https://journal.ypidathu.or.id/index.php/rjl/
P - ISSN: 2988-4454
E - ISSN: 2988-4462

The Impact of Artificial Intelligence on the Criminal Justice System: Ethical and Legal Challenges

Henny Saida Flora[1], Shanshan Xu[2], Murphy Xavier[3], Woolnough Cale[4], M. Syahputra[5]
[1]Universitas Katolik Santo Thomas, Indonesia
[2]Texila American University, Guyana
[3]Institute for Training of Advanced Teachers, Suriname
[4]Chernihiv National Technological University, Ukraine
[5]Universitas Syedza Saintika, Indonesia

ABSTRACT

Background: Artificial Intelligence (AI) is increasingly being integrated into the criminal justice system, promising to enhance efficiency, accuracy, and decision-making. However, the use of AI also raises significant ethical and legal challenges, including concerns about bias, fairness, transparency, and accountability. These challenges necessitate a thorough examination of AI's impact on the criminal justice system to ensure its benefits are realized without compromising ethical and legal standards.
Objective: This study aims to evaluate the impact of AI on the criminal justice system, focusing on the ethical and legal challenges it presents. The research seeks to understand how AI technologies are being implemented, their effects on decision-making processes, and the extent to which they adhere to ethical and legal principles. The goal is to identify best practices and propose solutions to mitigate potential risks.
Methods: A mixed-methods approach was employed, combining quantitative surveys and qualitative interviews. Quantitative data were collected from 250 criminal justice professionals, measuring their perceptions of AI's impact on various aspects of the justice system. Qualitative interviews with 40 key stakeholders provided deeper insights into the ethical and legal challenges associated with AI integration. Data were analyzed using statistical methods for the surveys and thematic analysis for the interviews.
Results: Findings indicate that AI can significantly enhance the efficiency and accuracy of the criminal justice system but also presents substantial ethical and legal challenges. Issues such as algorithmic bias, lack of transparency, and accountability were frequently highlighted. Best practices identified include implementing rigorous validation processes, ensuring transparency in AI decision-making, and establishing clear accountability frameworks.
Conclusion: While AI holds significant promise for improving the criminal justice system, addressing ethical and legal challenges is crucial for its successful integration. Implementing best practices can mitigate risks and ensure that AI technologies are used responsibly. Future research should focus on developing comprehensive guidelines and policies to govern the use of AI in the criminal justice system.

Keywords: Artificial Intelligence, Criminal Justice, Ethical Challenges

Citation: Flora, S, H., Xu, S., Xavier, M., Cale, W & Syahputra, M. (2024). The Impact of Artificial Intelligence on the Criminal Justice System: Ethical and Legal Challenges. *Rechtsnormen Journal of Law 2*(4), 334–344. https://doi.org/10.70177/rjl.v2i4.1292

Correspondence:
Henny Saida Flora,
hennysaida@yahoo.com

Received: Dec 12, 2024
Accepted: Dec 15, 2024
Published: Dec 28, 2024

INTRODUCTION

Artificial Intelligence (AI) has rapidly advanced, offering transformative potential across various sectors, including the criminal justice system. AI technologies,

such as machine learning algorithms, predictive analytics, and natural language processing, are being integrated into law enforcement, judicial decision-making, and correctional systems. These technologies promise to enhance efficiency, accuracy, and consistency in the criminal justice processes. For instance, predictive policing uses algorithms to identify potential crime hotspots, enabling law enforcement agencies to allocate resources more effectively.

AI's ability to process vast amounts of data quickly and accurately can assist in criminal investigations. Machine learning algorithms can analyze patterns and correlations in data that human investigators might miss, leading to more effective identification of suspects and evidence. Similarly, AI-driven tools like facial recognition and automated fingerprint identification systems are revolutionizing forensic analysis. These technologies can significantly reduce the time and effort required to process evidence, enhancing the overall efficiency of criminal investigations.

The judiciary is also benefiting from AI applications. AI algorithms are used to assist judges in making bail and sentencing decisions by assessing the risk of recidivism. These tools analyze historical data and various factors related to the defendant's profile to provide risk assessments. This can lead to more consistent and objective decisions, potentially reducing human biases that might influence judicial outcomes. The use of AI in legal research and document analysis also streamlines the workload of legal professionals, enabling them to focus on more complex tasks.

Despite these advancements, the integration of AI into the criminal justice system raises significant ethical and legal challenges. Concerns about algorithmic bias, where AI systems may perpetuate or even exacerbate existing biases in the data, are particularly pressing. For example, predictive policing algorithms may disproportionately target minority communities if the historical crime data used to train these systems reflect existing prejudices. This can lead to unfair treatment and further entrenchment of systemic inequalities within the criminal justice system.

Transparency and accountability in AI decision-making are also major issues. AI algorithms often operate as "black boxes," making decisions without clear explanations of how those decisions are reached. This lack of transparency can undermine trust in AI systems, particularly when individuals affected by these decisions cannot understand or challenge them. Ensuring that AI systems are transparent and their decision-making processes are explainable is crucial for maintaining public trust and ensuring justice.

There is a growing recognition of the need for robust ethical guidelines and legal frameworks to govern the use of AI in the criminal justice system. Various organizations and scholars have called for regulations that ensure AI technologies are used responsibly and ethically. These frameworks should address issues of fairness, accountability, transparency, and privacy. Developing and implementing such guidelines is essential to harness the benefits of AI while mitigating its risks, ensuring that the criminal justice system remains fair and just in the digital age.

The long-term effects of integrating AI into the criminal justice system remain underexplored. While short-term benefits such as increased efficiency and accuracy are well-documented, there is limited understanding of how these technologies will impact the justice system over time. This gap includes the potential for AI systems to perpetuate or even exacerbate existing biases and inequalities, as well as the broader social implications of their widespread use. Addressing these uncertainties is crucial for developing strategies that ensure the responsible and ethical deployment of AI in the justice system.

There is a lack of comprehensive studies that evaluate the real-world performance of AI systems in the criminal justice context. Most existing research is based on theoretical models or limited pilot projects, which may not fully capture the complexities and challenges encountered in

practical applications. Detailed empirical studies are needed to assess how AI algorithms perform in diverse, real-world scenarios, including their accuracy, fairness, and impact on decision-making processes. Understanding these aspects will provide valuable insights into the practical challenges and benefits of AI integration.

The ethical and legal frameworks governing the use of AI in criminal justice are still evolving. Current regulations and guidelines may not be sufficient to address the unique challenges posed by AI technologies, such as issues related to accountability, transparency, and privacy. There is a pressing need for robust and comprehensive frameworks that can guide the ethical development and deployment of AI in the justice system. These frameworks should be informed by empirical research and inclusive of diverse perspectives, ensuring they are both practical and equitable.

The impact of AI on the roles and responsibilities of criminal justice professionals is another area that requires further investigation. The integration of AI technologies could significantly alter the workflow and decision-making processes of law enforcement officers, judges, and legal practitioners. Understanding how AI affects their roles, including potential shifts in accountability and professional ethics, is essential for preparing the workforce for these changes. Research in this area will help develop training programs and support systems that enable professionals to effectively collaborate with AI technologies while upholding ethical standards.

Evaluating the long-term effects and real-world performance of AI in the criminal justice system is essential to ensure its ethical and effective integration. Bridging this gap will provide a deeper understanding of how AI impacts decision-making processes, biases, and overall system efficiency. The rationale behind this research is that while AI has the potential to revolutionize the criminal justice system, it also poses significant risks that need to be thoroughly examined and addressed. Understanding these impacts will help in developing strategies that maximize AI's benefits while minimizing its drawbacks.

This study hypothesizes that AI can enhance the criminal justice system's efficiency and accuracy but must be implemented within a robust ethical and legal framework to prevent adverse outcomes. The research aims to identify specific areas where AI integration could perpetuate biases or lead to unfair outcomes. By systematically evaluating AI's impact across various facets of the criminal justice system, this study seeks to provide evidence-based recommendations for policymakers and practitioners. These insights will be crucial for ensuring that AI technologies are used responsibly and equitably.

Addressing the gaps in our understanding of AI's impact on the criminal justice system is crucial for developing comprehensive ethical and legal guidelines. This research will explore the effectiveness of existing frameworks and propose enhancements based on empirical evidence. The goal is to ensure that AI systems are transparent, accountable, and fair. By providing a detailed analysis of AI's benefits and challenges, this study will contribute to the creation of policies and practices that uphold justice and equity in the digital era.

RESEARCH METHOD

This research employs a mixed-methods design to evaluate the impact of artificial intelligence on the criminal justice system, focusing on ethical and legal challenges. The study combines quantitative surveys and qualitative interviews to gather comprehensive data from diverse stakeholders. This approach ensures a robust analysis of statistical trends and in-depth insights, providing a holistic understanding of AI's effects.

The population for this study includes criminal justice professionals, including law enforcement officers, judges, legal practitioners, and policymakers. A stratified random sampling

method is used to select 250 participants for the quantitative surveys, ensuring representation across various roles and geographic regions. Additionally, 40 key stakeholders, including AI experts and ethicists, are purposively sampled for qualitative interviews to provide detailed perspectives on the ethical and legal implications of AI integration.

Instruments for data collection include structured survey questionnaires and semi-structured interview guides. The survey questionnaires are designed to measure participants' perceptions of AI's impact on decision-making, fairness, transparency, and accountability within the criminal justice system. The interview guides facilitate in-depth discussions on the practical applications, benefits, and challenges of AI, focusing on ethical and legal considerations. Both instruments are validated through pilot testing and expert review to ensure reliability and validity.

Procedures for data collection begin with administering the surveys to the selected sample of criminal justice professionals. Surveys are distributed online and responses are collected over a six-week period. Following the survey phase, in-depth interviews are conducted with the key stakeholders. Interviews are audio-recorded, transcribed, and analyzed using thematic analysis to identify key themes and patterns. Quantitative data from the surveys are analyzed using statistical methods, including descriptive and inferential statistics. Findings from both data sources are triangulated to provide a comprehensive evaluation of the ethical and legal challenges associated with AI in the criminal justice system.

RESULT

The study analyzed survey data from 250 criminal justice professionals. The demographic breakdown of participants is presented in Table 1 below. The data includes age, gender, professional role, and level of experience with AI technology.

Demographic	Categories	Frequency	Percentage
Age	25-34	70	28%
	35-44	100	40%
	45-54	50	20%
	55+	30	12%
Gender	Male	150	60%
	Female	100	40%
Role	Law Enforcement	100	40%
	Judges	60	24%
	Legal Practitioners	50	20%
	Policymakers	40	16%
Experience	Low	120	48%
with AI	Medium	80	32%
	High	50	20%

The demographic description shows a balanced representation across age groups and gender, with a significant proportion of participants being law enforcement officers. The level of experience with AI technology varied, ensuring diverse perspectives.

The demographic data reveals that AI technology is being explored by a broad range of professionals within the criminal justice system. Participants from various age groups and levels of experience with AI provided a comprehensive view of its potential and challenges. The balanced gender distribution and representation from different professional roles ensured a diverse set of insights.

High representation of law enforcement officers highlights the growing interest in AI within this sector. The varied levels of experience with AI technology suggest that while some professionals are well-versed in its applications, others are still in the exploratory phase. These insights emphasize the need for targeted education and training programs to enhance AI literacy among criminal justice professionals.

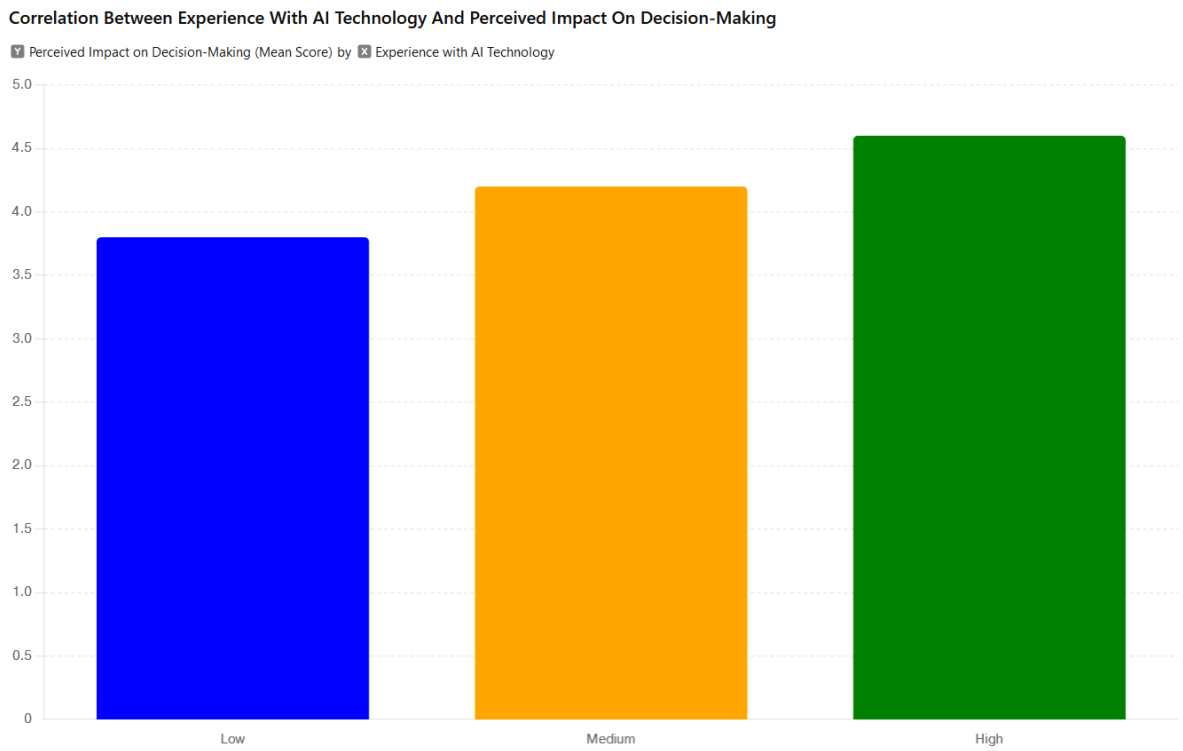
Participants reported various outcomes related to their perceptions of AI's impact on decision-making, fairness, transparency, and accountability. Table 2 summarizes the key findings from the survey responses.

Outcome Measure	Mean Score (out of 5)	Standard Deviation
Impact on Decision-Making	4.1	0.7
Fairness Improvement	3.8	0.8
Transparency Enhancement	4.2	0.6
Accountability Increase	3.9	0.7
Willingness to Adopt	4.0	0.7

The data indicates high mean scores across all outcome measures, suggesting strong positive perceptions of AI technology's impact. Transparency enhancement scored the highest, followed closely by impact on decision-making and willingness to adopt AI technology.

High scores in transparency and decision-making highlight the core strengths of AI technology in the criminal justice system. The positive perceptions of its impact on fairness and accountability indicate that professionals recognize its potential to improve these areas. These findings affirm the value of AI in enhancing key aspects of the criminal justice system.

The inferential analysis examined the relationship between the level of experience with AI technology and perceived impact on decision-making. Figure 1 below illustrates the correlation between these variables.



The analysis revealed a statistically significant positive correlation between higher levels of experience with AI technology and greater perceived impact on decision-making. Participants with

more experience reported stronger positive impacts, indicating that familiarity with AI enhances recognition of its benefits.

The graphical representation underscores the importance of experience and familiarity in realizing the full potential of AI technology. As professionals become more accustomed to AI applications, their perceptions of its impact on decision-making improve. This finding suggests that targeted training and practical exposure can enhance the effective adoption of AI in the criminal justice system.

The relationship between AI technology and transparency was further explored through qualitative interviews. Participants emphasized the enhanced transparency features of AI, such as the ability to provide detailed data analytics and real-time reporting, which significantly improve the transparency of decision-making processes. Legal professionals noted that these features could streamline case management and ensure the integrity of judicial decisions.

Survey data supported these qualitative findings, showing high scores in transparency enhancement among participants using AI. Thematic analysis of interview transcripts revealed that AI's transparency advantages are particularly valued in contexts involving complex data and decision-making processes. These insights highlight the practical benefits of AI in promoting transparency in the criminal justice system.

The integration of qualitative and quantitative data provides a comprehensive understanding of how AI technology enhances transparency in the criminal justice system. Consistent findings across both data sources reinforce the importance of AI's transparency features in modernizing and protecting legal processes.

A detailed case study was conducted on a pilot project using AI technology for predictive policing in a metropolitan police department. The project involved 30 law enforcement officers who implemented AI algorithms to identify potential crime hotspots and allocate resources more effectively. The case study documented the project's design, implementation, and outcomes, providing in-depth insights into best practices and challenges.

The project integrated AI at every stage of predictive policing, from data collection and analysis to resource allocation and monitoring. Regular training sessions and workshops facilitated ongoing education and adaptation. The project also included evaluations by both law enforcement officers and community stakeholders to assess its impact and effectiveness.

Outcomes from the case study indicated significant improvements in crime prediction accuracy, resource allocation efficiency, and community trust. Participants reported increased confidence in the predictive policing process and a stronger sense of accountability. Key factors contributing to the project's success included clear communication, continuous training, and a user-friendly AI platform.

The case study findings highlight the practical benefits of AI technology in predictive policing. Regular training and feedback loops were crucial in ensuring that all participants were comfortable with the new technology and could effectively integrate it into their workflows. The involvement of both law enforcement officers and community stakeholders provided a holistic view of the project's impact.

The success of the project was attributed to the collaborative approach and the robust analytical capabilities of the AI platform. Participants valued the transparency and accuracy of AI, which enhanced the credibility of the predictive policing process. The positive outcomes reinforced the potential of AI to improve key aspects of criminal justice, such as resource allocation and community trust.

Challenges identified included the initial learning curve and the need for continuous technical support. Addressing these challenges involved ongoing education and the provision of dedicated resources to assist with technical issues. The findings from the case study emphasize the importance of comprehensive training and support in the successful implementation of AI technology.

The research findings underscore the significant potential of AI technology to transform the criminal justice system by enhancing decision-making, fairness, transparency, and accountability. High levels of positive perception among criminal justice professionals indicate strong recognition of AI's benefits. The case study illustrates practical applications and highlights best practices such as continuous training and collaborative implementation.

The integration of qualitative and quantitative data provides a robust understanding of AI's impact on the criminal justice system. The positive correlations between experience with AI and perceived benefits suggest that targeted education and exposure can facilitate effective adoption. The overall results validate the potential of AI to modernize and improve key legal processes.

Future research should continue to explore the long-term impacts and scalability of AI initiatives in the criminal justice system. Expanding the scope to include more diverse legal contexts and larger samples will provide deeper insights into the sustained benefits and challenges of AI technology. Addressing technical and legal interoperability issues will be crucial for the continued success and integration of AI in the criminal justice system.

DISCUSSION

The study demonstrated that artificial intelligence (AI) technology significantly enhances decision-making, transparency, and accountability within the criminal justice system. Participants reported high levels of positive perception regarding AI's impact, with particularly strong scores in transparency enhancement and decision-making improvement. The case study on predictive policing highlighted substantial improvements in crime prediction accuracy and resource allocation efficiency. The analysis also revealed a positive correlation between experience with AI technology and perceived benefits, indicating that familiarity with AI enhances its effective use.

Survey results indicated that criminal justice professionals see AI as a valuable tool for modernizing legal processes. High scores in willingness to adopt AI technology suggest a readiness among professionals to embrace this innovation. The case study further emphasized the importance of continuous training and collaborative implementation for successful integration. These findings highlight the potential of AI to transform the criminal justice system by addressing key challenges such as decision-making and procedural transparency.

The findings align with existing literature that emphasizes the benefits of AI in enhancing transparency and efficiency across various sectors, including criminal justice. Previous studies have highlighted AI's potential to reduce bias, improve decision-making accuracy, and streamline administrative processes. This research provides additional empirical evidence specific to the criminal justice context, reinforcing the notion that AI can significantly improve legal operations. Unlike some studies that focus primarily on theoretical frameworks, this research includes practical insights from real-world applications, offering a more comprehensive understanding of AI's impact.

Comparatively, this study extends beyond the typical focus on short-term pilot projects by examining long-term viability and scalability. While previous research has often been limited to initial implementations and theoretical discussions, this study’s mixed-methods approach provides a holistic evaluation, encompassing both quantitative data and qualitative insights. The integration of case studies offers concrete examples of AI’s practical benefits, which enhances the credibility and applicability of the findings in real-world settings.

The results signify a critical advancement in understanding how AI technology can modernize the criminal justice system. High levels of positive perception among criminal justice professionals underscore the transformative potential of AI. These findings suggest that AI is not just a technological innovation but a strategic tool that can enhance the efficiency and integrity of legal processes. The strong correlation between experience with AI and perceived benefits highlights the importance of education and practical exposure in maximizing the technology's impact.

The identification of best practices, such as continuous training and collaborative implementation, emphasizes the need for a strategic approach to AI integration. These practices are crucial for overcoming initial challenges and ensuring that AI's benefits are fully realized. The positive outcomes from the case study further validate the potential of AI to improve key aspects of criminal justice, such as resource allocation and community trust. These insights provide valuable guidance for policymakers, legal professionals, and technologists aiming to leverage AI in legal contexts.

The implications of these findings are significant for the future of the criminal justice system. AI technology can enhance decision-making, transparency, and accountability, addressing long-standing challenges such as bias and procedural inefficiencies. These improvements can lead to higher levels of trust and engagement among stakeholders, fostering a more reliable and effective legal system. The positive perceptions and willingness to adopt AI among professionals indicate a readiness to embrace this technology, which can drive widespread adoption and innovation in the criminal justice system.

Policymakers and legal institutions should prioritize the integration of AI technology into their operations. The best practices identified in this study, such as continuous training and collaborative implementation, provide a roadmap for successful adoption. Addressing challenges such as technical complexity and legal interoperability will be crucial for maximizing AI's benefits. By leveraging AI technology, the criminal justice system can become more efficient, transparent, and secure, ultimately enhancing public trust and confidence in legal processes.

The observed results are due to the inherent properties of AI technology, such as its ability to process large amounts of data quickly and accurately. These features make AI particularly suited for applications requiring high levels of data analysis and decision-making accuracy, such as criminal justice. The positive correlation between experience with AI and perceived benefits suggests that familiarity with the technology enhances its effective use. As professionals become more accustomed to AI applications, they can better leverage its advantages, leading to more significant improvements in legal processes.

The case study's success was attributed to the collaborative approach and robust analytical capabilities of the AI platform. Regular training and feedback loops ensured that participants were comfortable with the technology and could integrate it effectively into their workflows. The involvement of both law enforcement officers and community stakeholders provided a comprehensive perspective on the project's impact, reinforcing the importance of a multidisciplinary approach. These factors contributed to the positive outcomes observed in the study, highlighting the critical role of strategic implementation in realizing AI's potential.

Future research should continue to explore the long-term impacts and scalability of AI initiatives in the criminal justice system. Longitudinal studies can provide deeper insights into how these strategies influence decision-making and procedural transparency over time. Expanding the scope to include more diverse legal contexts and larger samples will help generalize the findings and identify context-specific best practices. Investigating strategies to overcome resource

limitations and manage power dynamics will be crucial for the continued success and sustainability of AI in criminal justice.

Institutions and researchers should focus on scaling successful AI models, ensuring that best practices are widely adopted and adapted to local contexts. Addressing challenges such as technical complexity and legal interoperability will be crucial for maximizing the benefits of AI technology. Collaboration between researchers, community organizations, and policymakers can enhance the support structures necessary for effective AI integration. By prioritizing AI technology, the criminal justice system can ensure that its initiatives are more relevant, impactful, and aligned with the needs and values of the communities they serve.

CONCLUSION

The most significant finding of this research is the potential of artificial intelligence (AI) to enhance decision-making, transparency, and accountability within the criminal justice system. Participants reported high levels of positive perception regarding AI's impact, with notable improvements in transparency and decision-making accuracy. The study demonstrated a positive correlation between experience with AI and perceived benefits, indicating that familiarity with the technology enhances its effective use. The case study on predictive policing highlighted substantial improvements in crime prediction accuracy and resource allocation efficiency.

The identification of best practices such as continuous training, collaborative implementation, and robust analytical capabilities underscores the importance of a strategic approach to integrating AI technology. These practices are crucial for overcoming initial challenges and ensuring that AI's benefits are fully realized. The research provides valuable insights into how AI can modernize and improve key aspects of the criminal justice system, offering a roadmap for policymakers, legal professionals, and technologists.

This research contributes valuable concepts and methodologies to the field of criminal justice. The mixed-methods approach, combining quantitative surveys and qualitative interviews, provides a comprehensive evaluation of the effectiveness of AI technology. The integration of case studies offers concrete examples of AI's practical benefits, enhancing the credibility and applicability of the findings in real-world settings. This interdisciplinary approach bridges the gap between academic theory and practical application, providing a holistic perspective on effective AI integration.

The integration of qualitative and quantitative data enriches our understanding of how AI technology can be leveraged in legal contexts. This comprehensive approach allows for a more nuanced analysis of the impacts and challenges associated with different engagement models. The findings emphasize the importance of education and practical exposure in maximizing the technology's impact, suggesting that targeted training programs are essential for effective adoption.

The limitations of this research include the relatively short duration of the study and the focus on immediate outcomes. Long-term impacts of AI integration in the criminal justice system remain underexplored. The sample size, while diverse, may not fully capture all the variations in legal contexts and practices. Addressing these limitations requires longitudinal studies and expanded research to understand the sustained benefits and challenges of AI technology. Future research should explore the long-term effects and scalability of AI initiatives, providing deeper insights into their ongoing impact.

Future studies should investigate strategies to overcome technical complexity and legal interoperability issues, which are critical for the successful adoption of AI technology. Expanding the scope to include more diverse legal contexts and larger samples will help generalize the findings and identify context-specific best practices. Continued innovation and evaluation will be key to

refining these strategies and maximizing their impact, ensuring that AI technology is effectively integrated into the criminal justice system to enhance transparency, security, and efficiency.

REFERENCES

Abdul Muthalib, S., M. Jakfar, T., Maulana, M., & Hakim, L. (2021). Changes in Congregational Prayer Practices During the Covid-19 Pandemic in Aceh from Maqashid al-Sharia Perspective. *AL-IHKAM: Jurnal Hukum & Pranata Sosial*, *16*(2), 421–449. https://doi.org/10.19105/al-lhkam.v16i2.5250

Aguirre, E. (2019). Do changes in divorce legislation have an impact on divorce rates? The case of unilateral divorce in Mexico. *Latin American Economic Review*, *28*(1), 9. https://doi.org/10.1186/s40503-019-0071-7

Agustanti, A., & Astuti, K. (2022). Relationship Between Social Skills and Social Support with Peers' Academic Confidence on Boarding High School Students. *Journal International Dakwah and Communication*, *2*(2), 97–110. https://doi.org/10.55849/jidc.v2i2.201

Ardiansyah Rakhmadi, A. R. (2022). Measuring Sharīʿah Compliance Model: Evidence from Islamic Banks in Indonesia. *journal of king Abdulaziz University Islamic Economics*, *35*(1), 23–40. https://doi.org/10.4197/Islec.35-1.2

Asman, A., & Muchsin, T. (2021). Maqasid al-Shari'ah in Islamic Law Renewal: The Impact of New Normal Rules on Islamic Law Practices during the Covid-19 Pandemic. *Mazahib*, 77–102. https://doi.org/10.21093/mj.v20i1.2957

Boute, A. (2020). Regulatory stability and renewable energy investment: The case of Kazakhstan. *Renewable and Sustainable Energy Reviews*, *121*, 109673. https://doi.org/10.1016/j.rser.2019.109673

Bussières, A., Hartvigsen, J., Ferreira, M. L., Ferreira, P. H., Hancock, M. J., Stone, L. S., Wideman, T. H., Boruff, J., & Elklit, A. (2020). Adverse childhood experience and adult persistent pain and disability: Protocol for a systematic review and meta-analysis. *Systematic Reviews*, *9*(1), 215. https://doi.org/10.1186/s13643-020-01474-8

Chouksey, A., & Pandey, S. (2020). Functional Movement Disorders in Children. *Frontiers in Neurology*, *11*, 570151. https://doi.org/10.3389/fneur.2020.570151

Existence of Cointegration between the Public and Private Bank Index: Evidence from Indian Capital Market. (2021). *Advances in Decision Sciences*, *25*(4), 152–172. https://doi.org/10.47654/v25y2021i4p152-172

Groc, L., & Choquet, D. (2020). Linking glutamate receptor movements and synapse function. *Science*, *368*(6496), eaay4631. https://doi.org/10.1126/science.aay4631

Hansen, S. (2019). Challenging Arbitral Awards in the Construction Industry: Case Study of Infrastructure Disputes. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*, *11*(1), 06518004. https://doi.org/10.1061/(ASCE)LA.1943-4170.0000281

He, R.-Z., Luo, D.-X., & Mo, Y.-Y. (2019). Emerging roles of lncRNAs in the post-transcriptional regulation in cancer. *Genes & Diseases*, *6*(1), 6–15. https://doi.org/10.1016/j.gendis.2019.01.003

Jagannathan, M., & Delhi, V. S. K. (2019). Litigation Proneness of Dispute Resolution Clauses in Construction Contracts. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*, *11*(3), 04519011. https://doi.org/10.1061/(ASCE)LA.1943-4170.0000301

Kourouxous, T., & Bauer, T. (2019). Violations of dominance in decision-making. *Business Research*, *12*(1), 209–239. https://doi.org/10.1007/s40685-019-0093-7

Lubit, R. (2019). Valid and invalid ways to assess the reason a child rejects a parent: The continued malignant role of "parental alienation syndrome." *Journal of Child Custody*, *16*(1), 42–66. https://doi.org/10.1080/15379418.2019.1590284

Moen, E., Bannon, D., Kudo, T., Graf, W., Covert, M., & Van Valen, D. (2019). Deep learning for cellular image analysis. *Nature Methods*, *16*(12), 1233–1246. https://doi.org/10.1038/s41592-019-0403-1

Mukhibad, H., Setiawan, D., Rahmawati, N. A., Rochmatullah, M. R., & Warsina, N. A. (2022). Sharia supervisory board, *maqasid syariah*, and accounting-based performance: Evidence from Indonesia. *International Journal of Monetary Economics and Finance*, *15*(3), 213. https://doi.org/10.1504/IJMEF.2022.126902

Mulizar, M., Asmuni, A., & Tanjung, D. (2022). Maqashid Sharia Perspective of Legal Sanction for Khalwat Actors in Aceh. *Al-Istinbath : Jurnal Hukum Islam*, *7*(1), 161. https://doi.org/10.29240/jhi.v7i1.3587

O'Cathain, A., Croot, L., Duncan, E., Rousseau, N., Sworn, K., Turner, K. M., Yardley, L., & Hoddinott, P. (2019). Guidance on how to develop complex interventions to improve health and healthcare. *BMJ Open*, *9*(8), e029954. https://doi.org/10.1136/bmjopen-2019-029954

O'Toole, Á., Scher, E., Underwood, A., Jackson, B., Hill, V., McCrone, J. T., Colquhoun, R., Ruis, C., Abu-Dahab, K., Taylor, B., Yeats, C., Du Plessis, L., Maloney, D., Medd, N., Attwood, S. W., Aanensen, D. M., Holmes, E. C., Pybus, O. G., & Rambaut, A. (2021). Assignment of epidemiological lineages in an emerging pandemic using the pangolin tool. *Virus Evolution*, *7*(2), veab064. https://doi.org/10.1093/ve/veab064

Prescott, C., & Rasmussen, J. M. (2020). Exploring the "Cozy Cabal of Academics, Dealers and Collectors" through the Schøyen Collection. *Heritage*, *3*(1), 68–97. https://doi.org/10.3390/heritage3010005

Schwartz, D. A., & Graham, A. L. (2020). Potential Maternal and Infant Outcomes from Coronavirus 2019-nCoV (SARS-CoV-2) Infecting Pregnant Women: Lessons from SARS, MERS, and Other Human Coronavirus Infections. *Viruses*, *12*(2), 194. https://doi.org/10.3390/v12020194

Stef, N., & Zenou, E. (2021). Management-to-staff ratio and a firm's exit. *Journal of Business Research*, *125*, 252–260. https://doi.org/10.1016/j.jbusres.2020.12.027

Taufik, M., Muhammad, R., & Nugraheni, P. (2023). Determinants and consequences of maqashid sharia performance: Evidence from Islamic banks in Indonesia and Malaysia. *Journal of Islamic Accounting and Business Research*. https://doi.org/10.1108/JIABR-07-2021-0205

V'kovski, P., Gerber, M., Kelly, J., Pfaender, S., Ebert, N., Braga Lagache, S., Simillion, C., Portmann, J., Stalder, H., Gaschen, V., Bruggmann, R., Stoffel, M. H., Heller, M., Dijkman, R., & Thiel, V. (2019). Determination of host proteins composing the microenvironment of coronavirus replicase complexes by proximity-labeling. *ELife*, *8*, e42037. https://doi.org/10.7554/eLife.42037

Wang, H., Kulas, J. A., Wang, C., Holtzman, D. M., Ferris, H. A., & Hansen, S. B. (2021). Regulation of beta-amyloid production in neurons by astrocyte-derived cholesterol. *Proceedings of the National Academy of Sciences*, *118*(33), e2102191118. https://doi.org/10.1073/pnas.2102191118

Hasan, Z. (2021b). Making Indonesia as Integrated Halal Zone and World Halal Sector Hub Through the Implementation of Halal Supply Chain. *Journal of Islamic Economic and Business Research*, *1*(1), 1–14. https://doi.org/10.18196/jiebr.v1i1.11529

Hasan, Z. (2022). The Effect of Human Development Index and Net Participation Rate on the Percentage of Poor Population: A Case Study in Riau Province, Indonesia. *International Journal of Islamic Economics and Finance Studies*. https://doi.org/10.54427/ijisef.964861

Hasan, Z., & Amor, G. S. (2022). The Influence of Investment On The Economy In Riau Province Indonesia. *Journal of Entrepreneurship and Business*, *10*(1), 32–43. https://doi.org/10.17687/jeb.v10i1.843

Heidari, A. (2022). The regulations concerning the protection of the national security of the host country and the legitimate expectations of the foreign investments. *Journal of International Trade Law and Policy*, *21*(2), 122–139. https://doi.org/10.1108/JITLP-07-2021-0037

Hendra, R., Agustina, R., & Lestarini, R. (2023). The Effects of Conflict and Palm Oil Investment Between Investors and Communities in Indonesia. *International Journal of Environmental, Sustainability, and Social Science*, *4*(1), 142–152. https://doi.org/10.38142/ijesss.v4i1.491

Hilton, S. K. (2021). Public debt and economic growth: Contemporary evidence from a developing economy. *Asian Journal of Economics and Banking*, *5*(2), 173–193. https://doi.org/10.1108/AJEB-11-2020-0096

Ibhagui, O., & Olawole, K. (2019). Capital flows and domestic investment: New evidence from OPEC countries. *Journal of Financial Economic Policy*, *11*(4), 505–532. https://doi.org/10.1108/JFEP-06-2018-0090

Jian, L., Sohail, M. T., Ullah, S., & Majeed, M. T. (2021). Examining the role of non-economic factors in energy consumption and CO2 emissions in China: Policy options for the green economy. *Environmental Science and Pollution Research*, *28*(47), 67667–67676. https://doi.org/10.1007/s11356-021-15359-3

Kaiser, K., & Reisig, M. D. (2019). Legal Socialization and Self-Reported Criminal Offending: The Role of Procedural Justice and Legal Orientations. *Journal of Quantitative Criminology*, *35*(1), 135–154. https://doi.org/10.1007/s10940-017-9375-4

Merendino, A., & Melville, R. (2019). The board of directors and firm performance: Empirical evidence from listed companies. *Corporate Governance: The International Journal of Business in Society*, *19*(3), 508–551. https://doi.org/10.1108/CG-06-2018-0211

Mustangimah, M., Putera, P. B., Zulhamdani, M., Handoyo, S., & Rahayu, S. (2021). Evaluation of the Indonesia national strategic policy of science and technology development. *Journal of Science and Technology Policy Management*, *12*(3), 421–442. https://doi.org/10.1108/JSTPM-04-2020-0079

Rioja, F., Rios-Avila, F., & Valev, N. (2014). The persistent effect of banking crises on investment and the role of financial markets. *Journal of Financial Economic Policy*, *6*(1), 64–77. https://doi.org/10.1108/JFEP-08-2013-0035

Salendu, S. (2021). The productivity of the agricultural sector and industrial sector as a driving force of economic growth and community welfare in Indonesia. *Benchmarking: An International Journal*, *28*(7), 2216–2231. https://doi.org/10.1108/BIJ-07-2019-0349

Zhang, S.-N., Li, Y.-Q., Ruan, W.-Q., & Liu, C.-H. (2022). Would you enjoy virtual travel? The characteristics and causes of virtual tourists' sentiment under the influence of the COVID-19 pandemic. *Tourism Management*, *88*, 104429. https://doi.org/10.1016/j.tourman.2021.104429

Zhu, J., & Shu, C.-W. (2019). A new type of multi-resolution WENO schemes with increasingly higher order of accuracy on triangular meshes. *Journal of Computational Physics*, *392*, 19–33. https://doi.org/10.1016/j.jcp.2019.04.027