

Gauging Algorithmic Justice: Assessing Indonesia's Readiness to Adopt Predictive Justice in Criminal Law

Gunawan Rena

Faculty of Law, Universitas Negeri Gorontalo, Indonesia
Email: gunawanrena19@gmail.com

This article analyses the normative, institutional, and procedural readiness of Indonesia's criminal justice system to adopt predictive justice tools, particularly algorithmic risk assessment, as decision-support in bail, sentencing, and parole. Using a normative juridical and comparative approach, the study examines the compatibility of such tools with fundamental criminal law principles, including legality, individual culpability, presumption of innocence, proportionality, equality before the law, and the right to a fair and transparent trial. It argues that algorithmic, forward-looking assessments of risk sit in structural tension with a system traditionally grounded in adjudication of past wrongdoing and individual guilt, and may entrench historical bias embedded in criminal justice data. At the same time, the article evaluates Indonesia's institutional and regulatory infrastructure, identifying serious deficiencies in data quality and governance, legal rules on admissibility and transparency of algorithmic assessments, oversight mechanisms, and technical capacity among legal actors. The study concludes that Indonesia is not yet adequately prepared to integrate predictive justice and that significant reforms are required before such tools can be legitimately employed as subordinate aids rather than drivers of criminal decision-making.

Keywords: Predictive Justice; Criminal Law; Algorithmic Risk Assessment

This is an open access
article under the [CC BY-NC](#)
license



Corresponding Author:

Gunawan Rena
Faculty of Law, Universitas Negeri Gorontalo, Indonesia
gunawanrena19@gmail.com

1. Introduction

The accelerating integration of algorithmic systems into criminal justice decision-making has triggered profound debates about fairness, accountability, and the very meaning of justice in contemporary legal orders. In many jurisdictions, so-called predictive justice tools most notably risk assessment algorithms used for bail, sentencing, parole, and recidivism prediction are increasingly deployed to support or structure judicial and prosecutorial discretion. These systems, typically grounded in statistical models and machine learning techniques, promise greater consistency, efficiency, and evidence-based decision-making by quantifying the probability of future offending or failure to comply with legal obligations. Yet, they simultaneously raise serious normative concerns, particularly regarding opacity, bias, due process, and the potential erosion of core principles in criminal law such as individual culpability, presumption of innocence, and human dignity. Against this global backdrop, the question arises whether, and to what extent, Indonesia's criminal law and criminal procedure framework is normatively, institutionally, and technically prepared to accommodate the introduction of predictive justice tools as risk assessment aids.[1]

Indonesia's criminal justice system is built upon a complex interaction between statutory provisions in substantive and procedural criminal law, constitutional guarantees of human rights, and long-standing judicial and prosecutorial practices. Within this framework, decisions concerning arrest, detention, charging, sentencing, and conditional release are formally entrusted to human authorities who must weigh legal norms, evidentiary standards, and contextual factors. The potential introduction of algorithmic risk assessment tools into this decision-making chain would not be a neutral technical adjustment, but a structural change that affects how discretion is exercised and justified. Predictive models, by design, rely

on historical data patterns which may encode past discriminatory practices, socio-economic inequalities, and institutional biases. If such tools are adopted without a robust legal framework governing their design, validation, transparency, and contestability, there is a serious risk that existing injustices could be reproduced and amplified under the guise of objectivity and scientific neutrality. This creates an urgent need to examine whether Indonesian criminal law currently provides sufficient safeguards to regulate and constrain the use of such technologies.[2]

From a normative perspective, the deployment of predictive justice tools must be assessed in light of fundamental criminal law principles and constitutional rights. Core tenets such as legality, culpability, proportionality, presumption of innocence, equality before the law, and the right to a fair trial impose substantive and procedural limits on any mechanism that influences decisions about deprivation of liberty or the imposition of punishment. Risk assessment algorithms, however, typically operate on probabilistic correlations rather than concrete proof of individual wrongdoing. They evaluate people in terms of group-based risk factors such as age, residence, employment, or prior contacts with the justice system rather than strictly on the basis of the offence committed and the evidence presented in the specific case. This raises the question whether integrating such tools into Indonesian practice would be compatible with the requirement that criminal sanctions and restrictions on liberty be justified by individual culpability and a fair adjudicative process, rather than by actuarial predictions of future conduct. The legal system must decide whether predictive scores can legitimately inform decisions such as pre-trial detention or sentencing and, if so, under what conditions and limitations.[3]

Procedurally, the adoption of predictive justice also engages issues of transparency, accountability, and the right to be heard. Many algorithmic tools used internationally are proprietary, opaque, or technically complex, making it difficult for defendants, counsel, and even judges to understand how risk scores are generated and what variables are determinative. For Indonesia, this prompts the question of whether existing procedural rules and evidentiary principles are adequate to ensure that parties can challenge the basis, reliability, and relevance of algorithmic assessments. If risk scores are used to justify decisions, defendants must be able to access meaningful explanations and to contest both the underlying data and the model's assumptions. Without clear legal provisions on disclosure, expert scrutiny, and standards of admissibility for algorithmic evidence, there is a danger that predictive tools could operate as *de facto* authoritative inputs in judicial decisions, shielded from effective adversarial testing, thus undermining due process guarantees.

Institutionally, the readiness of Indonesian criminal justice agencies to adopt predictive justice must be evaluated in light of existing capacities in data governance, information technology, and oversight [4]. Effective and just use of risk assessment tools requires high-quality, accurate, and representative data; robust mechanisms for data protection and privacy; and independent bodies capable of auditing algorithms for bias, error, and disproportionate impact. In the Indonesian context, where challenges of data completeness, interoperability, and integrity still affect many public systems, the uncritical introduction of predictive tools based on fragmented or distorted datasets could generate unreliable or systematically skewed risk profiles. Moreover, the absence of specialised regulatory bodies or clear statutory mandates for auditing and supervising algorithmic tools could leave significant gaps in accountability. This suggests that the legal and institutional framework must be strengthened before predictive justice can be responsibly integrated into criminal decision-making processes.

From a policy standpoint, the debate over predictive justice in Indonesia also intersects with broader discussions about penal policy, prison overcrowding, and selective law enforcement [5]. Proponents might argue that algorithmic risk assessment could help allocate scarce resources more efficiently, reduce unnecessary detention, and support more targeted interventions. However, if the tools are trained on

historical data reflecting patterns of policing that concentrate on certain communities or offences, they may entrench selective enforcement and exacerbate existing disparities. Indonesian lawmakers and policymakers must therefore consider whether predictive justice would advance or undermine ongoing reforms aimed at humanising criminal justice, reducing over-criminalisation, and strengthening restorative and rehabilitative approaches. Any move toward algorithmic risk assessment must be situated within a clear policy vision for the future of criminal justice, rather than driven solely by technological availability or external trends.

Finally, the emerging global discourse on ethical and human-rights-based regulation of artificial intelligence provides an important reference point for Indonesia. International principles stress transparency, fairness, non-discrimination, human oversight, and remedy as essential conditions for the legitimate use of AI in the public sector, especially in high-stakes domains such as criminal justice [6]. For Indonesia, aligning national regulation with these principles requires careful legislative and doctrinal development. This includes defining the permissible scope of predictive tools, setting minimum standards for validation and impact assessment, guaranteeing human decision-maker primacy, and ensuring effective remedies where algorithmic recommendations contribute to unjust outcomes. In this sense, the readiness of Indonesian criminal law to adopt predictive justice cannot be measured solely by technological capability, but must be assessed through a comprehensive juridical analysis of whether existing norms, institutions, and safeguards are sufficient or require substantial reform to ensure that algorithmic assistance enhances rather than erodes justice in the era of algorithms.

2. Literature Reviewe

Existing literature on algorithmic decision-making in criminal justice highlights both its transformative potential and its deep risks. Studies in comparative criminal law examine risk assessment tools used for bail, sentencing, and parole, emphasizing concerns about opacity, embedded bias, and the erosion of individualized justice[7]. Scholarship on predictive policing and actuarial justice warns that algorithms may reproduce historical discrimination by relying on skewed datasets and proxy variables. In parallel, legal theorists stress the tension between predictive tools and core principles such as presumption of innocence, culpability, proportionality, and due process [8]. Within the Indonesian context, emerging works on digitalization of law and e-justice touch only briefly on predictive justice, indicating a significant research gap regarding the normative, institutional, and procedural readiness of Indonesia's criminal law to regulate algorithmic risk assessment.

Problem Statement

The core problem addressed in this study is the absence of a clear, explicit, and comprehensive legal framework governing the use of predictive justice tools, particularly algorithmic risk assessment, within Indonesia's criminal justice system. While global practice shows a growing reliance on such tools for bail, sentencing, and parole decisions, Indonesian criminal law and procedure have not yet systematically regulated their design, deployment, transparency, and contestability. As a result, any potential adoption of predictive justice risks colliding with fundamental principles such as presumption of innocence, individual culpability, equality before the law, and the right to a fair trial. The key problem, therefore, is how far Indonesia's current criminal law is normatively and institutionally prepared to accommodate predictive justice while safeguarding constitutional rights and preventing the reinforcement of structural bias.

3. Method

This research employs a normative juridical method, focusing on the analysis of legal norms, principles, and doctrines governing criminal justice and the potential use of predictive justice tools in Indonesia [9]. Primary legal materials include statutory provisions in substantive and procedural criminal law, constitutional guarantees of human rights, and relevant regulations on electronic government and information technology. These are examined through statutory and conceptual interpretation to assess their compatibility with algorithmic risk assessment. Secondary legal materials consist of scholarly writings, comparative studies on algorithmic decision-making in criminal justice, and international soft-law instruments on AI, fairness, and due process. The study also uses a comparative approach by examining regulatory and jurisprudential developments in other jurisdictions that have adopted risk assessment algorithms. Through qualitative analysis, the research identifies normative gaps, evaluates institutional readiness, and formulates recommendations for a principled regulatory framework governing predictive justice in Indonesian criminal law.

4. Results and Discussion

Reframing Criminal Justice in the Age of Algorithms

The prospect of introducing predictive justice into Indonesia's criminal justice system compels a fundamental re-examination of how the state conceptualises, justifies, and exercises its punitive authority in an era increasingly shaped by data and algorithms. Indonesian criminal law has long been structured around a backward-looking paradigm: state coercion is legitimised only when directed at individuals who, through a clearly defined offence, have violated a statutory norm and whose culpability has been proven in proceedings that respect due process guarantees. Within this paradigm, punishment is justified as a response to past wrongdoing, and core principles such as legality, presumption of innocence, and proportionality ensure that any restriction of liberty is firmly anchored in individual responsibility for specific acts [10]. Predictive justice tools, particularly algorithmic risk assessment models, introduce a qualitatively different logic. They are forward-looking and probabilistic, seeking to estimate the likelihood of future offending or non-compliance by identifying patterns in historical data and correlations between certain risk factors and recidivism. When such tools begin to inform decisions on arrest, bail, detention, sentencing, or parole, the criminal process is subtly reoriented towards a preventive and actuarial rationale: individuals are managed as bearers of risk, and restrictions on liberty are justified not only by what they have done, but also by what they are statistically predicted to do. This shift raises a critical question for Indonesian law: to what extent can a criminal justice system that purports to be grounded in moral blame and legally established guilt legitimately incorporate techniques that evaluate persons primarily as data points on a risk continuum?

This tension can be framed as a confrontation between two competing conceptions of justice. On one side stands the classical liberal-legal conception, reflected in Indonesia's constitutional framework and doctrinal tradition, which conceives the criminal process as a forum for attributing individual responsibility on the basis of past conduct, through transparent procedures that allow contestation and defence [11]. Under this conception, the defendant is recognised as a rights-bearing subject whose autonomy and dignity require that he or she be judged for concrete, legally defined acts, not for speculative predictions about future behaviour. On the other side stands an increasingly influential managerial, risk-oriented conception, in which the central aim of criminal justice shifts toward the optimisation of public safety and the efficient management of "dangerousness" through data-driven tools. Within this latter logic, the individual tends to be redescribed as a bundle of risk factors age, education, employment status, residence, prior record, social network whose combination yields a numerical score representing the probability of future offending. If this

managerial conception is allowed to expand unchecked, the criminal process can gradually lose its character as a site of moral and legal judgment and become an administrative apparatus for sorting and managing risk categories. Defendants then appear less as autonomous subjects and more as statistical profiles, positioned at different points along a risk distribution curve, with corresponding consequences for their liberty.[12]

For Indonesia, the danger lies in the possibility that this transformation may occur incrementally and almost invisibly, under the auspices of “modernisation” and “evidence-based policy.” Predictive justice tools are often presented in technocratic terms: they promise to reduce arbitrariness, make implicit judicial intuitions more explicit, and support more consistent decision-making. In a system confronted with prison overcrowding, resource constraints, and disparities in sentencing, such promises can appear particularly attractive. It may be argued that structured risk assessment can help prioritise detention for those who pose the greatest danger, reserve custodial sanctions for serious cases, and support alternatives to incarceration where risk is assessed as low. However, the normative cost of adopting such tools cannot be evaluated solely in terms of efficiency gains. The key issue is whether, and under what conditions, algorithmic methods can be integrated without eroding the fundamental principles that confer legitimacy on criminal punishment in the first place [13]. Without robust normative framing, predictive justice risks shifting the justificatory centre of criminal law from accountability for past wrongs to management of future risk, thereby destabilising the very foundations upon which Indonesian criminal law has been built.

At the doctrinal level, this raises several specific concerns. First, the presumption of innocence is threatened when pre-trial detention or restrictive measures are justified predominantly by high risk scores rather than by strong evidence of guilt regarding the alleged offence. While preventive detention is not foreign to Indonesian law, its use has traditionally been framed as an exceptional measure tied to concrete procedural needs, such as securing the presence of the accused or preventing interference with evidence. Predictive tools may normalise a broader form of preventive logic, in which detention becomes a routine instrument of risk management based on statistical prediction. Second, the principle of individual culpability is strained when sentencing decisions are influenced significantly by risk factors that extend beyond the defendant’s culpable conduct factors which may reflect social and economic conditions rather than moral blameworthiness [14]. When a person receives a harsher sentence because an algorithm considers their neighbourhood, employment status, or prior contacts with the justice system to be indicative of higher risk, the boundary between what is being punished (the offence) and what is being managed (the person’s risk profile) becomes blurred. Third, proportionality is jeopardised when the severity or type of sanction is calibrated not only to the seriousness of the offence, but also to the forecast of future danger, potentially leading to longer or more intrusive measures for individuals deemed high-risk, regardless of the intrinsic gravity of their past act.

The epistemic character of predictive tools compounds these concerns. Algorithmic models are built on historical data, and in contexts where policing, prosecution, and sentencing practices have been uneven or selective, the underlying datasets inevitably bear the imprint of structural biases [15]. Communities that have historically been more heavily policed will appear in the data as higher-risk, not necessarily because their members offend more, but because their offences are more frequently detected, recorded, and prosecuted. When these patterns are fed into risk assessment algorithms, the tools can replicate and magnify existing inequalities under the guise of neutrality. In Indonesia, where social, economic, and geographic disparities already influence exposure to the criminal justice system, uncritical use of such models risks entrenching a cycle in which those who have been more visible to law enforcement in the past are more likely to be labelled high-risk in the future, leading to greater surveillance, more intrusive measures, and further data confirming their supposed dangerousness [16]. This dynamic challenges the constitutional

commitment to equality before the law and non-discrimination, and calls into question whether predictive justice can ever be truly “fair” in the absence of comprehensive strategies to de-bias data and address underlying structural conditions.

Transparency and contestability are additional points of tension between predictive justice and Indonesian criminal procedure. Many algorithmic models are technically complex or proprietary, meaning that neither judges nor defendants can easily access the internal logic of the system, understand the weight assigned to particular factors, or scrutinise the validity of the underlying data. If such tools are used in criminal decisions, yet operate as opaque “black boxes,” the right to a fair trial and effective defence is compromised [17]. A defendant has a legitimate interest in knowing not only that a risk score has influenced the decision, but also why that score was generated and on what basis. Without clear procedural rules mandating disclosure of the model’s parameters, error rates, known limitations, and sources of data, as well as mechanisms for independent expert review, algorithmic assessments risk acquiring a quasi-mystical authority in court, accepted as “objective” or “scientific” without meaningful adversarial testing. This would represent a significant departure from the traditional evidentiary culture of Indonesian criminal procedure, in which the probative value of evidence is subject to examination and contradiction in open court [18].

Despite these serious risks, the potential benefits of carefully constrained predictive justice tools cannot be ignored. There is a real concern that human decision-making in criminal justice is itself deeply fallible: judges and prosecutors may be influenced by unconscious bias, stereotypes, fatigue, or inconsistent heuristics. In principle, structured risk assessment could serve as a mirror that reveals, rather than conceals, such tendencies. If transparently designed and properly validated, algorithms might help identify patterns of disparity, signal cases where intuitive judgments deviate from empirical evidence, and support more consistent and rational allocation of penal resources. For example, tools might highlight categories of defendants who historically have low rates of reoffending yet are frequently subjected to custodial measures, thereby prompting reforms that reduce unnecessary imprisonment. In this vision, predictive justice is not a replacement for human judgment, but a form of decision-support that can correct some of the shortcomings of purely intuitive assessment [19].

For this more optimistic scenario to be realised in Indonesia, however, predictive justice must be “caged” within a dense framework of normative and procedural safeguards. First, the law would need to explicitly define the permissible purposes for which risk assessment tools may be used such as informing, but not determining, specific stages of the process and categorically prohibit their use for purposes that are incompatible with fundamental rights. Second, predictive outputs must be treated strictly as one factor among many, never as an overriding determinant. Judicial and prosecutorial discretion must remain guided primarily by statutory criteria and constitutional principles, with algorithms serving only as supplementary information that can be weighed, contextualised, or rejected in light of the individual circumstances of the case. Third, robust requirements of transparency, explainability, and contestability must be imposed: defendants and their counsel should have access to meaningful information about how risk scores are produced and the opportunity to challenge both the model and the data in adversarial proceedings [20]. Fourth, independent oversight bodies with legal and technical expertise should be responsible for certifying, auditing, and periodically reviewing predictive tools to ensure that they meet standards of accuracy, fairness, and non-discrimination, and for suspending or prohibiting tools that fail to comply.

Ultimately, the challenge for Indonesian criminal law is not simply to decide whether to accept or reject predictive justice in the abstract, but to determine how to reframe and regulate the criminal process in a way that preserves its core normative commitments while responsibly engaging with the possibilities and perils of algorithmic technologies. Reframing criminal justice in the age of algorithms requires maintaining a clear hierarchy: constitutional rights, fundamental principles of criminal law, and human dignity must

occupy the apex; technological tools, including predictive models, must remain subordinate instruments whose legitimacy depends entirely on their capacity to serve, rather than subvert, those higher norms [21]. Only under such a principled architecture can predictive justice be considered as a cautious, tightly controlled experiment in enhancing fairness and rationality, rather than a quiet transformation of criminal justice into a system governed by abstract risk management and opaque computational logics.

Institutional and Regulatory Readiness for Predictive Justice in Indonesia

Assessing Indonesia's readiness to adopt predictive justice requires moving beyond abstract normative debates and examining the concrete institutional and regulatory conditions under which algorithmic tools would operate. Predictive justice, particularly in the form of algorithmic risk assessment used for bail, sentencing, parole, or correctional classification, depends fundamentally on the quality of data, the robustness of procedural safeguards, and the effectiveness of oversight institutions. An algorithm can only be as fair, accurate, and legitimate as the infrastructure that sustains it. In the Indonesian context, the existing landscape of criminal justice administration reveals significant challenges in each of these dimensions, suggesting that institutional and regulatory foundations remain fragile for the safe and principled integration of predictive tools into criminal decision-making. Without prior, deliberate strengthening of these foundations, the introduction of predictive justice would risk not reforming the system but rather embedding and automating its existing weaknesses [22].

A first and crucial component is data governance. Predictive models require structured, comprehensive, and reliable datasets drawn from multiple stages of the criminal process: police reports, prosecutorial decisions, court judgments, and correctional records. In practice, however, Indonesia's criminal justice data remain fragmented across institutions, often recorded in heterogeneous formats, and sometimes incomplete or inconsistent. Different agencies may use incompatible information systems, with limited interoperability and weak mechanisms for data verification or correction. Errors in personal identity, misclassification of offences, missing information on case outcomes, and regional disparities in recording practices are not uncommon. When such imperfect data are used as the training material for risk assessment algorithms, the resulting models inevitably reflect these shortcomings [23]. Risk scores generated from biased or incomplete records may misrepresent the true patterns of offending and compliance, inflating the perceived risk of individuals who happen to be more visible in the data and underestimating the risk of those who, for various reasons, are under-represented. In a system where law enforcement practices already show uneven geographic or socio-economic coverage, this means that predictive tools may systematically disadvantage certain communities, not because they are inherently more dangerous, but because their interactions with the justice system are more frequently recorded.

A second dimension of data governance concerns representativeness and updating. Predictive models are typically trained on historical data, yet social conditions, crime patterns, and enforcement priorities evolve over time. If algorithms in Indonesia were built on dated datasets that no longer reflect current realities, they would propagate obsolete patterns and fail to capture shifts in behaviour or policy [24]. Moreover, if training data are drawn only from certain regions, types of crime, or specific segments of the population, the model will be poorly calibrated for others. Without clear institutional mechanisms for periodic updating, re-training, and recalibration of models, predictive tools risk becoming less accurate and more unfair over time, even if they were initially designed with care. This raises the question of whether Indonesian criminal justice institutions currently possess the technical capacity, resources, and organisational culture necessary to maintain and revise complex risk assessment systems on an ongoing basis. At present, there is little evidence of stable, cross-institutional structures dedicated to data quality, statistical monitoring, or algorithmic maintenance in the criminal justice domain.

Data protection and privacy add a further layer of complexity. Risk assessment tools often rely on sensitive personal information, including prior criminal records, socio-economic indicators, psychological assessments, and other intimate data. Indonesian law recognises certain protections for personal data, but the regulatory framework and its enforcement remain in development [25]. The use of such data for predictive purposes raises questions about consent, purpose limitation, data minimisation, retention periods, and safeguards against misuse or unauthorised access. If predictive models are constructed or applied without strict adherence to data protection principles, individuals may be exposed to secondary harms such as stigmatisation, discrimination in other domains, or security breaches. The institutional capacity of criminal justice agencies to implement robust data protection practices through secure storage, access control, audit trails, and staff training is therefore a precondition for any legitimate deployment of predictive justice. Without such capacity, algorithmic tools could become conduits for new forms of privacy intrusion and misuse of personal information under the justification of efficiency and security [26].

Turning to the regulatory framework, Indonesian criminal procedure and evidentiary law have not yet been systematically adapted to address the specific challenges posed by algorithmic decision support. At present, there are no explicit legal provisions that define the doctrinal status of algorithmic risk scores in criminal proceedings. It is unclear whether such outputs should be treated as a form of expert evidence, as internal administrative information that does not enter the evidentiary record, or as a hybrid category requiring its own rules. This ambiguity has far-reaching implications. If risk scores are treated as evidence, questions arise regarding admissibility standards, disclosure obligations, and the rights of the defence to examine the “expert” behind the algorithm whether that is a human developer, a governmental agency, or a private vendor. If they are treated merely as internal tools, there is a danger that they nonetheless exert significant influence on decisions without being visible or contestable in court, thereby undermining transparency and the adversarial process [27].

Moreover, Indonesian law does not yet set out specific standards for the reliability and validation of algorithmic tools used in the criminal context. Unlike traditional forensic evidence, which has gradually developed criteria for scientific validity and methodological soundness, predictive models may be introduced without rigorous, legally mandated testing. In the absence of statutory or regulatory requirements for pre-deployment validation such as minimum acceptable error rates, documented assessments of bias, and impact evaluations there is nothing to prevent the use of poorly calibrated or discriminatory algorithms. The lack of clear thresholds and evaluation procedures makes it difficult for judges to assess the probative value of risk scores and for defendants to challenge their use. This regulatory vacuum invites a situation in which algorithmic tools are trusted as “objective” or “scientific” despite being largely unexamined and unregulated, which is incompatible with rule-of-law expectations in high-stakes decisions concerning liberty [28].

Transparency and explainability represent another critical regulatory gap. For predictive justice to be compatible with due process in Indonesia, defendants and their counsel must be able to understand, at least in broad terms, how a risk score was produced, what variables were considered, and how sensitive the model is to changes in input data. Yet, many modern algorithms are complex, and some may be proprietary systems supplied by private vendors who claim trade secret protections. Without legal instruments that require at least a meaningful level of explanation and mandate disclosure of relevant information about the model and its limitations, there is a serious risk that defendants will be confronted with authoritative numerical scores that they cannot meaningfully interrogate. This undermines the right to a fair hearing and to an effective defence. Procedural rules would need to specify what information must be disclosed, under what conditions, and how conflicts between transparency and intellectual property claims are to be resolved, particularly where fundamental rights are at stake [29].

Institutional oversight is another area where Indonesian readiness appears limited. Effective governance of predictive justice would require the establishment or designation of bodies with both legal and technical competence to authorise, monitor, and, when necessary, restrain the use of algorithmic tools in criminal justice. Such bodies would be responsible for pre-implementation review of models, including assessment of their goals, design choices, training data, and expected impact; for ongoing audits to detect emergent bias, error, or drift in performance; and for investigating complaints from individuals who believe they have been harmed by algorithmic decisions. Currently, no dedicated institutional architecture of this kind exists. Oversight functions are dispersed among different agencies with limited specialised expertise in algorithms, and there are no clear procedures for algorithmic impact assessments or for suspending tools that fail to meet normative or technical standards. This institutional vacuum means that, were predictive justice tools to be introduced, there would be no robust mechanism to ensure accountability beyond individual case-by-case judicial review, which itself is constrained by the opacity and novelty of the technology.

In addition, the professional culture and capacity of key criminal justice actors judges, prosecutors, defence lawyers, and law enforcement officers must be considered. Predictive justice tools can only be used responsibly if those who rely on them understand their strengths, limitations, and appropriate role in decision-making [30]. At present, training in data literacy, statistics, and algorithmic reasoning is not systematically integrated into legal education or judicial training in Indonesia. Without adequate capacity-building, there is a risk that decision-makers either over-rely on algorithmic outputs (treating them as infallible) or dismiss them without understanding their potential value, leading in both cases to suboptimal and inconsistent practices. An institutional strategy for predictive justice would therefore need to include comprehensive and ongoing training programmes that equip legal professionals to interpret, critically evaluate, and properly contextualise algorithmic risk scores, ensuring that these remain tools for informed human judgment rather than opaque drivers of decisions.

Taken together, these institutional and regulatory factors indicate that Indonesia's criminal law system is, at present, not yet adequately prepared to integrate predictive justice in a manner consistent with rule-of-law standards and constitutional guarantees. Before algorithmic risk assessment tools can be responsibly employed as decision-support instruments, substantial groundwork is required. This includes: developing integrated and reliable criminal justice data infrastructures; strengthening data protection and privacy safeguards; enacting clear legal norms that define the status, admissibility, transparency, and contestability of algorithmic assessments; building institutional oversight mechanisms with the authority and expertise to audit and regulate predictive tools; and investing in the capacity of legal professionals to engage critically with algorithmic evidence. Only once these conditions are in place can predictive justice plausibly function as a complement to, rather than a threat against, the ideals of fairness, accountability, and human dignity that are supposed to underpin Indonesia's criminal justice system.

5. Conclusion

This study demonstrates that Indonesia is not yet normatively, institutionally, or procedurally prepared to responsibly adopt predictive justice tools in its criminal justice system. At the level of legal principles, algorithmic risk assessment conflicts fundamentally with core guarantees such as legality, individual culpability, the presumption of innocence, proportionality, equality before the law, and the right to a fair and transparent trial. Without strict safeguards, predictive tools risk shifting the focus of criminal justice from adjudicating past wrongdoing to managing statistically constructed future risk, thereby undermining the moral basis of punishment and perpetuating structural bias embedded in historical data. Institutionally, fragmented and unreliable criminal justice data, underdeveloped data protection practices, the absence of clear rules on the status, admissibility, transparency, and contestability of algorithmic assessments, and the

lack of specialised oversight bodies and technical capacity collectively indicate low readiness. Consequently, before predictive justice can be considered a legitimate decision-support instrument, Indonesia must undertake comprehensive reforms. Recommendations include: establishing a national, bias-cleansed criminal data governance system; enacting regulations that limit algorithmic tools to decision support rather than judicial substitution; creating an independent oversight authority; providing mandatory training for judges and law enforcement personnel; engaging civil society in public monitoring; and conducting further empirical research on the impacts of predictive algorithms on fairness and human rights. Only through such reforms can algorithmic assistance strengthen, rather than erode, justice, accountability, and human dignity in Indonesia's criminal process.

6. References

- [1] V. Chiao, "Fairness, Accountability and Transparency: Notes on Algorithmic Decision-Making in Criminal Justice," *International Journal of Law in Context*, vol. 15, no. 2, hlm. 126–143, 2019, doi: 10.1017/s1744552319000077.
- [2] R. Jorgensen, "Algorithms and the Individual in Criminal Law," *Canadian Journal of Philosophy*, vol. 52, no. 1, hlm. 61–77, 2022, doi: 10.1017/can.2021.28.
- [3] T. Sabera, "Beyond 'Fairness': Rethinking the Use of Algorithmic Predictions in Criminal Justice," *Proceedings of the AAAI/ACM Conference on AI, Ethics, and Society 8*, no. 3, hlm. 2242–2247, 2025, doi: 10.1609/aies.v8i3.36709.
- [4] A. S. Almasoud dan J. A. Idowu, "Algorithmic Fairness in Predictive Policing," *AI and Ethics*, vol. 5, no. 3, hlm. 2323–2337, 2025.
- [5] R. A. Berk, A. K. Kuchibhotla, dan E. T. Tchetgen, "Improving Fairness in Criminal Justice Algorithmic Risk Assessments Using Optimal Transport and Conformal Prediction Sets," *Sociological Methods & Research*, vol. 53, no. 1, hlm. 3–44, 2024, doi: 10.1177/00491241231155883.
- [6] T.-W. Hung dan C.-P. Yen, "Predictive Policing and Algorithmic Fairness," *Synthese*, vol. 201, no. 6, hlm. 1–25, 2023, doi: 10.1007/s11229-023-04189-0.
- [7] R. Arvitto dan P. Astuti, "Predictive Justice Sebagai Inovasi Sistem Peradilan Pidana: Studi Komparatif Indonesia Dan Belanda," *Indonesian Journal of Contemporary Law*, vol. 3, no. 02, hlm. 1–20, Jan 2026.
- [8] C. Engels, L. Linhardt, dan M. Schubert, "Code is law: how COMPAS affects the way the judiciary handles the risk of recidivism," *Artif Intell Law*, vol. 33, no. 2, hlm. 383–404, Jun 2025, doi: 10.1007/s10506-024-09389-8.
- [9] J. Efendi Jonaedi, dan Ibrahim, *Metode Penelitian Hukum: Normatif dan Empiris*. Prenadamedia Group, 2018.
- [10] J. E. Johndrow dan K. Lum, "An Algorithm for Removing Sensitive Information: Application to Race-Independent Recidivism Prediction," *Annals of Applied Statistics*, vol. 13, no. 1, hlm. 189–220, 2019, doi: 10.1214/18-AOAS1201.
- [11] J. E. Johndrow dan K. Lum, "An Algorithm for Removing Sensitive Information: Application to Race-Independent Recidivism Prediction," *Annals of Applied Statistics*, vol. 13, no. 1, hlm. 189–220, 2019, doi: 10.1214/18-AOAS1201.
- [12] M. Miron, S. Tolan, E. Gómez, dan C. Castillo, "Evaluating Causes of Algorithmic Bias in Juvenile Criminal Recidivism," *Artificial Intelligence and Law*, vol. 29, no. 1, hlm. 111–138, 2021, doi: 10.1007/s10506-020-09268-y.
- [13] R. Peeters dan M. Schuilenburg, "Machine Justice: Governing Security through the Bureaucracy of Algorithms," *Information Polity*, vol. 23, no. 3, hlm. 267–280, 2018.

- [14] J. Ryberg, "Criminal Justice and Artificial Intelligence: How Should We Assess the Performance of Sentencing Algorithms?," *Philosophy & Technology*, vol. 37, no. 1, hlm. 1–15, 2024, doi: 10.1007/s13347-024-00694-3.
- [15] A. Završnik, "Algorithmic Justice: Algorithms and Big Data in Criminal Justice Settings," *European Journal of Criminology*, vol. 18, no. 5, hlm. 623–642, 2021, doi: 10.1177/1477370819876762.
- [16] A. S. Almasoud dan J. A. Idowu, "Algorithmic Fairness in Predictive Policing," *AI and Ethics*, vol. 5, no. 3, hlm. 2323–2337, 2025.
- [17] R. A. Berk, A. K. Kuchibhotla, dan E. T. Tchetgen, "Improving Fairness in Criminal Justice Algorithmic Risk Assessments Using Optimal Transport and Conformal Prediction Sets," *Sociological Methods & Research*, vol. 53, no. 1, hlm. 3–44, 2024, doi: 10.1177/00491241231155883.
- [18] R. Berk, H. Heidari, S. Jabbari, M. Kearns, dan A. Roth, "Fairness in Criminal Justice Risk Assessments: The State of the Art," *Sociological Methods & Research*, vol. 50, no. 1, hlm. 3–44, 2021, doi: 10.1177/0049124118782533.
- [19] J. Dressel dan H. Farid, "The Accuracy, Fairness, and Limits of Predicting Recidivism," *Science Advances*, vol. 4, no. 1, hlm. 5580, 2018, doi: 10.1126/sciadv.aao5580.
- [20] S. Kawamleh, "Algorithmic Evidence in U.S Criminal Sentencing," *AI and Ethics*, vol. 4, no. 4, hlm. 1315–1328, 2024, doi: 10.1007/s43681-023-00368-4.
- [21] M. Miron, S. Tolan, E. Gómez, dan C. Castillo, "Evaluating Causes of Algorithmic Bias in Juvenile Criminal Recidivism," *Artificial Intelligence and Law*, vol. 29, no. 1, hlm. 111–138, 2021, doi: 10.1007/s10506-020-09268-y.
- [22] M. Musbih dan O. Abdal, "Using Predictive Justice Algorithms in Criminal Justice System: Prospects and Challenges," *International Review of Law*, vol. 10, no. 1, hlm. 233–266, 2021, doi: 10.29117/irl.2021.0161.
- [23] M. Ríos dan Pilar, "Predictive Algorithms and Criminal Justice: Expectations, Challenges and a Particular View of the Spanish VioGén System," *Rivista Italiana di Informatica e Diritto*, vol. 6, no. 1, hlm. 1–18, 2024, doi: 10.32091/RIID0168.
- [24] A. Alimardani dan M. Istiqomah, "Beyond Black Boxes and Biases: Advancing Artificial Intelligence in Sentencing," dalam *Current Issues in Criminal Justice*, 2025, hlm. 1–22. doi: 10.1080/10345329.2025.2527994.
- [25] R. Arvitto dan P. Astuti, "Predictive Justice sebagai Inovasi Sistem Peradilan Pidana: Studi Komparatif Indonesia dan Belanda," *Indonesian Journal of Contemporary Law*, vol. 1, no. 2, hlm. 1–24, 2026.
- [26] R. Ayu, W. Karna, dan B. Wibowo, "Transformasi Penegakan Hukum di Era Kecerdasan Buatan: Analisis Normatif terhadap Kebutuhan Reformasi Regulasi Hukum Pidana dan Acara Pidana di Indonesia," *Legal Note: Jurnal Hukum dan Kebijakan Publik*, vol. 2, no. 1, hlm. 1–24, 2026, doi: 10.70716/legalnote.v2i1.197.
- [27] A. Chouldechova, "Fair Prediction with Disparate Impact: A Study of Bias in Recidivism Prediction Instruments," *Big Data*, vol. 5, no. 2, hlm. 153–163, 2017, doi: 10.1089/big.2016.0047.
- [28] C. S. A. T. Lesmana, D. Y. Pebrianto, dan A. Erfina, "Keadilan Mesin: Telaah Filosofis atas Legitimasi Keputusan Hukum Berbasis Teknologi," *Rechten: Riset Hukum dan Hak Asasi Manusia*, vol. 6, no. 2, hlm. 1–18, 2024, doi: 10.52005/rechten.v6i2.177.
- [29] R. Rusmiyati, "Advancing Law Enforcement Efficiency Through Predictive Policing Technologies," *Jurnal Puruhita*, vol. 7, no. 2, hlm. 39–42, 2025, doi: 10.15294/puruhita.v7i2.37902.
- [30] Y. Tertibi, "The Urgency of Artificial Intelligence Regulation in Indonesia's Criminal Justice," *METTA: Jurnal Ilmu Multidisiplin*, vol. 5, no. 3, hlm. 1–18, 2025, doi: 10.37329/metta.v5i3.4501.