Digital Ethics in AI-Based Services in Indonesia: Policy Evolution and Data Security Challenges —Literature Review

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Abstract. The rapid development of artificial intelligence (AI) technology in Indonesia has presented great opportunities in increasing the efficiency of digital services, but has also raised serious challenges related to personal data protection and digital ethics. This study uses a systematic literature review approach with the PRISMA method to analyze eight articles that relevantly discuss the relationship between AI, personal data protection, and digital ethics policies in Indonesia. The results of the study show that the biggest challenges lie in weak fragmented regulations, low public literacy, and the absence of an integrated supervisory institution. This study also identified gaps in the implementation of the Personal Data Protection Law and AI ethics that have not been optimally implemented in various sectors. Therefore, collaborative steps are needed between the government, private sector, and society in formulating policies and practices for the use of AI that are ethical, safe, and based on digital human rights.

Keywords: digital ethics, artificial intelligence, data protection.

Introduction

The development of artificial intelligence (AI) technology has brought about significant transformations in various aspects of life, including increasingly personalized and efficient digital services. However, this progress has also raised deep concerns regarding ethical issues and the protection of users' personal data. As time goes on, with the emergence of increasingly sophisticated AI in collecting and analyzing data, the potential risks to privacy also increase. Based on this, the issue of personal data protection has become increasingly relevant and urgent to discuss amid the rapid pace of digital innovation.

Personal data is now a highly valuable and vulnerable digital commodity prone to misuse. In Indonesia, the issue of personal data breaches has become a serious concern. The National Cyber and Cryptography Agency (BSSN) recorded 103 suspected data breach incidents throughout 2023, indicating the continued weakness of digital data security systems across various sectors. This situation highlights the importance of improving public literacy regarding personal data protection. A survey conducted by the Center for Digital Society (CfDS) at the University of Gadjah Mada in 2021 revealed that while 98.9% of respondents claimed to be aware of personal data, only 18.4% were able to identify the types of personal data completely and accurately. This finding indicates a gap between public perception and understanding of personal data, which could increase the risk of misuse of personal information. Therefore, collaborative efforts between the government, private sector, and the public are needed to enhance awareness and understanding of the importance of personal data protection.

As a protective measure, the Indonesian government has passed Law No. 27 of 2022 on Personal Data Protection (PDP Law) and issued Kominfo Circular Letter No. 9 of 2023 on Artificial Intelligence Ethics. These regulations demonstrate the importance of an ethical approach and legal protection in the development and utilization of AI. However, the implementation of these regulations still faces challenges, particularly in terms of law enforcement and the readiness of digital infrastructure across various sectors. Additionally, not all electronic system operators have adequate mechanisms in place to ensure compliance with the principles of personal data protection.

In this context, it is important to review how the application of AI technology in Indonesia can be examined from the perspective of digital ethics and personal data protection, particularly in various applications used by the public. The increasing use of AI in the public and private sectors makes it increasingly urgent to discuss the principles of transparency, accountability, and data security in scientific terms. Despite existing regulations, implementation and oversight remain significant challenges. Therefore, this literature review aims to identify challenges, examine existing policies, and formulate recommendations for the ethical and safe use of AI.
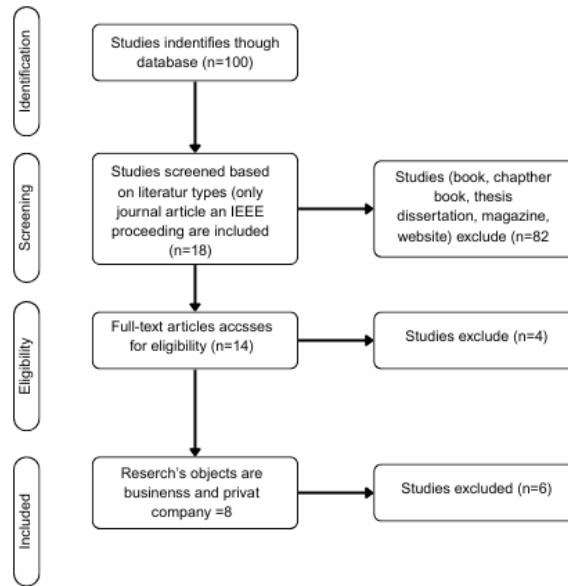
Methods

Figure 1. PRISMA flow chart

This study uses the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flowchart. This method was chosen to systematically, objectively, and transparently select literature sources to identify trends and correlations between digital ethics, artificial intelligence (AI), and user data protection in Indonesia.

This identification process began with an initial search that yielded 100 articles from various scientific databases. Next, screening was conducted based on publication type, retaining only scientific journal articles and IEEE proceedings. At this stage, 82 articles were excluded because they came from sources such as books, book chapters, theses, dissertations, magazines, or websites that did not meet the established academic criteria, leaving 18 articles.

Of the 18 articles, a full-text eligibility evaluation was conducted, and only 14 articles were deemed eligible for further review. Four articles were excluded because they did not meet the content eligibility criteria. The final stage was the inclusion process, where the focus was on research objects related to the business sector and private companies. From the final results, only 8 articles were relevant and in line with the research focus, while the other 6 articles were excluded because they were not relevant to the context of the study.

Through this PRISMA stage, the literature analyzed truly reflects an in-depth and focused discussion on the relationship between the use of artificial intelligence technology and issues of digital ethics and personal data protection in the Indonesian context.
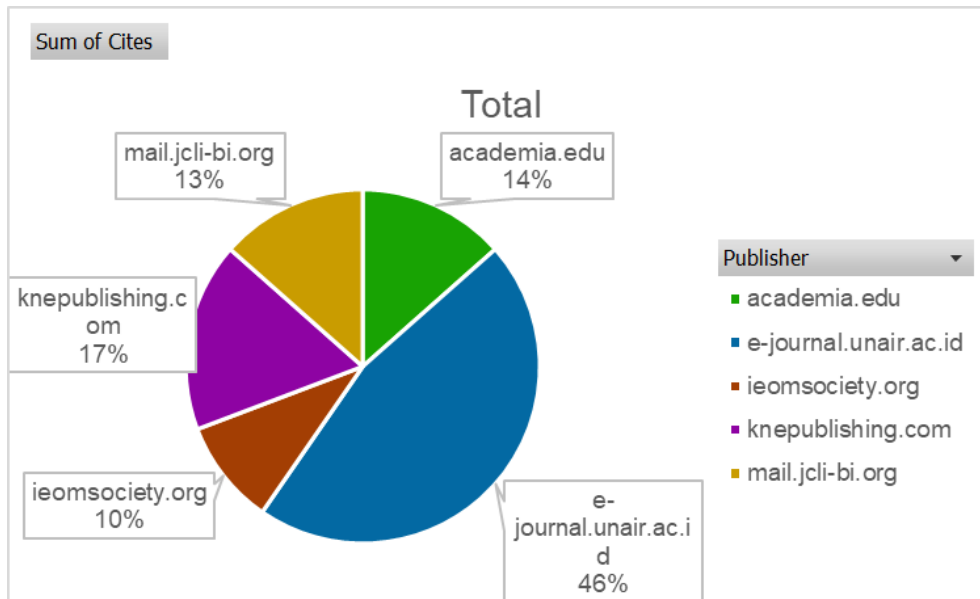
Result and Discussion

Figure 2. Pie chart sum of cites

The pie chart shows the distribution of total citations by publisher. The largest portion (46%) comes from e-journal.unair.ac.id, represented by the blue sector that dominates almost half of the circle. Second place is held by knepublishing.com with 17% (purple), followed by academia.edu with 14% (green). The other two publishers contribute smaller shares: mail.jcli-bi.org accounts for 13% (gold-yellow) and ieomsociety.org for 10% (brown). Overall, this diagram shows that more than half of the citations are concentrated on one publisher (e-journal.unair.ac.id), while the remaining four publishers share the rest with a relatively even distribution.

In the process of exploring the topic of user personal data protection in AI-based applications in Indonesia, eight articles were selected from a hundred articles from various scientific databases. These eight articles were selected based on criteria of relevance, methodological quality, and the importance of personal data protection in Indonesia. The findings from these eight articles include, as identified by (Rika Widianita, 2023), four main challenges in the legal protection of personal data in Indonesia: low cybersecurity leading to data breaches, lack of government transparency in handling data breach cases, the absence of an integrated data protection oversight body, and the urgency of regulating AI users who process personal data.

Then in the legal sector, (Jacey & Yuniarti, 2023) highlight how AI has been used in the judicial systems of various countries, one of which is Indonesia, despite regulatory limitations. The use of AI in legal services (LegalTech) opens potential for efficiency and fairness, but without proper regulation, this technology can also pose ethical risks, such as algorithmic bias and non-transparent decision-making.

(Hilmy Rizqullah Ramadhan et al., 2024; Putri Adytia et al., 2024) state that personal data protection in the context of AI technology is still inadequate in Indonesia. Their research emphasizes the urgency of stringent legal regulations and proactive data protection. They also highlight that AI technology can be an effective tool in safeguarding personal data, provided it is used with caution and subject to strict oversight. The fundamental issue regarding legal disruption by AI, according to (Koos, 2021), is that traditional legal systems based on contracts and personal autonomy become irrelevant when AI acts autonomously without human intervention. In the context of consumer protection and digital ethics, he emphasizes the importance of transparency and fairness in algorithms, especially those related to consumer personal data.

(Utomo, 2020) examined the use of AI in peer-to-peer lending-based fintech services. He found that in this system, debtors' privacy rights are often violated due to a lack of regulation and oversight. Automation systems that utilize AI allow companies to access personal data without restrictions, causing harm to users. From a government policy perspective, (Gati et al., 2020) explains that Indonesia's national strategy for AI development has not been matched by cybersecurity readiness and data protection. Although there are plans to integrate AI into bureaucratic systems and public services, the lack of investment in digital security leaves user data vulnerable to breaches. (Dewi & Hidayat, 2022) highlight the impact of AI in the financial industry,

particularly in relation to user profiling that threatens privacy. They suggest the need for a combination of legal regulation and self-regulation as a solution to bridge technological developments and the protection of people's digital rights.

These eight articles show that although the use of AI in Indonesia has brought about various advances, the protection of personal data and digital ethics have not received adequate attention. The main challenges are the suboptimal legal framework, low awareness of digital ethics, and weak cybersecurity. Therefore, collaboration between regulation, technology, and public education is needed to create an ethical, safe, and responsible AI ecosystem in Indonesia. Information from each article, including author details, titles, publication years, journal sources, publishers, as well as links and citations, has been documented in an Excel file for tracking and academic reference purposes.
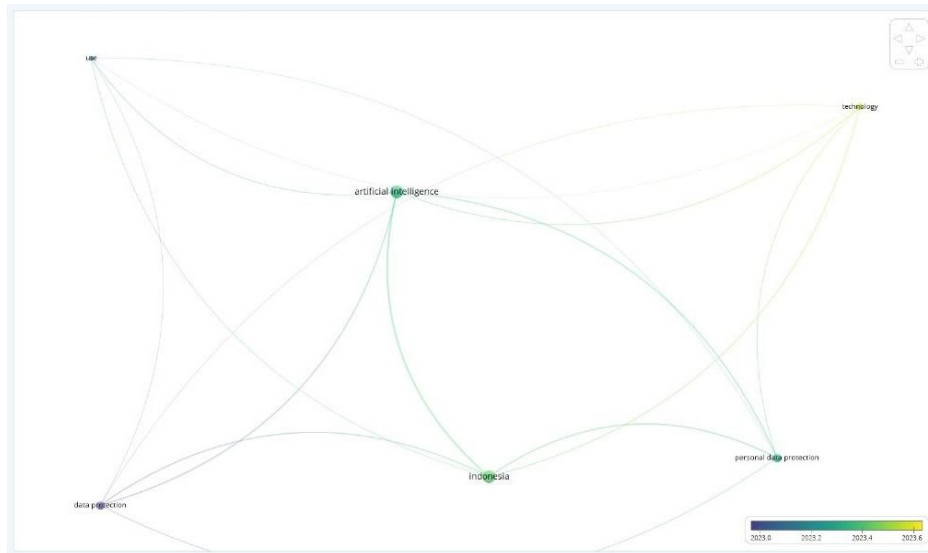

Figure 3. Relationships between keywords via VOSviewer

The VOS viewer network map visualizes the co-occurrence of research keywords and shows that "artificial intelligence" occupies a central position as the strongest link, especially with terms such as 'Indonesia' and "data protection," illustrating the dominance of the theme of artificial intelligence in the Indonesian context, which is fraught with data protection issues. on the right side, the node "image seg" (possibly "image segmentation") is connected more weakly to the center, indicating a more specific thematic relationship, while on the lower left, the dark blue cluster contains "data protection," "personal data protection," and "technology," which—based on the color gradient of the year in the lower-right corner—represent relatively older research compared to the yellow-green nodes in the central cluster indicating more recent topics (2024 publications); Overall, this map indicates two main clusters: the yellow-green cluster that unites core AI issues in Indonesia and the blue-purple cluster that focuses on personal data protection technology—reflecting how AI research in Indonesia is evolving alongside increasing attention to data security and privacy.

Visualization of the interconnectedness between keywords using a keyword co-occurrence network based on literature trends from 2020 to 2024. It is evident that the keywords artificial intelligence, data protection, privacy, regulation, and Indonesia are interconnected in a dense and tight pattern, reflecting how the issue of personal data protection in the context of AI has become the focus of scientific literature in Indonesia. The strongest connection is between artificial intelligence and data protection, indicating a particular focus on the potential risks and opportunities of AI in safeguarding users' personal data. The cross-year connection pattern, shown by the color gradient from blue to yellow, indicates that this topic has developed progressively and remained relevant from 2020 to 2024.

The connection between artificial intelligence and privacy is clearly illustrated in the article (Dewi & Hidayat, 2022), which highlights the risks of algorithms to user privacy, especially in the financial sector, which is dense with automated data profiling. This relationship is also evident in the work of Ramadhan et al. (2024), which emphasizes the importance of legal protections for personal data processed by AI-based systems. The

emphasis on privacy is not only discussed technically but also ethically, indicating that the concept of privacy is multidimensional in the discourse on artificial intelligence. Therefore, this keyword does not stand alone but is always associated with legal and cybersecurity concepts.

Meanwhile, regulation is an important link between AI and data protection, as explained by (Putri Adytia et al., 2024), who mentions the need for specific regulations to protect personal data from exploitation by AI systems. (Rika Widianita, 2023) also emphasizes that weak regulations are the main cause of rampant personal data leaks in Indonesia. The need for such regulations is increasingly urgent, given that AI is now used not only in the public sector but also in the fintech sector, as revealed in a study by (Utomo, 2020), which discusses AI in P2P online lending systems that violate borrowers' privacy. Thus, regulation serves as a strategic link in maintaining a balance between technological innovation and citizens' fundamental rights.

Ultimately, the relevance of the keyword "Indonesia" in this visualization reinforces the geographical context of the studies analyzed. The article (Gati et al., 2020) describes how national AI policies have not fully considered cybersecurity readiness and ethical data governance. In the legal realm, (Jacey & Yuniarti, 2023) compares Indonesia's approach with that of other countries, emphasizing the need for adaptive policies that are responsive to AI developments. The overall analysis of these eight articles shows that, in the Indonesian context, the interconnection between AI, digital ethics, and personal data protection is not only increasingly important but also requires solid and systematic legal intervention.

Tabel 1: Search Results for Articles That Meet the Criteria

No	Authors	Year	Title	Source	Citation
1	S Koos	2021	Impact of the use of artifical intelligence in liability, contracting, competition law and consumer protection with reference to the german and indonesian	Yuridika	14
2	SD Rosadi, S Yuniarti, R Fauzi	2022	Protection of data privacy in the era of artificial intelligence in the financial sector in Indonesia	Journal of Central Banking Law	21
3	MHR Ramadhan, K Ramadhani, M Isrok	2024	Legal protection of personal data in artificial intelligence for legal protection viewed from legal certainty aspect	KnE Social	22
4	RA Gati, M Rizki, RY Posumah	2020	Artificial Intelligence and Indonesia Government Cyber Security Strategies	academia.edu	16
5	P Jacey, S Yuniarti	2023	Artificial intelligence: Implementation in legal services (comparative study on china, united stated and indonesia)	Proceedings of the 3rd Asia Pacific	17
6	NAP Adytia, S Arief, D Astesa	2024	Regulatory arrangements and utilization of artificial intelligence (AI) in realizing personal data protection in Indonesia	KnE Social Sciences	19
7	YA Utomo	2020	Legal Protection for Problem Debtor Related to the Use of the Artificial Intelligence System in Peer to Peer Lending	Yuridika	20
8	W Waspiah, A Lies, T Islami	2023	Model Pelindungan Hukum Data Pribadi di Era Digital Guna Menjamin Hak Warga Negara Atas Pelindungan Data Pribadi	Jurnal Ilmiah Indonesia	28

Tabel 2: Mapping Research Methods

No	Authors	Research Method
1	S Koos	Normative-theoretical
2	SD Rosadi, S Yuniarti, R Fauzi	Qualitative-descriptive
3	MHR Ramadhan, K Ramadhani, M Isrok	Legal normative
4	RA Gati, M Rizki, RY Posumah	Policy studies
5	P Jacey, S Yuniarti	Comparative studies
6	NAP Adytia, S Arief, D Astesa	Legal empirical
7	YA Utomo	Case studies
8	W Waspiah, A Lies, T Islami	Legal normative studies

Challenges in Personal Data Protection in Indonesia

One of the main challenges in protecting personal data in the AI era is the low level of national cybersecurity. (Rika Widianita, 2023) notes that data breaches in Indonesia often occur due to weak data protection infrastructure, compounded by the absence of an integrated and effective supervisory agency. This issue is exacerbated by the government's lack of transparency in responding to data breaches, which has led to a crisis of public trust. This situation shows that even though technology is advancing, protection aspects are still far from ideal.

On the other hand, AI facilitates large-scale data collection and analysis, which increases the potential for privacy violations. An article by (Dewi & Hidayat, 2022) highlights how algorithm-based user profiling in the financial sector can expose users' personal information without adequate control. In many cases, AI acts autonomously in classifying individuals based on collected data, without transparent procedures. This raises concerns about digital discrimination and information manipulation.

Another challenge is the lack of awareness and digital literacy among the public regarding their privacy rights. A study by (Hilmy Rizqullah Ramadhan et al., 2024) shows that many digital app users do not fully understand the implications of granting data access to AI-based systems. This phenomenon widens the gap for violations because users do not have enough information to make informed decisions. Therefore, improving digital education is an important step that cannot be ignored.

The private sector also often aggressively utilizes AI without considering aspects of personal data protection. In the context of fintech services, (Utomo, 2020) found that debtor data is often compromised by AI-based loan service providers due to weak regulations. The imbalance between technological power and legal protection makes users highly vulnerable to data misuse. This shows that data protection challenges are not only technical but also systemic.

Effectiveness of Policies and Regulations in Indonesia

Personal data protection regulations in Indonesia are still scattered across various regulations, so they don't give full protection. (Putri Adytia et al., 2024) says that the lack of an integrated legal framework makes it hard to enforce policies consistently, especially in the context of complex and fast-changing AI use. Law No. 27 of 2022 is indeed an important milestone, but its implementation has not yet touched on advanced technologies such as AI. This situation highlights the gap between technological developments and policy responses.

Existing regulations are also not yet sufficiently responsive to the risks posed using AI in the public sector and bureaucracy. (Gati et al., 2020) emphasize that although the government has begun to integrate AI into the Electronic-Based Government System (SPBE), data security issues have not been a top priority. The implementation of AI for bureaucratic efficiency has not been accompanied by adequate investment in cybersecurity systems. As a result, public data is at risk of being exposed without adequate protection.

Additionally, the absence of independent oversight mechanisms for AI utilization creates a vacuum in digital ethics control. An article by (Koos, 2021) shows that AI acting autonomously can disrupt civil and

contractual legal principles based on human autonomy. The lack of transparency in AI decision-making processes can violate users' rights to understand and control their data. Therefore, legal policies need to accommodate a more adaptive and anticipatory approach.

Aggressive AI practices in the private sector increasingly reveals regulatory weaknesses. (Jacey & Yuniarti, 2023) show that Indonesia lags other countries in developing technical rules for the use of AI, both in civil and public law. Without clear restrictions, AI can be used as a tool for data exploitation rather than as a protector of privacy. This is evidence that the effectiveness of regulations is still far from optimal.

Approach to AI Utilization

Indonesia needs to immediately establish an independent agency specifically for the protection of personal data that also oversees the use of AI technology. This is in line with the recommendation (Rika Widianita, 2023) which emphasizes the importance of an integrated regulatory agency to systematically handle data leaks and oversee personal data. This institution must have the authority to set ethical standards for AI use and enforce data violations. This is a foundational step toward strengthening national digital governance.

It is important to design specific regulations that not only govern data protection but also the principle of algorithm transparency. (Dewi & Hidayat, 2022) recommend a combination of formal legal rules and self-regulatory mechanisms to ensure a balance between innovation and privacy protection. This approach allows for flexibility without compromising the protection of digital rights. Such regulations must include the requirement to explain the logic of AI systems to users.

Additionally, the government should encourage collaboration between the public and private sectors to implement ethical AI technology. (Putri Adytia et al., 2024) suggest leveraging AI to minimize human error in data protection and enhance the efficiency of public services responsibly. This collaboration must be accompanied by digital ethics training for developers and users. In this way, an AI ecosystem can be formed in a sustainable and accountable manner.

Similarly, the digital literacy of the public must be improved so that users are able to understand and control their personal data. (Hilmy Rizqullah Ramadhan et al., 2024) emphasize that users who are aware of their rights are better able to make decisions when interacting with AI-based technology. This digital education can be incorporated into formal education curricula and public campaigns. With an informed public, social oversight of AI practices will also become stronger.

Conclusion

The development of artificial intelligence (AI) technology in Indonesia's digital landscape has presented a dilemma between progress and protection. On the one hand, AI offers efficiency and convenience in various sectors, but on the other hand, it also raises serious concerns about ethical issues and personal data vulnerabilities. This issue is becoming increasingly relevant as the use of AI-based digital services that actively collect, process, and evaluate user data continues to grow.

In this context, various challenges faced by Indonesia have been identified from the literature, particularly regarding weak cybersecurity systems and low public awareness of their digital rights. As explained by (Rika Widianita, 2023), the lack of integrated oversight institutions and the absence of a strong control system have led to data breaches becoming a recurring phenomenon. The disparity between the speed of technology adoption and the readiness of legal and social systems is the main obstacle to personal data protection.

Therefore, the effectiveness of regulations such as the PDP Law and the AI Ethics Circular Letter still cannot guarantee comprehensive protection for users. Articles by (Gati et al., 2020; Putri Adytia et al., 2024) emphasize that the biggest challenge is not only in the substance of the law but also in its implementation and institutional coordination. Additionally, the lack of algorithm transparency and the potential for data-based discrimination identified by (Dewi & Hidayat, 2022) underscore the need to strengthen the ethical aspects of AI regulation.

Thus, it can be concluded that to realize an ethical and safe AI ecosystem in Indonesia, synergy is needed between adaptive regulations, increased digital literacy, and the formation of independent supervisory institutions. The results of the review of eight articles show that without a collaborative approach between the state, industry players, and society, the use of AI risks widening inequality and violating users'

digital rights. This literature review emphasizes that the future of AI in Indonesia is not only determined by technological sophistication but also by how ethics, law, and public awareness are implemented in tandem.

References

Badan Siber dan Sandi Negara (BSSN). (2024). *Lanskap Keamanan Siber Indonesia 2023*. Diakses dari https://www.bssn.go.id/laporan-statistik-keamanan-siber-indonesia-2023

Center for Digital Society (CfDS). (2021). *Survei CfDS UGM: Masih Sedikit Masyarakat Yang Paham Data Pribadi*. Diakses dari https://ugm.ac.id/id/berita/22036-survei-cfds-ugm-masih-sedikit-masyarakat-yang-mafhum-data-pribadi/

Kementerian Komunikasi dan Informatika Republik Indonesia. (2023). *Surat Edaran Menteri Komunikasi dan Informatika Nomor 9 Tahun 2023 tentang Etika Kecerdasan Buatan*. Diakses dari https://jdih.kominfo.go.id/produk_hukum/view/id/883

Pemerintah Indonesia. (2022). *Undang-Undang Nomor 27 Tahun 2022 tentang Perlindungan Data Pribadi*. Diakses dari https://peraturan.bpk.go.id/Details/229798/uu-no-27-tahun-2022

Dewi, S. & Hidayat, M. W. (2022). Protection of Data Privacy in The Era of Artificial Intelligence in The Financial Sector in Indonesia. *Journal of Central Banking Law and Institutions*, *1*(2), 353–366. https://doi.org/10.21098/jcli.v1i2.18

Gati, R. A., Rizki, M. & Posumah, R. Y. (2020). Artificial Intelligence and Indonesia Government Cyber Security Strategies. *International Conference on Public ….* https://www.academia.edu/download/84367831/ICONPO_X_Artificial_Intelligence_and_Indonesia_Government_Cyber_Security_Strategies_rev_29092020.pdf

Hilmy Rizqullah Ramadhan, M., Ramadhani, K., Isrok, M., Anggraeny, I. & Prasetyo, R. (2024). Legal Protection of Personal Data in Artificial Intelligence for Legal Protection Viewed From Legal Certainty Aspect. *KnE Social Sciences*, *2024*, 125–136. https://doi.org/10.18502/kss.v8i21.14710

Jacey, P. & Yuniarti, S. (2023). Artificial Intelligence: Implementation in Legal Services (Comparative Study on China, United Stated and Indonesia). *Proceedings of the International Conference on Industrial Engineering and Operations Management*, *Contini 2020*, 2113–2121. https://doi.org/10.46254/AP03.20220354

Koos, S. (2021). Artifical Intelligence as Disruption Factor in the Civil Law: Impact of the use of Artifical Intelligence in Liability, Contracting, Competition Law and Consumer Protection with Particular Reference to the German and Indonesian Legal Situation. *Yuridika*, *36*(1), 235. https://doi.org/10.20473/ydk.v36i1.24033

Putri Adytia, N. A., Arief, S. & Astesa, D. (2024). Regulatory Arrangements and Utilization of Artificial Intelligence (AI) in Realizing Personal Data Protection in Indonesia. *KnE Social Sciences*, *2024*, 920–927. https://doi.org/10.18502/kss.v8i21.14807

Rika Widianita, D. (2023). MODEL PELINDUNGAN HUKUM DATA PRIBADI DI ERA DIGITAL GUNA MENJAMIN HAK WARGA NEGARA ATAS PELINDUNGAN DATA PRIBADI. *Jurnal Ilmiah Indonesia*, *VIII*(I), 1–15.

Utomo, Y. A. (2020). Legal Protection for Problem Debtor Related to the Use of the Artificial Intelligence System in Peer to Peer Lending. *Yuridika*, *35*(3), 657. https://doi.org/10.20473/ydk.v35i3.19007