Author's name: Aulia Anugrah Intani, Fauza Annisa Agus Salim.
Title: "Legal Analysis: Accountability on Developing Artificial Intelligence in Healthcare Industry in Indonesia." South-East Asian Journal of Advanced Law and Governance 1 No. 1 (2024).

SEAJ-ALGOV
Volume 1 Issue 1, 2024
E-ISSN: 3062-7907

Legal Analysis: Accountability on Developing Artificial Intelligence in Healthcare Industry in Indonesia

Aulia Anugrah Intani[1], Fauza Annisa Agus Salim[2]

[1] *University of Glasgow*

[2] *University of Sheffield*

Abstract: The rapid development of Artificial Intelligence (AI) technology generates immense potential and challenges for various domains, including the healthcare sector. AI can encompass early disease detection, personalized patient care, streamlined workflows, and error reduction. Nevertheless, ethical and legal dilemmas surrounding data privacy and accountability arise. Currently, if AI fails to do its job in the healthcare industry, we are still unable to determine who holds the responsibility. This essay addresses a comprehensive legal analysis regarding those challenges and how health technology regulation should be created by involving government and healthcare stakeholders. A data protection approach by anonymizing data could ensure sensitive patient information and medical records remain confidential while implementing AI advancements. Meanwhile, AI systems are seen as electronic agents, which forces defining clear legal responsibilities for any unfavourable outcome. Therefore, a high urgency emerges for a robust regulatory framework regarding AI implementation and responsibility in the healthcare sector. A comprehensive legal framework must address responsibility and potential liability to ensure fairness, commitment, and transparency for medical professionals, patients, and AI developers. It should harmonize the innovation with Indonesia's ideology, values, and laws while promoting ethical considerations, equal healthcare access, and a balanced coexistence between humans and technology. A commitment to secure, equitable, and relevant regulations is imperative to safeguard individual rights, foster responsible AI innovation, and enhance the healthcare landscape.

Keywords: Artificial intelligence; Healthcare; Legal analysis; AI regulation

1. Introduction

Artificial intelligence (AI) is the development of computers and machines to perform human intelligence, such as learning, reasoning, and self-adjustment, using various programming techniques.[1] AI development can imitate human behaviour, learn from previous mistakes, increase purposiveness, and have an infinite life span as it rapidly evolves.[2] AI was initiated as a new research discipline at the Dartmouth Summer Research Project in 1956, where the shared vision that computers or machines can be made to simulate intelligent tasks was created, and John McCarthy was credited for the term 'artificial intelligence'.[3] AI technology has been assisting diverse sectors of businesses in attaining predetermined results and increasing the efficiency of productivity, such as fraud detection in the finance service sector by identifying customers' behaviour through previous transactions, utilising chatbot for teaching assistant purposes and building personalised mentors in the education sector, help farmers in analysing the condition of soil, weather, and temperature with AI-based seasonal forecasting models, and improving healthcare services by initially identifying potential diseases, simplifying administrative tasks, and monitoring patients' activities[4].

On the other hand, the progressive development of AI is inescapable from negative consequences, as it can threaten human labour and eventually lead to unemployment and wealth inequality.[5] In addition, adopting AI technology detrimentally contributes to expanding gaps between countries, companies, and workers. The disparities arise from several reasons, such as variations in a country's economic status between developed and developing countries, the increased advantages experienced by early-adopting companies compared to those that postponed their AI implementation, and discrepancies in the skills of individual workers, especially in tasks that prove challenging or replaceable by automation.[6]

Despite the positive and negative consequences of AI development for human beings, it is inevitable to state that AI technology generates positive impacts on

1 Kok, J. N., Boers, E. J., Kosters, W. A., Van der Putten, P., & Poel, M. (2009). Artificial intelligence: definition, trends, techniques, and cases. *Artificial intelligence*, *1*, 270-299.
2 Lehman-Wilzig, S. N. (1981). Frankenstein unbound: Towards a legal definition of artificial intelligence. *Futures*, *13*(6), 442-457.
3 Moor, J. (2006). The Dartmouth College artificial intelligence conference: The next fifty years. *Ai Magazine*, *27*(4), 87-87.
4 Kumain, S. C., Kumain, K., & Chaudhary, P. (2020). AI impact on various domain: an overview. *International Journal of Management*, *11*(10).
5 Tai, M. C. T. (2020). The impact of artificial intelligence on human society and bioethics. *Tzu-Chi Medical Journal*, *32*(4), 339.
6 Bughin, J., Seong, J., Manyika, J., Chui, M., & Joshi, R. (2018). Notes from the AI frontier: Modeling the impact of AI on the world economy. *McKinsey Global Institute*, *4*.

healthcare, which is essential for the preservation of humans.[7] The technology is globally employed in healthcare, as it has the capability to diagnose illnesses, increase time efficiency for patients by minimising hospital visits, and enhances efficiency for medical practitioners.[8] Moreover, the landscape of global healthcare innovation with AI has experienced significant transformation following the outbreak of the COVID-19 pandemic, which accelerated the pace of research and development, bypassed administrative obstacles, shifted the focus towards health rather than profit, and fostered international collaboration aimed at preserving lives.[9] The trend of embracing AI technology in Indonesia is also massively growing and expanding beyond healthcare services to encompass diverse sectors, such as integrating transportation, addressing licensing requirements and qualifications, and advancing digital banking.[10] Although advanced AI techniques have been applied in radiological examinations and the prediction of coronary heart disease through machine learning, there remains room for the broader advancement of AI technology within Indonesia's healthcare sector beyond its current focus on general detection and monitoring.[11] Concerning the rapid development of AI in the healthcare industry, law implications of the technology have been expressed due to privacy issues for data utilisation in AI algorithms and models, followed by security issues on AI implementation in medical environments.[12]

The perspective of law in seeing AI's rapid development is growing concerns in controlling the machines as it is made as independent as possible from human interference, which leads to inappropriate place or time in performing a programmed task or even increasing the possibility for machines to perform things with intricate details that humans may not have anticipated.[13] In the healthcare domain, current global AI utilisation for the system implies no issues with the regulations when relevant laws to AI technology still need to be fully prepared.[14] Therefore in the future, the aim to improve patient and population health through AI-advanced

7 Tai, M. C. T. (2020). The impact of artificial intelligence on human society and bioethics. *Tzu-Chi Medical Journal*, *32*(4), 339.

8 Horgan, D., Romao, M., Morré, S. A., & Kalra, D. (2020). Artificial intelligence: power for civilisation–and for better healthcare. *Public health genomics*, *22*(5-6), 145-161.

9 Palanica, A., & Fossat, Y. (2020). COVID-19 has inspired global healthcare innovation. *Canadian Journal of Public Health*, *111*(5), 645-648.

10 Yusriadi, Y., Rusnaedi, R., Siregar, N., Megawati, S., & Sakkir, G. (2023). Implementation of artificial intelligence in Indonesia. *International Journal of Data and Network Science*, *7*(1), 283-294.

11 Djanggih, H. (2021). The urgency on designing the legislation for the use of artificial intelligence in Indonesian medical practice. *Jurnal Penelitian Hukum De Jure*, *21*(4), 541-549.

12 Sunarti, S., Rahman, F. F., Naufal, M., Risky, M., Febriyanto, K., & Masnina, R. (2021). Artificial intelligence in healthcare: opportunities and risk for future. *Gaceta Sanitaria*, *35*, S67-S70.

13 Lehman-Wilzig, S. N. (1981). Frankenstein unbound: Towards a legal definition of artificial intelligence. *Futures*, *13*(6), 442-457.

14 Sunarti, S., Rahman, F. F., Naufal, M., Risky, M., Febriyanto, K., & Masnina, R. (2021). Artificial intelligence in healthcare: opportunities and risk for future. *Gaceta Sanitaria*, *35*, S67-S70.

technology might be hindered due to legal and ethical uncertainties, followed by a lack of explainability that results in violating ethical principles and overlooking regulatory concerns.[15] Besides the ability of AI technology to improve patients' health and save lives, there are significant considerations on how patients' data is utilized, which is one of the challenging issues from a legal perspective to comply with all relevant and adjusted laws, regulations, and policies.[16]

Indonesia's legal system that might support the legal liability enforcement for current AI violations is the regulation related to doctors' criminal prosecution under the Indonesian Penal Code technology for medical care under the Health Act of 2009.[17] The government should prioritise the protection of citizens' health in Indonesia by the provisions outlined in the Constitution of 1945 of Article 28H (1), in which individuals are entitled to obtain physical and mental well-being through the provision of healthcare services. In order to keep up with the flow of AI rapid development in healthcare and other domains, governments and stakeholders must actively drive the introduction of new regulations to produce a shaped guideline for AI innovation and achieve social objectives.[18]

As a result, this research aims to comprehensively analyze the significant intersections between healthcare and law within the rapid AI development in Indonesia's healthcare industry. Personal data protection of medical patients used in the AI technology, and legal analysis on liability and accountability for the outcome produced by AI inventions will be discussed to achieve the balance of technological innovation while including privacy, legal and ethical perspectives of AI applications in the healthcare industry. Additionally, this study aspires to contribute to analyzing and discussing the challenges and opportunities presented by AI technology in healthcare, following the effective regulations supporting AI innovation while safeguarding patient rights, data privacy, and overall well-being.

2. AI Technology in the Healthcare Domain

According to a report by Deloitte, a significant majority of large healthcare organizations, namely 75%, allocated a minimum of US$50 million towards investments in AI throughout 2019. The previously mentioned phenomenon has

15 Amann, J., Blasimme, A., Vayena, E., Frey, D., & Madai, V. I. (2020). Explainability for artificial intelligence in healthcare: a multidisciplinary perspective. *BMC medical informatics and decision making*, *20*(1), 1-9.

16 Ibid.

17 Djanggih, H. (2021). The urgency on designing the legislation for the use of artificial intelligence in Indonesian medical practice. *Jurnal Penelitian Hukum De Jure*, *21*(4), 541-549.

18 Riyanti, R. (2023). Legal status of artificial intelligence-based health insurance services: Challenges, opportunities for customer protection.

progressed upwards, mostly in economically advanced nations. The current AI technology in the medical sector is proven to detect diseases earlier, assist medical professionals by providing up-to-date medical information to decide the appropriate patient care and reduce the error level for diagnostic and therapeutic activities.[19] AI technology is portrayed as a valuable tool to enhance effectiveness, produce greater patient satisfaction, cost efficiencies, and better workflow productivity for healthcare professionals by supporting disease identification and creating personalised care based on patients' needs.[20] Specifically, the development of medical-image diagnostic systems with AI technology continues to expand related medicine areas, such as clinical experiences, translational medical studies, and basic biomedical research.[21] Using data from patients and running it through AI systems can be very beneficial. These algorithms can be used by experts in healthcare to make images from radiographs, nuclear medicine procedures, magnetic resonance tomography scans, or ultrasound of organ systems (brain, lungs, skin, fundus, etc.) more precise, fast, and reliable to analyze.

Although AI technology development in healthcare is widely growing, the research is mainly focusing on three disease types that are the significant causes of death, named cancer, nervous system disease, and cardiovascular illness.[22] The innovator companies are correspondingly competing in producing AI technology for healthcare providers, which included in focus research areas: Nvidia has pioneered an AI platform that generates synthetic scans for brain cancer disease, researchers at the Houston Methodist Research Institute have created software that performs 30 times faster to diagnose breast cancer risk through mammogram results and personal medical history, a diagnostics software programme from Caption Health that can perform medical imaging of cardiac ultrasound without specialised training, and AI algorithms developed by Oncompass Medicine that is capable of identifying genetic mutations present in patients' tumour samples, which enabling them to receive targeted treatment at an earlier stage.[23] Shrinking down the scope of AI development in Indonesia's healthcare sector, the country currently has 197 start-ups operating within the healthcare sector and 74 focusing on AI innovation. The healthcare industry has embraced telemedicine technology to improve the quality of

19 Jiang, F., Jiang, Y., Zhi, H., Dong, Y., Li, H., Ma, S., ... & Wang, Y. (2017). Artificial intelligence in healthcare: past, present and future. *Stroke and vascular neurology*, *2*(4).

20 Horgan, D., Romao, M., Morré, S. A., & Kalra, D. (2020). Artificial intelligence: power for civilisation–and for better healthcare. *Public health genomics*, *22*(5-6), 145-161.

21 Yu, K. H., Beam, A. L., & Kohane, I. S. (2018). Artificial intelligence in healthcare. *Nature biomedical engineering*, *2*(10), 719-731.

22 Jiang, F., Jiang, Y., Zhi, H., Dong, Y., Li, H., Ma, S., ... & Wang, Y. (2017). Artificial intelligence in healthcare: past, present and future. *Stroke and vascular neurology*, *2*(4).

23 Dodsworth, M. Technological Innovations to Help Solve the Global Healthcare Crisis.

public health services, offering convenient access from any location and at any time, which has proven to be beneficial to Indonesia's society and making Indonesia's medical practices utilizing AI technology to optimise operational procedures and enhance the quality of healthcare services.[24] One of the leading telemedicine technologies, called Halodoc, has been a successful breakthrough in Indonesia's telemedicine development and has received a genuinely good response from society, as it provides various health services from virtual appointments, pharmacy delivery and creating COVID-19 vaccination programs to halt the cycle of coronavirus transmission.[25] Besides telemedicine technology, robot utilization in the healthcare industry has been put into practice in several countries to help deliver meals and medicine to patients and perform disinfection procedures, which certainly have the possibility to be utilised in Indonesia's medical environment.[26]

Simultaneously in terms of medical equipment, AI innovation opportunities in Indonesia are in great demand, such as developing AI-based surgical equipment, radioimmunotherapy, and clinical laboratory equipment used for various diagnostics tests. One of the current AI developments that are anticipated for commercial implementation within the 5 years is an AI-based Diabetes Retinopathy screening system that is expected to be commercially used within the next 5 years and will be equipped with a fundus camera to capture a retinal photograph for diabetes examination without any extra cost needed for mobile unit transport.[27] When the COVID-19 pandemic attacked Indonesia, one of Indonesia's leading pharmaceutical companies, Indofarma, collaborated with Abu Dhabi's healthcare company to develop a viral detection test kit that utilized AI augmentation laser technology for viral detection.[28] Regarding the diagnosis processes, a web-based AI platform "CekMata" supports the healthcare sector by detecting potential cataracts in patients' eyes to counterbalance the shortage of ophthalmologists in Indonesia, followed by a Computer-Aided-Diagnosis (CAD) design using deep learning algorithms proposed to screening and diagnosing tuberculosis disease as early treatment.[29]

24 Machmud, M., Chairun Nasirin, N., Salahudin, S., & Tawakkal, B. (2020). Artificial intelligence in the public health sector: The use of telemedicine in Indonesia during Covid-19. *Palarch's Journal Of Archaeology Of Egypt/Egyptology*, *17*(7), 10106-10118.

25 Afifah, K., Yulita, I. N., & Sarathan, I. (2021, October). Sentiment Analysis on Telemedicine App Reviews using XGBoost Classifier. In *2021 International Conference on Artificial Intelligence and Big Data Analytics* (pp. 22-27). IEEE.

26 Betriana, F., Tanioka, T., Locsin, R., Malini, H., & Lenggogeni, D. P. (2020). Are Indonesian nurses ready for healthcare robots during the COVID-19 pandemic?. *Belitung Nursing Journal*, *6*(3), 63-66.

27 Sasongko, M. B., Wardhana, F. S., Febryanto, G. A., Agni, A. N., Supanji, S., Indrayanti, S. R., ... & Kartasasmita, A. S. (2020). The estimated healthcare cost of diabetic retinopathy in Indonesia and its projection for 2025. *British Journal of Ophthalmology*, *104*(4), 487-492.

28 Dwipayana, I. D. A. P. (2020). Efforts in securing vaccine for covid-19 outbreak in Indonesia. *Health Notions*, *4*(10), 313-317.

29 Asadi, F., Trinugroho, J. P., & Pardamean, B. (2023). Design of Computer-Aided-Diagnosis (CAD) for

However, encountering numerous obstacles across multiple domains, including the healthcare sector, while implementing AI technology is entirely inevitable. Indonesia should address several vital problems to enhance its technological landscape and foster a positive societal impact. These challenges encompass potential biases, the possibility of drawing wrong conclusions, the risk of job displacement, and the potential risks to data and system security, which makes it compulsory for Indonesia to devote considerable attention to these issues in order to facilitate technological advancements and their subsequent benefits for society.[30] Regarding the legal system, Indonesia ought to create specific policies and regulations for AI development to state the clarity of accountability, like which parties hold accountable if there is any risk, error, or threats generated by AI.[31] The government of Indonesia needs to be actively performing comprehensive examinations about the regulation of AI development responsibility and data privacy towards any threats and building protection for both technology and people to bring equal medical care and other beneficial outcomes for society.[32]

3. Regulation, Policy, and Strategy for AI Development in Indonesia

The regulation declared for technology and technology products used in the healthcare sector is written in Article 42 of the Health Act 2009, which expresses that (1) health technology products are held, studied, circulated, developed, and utilized for public health services, (2) health technology requires to include entire methods and instruments used to detect and prevent the presence of disease, reduce suffering from illness, remedies, minimize complications, and regain health post-illness, and (3) all health technology and technology products allocation need to adhere to the standards specified in the laws and regulations.[33] The Law on Health No. 36/2009 displayed thorough attention from the government of Indonesia about the importance of people's health, which states that every individual has the right to receive equal and responsible health information and education.[34] In terms of the establishment of healthcare services, the Medical Practice Act 2004 stated that the

Self-Assessment Tuberculosis in Indonesia. In *E3S Web of Conferences* (Vol. 388). EDP Sciences.

30 Al Ghozali, F., Destyarini, N., & Anggraini, O. E. (2022, September). The Emergence of Artificial Intelligence in Indonesian Healthcare Services: Potential Uses and Possible Legal Risks. In *Proceeding of International Conference on Science, Health, And Technology* (pp. 159-170).

31 Saragih, A. H., Reyhani, Q., Setyowati, M. S., & Hendrawan, A. (2023). The potential of an artificial intelligence (AI) application for the tax administration system's modernization: the case of Indonesia. *Artificial Intelligence and Law*, *31*(3), 491-514.

32 Kusumaa, F. I. S., & Hermawanb, S. (2020). Examining on Indonesian Legal Challenges for Future Transnational Healthcare Service. *Science & Medicine*, *66*, 2145-2156.

33 Afrilies, M. H., & Naili, Y. T. (2023). Legal Aspects of Telemedicine Health Services in the Perspective of Health Law in Indonesia in the Digital Era. *Journal of Advanced Health Informatics Research*, *1*(1), 41-46.

34 Budiyanti, R. T., Ganggi, R. I. P., & Murni, M. (2022). Community Legal Protection in Obtaining Comprehensive and Quality Health Information and Education. *Populasi*, *30*(1), 26-35.

medical services must be fully executed by doctors and dentists who have continuously developed exemplary ethical conduct, proficiency, and expertise to be aligned with the massive development of science and technology; and a specific regulation for the establishment of healthcare services is essential to ensure legal protection and certainty for healthcare recipients, doctors and dentists.[35] Nevertheless, the legal development of AI technology in Indonesia is not aligned with its rapid progress, as no clear law or regulation explicitly controls it.[36] The current legislative provisions under the Health Law need more clarity regarding the specific types of technology and the extent of patient protection they should encompass. In addition, from a legal point of view, the regulation of AI is within the authority of the ministry of ICT, number 3 of 2021.

Indonesia unveiled a national strategic document named "Strategi Nasional Kecerdasan Artifisial" or "Stranas KA," in 2020 which centers on the advancement of Artificial Intelligence technology. The national strategy is typically formulated as a guiding framework document that has been a relevant policy reference for the government, ministries, agencies, and local authorities by outlining future paths for advancing AI technology in respective countries to generate positive societal outcomes for society.[37] The creation of the national strategy document is said to construct the innovations and limitations of AI development from collective thinking across different institutions of government and stakeholders.[38] An AI-oriented organization with Quad-Helix collaboration of governments, industries, academics, and communities organization called KORIKA, contributed in the making of Stranas KA and initially drafted the Presidential Regulation on the national strategy document since 2021, planning it to be implemented as a new legislation.[39] Regulation on AI is currently being a topmost concern amidst the rapid development of the technology, making the Presidential Regulation specified on AI is expected to be enacted by the end of 2025. [40]Some national strategy documents display guidelines for AI innovations alongside prominent priorities, which matches how the Stranas KA is

35 Susila, M. E. (2015). Medical law in Indonesia: Its history and development. *Jurnal Hukum PRIORIS*, *5*(1), 63-76.

36 Chairani, M. A., Pradhana, A. P., & Purnama, T. Y. (2022). The Urgency Of Developing Law As A Legal Basis For The Implementation Of Artificial Intelligence In Indonesia. *Law and Justice*, *7*(1), 35-45.

37 Fatima, S., Desouza, K. C., & Dawson, G. S. (2020). National strategic artificial intelligence plans: A multi-dimensional analysis. *Economic Analysis and Policy*, *67*, 178-194.

38 Radu, R. (2021). Steering the governance of artificial intelligence: national strategies in perspective. *Policy and society*, *40*(2), 178-193.

39 Bower Group Asia. (2023). AI Policy and Regulatory Frameworks Take Shape in APAC. *Bower Group Asia*. https://bowergroupasia.com/ai-policy-and-regulatory-frameworks-take-shape-in-apac/#IndonesiaSection.

40 New Zealand Foreign Affairs & Trade. (2023). Indonesia's National Strategy for Artificial Intelligence - July 2023. New Zealand Government. https://www.mfat.govt.nz/en/trade/mfat-market-reports/indonesias-national-strategy-for-artificial-intelligence-july-2023/.

created by outlining five priority areas for AI technology development in Indonesia. The five priority areas include healthcare, reformation of bureaucracy, education and research, food security, and mobility & smart cities.

Stranas KA highlights the healthcare sector as one of the priority areas for developing AI technology and one of the chosen public sectors that refers to various government services to enhance AI research and innovation. It is written that the objective of implementing AI research and innovation in the medical environment is to improve health services with AI technological innovation to speed up service time, expand health coverage, and reduce health costs for all of Indonesia's society. Potential AI technology developed through research and innovation in the national strategy document covers the expansion of health service coverage through telemedicine technology, management and effectiveness of health services. Regarding the decision to make the healthcare sector one of the priority areas in the Stranas KA document, Indonesia changed the orientation of healthcare services to 4P, which covers Predictive, Preventive, Participative, and Personal. The 4P approach can be applied through smart hospitals, telemedicine, the Health Resilience Dashboard, and the national-scale medical data interoperability system development. The combination of AI and big data analytics is also planned to build a machine learning-based alert system for the spread of the COVID-19 virus, improve the easiness of access to the availability of health facilities using a conversation interface, build recommendations for access and use of medical facilities and professionals, and produce recommendation machines for pandemic prevention.

Regarding protecting personal information, medical data must be protected under the relevant regulation to implement AI development, which prioritizes security elements and can be held accountable. The Data Protection Law emphasizes the principle of accountability, which requires organizations to demonstrate compliance with the regulation or in this case, health sector organizations. Implementing strong governance structures and accountability mechanisms is essential, especially as AI systems evolve and adapt. The Law Number 27 of 2022 about Personal Data Protection (PDP Law) was enacted in October 2022 after its draft was created in 2019 by the Ministry of Communication and Information. Article (1) Section 3 of Law Number 27 of 2022 expressed that "Information is explanations, statements, ideas, and signs that contain value, meaning, and messages, both data, facts, and explanations that can be seen, heard, and read presented in various packages and formats according to development of information and communication technology electronically or non-electronically.". Meanwhile in Article (1) Section 4, it is stated that "Personal Data Controller is any person, public entities, and international

organizations acting individually or jointly in determining purposes and exercising control over the processing of Personal Data." The respective law can support individuals' right to protect their personal data and respect the private life of Indonesia's society, especially for the use of data on AI technology development.

The current laws and strategies accommodating the innovation and demand of AI technologies in Indonesia form an interconnected framework that addresses the concerns produced by AI byproducts and invent suggestions to create responsible, transparent, and ethical AI technology innovations in the country. Additionally, Personal Data Protection Law and Stranas KA align in terms of prioritizing the ethical considerations and accountability in AI development, which could lead to promote responsible AI practices for both technology and society.

4. Discussion

4.1 Legal examination for data utilization and protection

Indonesia, consisting of 17,508 islands, possesses 10,205 Community Health Centres (referred to as 'Puskesmas'), of which merely 4,119 provide in-patient services. Fifteen out of the thirty-four provinces in Indonesia persist in delivering inadequate public services, exhibiting a compliance rate of less than 70% with national criteria. These two scenarios underscore the inadequate state of healthcare provision in Indonesia, alongside the constrained accessibility of medical services, hence hindering the enhancement of healthcare quality for the Indonesian population. In November 2021, UNESCO adopted the first global standard on AI ethics, the Ethical Recommendation on Artificial Intelligence. The Recommendation is designed as a framework for AI systems to benefit humans and prevent harm. It is based on the promotion and protection of human rights, human dignity, and environmental sustainability. It emphasizes principles such as accountability and the rule of law, and includes concrete policy chapters that call for better data governance, inclusivity, and gender equality.

Specifically in the healthcare sector, the adoption of artificial intelligence (AI) is anticipated to be impeded by several factors, including a dearth of specialized knowledge, the substantial expenses associated with implementing AI technology, and several regulatory obstacles. As an example regarding data protection, the lack of knowledge and information in remote areas will confuse medical personnel in sorting out patient data protection. The inequality of knowledge awareness of data protection will undoubtedly harm patients in

areas with minimal knowledge and network connections. The innovation of establishing a comprehensive, integrated system for storing medical records and patient data is also essential for healthcare technology advancement, yet the ethical awareness of personal data utilization should be highly considered to build relevant legal measurement and achieve fairness for both technology and user.[41] Inadequate ethical training and ethical guidelines for researchers has been one of significant constraints for research in Indonesia that involves humans, which could lead to exploitation of vulnerable society who suffer from power to stimulate their rights in protecting their personal information. Consequently, th ethical practices to show respect to the patient's privacy by gaining consent, being transparent of how data is collected, processed, and analyzed, and safeguarding data confidentiality are obligatory to be included as legal requirements for ensuring ethical conduct in AI healthcare technology development is applied to both healthcare providers and patients.

In a more comprehensive manner regarding health data, a significant challenge to AI implementation in Indonesia's healthcare industry, as stated in the national strategy document, is the availability, digitalisation and integration of medical data. Data availability in the medical sector is one of the critical enablers for AI implementation. Nevertheless, the main concern with health data availability is closely related to data privacy, where health information is notably private. Personal health data collected from patients' medical history and current information realizing the significance of individual consent as the standard for data utilization in AI development due to the absence of general laws in facilitating protection for the use of personal data.[42] Regarding data digitalisation, hospital and public health centers in each city have different data formats to store medical data that hinder data integration, which is essential for accuracy in AI technology adoption. Consequently, it is highly required to shield the stored health data with data protection approaches, followed by building an advanced security system to protect health data from unresponsible parties who want to access and utilize the data in an unfavorable manner.

One of the data protection approaches for medical data is the essence of the process is anonymization or synthesis, which hides the real identity of the patient's personal and medical information for any technology construction

41 Rachmawaty, R. (2017). Ethical issues in action-oriented research in Indonesia. *Nursing Ethics*, *24*(6), 686-693.

42 Amann, J., Blasimme, A., Vayena, E., Frey, D., & Madai, V. I. (2020). Explainability for artificial intelligence in healthcare: a multidisciplinary perspective. *BMC medical informatics and decision making*, *20*(1), 1-9.

or data analysis purposes. The data anonymization point was not stated in the PDP Law as the primary regulation for data protection for entire categories of data. Besides the absence of data anonymization, restricted allowance for profiling, automated decision-making, monitoring, tracking, Big Data analysis, and AI development were not covered in the current PDP Law. The significance of data anonymization cannot be underestimated as one of the crucial data protection strategies, particularly within the context of health data. While the PDP Law does not explicitly highlight data anonymization, it is highly required to conduct a further legal examination of this pivotal aspect of safeguarding patient privacy and facilitating responsible AI technology development and other data analysis purposes. The Ministry of Health can support the government and stakeholders from the healthcare sector in discussing this recommendation to become the basis for comprehensively implementing health technology regulation.

4.2 Liability and Accountability of AI Technology

Discussing the liability and accountability aspects of AI technology in Indonesia, it becomes apparent that AI-driven healthcare systems are categorized as property, lacking equivalent legal rights and obligations as human or legal entities. Therefore, AI technology is considered an electronic agent based on Law No. 19 of 2016 and Government Regulation No. 71 of 2019. Due to unavailability of AI regulations in Indonesia, its legal field is still examining whether the technology is included as one of the legal subjects of legal entities as AI could not be equated as human legal subjects.[43] The Law No. 11 of 2008 on Electronic Information and Transactions, or generally referred as ITE Law, stated the principle of liability when negligence occurs as a result of AI by placing the organizer as the presumed accountable party unless they could demonstrate the electronic system errors are not attributed to them.[44] An analogy of business rule for employer and employee implies that the employer would typically be held responsible for the consequences if any threat or inaccurate result arises from analysis or development process that could harm respective parties, including clinicians and patients. Although, respective employees who were involved in the analysis and decision-making

43 Chairani, M. A., Pradhana, A. P., & Purnama, T. Y. (2022). The Urgency Of Developing Law As A Legal Basis For The Implementation Of Artificial Intelligence In Indonesia. *Law and Justice*, *7*(1), 35-45.
44 Pratama, A. M., & Kharisma, D. B. (2023). Civil Liability Regime for Artificial Intelligence in Indonesia: Become a Future Legal Subject?. *Proceedings of the International Conference for Democracy and National Resilience 2022 (ICDNR 2022), 237-243.*

process would be held accountable internally according to the company's regulations. If the analogy is applied to hospitals and medical professionals, a distinct accountability dynamic emerges, considering they do not develop AI systems but rather utilize them. Various research stated different decisions on who needs to justify and be responsible for the actions and results operated by AI technologies.

Clinicians are said to be held accountable for operating AI-based health technologies due to being sufficiently in control in producing decisions based on the system's outcome[45], but technologists who created the AI technology also contributed to doctors' decision making by designing healthcare technologies that must avoid harm and ensure accuracy[46]. Considering the AI technologies adapted to healthcare industries are mostly assistive systems and providing recommendations of medicine and treatment, final decisions are still mainly decided by healthcare professionals based on experiences and diverse diagnosis. At the same time, the hospital stakeholders are the pacesetter for hospitals to incorporate specific AI technologies in their medical settings and must be fully attentive to the AI systems operated in the workplace that might be generating any harmful outcome. Consequently, the decision about AI accountability is still a huge dilemma in the healthcare industries, although it is evident that stakeholders, doctors, and technologists are the involved parties who must collaborate in preventing harms and negative outcomes produced by AI technologies in the healthcare domains.

Doctors who directly utilize AI technology in their work environment are also protected by Medical Practice Act 2004, which ensures legal protection and certainty for healthcare workers and recipients. However, based on the principle of legal equality, every citizen, including doctors who engaged in unlawful behavior, could be liable for criminal prosecution. However, the criminal act alone is not sufficient for establishing criminal liability. Regarding AI technology, if an action causes crime, criminal action will likely be possible to occur again. As a result, the allocation of responsibility in cases of errors, malfunctions, or biased outcomes from AI technology should be significantly considered through a thorough analysis of regulation. Especially in the healthcare sector, the law and regulation should cover whether AI developers, AI companies, healthcare providers, or other stakeholders would be held

45 Alexander, M. K., & Polyxeni, V. (2021). Accountability, Transparency, and Explainability in AI for Healthcare. *Infrahealth 2021 - Proceedings of the 8th International Conference on Infrastructures in Healthcare*.
46 Smith, H. (2020). Clinical AI: opacity, accountability, responsibility and liability. *AI & SOCIETY*, *36*, 535-545.

accountable and how liability issues would be resolved. A collaborative effort is needed between government, policymakers, healthcare stakeholders and professionals, and legal experts to achieve a practicable and equitable regulation framework for liability and accountability in AI technology.

4.3 Future Possibilities of Development of AI Regulation

The current stage of acceptance and utilization of AI in the healthcare sector in Indonesia remains in its early phase. However, it is worth noting that AI holds substantial promise in enhancing the provision of healthcare services within the country. The anticipated growth of AI utilization in the healthcare sector in Indonesia is attributed to the increasing number of healthcare professionals who are investing in AI and acquiring competence in this technology. Hence, Indonesia must establish a regulatory framework specialized for Artificial Intelligence (AI) encompassing the following fundamental concepts and substantive components. Firstly, the legislation must prioritize strengthening regulations regarding data quality, openness, human oversight, and accountability.

Furthermore, the Indonesian AI Law should focus on enhancing Indonesia's global standing as an important center for Digital Transformation and the digital economy. Therefore, it is important for the legal framework to ensure that the advancement and utilization of AI in Indonesia is in accordance with Indonesian laws and regulations.It is crucial to preserve the digital ecosystem of Indonesian society and safeguard the sovereignty and territorial integrity of the Republic of Indonesia. Thirdly, it is significant that legislation promotes AI technology as a facilitative instrument for fostering industrial expansion, advancing the digital economy, enhancing educational systems, improving healthcare services, and other pertinent sectors. This approach should consistently prioritize the preservation of human existence, the pivotal role of humans, and the overall progression of human civilization. It is paramount that the legal structure ensures AI advancement and application align with Indonesia's principles and laws while safeguarding the nation's digital ecosystem.

Moreover, by comprehensively constructing AI regulations with including ethical considerations for technology and data utilization, legislation can drive industrial growth, and elevate healthcare and other sectors, all while maintaining a steadfast focus on human well-being and security as the central role of humanity.

5. Conclusion

The massive development of AI technology has created various possibilities and challenges for numerous sectors, with healthcare being one of the central domains impacted by its transformative development. AI technology offers remarkable capabilities for medical practices, such as early disease detection, enhanced personalized patient care, optimized healthcare workflows, and reducing the occurrence of errors in diagnostic and therapeutic treatments. In contrast, the massive growth of AI also poses ethical and legal dilemmas, particularly in the realm of health data protection and patient privacy. The regulation of AI technology requires a robust analysis in data anonymization, ensuring that sensitive patients' personal and medical information remains confidential while fostering the advancement of AI technology for a better impact on society. The discussion of implementing health technology regulation ought to be performed by the government and healthcare stakeholders.

Furthermore, AI technology adoption also concerns data privacy, security, liability, and accountability. The way AI systems are seen as electronic agents and viewed as legal subject underscores the need to define clear legal responsibilities for any adverse outcomes generated from AI technology. In this regard, hospitals and healthcare stakeholders that deploy AI technologies might be held responsible for potential consequences.

Although existing medical practice laws safeguard doctors in utilizing AI systems, the allocation of responsibility and potential criminal liability must be addressed comprehensively within a legal framework that promotes fairness, transparency, and well-being for medical professionals, patients, and AI developers. From that point, moving forward, Indonesia stands at a pivotal moment in shaping the regulatory landscape for AI development in healthcare. A robust legal framework must be established to ensure that AI innovation is aligned with Indonesia's ideology (Pancasila), values and laws while fostering technological development. By addressing the suggestions proactively in creating further regulation, Indonesia can maximize the full potential of AI technology to elevate healthcare services, drive economic growth, and ensure the well-being of its society.

The intersection of AI and healthcare in Indonesia pushes the urgency to establish a comprehensive and forward-looking regulatory framework that is pivotal in navigating the complexities of AI technology, upholding ethical considerations, creating an equal healthcare environment, and promoting a harmonious coexistence between human and technological innovation. As Indonesia currently performs a

massive development of AI technology in the healthcare domain, it is obligatory to build a firm commitment through protective, equitable, and appropriate regulations to safeguard individual rights, foster responsible AI innovation, and build a more empowered healthcare landscape.

6. References

Adams SJ and others, 'Artificial Intelligence Solutions for Analysis of X-Ray Images' (2021) 72 Canadian Association of Radiologists Journal 60 <http://journals.sagepub.com/doi/10.1177/0846537120941671> accessed 15 August 2023.

anon C, 'An Evaluation of the ChatGPT Decision, Which Italy Blocked Access on the Grounds of Violation of the GDPR' [2023] SSRN Electronic Journal <http://dx.doi.org/10.2139/ssrn.4423779> accessed 12 August 2023.

—— 'An Evaluation of the ChatGPT Decision, Which Italy Blocked Access on the Grounds of Violation of the GDPR' [2023] SSRN Electronic Journal <http://dx.doi.org/10.2139/ssrn.4423779> accessed 13 August 2023.

Al Ghozali F, Destyarini N and Eko Anggraini O, 'The Emergence of Artificial Intelligence in Indonesian Healthcare Services: Potential Uses and Possible Legal Risks' [2022] Proceeding of International Conference on Science, Health, And Technology 159 <https://ojs.udb.ac.id/index.php/icohetech/article/view/2247> accessed 15 August 2023.

Alexander, M. K., & Polyxeni, V. (2021). Accountability, Transparency, and Explainability in AI for Healthcare. *Infrahealth 2021 - Proceedings of the 8th International Conference on Infrastructures in Healthcare*. <https://doi.org/10.18420/ihc2021_018>.

Arora A, 'Conceptualising Artificial Intelligence as a Digital Healthcare Innovation: An Introductory Review' (2020) Volume 13 Medical Devices: Evidence and Research 223 <http://dx.doi.org/10.2147/mder.s262590> accessed 15 August 2023.

Biallas M and O'Neill F, *Artificial Intelligence Innovation in Financial Services* (International Finance Corporation, Washington, DC 2020) <https://openknowledge.worldbank.org/handle/10986/34305> accessed 15 August 2023.

Bower Group Asia. (2023). AI Policy and Regulatory Frameworks Take Shape in APAC. *Bower Group Asia*.

<https://bowergroupasia.com/ai-policy-and-regulatory-frameworks-take-shape-in-apac/#IndonesiaSection>.

Dash S and others, 'Big Data in Healthcare: Management, Analysis and Future Prospects' (2019) 6 Journal of Big Data 54 <https://journalofbigdata.springeropen.com/articles/10.1186/s40537-019-0217-0> accessed 15 August 2023.

Fatima S, Desouza KC and Dawson GS, 'National Strategic Artificial Intelligence Plans: A Multi-Dimensional Analysis' (2020) 67 Economic Analysis and Policy 178 <https://linkinghub.elsevier.com/retrieve/pii/S0313592620304021> accessed 15 August 2023.

Fitrina Andiani A, Widjaja Putra1 BT and Khoiri A, 'Future of Telemedicine in Indonesia During Covid-19 Pandemic Era: "Literature Review' [2023] Health Technology Assessment in Action <https://publish.kne-publishing.com/index.php/HTAA/article/view/12198> accessed 15 August 2023.

Guan C, Mou J and Jiang Z, 'Artificial Intelligence Innovation in Education: A Twenty-Year Data-Driven Historical Analysis' (2020) 4 International Journal of Innovation Studies 134 <https://linkinghub.elsevier.com/retrieve/pii/S2096248720300369> accessed 15 August 2023.

Hakim HA, Praja CBE and Djanggih H, 'Legal Urgency on Designing The Legislation for The Use of Artificial Intelligence in Indonesian Medical Practice' (2021) 21(4) Jurnal Penelitian Hukum De Jure 541 <http://dx.doi.org/10.30641/dejure.2021.v21.541-550> accessed 15 August 2023.

Horgan D and others, 'Artificial Intelligence: Power for Civilisation – and for Better Healthcare' (2019) 22 Public Health Genomics 145 <https://www.karger.com/Article/FullText/504785> accessed 15 August 2023.

Kok J and others, (2009). 'Artificial intelligence: definition, trends, techniques, and cases' (2009) 1 Artificial intelligence 270.

Kusuma F and Hermawan S, 'Examining on Indonesian Legal Challenges for Future Transnational Healthcare Service' (2020) 7 Brawijaya Law Journal 96 <https://lawjournal.ub.ac.id/index.php/law/article/view/295> accessed 15 August 2023.

Lawrence NR and Bradley SH, 'Big Data and the NHS – We Have the technology, but We Need Patient and Professional Engagement' (2018) 5 Future Healthcare Journal 229 <https://www.rcpjournals.org/lookup/doi/10.7861/futurehosp.5-3-229> accessed 15 August 2023.

Martha M and others, 'ACCEPTANCE OF TECHNOLOGY IN ONLINE TRAINING BY HUMAN RESOURCE MANAGEMENT TRAINING PARTICIPANTS DURING COVID 19' (2022) 93(1) International Journal of Research Publications <http://dx.doi.org/10.47119/ijrp100931120222757> accessed 15 August 2023.

New Zealand Foreign Affairs & Trade. (2023). Indonesia's National Strategy for Artificial Intelligence - July 2023. New Zealand Government. <https://www.mfat.govt.nz/en/trade/mfat-market-reports/indonesias-national-strategy-for-artificial-intelligence-july-2023/>.

Olivia D, 'Legal Aspects of Artificial Intelligence on Automated Decision-Making in Indonesia' (2020) 7(3) Lentera Hukum 301 <http://dx.doi.org/10.19184/ejlh.v7i3.18380> accessed 12 August 2023.

Palanica A and Fossat Y, 'COVID-19 Has Inspired Global Healthcare Innovation' (2020) 111 Canadian Journal of Public Health 645 <https://link.springer.com/10.17269/s41997-020-00406-2> accessed 15 August 2023.

Phani Teja Nallamothu and Kimberly Morton Cuthrell, 'Artificial Intelligence in Health Sector: Current Status and Future Perspectives' (2023) 15 Asian Journal of Research in Computer Science 1.

Pratama A M and Kharisma D B, 'Civil Liability Regime for Artificial Intelligence in Indonesia: Become a Future Legal Subject?' (2022) Proceedings of the International Conference for Democracy and National Resilience 2022 (ICDNR 2022) 237 <https://doi.org/10.2991/978-2-494069-75-6_30>.

Rachmawaty R, 'Ethical issues in action-oriented research in Indonesia', (2017) 24(6) Nursing Ethics 686 <https://doi.org/10.1177/0969733016646156>.

Roy D and Srivastava R, 'The Impact of AI on World Economy', *Artificial Intelligence and Global Society*(Chapman and Hall/CRC 2021) <http://dx.doi.org/10.1201/9781003006602-3> accessed 15 August 2023.

Sasongko MB and others, 'The Estimated Healthcare Cost of Diabetic Retinopathy in Indonesia and Its Projection for 2025' (2020) 104 British Journal of Ophthalmology 487 <https://bjo.bmj.com/lookup/doi/10.1136/bjophthalmol-2019-313997> accessed 15 August 2023.

Sebastian G, 'Do ChatGPT and Other AI Chatbots Pose a Cybersecurity Risk? - An Exploratory Study' [2023] SSRN Electronic Journal <http://dx.doi.org/10.2139/ssrn.4363843> accessed 13 August 2023.

Shinkariov S and others, 'Telemedicine System with Elements of Artificial Intelligence for Health Monitoring During COVID-19 Pandemic', *Health Information Science*(Springer International Publishing 2020) <http://dx.doi.org/10.1007/978-3-030-61951-0_10> accessed 15 August 2023.

Shen Y-T and others, 'Digital Technology-Based Telemedicine for the COVID-19 Pandemic' (2021) 8 Frontiers in Medicine 646506 <https://www.frontiersin.org/articles/10.3389/fmed.2021.646506/full> accessed 15 August 2023.

Smith, H. (2020). Clinical AI: opacity, accountability, responsibility and liability. *AI & SOCIETY*, *36*, 535-545. <https://doi.org/10.1007/s00146-020-01019-6>.

Talukdar J, Singh TP and Barman B, *Artificial Intelligence in Healthcare Industry* (Springer Nature Singapore 2023) <https://link.springer.com/10.1007/978-981-99-3157-6> accessed 15 August 2023.

Yusriadi Y and others, 'Implementation of Artificial Intelligence in Indonesia' (2023) 7 International Journal of Data and Network Science 283 <http://www.growingscience.com/ijds/Vol7/ijdns_2022_133.pdf> accessed 15 August 2023.