291-323.

[35] Carnat, I. (2024). Addressing the risks of generative AI for the judiciary: The accountability framework (s) under the EU AI Act. *Computer Law & Security Review*, *55*, 106067.

[36] Wachter, S. (2023). Limitations and loopholes in the EU AI Act and AI Liability Directives: what this means for the European Union, the United States, and beyond. *Yale JL & Tech.*, *26*, 671.

[37] Mefford, A. (1997). Lex informatica: Foundations of Law on the Internet. *Ind. J. Global Legal Stud.*, *5*, 211.

by J Reidenberg, the term refers to regulation through code, or "the formulation of information policy rules through technology", whereby behaviour is constrained not by legal norms applied ex post, but by technical architectures that shape permissible actions ex ante[38]. In the judicial context, *Lex Informatica* manifests in centrally designed and administered digital systems, such as AI-assisted case management, predictive analytics, and decision-support tools, embedded within existing court hierarchies and governance structures.

This model preserves institutional control by locating authority within courts, ministries of justice, or court administrations, which are responsible for selecting, deploying, and overseeing technological tools. AI systems operating under *Lex Informatica* are typically proprietary, developed by private vendors, and integrated into judicial workflows through administrative decisions rather than through democratic or participatory processes. Accountability is therefore channelled through traditional institutional mechanisms: judicial review, administrative oversight, and compliance with regulatory frameworks such as the EU AI Act.

While this centralised approach offers advantages in terms of standardisation, scalability, and alignment with constitutional structures, it also reproduces the structural vulnerabilities identified in the literature. Algorithmic opacity is exacerbated when proprietary systems limit transparency. Accountability becomes diffuse in hybrid human–machine decision-making, and public trust may erode where technological authority appears detached from human judgment. Importantly, *Lex Informatica* tends to reinforce hierarchical governance, positioning judges and institutions as passive recipients of technological "solutions" rather than as active participants in their design or evolution[39].

From a legitimacy perspective, centralised digital justice remains anchored in Weberian rational-legal authority. Decisions derive their authority from institutional position and formal legality, even when mediated by complex technological systems. As a result, *Lex Informatica* is normatively dependent on trust in institutions—a condition that is increasingly fragile in many jurisdictions.

3.2. Decentralised Justice and Blockchain-Based Enforcement: Lex Cryptographia

In contrast, *Lex Cryptographia* describes a regulatory paradigm in which rules are encoded and enforced through decentralised technological infrastructures, most notably blockchain and smart contracts[40]. Rather than relying

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[38] Reidenberg, J. R. (1997). Lex informatica: The formulation of information policy rules through technology. *Tex. L. Rev.*, *76*, 553.

[39] Cohen, J. E. (2021). From lex informatica to the control revolution. *Berkeley Technology Law Journal*, *36*(3), 1017-1050.

[40] Wright, A., & De Filippi, P. (2015). Decentralized blockchain technology and the rise of lex cryptographia. *Available at SSRN 2580664*.

on central authorities to interpret and apply rules, *Lex Cryptographia* distributes enforcement across a network of participants, using cryptographic verification and consensus mechanisms to ensure compliance. Legal theorists such as De Filippi and Wright[41] conceptualise this model as a shift from institutional trust to "trustless" or trust-minimised systems, where confidence is placed in transparent code rather than hierarchical authority.

In the context of dispute resolution, decentralised justice systems operationalise *Lex Cryptographia* by embedding procedural rules directly into smart contracts[42]. Jurisdiction, evidence submission, adjudication, and enforcement are governed by code that is publicly auditable and executed automatically once predefined conditions are met. Authority is no longer concentrated in a single institution but is dispersed among network participants, who collectively uphold the system's integrity.

This decentralisation introduces a fundamentally different governance logic. Decision-making power is distributed, participation is open (subject to technical and economic constraints), and legitimacy is derived from transparency, replicability, and community validation rather than from institutional pedigree. Enforcement is immediate and automatic, reducing reliance on coercive state power but also narrowing opportunities for discretion, mercy, or contextual adjustment.

Importantly, decentralised justice does not eliminate human judgment; rather, it reconfigures it. Human actors—jurors, validators, or arbitrators—operate within algorithmically structured environments that constrain behaviour while preserving deliberation. The system's normative commitments are thus embedded at the design stage, shifting regulatory power upstream from adjudication to architecture.

3.3. Situating Kleros within the Centralised–Decentralised Spectrum

Kleros occupies an intermediate position between fully centralised judicial AI and fully automated enforcement. It exemplifies a hybrid decentralised model in which algorithmic coordination facilitates, rather than replaces, human adjudication[43]. Smart contracts govern procedural aspects, such as juror selection, staking, and enforcement, while substantive decision-making remains in the hands of human jurors incentivised to reach what the system defines as the "coherent" outcome.

Unlike *Lex Informatica*, where AI tools are subordinate to institutional hierarchies, Kleros operates without a central adjudicatory authority. Governan-

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[41] [*ibid*.] 18-35.

[42] Rodríguez, A. M. L. (2021). Applicable law to smart contracts and lex cryptographia. *Cuadernos Derecho Transnacional*, *13*, 441.

[43] Desai, A. (2024). Integrating Smart Contracts with Hybrid Online Dispute Resolution Mechanisms in Cross-Border Commercial Transactions. *Jus Corpus LJ*, *5*, 194.

ce is distributed across token holders, developers, and users, with protocol changes subject to community mechanisms rather than administrative fiat[44]. Discretion is thus relocated from institutionally constrained AI systems to a socially distributed body of human jurors coordinated by code rather than command. At the same time, Kleros differs from purely automated systems in that it explicitly preserves deliberation, disagreement, and interpretation as core components of dispute resolution.

This positioning makes Kleros particularly valuable as a theoretical counterpoint to judicial AI. It demonstrates that automation need not imply centralisation, and that efficiency gains can be achieved without surrendering transparency or human involvement. However, it also exposes the trade-offs inherent in decentralisation, including reliance on economic incentives, susceptibility to strategic behaviour, and exclusionary technical barriers[45].

3.4. Conceptual Bridge: Decentralisation, Opacity, and Legitimacy

The central theoretical claim emerging from this contrast is that decentralisation offers an alternative pathway to legitimacy in digital justice, particularly in contexts where trust in institutions or opaque algorithms is low. Decentralised justice makes rules transparent, auditable, and collectively enforced. In doing so, it directly addresses concerns of algorithmic secrecy. Code is not hidden behind proprietary walls but open to inspection, critique, and modification.

Moreover, decentralised justice redistributes accountability[46]. While responsibility is diffused rather than concentrated, it is also more visible: participants understand the rules, the incentives, and the consequences of decisions. This can enhance perceived fairness, particularly in low-value or cross-border disputes where access to state courts is limited or impractical.

At the same time, decentralisation does not eliminate normative risk. Bias may still emerge through juror selection mechanisms, economic incentives may distort participation, and the absence of institutional safeguards may undermine procedural protections[47]. Legitimacy, therefore, is not guaranteed by decentralisation per se but depends on careful system design and continuous governance.

This theoretical framework provides the basis for analysing Kleros not as a substitute for courts, but as a complementary governance expe-

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[44] [*ibid*] pp.194-197

[45] In the absence of institutional authority, legitimacy is grounded less in heirarchical mandate than in predictability, incentive alignment, and the capacity of participants to exit the system.

[46] Zeggari, M., Lambiotte, R., Abadi, A., & Kassab, M. (2023, March). An efficient and decentralized blockchain-based commercial alternative. In *2023 IEEE 20th International Conference on Software Architecture Companion (ICSA-C)* (pp. 231-238). IEEE.

[47] [*ibid*.] pp. 231-239

riment[48]. By comparing *Lex Informatica* and *Lex Cryptographia*, the paper situates decentralised justice within broader debates on automation, legitimacy, and access to justice, setting the stage for a detailed examination of Kleros's practical operation and normative implications.

4. CASE STUDY: THE KLEROS MODEL

4.1. Origins and Purpose: Building Trust in Online Transactions

Kleros emerged in response to a structural deficit in online commerce and digital interactions: the absence of affordable, neutral, and enforceable dispute resolution for low-value, cross-border transactions[49]. Traditional courts are often inaccessible or disproportionate for such disputes[50]. Private platforms, by contrast, tend to rely on unilateral enforcement mechanisms that prioritise efficiency over fairness. Kleros was conceived as a decentralised alternative capable of resolving disputes without reliance on state courts or centralised intermediaries[51].

Launched in 2018, Kleros positions itself as an "on-chain court" designed to adjudicate disputes arising from smart contracts and online interactions. Its founding premise is that trust in digital environments can be reconstructed through transparent procedures, economic incentives, and distributed human judgment. Rather than eliminating adjudication, Kleros seeks to reconfigure it by embedding procedural rules into blockchain infrastructure and distributing decision-making authority among a pool of incentivised jurors, thereby operationalising decentralised legitimacy in practice[52].

The platform's initial use cases focused on simple disputes—such as escrow disagreements and digital service contracts where factual complexity is limited and enforcement through smart contracts is feasible[53]. Over time, Kleros expanded into more specialised domains, including token curation registries, decentralised autonomous organisation (DAO) governance, and online content moderation. This evolution reflects both the flexibility of decentralised dispute resolution and the growing demand for governance mechanisms within blockchain ecosystems.

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[48] Jaodun, M., & Bouafia, K. (2025). Analysis and Evaluation of a Blockchain-Based Framework for Decentralized Rental Agreements and Dispute Resolution. *Blockchains*, *3*(2), 8.

[49] Zhuk, A. (2023). Applying blockchain to the modern legal system: Kleros as a decentralised dispute resolution system. *International Cybersecurity Law Review*, *4*(3), 351-364.

[50] Bergolla, L., Seif, K.& Eken, C. 37 (2022). Kleros: A Socio-Legal Case Study of Decentralized Justice & Blockchain Arbitration. Ohio State Journal on Dispute Resolution 55-98

[51] [*ibid*.] 65-71

[52] Zhuk, pp. 356-361

[53] Bergolla, 68-75

4.2. Technical Operation: Smart Contracts, Token Staking, and Juror Selection

Kleros operates through a system of interconnected smart contracts deployed on a public blockchain. These contracts govern jurisdiction selection, evidence submission, juror appointment, voting, and enforcement. Parties agree ex ante—often through an arbitration clause embedded in a smart contract—that disputes will be resolved by Kleros, thereby substituting traditional enforcement with automatic execution of outcomes[54].

Central to the system is the Pinakion (PNK) token, which functions as both a governance and incentive mechanism. Individuals wishing to serve as jurors must stake PNK tokens in specific jurisdictions, signalling their availability and expertise. Jurors are selected pseudo-randomly from the relevant pool, with selection weighted by the number of tokens staked[55]. This mechanism aims to balance decentralisation with competence, while deterring frivolous participation through financial exposure.

Once selected, jurors review submitted evidence and vote on the dispute outcome. Votes are confidential during the deliberation phase, and jurors are economically rewarded or penalised based on alignment with the majority decision. The incentive structure is designed to promote what Kleros terms "Schelling-point behaviour": jurors are encouraged to vote for the outcome they believe other reasonable jurors will select, which is assumed to approximate the objectively fair or legally correct result[56].

Appeals are possible through a hierarchical mechanism in which subsequent rounds involve a larger number of jurors and higher stakes. This process mirrors, in abstract form, appellate review, while remaining fully automated and decentralised. Once the final decision is reached, enforcement occurs automatically through smart contracts, transferring funds or updating registries without reliance on external authorities.

4.3. Use Cases and Jurisdictional Expansion

Kleros's application across diverse domains illustrates both its adaptability and its limitations. In small-claims-style disputes, such as escrow disagreements or freelance contract conflicts, the platform offers a rapid and relatively low-cost alternative to traditional litigation. Resolution times are

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[54] Aditya, A., & Kumar, H. THE SYMPHONY OF SMART CONTRACTS & BLOCKCHAIN ARBITRATION: AUTOMATING JUSTICE IN DECENTRALIZED SYSTEMS. *Indian Journal of Integrated Research in Law Volume V Issue III| ISSN*, *2583*, 0538.

[55] Piers, M. (2025). ADR in the Age of NFTs: Smart Disputes, Smarter Justice!. In *Routledge Handbook of NFT Law* (pp. 318-341). Routledge.

[56] Zhuk, A. (2023). pp. 360-364.

typically measured in days or weeks rather than months, and enforcement is immediate where assets are held on chain.

More complex use cases include token curation registries, where jurors decide whether digital assets, service providers, or content meet predefined criteria[57]. In these contexts, Kleros functions less as a dispute resolver and more as a governance mechanism, arbitrating inclusion or exclusion decisions that carry economic and reputational consequences. Similarly, some decentralised organisations rely on Kleros to resolve internal governance disputes[58]. effectively outsourcing conflict resolution to an external, decentralised adjudicatory layer.

This expansion raises important questions about the boundaries of decentralised justice. As disputes increase in normative complexity, interpretation, proportionality, or competing values, the limits of economically incentivised adjudication become more apparent. Kleros's architecture assumes that disputes can be resolved through majority consensus guided by incentives, an assumption that holds more readily in factual or rule-based conflicts than in value-laden or rights-sensitive cases.

4.4. Empirical Observations: Participation Patterns and Behavioural Dynamics

Empirical observations of Kleros usage reveal asymmetries between disputants and jurors. Juror participation is often motivated primarily by economic incentives rather than civic or adjudicative principles, with some participants treating juror service as a yield-generating activity. This dynamic raises concerns about whether economic incentives alone can sustain fair and principled decision-making over time[59].

Disputants, by contrast, are typically motivated by cost and enforceability rather than ideological commitment to decentralisation[60]. Many users engage with Kleros indirectly through platforms that integrate it as a backend dispute resolution mechanism, suggesting that decentralised justice may function most effectively when abstracted from direct user interaction.

Participation patterns also indicate concentration risks. Although Kleros is formally open, juror pools are frequently dominated by participants with greater financial capacity to stake tokens, potentially undermining representativeness. While random selection mitigates some risks, the weighting mechanism introduces structural biases linked to wealth and risk tolerance[61].

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[57] Piers, M. (2025). pp 323-333.

[58] Jaodun, M., & Bouafia, K. (2025). Analysis and Evaluation of a Blockchain-Based Framework for Decentralized Rental Agreements and Dispute Resolution. *Blockchains*, *3*(2), 8.

[59] Maag, L., Jagielski, B., Pyers, Z., & Steele, K. (2022). The Use of Crowdsource Funding and Game Theory in the Decentralized Arbitration Process. *Int'l. In-House Counsel J.*, *15*, 7917.

[60] Zhuk, A. (2023). pp. 357-367

[61] [*ibid*.] 7917

4.5. Identified Issues: Speculation, Bias, and Strategic Behaviour

Several challenges emerge from Kleros's incentive-driven design. First, speculative engagement may distort juror behaviour, particularly where token price volatility influences participation. Jurors may prioritise short-term gains over deliberative accuracy, especially in low-stakes disputes where penalties are limited.

Second, bias remains a persistent concern. While Kleros avoids algorithmic bias in the traditional sense, it introduces new forms of systemic bias through self-selection and staking mechanisms. Juror pools may skew toward technologically literate, crypto-native participants, potentially disadvantaging disputants unfamiliar with blockchain norms or evidentiary expectations[62].

Third, strategic behaviour poses a structural risk. Coordinated voting, information asymmetries, or exploitation of predictable incentive structures may undermine fairness, particularly in niche jurisdictions with small juror pools. Although Kleros incorporates safeguards such as appeals and increased juror numbers, these mechanisms raise costs and complexity, potentially deterring legitimate claims[63].

4.6. Accessibility Barriers and Usability Constraints

Despite its stated commitment to access to justice, Kleros faces significant accessibility challenges. Participation requires familiarity with blockchain wallets, cryptocurrency transactions, and platform-specific interfaces. Gas fees, token volatility, and technical errors may deter or disadvantage users, particularly those from non-technical backgrounds or low-income contexts[64].

Language barriers and the absence of legal assistance further compound these issues. Unlike courts, Kleros does not provide institutional support structures such as legal aid, procedural guidance, or judicial discretion to accommodate vulnerable users. As a result, accessibility gains achieved through cost reduction may be offset by technical and cognitive barriers[65].

These limitations underscore a broader insight: decentralisation shifts, rather than eliminates, barriers to justice. While it removes institutional gatekeepers, it introduces technical and economic thresholds that shape who can effectively participate.

Kleros illustrates both the promise and the fragility of decentralised justice. It demonstrates that dispute resolution can be coordinated without cen-

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[62] Kamalova, J. (2024). Exploring Blockchain-Based Alternative Dispute Resolution: Limitations of Traditional Methods and Prospects for Further Research. *Harv. Negot. L. Rev.*, *29*, 87.

[63] [*ibid*.] 87-90

[64] Maag, L., Jagielski, B., Pyers, Z., & Steele, K. (2022). 7919.

[65] Zhuk, A. (2023). pp. 360-364.

tral authority, relying instead on transparent rules, economic incentives, and distributed human judgment. At the same time, it exposes the normative and practical challenges of translating adjudication into code. As a case study, Kleros does not offer a blueprint for replacing courts. Rather, it provides a testing ground for alternative governance logics that prioritise transparency and participation over hierarchy and institutional control. These insights are particularly valuable when evaluating how traditional judicial systems might integrate AI and digital tools without reproducing the opacity and legitimacy deficits associated with centralised automation.

5. BALANCING FAIRNESS, EFFICIENCY, AND OVERSIGHT

5.1. Kleros and Judicial AI as Competing and Complementary Models

Judicial AI tools and decentralised dispute resolution systems such as Kleros are often discussed as distinct or even competing paradigms of digital justice[66]. In practice, however, they address overlapping problems—judicial inefficiency, access barriers, and legitimacy deficits—through fundamentally different governance logics. Judicial AI operates within centralised institutional frameworks, augmenting existing courts with data-driven tools designed to optimise workflow, consistency, or decision-support. Kleros, by contrast, externalises dispute resolution from state institutions altogether, relying on decentralised coordination and economic incentives to produce enforceable outcomes.

From a functional perspective, both models aim to reduce transaction costs and procedural delay, particularly in low-value or routine disputes. However, their normative foundations diverge. Judicial AI derives legitimacy from institutional authority and regulatory compliance, whereas Kleros relies on procedural transparency and collective participation[67]. This distinction is critical when assessing how each model balances fairness, efficiency, and oversight.

Rather than viewing decentralised justice as an alternative to judicial AI, this analysis treats Kleros as a complementary experiment that exposes the strengths and weaknesses of centralised automation. In doing so, it offers insights into how courts might integrate digital tools without replicating the opacity and accountability gaps associated with algorithmic decision-making.

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[66] Zhuk, A. (2023). pp. 360-370.

[67] Aljinović, N. (2024). Artificial intelligence in judicial decision-making: challenges of bias and lack of transparency of predictive algorithms. *ORGANIZER*, 782.

5.2. Transparency and Explainability

Transparency constitutes one of the most frequently cited deficits of judicial AI[68]. Even where AI systems are formally advisory, their influence on judicial reasoning may be difficult to detect or contest, particularly when proprietary models limit explainability. The literature consistently identifies this opacity as a threat to procedural justice, undermining litigants' ability to understand and challenge decisions. Kleros addresses transparency through architectural design rather than post hoc explanation. Its procedural rules, juror selection mechanisms, and incentive structures are publicly auditable on the blockchain[69]. Decisions are the product of identifiable voting processes rather than opaque algorithmic outputs. While individual juror reasoning is not always articulated in detailed written form, the process by which outcomes are generated is visible and replicable. This form of transparency differs from traditional judicial reasoning but may nevertheless enhance perceived legitimacy in certain contexts. For low-stakes disputes, the ability to observe how a decision was reached, even without extensive legal justification, may be sufficient to satisfy procedural expectations. By contrast, AI-supported judicial decisions may appear inscrutable even when formally reasoned, if litigants suspect that unseen algorithmic recommendations shaped the outcome[70].

However, Kleros's transparency is not absolute. Technical complexity, blockchain illiteracy, and the abstraction of governance mechanisms may limit meaningful understanding for non-expert users[71]. Transparency in code does not automatically translate into accessibility in practice. This highlights an important lesson for judicial AI: explainability must be user-centred rather than merely technical.

5.3. Fairness, Bias, and Representativeness

Concerns about bias feature prominently in critiques of both judicial AI and decentralised justice. In AI systems, bias is typically framed as a data problem: algorithms trained on historical judicial decisions risk reproducing systemic inequalities[72]. Mitigation strategies focus on dataset curation, auditing, and human oversight, but empirical evidence suggests that eliminating bias entirely remains elusive[73].

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[68] [*ibid*.] 782-784

[69] De Filippi, P., Wray, C., & Sileno, G. (2021). Smart contracts. Internet Policy Review, 10(2). *https://doi.org/10.14763/2021.2.1549*

[70] Gabuthy, Y. (2023). Blockchain-based dispute resolution: insights and challenges. *Games*, *14*(3), 34.

[71] [*ibid*.] 34-37.

[72] Barocas, S., & Selbst, A. D. (2016). 671.

[73] Greenstein, S. (2022). 291-323.

Kleros avoids algorithmic bias in the conventional sense by relying on human jurors rather than predictive models. Yet it introduces alternative sources of bias rooted in participation dynamics. Juror pools are shaped by self-selection, token staking capacity, and technical literacy, which may skew representation toward economically privileged or technologically adept users[74]. These structural biases are less visible than algorithmic ones but equally significant. Moreover, incentive-based voting raises questions about normative fairness[75]. The assumption that majority consensus approximates correctness may hold in factual disputes but becomes problematic in value-laden or legally complex cases. While appeals mechanisms mitigate some risks, they do so at the cost of increased expense and procedural complexity.

Comparatively, judicial AI retains the normative advantage of professional adjudication, where judges are trained, accountable, and bound by ethical duties[76]. However, decentralised justice demonstrates that fairness need not be monopolised by institutions. Distributed decision-making can, under certain conditions, approximate fairness through collective judgment—particularly where disputes are narrow in scope and consequences.

5.4. Accountability and Oversight

Accountability is one of the most challenging dimensions of digital justice[77]. In judicial AI systems, responsibility is diffused across judges, administrators, developers, and regulators. Even where human oversight is formally preserved, the epistemic authority of algorithmic recommendations may subtly shift responsibility away from individual decision-makers.

Kleros adopts a radically different accountability model. There is no single authority responsible for outcomes; instead, responsibility is distributed across protocol designers, jurors, and users[78]. Enforcement is automatic, leaving little room for discretionary correction once a decision is final. This raises concerns about error correction, proportionality, and procedural justice, particularly where outcomes have significant consequences[79]. Nevertheless, decentralised accountability has distinctive advantages. Rules are known in advance, enforcement is predictable, and discretionary abuse is limited by design. For certain categories of disputes—especially those involving digital assets held on-chain—this predictability may be preferable to opaque institutional discretion.

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[74] Zhuk, A. (2025). Enhancing online dispute resolution through natural language processing: a case study of kleros. *International Cybersecurity Law Review*, *6*(4), 599-625.

[75] [*ibid*.] 607-619.

[76] Sourdin, T. (2018). Judge v Robot?: Artificial intelligence and judicial decision-making. *University of New South Wales Law Journal, The*, *41*(4), 1114-1133.

[77] Dancy, T., & Zalnieriute, M. (2025). AI and Transparency in Judicial Decision Making. *Oxford Journal of Legal Studies*, gqaf030.

[78] Zhuk, A. (2025). 599-604.

[79] [*ibid*.] 600-605.

The comparison suggests that neither centralised nor decentralised models offer a complete solution to accountability challenges. Judicial AI struggles with hidden influence and responsibility gaps, while Kleros faces risks of rigidity and irreversibility. Hybrid approaches that combine decentralised transparency with institutional safeguards may offer a more balanced path forward.

5.5. Efficiency and Procedural Proportionality

Efficiency is often invoked as the primary justification for both judicial AI and decentralised dispute resolution[80]. Courts deploy AI to manage caseloads and reduce delays, while Kleros promises rapid, low-cost resolution without jurisdictional barriers. Empirical observations suggest that Kleros performs well in delivering timely outcomes for simple disputes, often at a fraction of the cost of traditional litigation[81].

However, efficiency gains must be assessed through the lens of procedural proportionality. For low-value disputes, the streamlined procedures of Kleros may be normatively appropriate, even if they sacrifice some procedural formalities. In contrast, applying similar mechanisms to high-stakes disputes would risk undermining due process[82]. Judicial AI, operating within formal procedural frameworks, retains the capacity to scale safeguards according to case complexity. Yet this scalability often comes at the cost of speed and accessibility. The comparison underscores the importance of context-sensitive design: digital justice tools should be matched to dispute type rather than applied uniformly.

5.6. Normative Lessons for Judicial Systems

The Kleros case study offers several normative lessons for courts considering AI or hybrid digital reforms. First, transparency should be embedded in system architecture rather than retrofitted through disclosure obligations. Second, human oversight is not merely a safeguard but a source of legitimacy that must remain visible and meaningful. Third, participation and accessibility should be treated as core design objectives rather than secondary considerations.

At the same time, decentralised justice highlights the limits of market-based governance in adjudication[83]. Economic incentives can support participation but cannot substitute for ethical commitments or institutional res-

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[80] Dancy, T., & Zalnieriute, M. (2025).

[81] Aljinović, N. (2024).

[82] Zhuk, A. (2023). pp. 360-364.

[83] Moyaux, T., & McBurney, P. (2012). Centralized vs. market-based and decentralized decision making: A review. *Cybernetics and Systems*, *43*(7), 567-622.

ponsibility. Courts should therefore resist wholesale decentralisation while remaining open to adopting modular elements—such as transparent rule encoding or collective decision mechanisms—in appropriate contexts.

Ultimately, decentralised justice does not resolve the tensions inherent in digital adjudication; it reframes them. By shifting authority from institutions to architecture, it forces explicit choices about values, trade-offs, and design priorities. This reframing is perhaps its most significant contribution to debates on judicial AI.

6. POLICY IMPLICATIONS AND RECOMMENDATIONS

6.1. Synthesising Lessons from Decentralised Justice

The analysis of Kleros demonstrates that decentralised justice does not offer a wholesale alternative to state courts, but it does provide valuable insights into how digital dispute resolution can be designed to enhance transparency, efficiency, and legitimacy. In particular, Kleros illustrates that automation need not entail opacity, and that human judgment can be preserved within technologically mediated systems through carefully structured incentives and procedural rules.

At the same time, the limitations identified, speculative participation, representational bias, technical barriers, and limited procedural safeguards, underscore that decentralisation alone is not a panacea. Rather, its value lies in revealing design choices that are often obscured in centralised judicial AI systems. These insights can inform both regulatory approaches and institutional reform efforts within traditional judicial frameworks.

6.2. Implications for the EU AI Act and Judicial Governance

The EU AI Act establishes a foundational regulatory framework by classifying AI systems used in the administration of justice as high-risk technologies. This classification appropriately reflects the constitutional sensitivity of adjudication and reinforces the requirement of meaningful human oversight. However, as demonstrated by the comparative analysis with decentralised justice, compliance-based regulation alone is insufficient to address deeper legitimacy concerns[84].

First, the AI Act focuses primarily on risk mitigation rather than institutional design. It mandates transparency and oversight but does not specify how AI systems should be integrated into judicial workflows in ways that preserve trust and accountability. Lessons from decentralised justice suggest that transparency must be architectural and procedural, not merely informa-

[84] Kozlova, M. Y., & Davydova, M. L. (2024). pp.207-208.

tional. Courts should therefore be encouraged to adopt design standards that make the influence of AI tools visible and contestable within proceedings [85].

Second, the Act does not adequately address participatory dimensions of digital justice. Decentralised systems highlight the importance of user engagement and collective validation in fostering legitimacy. While courts cannot replicate open participation models, they can incorporate participatory safeguards, such as clearer explanations of AI-assisted processes, opportunities for challenge, and enhanced procedural dialogue [86].

Finally, the AI Act remains largely silent on non-state or hybrid dispute resolution mechanisms. As decentralised platforms increasingly resolve disputes with real economic and social consequences, regulatory clarity is needed to delineate their relationship with judicial systems, particularly regarding enforceability, consumer protection, and fundamental rights.

6.3. Recommendations for Judicial AI Design and Deployment

Drawing on the comparative insights of this study, several policy recommendations emerge for courts and regulators:

Judicial AI systems should be developed with transparency as a core architectural principle. This includes clear documentation of system functions, decision-support logic, and data sources, as well as mechanisms that allow judges and litigants to understand when and how AI tools influence outcomes. Merely disclosing the existence of AI is insufficient; its role must be intelligible and procedurally relevant. Furthermore, human oversight should not be symbolic or residual. Judges must retain meaningful discretion and be required to articulate independent reasoning, particularly where AI recommendations are involved. This visibility reinforces accountability and counters the perception that decisions are outsourced to machines.

Not all disputes require the same level of procedural formality. Courts should adopt proportional digital procedures that align technological intensity with dispute value and complexity. Lessons from Kleros suggest that streamlined, semi-automated processes may be appropriate for low-value claims, while high-stakes disputes demand robust safeguards. Both judicial AI and decentralised platforms risk excluding users with limited digital literacy. Courts and policymakers should invest in user-centred design, procedural guidance, and support mechanisms to ensure that digital justice reforms enhance rather than undermine access to justice.

While courts cannot adopt decentralised justice wholesale, they can integrate selective elements that enhance legitimacy. These include greater pro-

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[85] Fine, A., Berthelot, E. R., & Marsh, S. (2025). Public Perceptions of Judges' Use of AI Tools in Courtroom Decision-Making: An Examination of Legitimacy, Fairness, Trust, and Procedural Justice. *Behavioral Sciences*, *15*(4), 476.

[86] [*ibid*.] pp. 476-477.

cedural transparency, clearer rule encoding, and mechanisms that distribute epistemic authority without sacrificing accountability. For example, collective decision-support tools or peer-based review mechanisms could complement judicial reasoning in appropriate contexts. At the same time, regulators should approach decentralised dispute resolution with cautious engagement rather than prohibition. Clear standards on disclosure, consumer protection, and appealability could mitigate risks without stifling innovation. Experimental regulatory sandboxes may offer a controlled environment for testing hybrid models that combine decentralised governance with public oversight.

6.5. Ethical and Practical Considerations

Finally, ethical considerations must remain central to digital justice reform. Efficiency gains should not come at the expense of fairness, dignity, or trust. Both centralised AI systems and decentralised platforms encode normative assumptions that shape outcomes. Making these assumptions explicit is a prerequisite for responsible governance. Decentralised justice reminds policymakers that legitimacy cannot be engineered solely through compliance or technical performance[87]. It emerges from procedural fairness, transparency, and meaningful human involvement. Judicial reform efforts that ignore these dimensions risk deepening public scepticism toward digital adjudication[88].

7. CONCLUSION

This paper has examined the evolving relationship between digital justice, artificial intelligence, and decentralised dispute resolution through the lens of judicial legitimacy, fairness, and efficiency. As courts worldwide increasingly rely on digital technologies to address systemic pressures of cost, delay, and accessibility, the automation of judicial functions raises fundamental questions about transparency, accountability, and public trust. While AI-driven tools offer tangible efficiency gains, their deployment within centralised institutional frameworks risks exacerbating concerns of opacity, bias, and diluted responsibility if not carefully designed and governed.

Against this backdrop, the paper has argued that decentralised justice, exemplified by the Kleros platform, offers a valuable complementary perspective on digital adjudication. Rather than replacing courts or eliminating human judgment, Kleros demonstrates how partial automation, combined with transparent rule encoding and distributed human decision-making, can resolve certain categories of disputes efficiently while preserving procedural visibility. By situating Kleros within the theoretical contrast between Lex In-

[87] Fine, A., Berthelot, E. R., & Marsh, S. (2025). pp. 476-479.

[88] van Domselaar, I. (2022). Inquiry and Imagination in Adjudication: The Case of Digitalisation. *Neth. J. Legal. Phil.*, *51*, 187.

formatica and Lex Cryptographia, the analysis has shown that automation does not inevitably entail centralisation or algorithmic secrecy.

The case study of Kleros highlights both the promise and the limitations of decentralised justice. On the one hand, its architecture mitigates several risks associated with judicial AI by making procedural rules auditable, enforcement predictable, and human participation central to decision-making. On the other hand, it introduces new challenges, including speculative juror behaviour, representational bias, technical complexity, and limited procedural safeguards. These findings underscore that decentralisation is not inherently more legitimate than institutional adjudication; rather, legitimacy depends on design choices, governance structures, and the proportionality of procedures to dispute type.

The comparative analysis suggests that the most productive path forward lies not in choosing between centralised judicial AI and decentralised justice, but in learning from their respective strengths and weaknesses. Courts can draw on insights from decentralised systems to embed transparency by design, preserve visible human oversight, and adopt proportionate digital procedures, particularly for low-value or high-volume disputes. At the same time, the safeguards of institutional adjudication, professional ethics, appellate review, and constitutional accountability, remain indispensable for disputes implicating fundamental rights or significant public interests.

From a regulatory perspective, the EU AI Act provides an essential baseline by recognising judicial AI as high-risk technology and mandating human oversight. However, this paper has shown that compliance-oriented regulation alone cannot resolve the deeper legitimacy challenges posed by digital adjudication. Complementary governance approaches, informed by decentralised justice experiments, are necessary to ensure that technological innovation in the judiciary enhances rather than undermines public confidence.

Ultimately, the central question is not whether justice should be digital, but which model of digital justice should be built. The tension identified at the outset, between efficiency-driven automation and the preservation of legitimacy, transparency, and accountability, has become increasingly urgent as courts move from experimentation to systemic digital integration. For practitioners, this shift requires a more critical engagement with the tools shaping adjudication, including their evidentiary, procedural, and ethical implications. For policymakers, it underscores the need to move beyond compliance-based regulation towards institutional design choices that embed transparency, human oversight, and proportionality from the outset. In this sense, decentralised justice should not be viewed merely as a technological curiosity, but as a timely intervention that exposes the limits of current models and offers concrete insights for the future architecture of judicial systems. As digitalisation accelerates, the choices made today will determine not only how justice is delivered, but whether it continues to be perceived as legitimate.

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