REGULATION OF ARTIFICIAL INTELLIGENCE IN FINTECH SECTOR: CHALLENGES AND OPPORTUNITIES IN INDONESIA

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Abstract

The rapid development of artificial intelligence (AI) has significantly influenced various sectors, including financial technology (fintech). In Indonesia, fintech innovations such as digital payments and wealth management are reshaping financial services. However, the regulatory framework for AI in this sector remains underdeveloped, creating both challenges and opportunities. This article explores the current state of AI regulation in Indonesia's fintech sector and examines the potential hurdles and benefits of implementing comprehensive AI regulations. Utilizing a normative juridical approach, the study integrates conceptual, statutory, and case-based analyses to provide a multidimensional understanding of the issue. The findings reveal several challenges, including algorithmic bias, data privacy concerns, and the complexity of ensuring transparency and accountability in AI-based decision-making. On the other hand, AI offers opportunities for increased efficiency, enhanced risk assessment, and improved financial services scalability. The article underscores the urgency of establishing specific regulations to ensure AI accountability and transparency while fostering innovation. Such measures will help Indonesia balance the benefits of AI integration in fintech with the need to safeguard legal and ethical standards.

A. Introduction

It is undeniable that the development of technology globally is very fast. One of the results of this technological development is artificial intelligence (Hereinafter referred to as AI), AI itself was developed around 1950 where John McCarthy, Marvin Minsky, and other scientists at the Massachusetts Institute of Technology (MIT) formed a group to research AI. Furthermore, in 1956 McCarthy held a conference on AI (Darthmouth Conference). After the conference was held, the scientists agreed that they would create an AI whose final result would be able to think like humans and also be able to learn something by itself.

However, the development of AI itself did not always run smoothly, one of the obstacles occurred because of the financial crisis around 1970 which resulted in the cessation of the development of this AI. Then the development of AI was continued again in 1980 which culminated in producing a computer program that could beat the chess champion Garry Kasparov in 1997[1].

Furthermore, if we look at the current conditions, AI is much more advanced when compared to the AI that beat the chess champion, it can be said that because currently AI is at the stage of imitating and thinking the same as humans. One example is in the field of education, AI in the field of education shows that learning using AI can increase student's concentration levels. In addition, AI can also think about what learning system is more suitable for a students. This will ultimately make it easier for students to understand learning as well as determine which areas the students does not understand[2].

From this, it can be indicated that AI has now begun to be able to replace the role of a teacher, besides that, AI has now also been adopted by various large companies such as Google, Meta, Microsoft and Amazon[3]. Then with the very rapid development of AI, now AI is also starting to enter the banking sector. Now something called Financial Technology (Hereinafter referred to as Fintech) is known, which provides wealth management services[4]. Fintech itself essentially combines the concepts of technology and finance, one example is that when making payments, it is no longer necessary to come to a bank to withdraw money and give it to the intended recipient or come to the bank and ask the bank teller to send a certain amount of money, but only need to tap your finger on Fintech such as

[1] Ajeng H. Z. C. Aprilia, "Artificial Intelligence" Kementerian Keuangan Republik Indonesia, 2023, *https://www.djkn.kemenkeu.go.id/kpknl-bandaaceh/baca-artikel/16443/Artificial-Intelligence.html#:~:text=Pada%20tahun%201956%2C%20McCarthy%20mengadakan,sebagai%20bidang%20ilmu%20yang%20mandiri*, accessed on 7 December 2024.

[2] I. Fauzan, "Artificial Intelligence (AI) pada Proses Pengawasan dan Pengendalian Kepegawaian: Sebuah Eksplorasi Konsep setelah Masa Pandemi Berakhir", *Civil Service,* Vol. 14, No. 1, 2020, p. 31–42.

[3] T. Wahyudi, "Studi Kasus Pengembangan dan Penggunaan Artificial Intelligence (AI) sebagai Penunjang Kegiatan Masyarakat Indonesia", *Indonesian Journal on Software Engineering (IJSE),* Vol. 9, No. 1, 2023, p. 28–32.

[4] Y. Kato, "AI/FinTech and Asset Management Businesses", *Public Policy Review,* Vol. 16, No. 4, 2020, p. 1–28.

Gopay, OVO, Qris or other digital applications you can send money very simply and quickly. However, with the development of the era, it does not mean that society can relax and let AI develop rapidly. The development of AI should also be followed by the development of regulations, without the development and addition of regulations, a country will definitely be confused when there is a legal problem that arises due to the results of an AI action.

As explained above, AI can imitate and think like humans, this indicates that AI can also produce an unlawful action. Furthermore, research related to AI and Fintech has been studied several times, three of which are articles entitled "*Artificial intelligence (AI) in FinTech decisions: the role of congruity and rejection sensitivity*" written by Gonçalves, A. R. et al in 2023, this article essentially analyzes how the impact and results of consumer reactions to AI and human behavior, which in the results state that consumers prefer the results of AI than the results of human work related to financial analysis, but for personal loans (credit) consumers prefer to reject AI[5]. The difference between this study and the research conducted by the researcher is that the study uses a direct experimental method by observing expressions and interviews with consumers, while the method used in this study is a literature review, then the study looks at its impact on consumers, while this study focuses more on regulations in Indonesia as well as the challenges and opportunities related to AI in Fintech. The second article is entitled "*Data science and AI in FinTech: an overview*" written by Cao, L et al in 2021, this article essentially discusses the big role of Fintech which is also supported by Data Science and Artificial Intelligence (DSAI), this article discusses how much Fintech has increased, the Fintech ecosystem and is also followed by research and development opportunities for Fintech[6]. The difference between this research and the research conducted by the researcher is that this research discusses Fintech with the support of DSAI globally including the opportunities for Fintech, while the research

[5] Gonçalves, A. R., et. all., "Artificial Intelligence (AI) in FinTech Decisions: The Role of Congruity and Rejection Sensitivity", *International Journal of Bank Marketing*, Vol. 41, No. 6, 2023, p. 1282–1307.
[6] Cao, L., Q. Yang, and P. S. Yu., "Data Science and AI in FinTech: An Overview", *International Journal of Data Science and Analytics*, Vol. 12, No. 2, 2021, p. 81–99.

conducted by the researcher focuses more on Fintech and AI in Indonesia which indicates whether or not regulations related to AI are needed by looking at conditions in Indonesia and also discussing the opportunities and challenges of AI and Fintech in Indonesia. The last article is entitled "*Artificial intelligence and fintech: An overview of opportunities and risks for banking, investments, and microfinance*" written by Ashta & Herrmann in 2021, this article essentially discusses the opportunities and risks of implementing AI in the financial sector, the opportunities in question are the increased efficiency of the financial sector followed by reduced employment costs, while the risks are the results of biased data and uncertainty of AI results if there is no intervention at all from humans[7]. The difference between this research and the research conducted by the researcher is in the focus of the research area, this research discusses the opportunities and risks of implementing AI in the financial sector globally while this research focuses on Indonesia only, in addition this research will also discuss the regulatory aspects related to AI in Indonesia in the banking sector.

Based on the background description above, the author will focus on: (1) how is artificial intelligence regulation in the fintech sector?; and (2) what are the challenges and opportunities in the implementation of artificial intelligence regulation?.

B. Method

The research methodology for this article employs a normative juridical approach, focusing on the study of legal principles, legal provisions, legislation, and legal mechanisms[8]. As this is a normative legal research type, three primary approaches are utilized. The Conceptual Approach analyzes legal doctrines and

[7] Ashta, A. and H. Herrmann, "Artificial Intelligence and Fintech: An Overview of Opportunities and Risks for Banking, Investments, and Microfinance", *Strategic Change,* Vol. 30, No. 3, 2021, p. 211–22.
[8] Ali, Salim Ibrahim, et. all., "Legal Research of Doctrinal and Non-Doctrinal", *International Journal of Trend in Research and Development, Vol.* 4, No. 1, 2023, p. 493–502.

perspectives based on literature studies and secondary data[9]. This approach seeks to explore foundational concepts and theoretical frameworks within the field of law. Meanwhile, the Statutory Approach involves examining legal norms and sets of positive legal rules related to the studied legal phenomena, particularly those that have occurred in the past. This helps ensure that the analysis aligns with existing legal frameworks. And finally, the Case Approach investigates the legal facts derived from various cases that have taken place. It aims to provide practical insights and contextual understanding, enhancing the comprehensiveness of the study.

These approaches are analyzed using a qualitative methodology, which, in legal studies, involves a comprehensive examination of current legal phenomena. This process includes the systematic reduction, processing, presentation, and analysis of data. Finally, concise conclusions are drawn based on the analyses, ensuring a thorough and multidimensional exploration of the legal issues discussed.

C. Analysis and Discussion

1. Regulation of Artificial Intelligence in the Fintech Sector

The development of fintech in Indonesia has been a key driver in changing the landscape of the financial industry. In recent years, the fintech sector in Indonesia has experienced rapid growth, with innovations bringing new financial solutions that are faster, more efficient, and more inclusive. The Indonesian government, through the Financial Services Authority (Hereinafter referred to as OJK), has introduced a series of regulations to oversee and regulate the development of fintech. These regulations aim to encourage innovation while protecting consumers in the digital ecosystem. One important

[9] Ngwoke, Rita Abhavan, et. all., "A Critical Appraisal of Doctrinal and Non-Doctrinal Legal Research Methodologies in Contemporary Times", *International Journal of Civil Law and Legal Research,* Vol 3, No. 1, 2023, p. 8–17.

regulation is OJK Regulation No. 13/POJK.02/2018, which provides a framework for fintech companies to operate legally in Indonesia[10].

The development of science and technology has a major impact on various aspects of human life including the fintech sector. In its development, artificial intelligence in fintech helps provide more efficient, transparent, and innovative financial services. Artificial intelligence in fintech itself plays a very important role, namely to analyze big data, provide smarter financial services, detect fraud, and provide customer service automatically. Artificial intelligence has brought great transformation by providing various conveniences including in providing consumer services, reducing costs and can create new business models in the financial sector. The various services and conveniences that can be accessed essentially raise a number of legal issues, in the use of AI artificial intelligence algorithms can potentially threaten personal data by collecting and analyzing large amounts of personal data. This raises concerns regarding data misuse, or data leakage[11]. As happened in August 2020, there was a leak of consumer personal data from a technology company engaged Fintech Kreditplus. This leak was first discovered through a report by US-based cybersecurity firm Clype. The report revealed that around 890,000 Kreditplus customer data was leaked and sold on the Raidforums site. This leak of personal consumer data caused huge losses to consumers and made the leaked data vulnerable[12]. On the other hand, the use of AI in fintech can also add legal problems, where the use of AI creates legal loopholes, which can have implications for customer losses where the use of AI in the system makes it easier for companies to avoid legal responsibility for losses experienced by consumers, such as the use of codes in financial services. The

[10] Suryadarma, F. R., and M. Faqih, "Fintech Regulation in Indonesia: Encouraging Innovation and Protecting Consumers in the Digital Ecosystem", *Islamic Banking Student Scientific Journal (JIMPA),* Vol. 4, No. 1, 2024, p. 117–26.
[11] Aldboush Hasan H. H.,and Mara Ferdou, "Building Trust in Fintech: An Analysis of Ethical and Privacy Considerations in the Intersection of Big Data, AI, and Customer Trust", *International Journal of Financial Studies*, Vol. 11, No. 3, 2023, p. 90–105.
[12] Disemadi, H. S., "The Urgency of Special Regulations and the Use of Artificial Intelligence in Realizing Personal Data Protection in Indonesia", *Journal of Wawasan Yuridika,* Vol. 5, No. 2, 2021, p. 177–99.

use of codes is generally sourced from artificial intelligence systems operated by companies. In practice, the use of AI in the fintech sector is not free from errors, so that if there is an error in the appearance of a code that is different from what has been regulated by the company, this will be considered a force majeure. This shows the urgency of the existence of regulations governing AI in fintech sector. Regulations focusing on the use of AI in fintechs aim to engender compliance with the law. Legal compliance with regulations is one of the key pillars in maintaining the integrity and stability of the financial system. Regulation in the financial context itself includes various regulations and laws set by governments, financial authorities, and supervisory agencies to regulate the behavior of financial entities, consumer protection, and prevent illegal activities. The financial sector has a complex and diverse regulatory framework that covers various aspects, including compliance with Financial Institutions Laws and Regulations, where companies must comply with relevant laws and regulations covering everything from consumer protection to financial reporting transparency. The second is Anti-Money Laundering (AML) compliance, which aims to prevent finances from being used for money laundering and terrorism financing. And the third is Data Security Protection compliance where personal data and data security are critical in the financial sector due to the potential risk of data leaks and privacy breaches[13].

Currently, Indonesia does not have specific regulations focused on the use of AI, whether in the education or economic sectors. There are no laws explicitly governing the use of AI. But its not mean that the Indonesian government is absent in regulating AI. Several regulations are related to the utilization of AI technology in Indonesia, such as the Ministry of Communication and Information Technology Regulation No. 3 of 2021, which governs licensing aspects for businesses utilizing AI, UU ITE 1. derivative regulations, which address AI under the terminology of electronic agents, UU

[13] Nuraziza, S., and W. F. R. Sudirman, "Literature Study: Artificial Intelligence (AI) Integration in Financial Management (Regulatory Challenges and Compliance)", *Money: Journal of Financial and Islamic Banking,* Vol. 2, No. 1, 2024, p. 47–57.

No. 27 of 2022 which regulates the use of AI involving personal data processing and the policy by the Ministry of Communication and Information Technology (Kemenkominfo), which issued ethical guidelines for AI utilization for businesses, outlined in Circular Letter of the Minister of Communication and Information Technology No. 9 of 2023 on Etika Kecerdasan Artifisial. Efforts to regulate the use of AI have also been made by the OJK. OJK appointed the Indonesian Financial Technology Association (AFTECH) together with other industry associations, namely AFSI, AFPI and ALUDI to compile and establish a Code of Conduct for Responsible and Trustworthy AI in the Financial Technology Industry, which was launched in early December 2023. In addition, OJK is also drafting a regulation on digital services by commercial banks which includes the principle of responsible innovation in the utilization of new technologies, one of which is AI technology[14].

In the fintech sector, currently regulation regarding the use of AI is still limited to the Ethical Guidelines, which contain provisions regarding the ethics of fintech companies in carrying out their activities. Matters regulated in the ethical guidelines include the Basic Principles of Responsible and Trustworthy Artificial Intelligence Behavior Guidelines and Supporting Factors for Responsible and Trustworthy AI.

1. Basic principles, the basic principles used based on the ethical guidelines include:
    1) Pancasila-based, where in its implementation the development and utilization of AI in fintech must be based on the values of Pancasila.
    2) Beneficial, where in its implementation, the Fintech organizer seeks to develop and utilize AI-based applications to improve business operations, consumer welfare, decision-making

[14] M. Irfan Dwi Putra, "Regulasi AI di Indonesia Belum Cukup, Perlu Aturan yang Lebih Spesifik", The Conversation: Disiplin Ilmiah, Gaya Jurnalistik, 2024, *https://theconversation.com/regulasi-ai-di-indonesia-belum-cukup-perlu-aturan-yang-lebih-spesifik-219827*, accessed on 7 December 2024.

3) capabilities, and financial inclusion, and support a sustainable economy by referring to applicable provisions, principles of human rights, diversity, and consumer protection.
4) Fair and accountable, where organizers must pay attention to validity and accuracy that consider the principles of fairness and non-discrimination, including, Fintech Organizers ensure that business models and AI-based applications developed and utilized do not cause harm to consumers; have a risk mitigation framework to ensure the security of algorithms, code and input data; ensure that the data used can be accounted for, is valid, is the latest data, does not contain bias, and meets the provisions stipulated in regulations related to personal data protection; ensure the processing carried out by AI-based applications is close to accuracy with the highest standards through a series of tests; ensure that AI-based applications are developed in accordance with values, ethics, and provisions; and have an accountability framework for the output generated from AI-based applications.
5) Transparent and explicable, transparent and explicable in this case is that the Fintech Operator can explain how AI processing works based on the explanation of the AI developer, owner, or vendor, including potential risks, losses for consumers, and mitigation steps in case of failure. Fintech providers also ensure that consumers receive easy-to-understand information about AI processing so that they understand and can act on the output. In addition, an AI risk management framework is applied, which includes mechanisms for handling inaccurate output, responsibilities according to guidelines, and recovery mechanisms in case of processing errors.
6) Robustness and security, its where the fintech organizer ensures the robustness and security of AI-based applications through a series of steps, including ensuring that the applications used are

robust for business purposes, resistant to cyberattacks with recovery mechanisms, and developed by certified experts in the field of AI. These applications must also undergo testing, continuous learning, and regular validation both technically and in terms of security to minimize errors. Additionally, the application validity standards are aimed to be measurable and accountable in accordance with applicable regulations.

2. supporting factors Responsible and Trustworthy AI:
    1) Based on Pancasila: Fulfillment of the values of fairness, representation, and diversity; Applicable ethical principles.
    2) Beneficial: Improved user welfare and no harm; Improved decision-making ability; Increased financial inclusion; Increased inclusive and sustainable growth.
    3) Fair and accountable: fair and accountable where is consistent use of data, algorithms, and programming code; Appropriateness and updating of technology in order to develop models and algorithms; Responsive and user-friendly product development; Continual learning for algorithms; Data integrity and privacy; Data collection in accordance with privacy provisions and processing needs; Data reliability through the data update process; Equality of data use, data access control, data segregation, and data recovery; Involvement of management in decision making and other third parties involved; Scalability of supporting infrastructure, data, algorithms, and models.
    4) Transparent and explicable: Human-on-the-loop; Development of unconventional models and algorithms; Model and algorithm interpretability; Model and algorithm interpretability and validation; User involvement; Communication mechanisms to consumers regarding AI utilization; Transparency regarding AI activities (disclosure), including models, technologies, input data, output, and processing mechanisms; Consumer protection

5) mechanisms and policies as well as legal accountability mechanisms; Considerations of user satisfaction and experience.
6) Robustness and security: Data Security; Testing and validation policy; Testing and validation of models and algorithms; Testing and validation of Al support infrastructure; Testing and validation of incidents and risks; Reliability of update and recovery of models and algorithms; Reliability of update and recovery of Al support infrastructure; Reliability of update and recovery of incidents and risks; Equal access to test and validation results; Technology updates in support of resilience and security; Partnerships with technology providers and industry players[15].

2. Challenges and Opportunities in the Implementation of Artificial Intelligence in Fintech Regulations

If we look at the AI code of ethics guidelines that have been described above, it can certainly be concluded that the guidelines are only recommendations and not coercion. This indicates that the guidelines issued by the OJK cannot be used as a legal basis when there is a legal problem that arises due to the actions of AI. According to researchers, this should be regulated with a simple concept of accountability, instead of the current Indonesian government preferring to use other laws and regulations as a legal basis. This will be very easy for companies to avoid by stating that there was an error in AI that resulted in a decision that was detrimental to consumers because there was a complex code change so that force majeure could be stated which ultimately made them unable to be punished because of the small element of error. The only element of error in the statement is why it was not stopped or how the companies could not know about the code that had changed, but this will be very difficult to prove. Furthermore, if we look at the implementation of the existing guidelines, it will be found that bias is not

[15] OJK, "Panduan Kode Etik Kecerdasan Buatan (Artificial Intelligence/AI) yang Bertanggung Jawab dan Terpercaya di Industri Teknologi Finansial", 2023, https://ojk.go.id/id/berita-dan-kegiatan/publikasi/Pages/Panduan-Kode-Etik-Kecerdasan-Buatan-AI-yang-Bertanggung-Jawab-dan-Terpercaya-di-Industri-Teknologi-Finansial.aspx, Accesed on 7 December 2024.

regulated in it.

The results of AI are not always correct or in other words there could be discrimination or bias in it, this can be seen from one of the studies conducted by Jennifer Graham which stated bias from AI in the education sector. The bias is in the results that come out of the A-Level Result which resulted in 31.9% of students getting grades that did not match predictions, then 48.6% of private schools students got an A or more while only 21.8% got the same grade of comprehensive students[16]. This shows that in the implementation of AI there is a possibility of bias which is because it does not analyze like humans but only based on existing code and data, while not everything can be data. The guide also states that transparency is needed from the AI used by a financial company but if what is in the AI itself then it will not be possible to determine how the AI uses the data provided, how the data is obtained and how the assessment system of an AI is. This indicates that there is an algorithm that sometimes cannot be understood by humans themselves, causing a lack of transparency. Furthermore, there is also a potential risk where the AI receives more credit for people who are considered better in terms of economy than people who are considered only good. With the existence of bias and discrimination, the implementation of AI will be very problematic if not addressed, because the accountability will be very difficult to determine whether to give responsibility to the company/bank for allowing the AI used to produce biased results while the results are beyond their control or to give responsibility to the AI because it has a complex algorithm.

Furthermore, with the presence of AI, although it can increase the efficiency of a bank/banking company's work, AI also provides complexity in business due to the existence of algorithms that are difficult for humans to guess, especially if there is no human intervention at all in it. The complexity of the business also includes the complexity of how an AI learns something, represents something, how much uncertainty there is from AI, both related to the results that

[16] J. Graham, 2021, *Risk of Discrimination in AI Systems: Evaluating the Effectiveness of Current Legal Safeguards in Tackling Algorithmic Discrimination*, In FinTech, Artificial Intelligence and the Law: Routledge, London, p. 211–29.

will be issued by AI and the working mechanism of AI itself which cannot be fully understood by humans themselves. In addition, with this complexity, it will also result in uncertainty about the correctness or otherwise of the results and data that appear after being processed by AI, this can be caused by the complexity of the characteristics of the data needed and processed by the AI[17]. The next challenge is related to consumer data privacy, this is also a challenge because for an AI system to run, it will certainly require data to process information and also the desires of consumers, both related to credit, accessing files and even personal information from a consumer. Moreover, a bank is also worried that it will use consumer information data to see consumer actions regarding their expenses or income, if allowed to happen, this will be a challenge in applying regulations related to AI in Fintech. Furthermore, there is also a challenge in the form of confusion about AI and Fintech itself, this is caused by the existence of banks or companies that publish with the term AI but some call it Fintech, this incident will ultimately cause uncertainty in the definition of AI and Fintech itself[18]. According to the researcher himself, in the banking context referred to in this study, AI is part of Fintech itself, meaning that Fintech can be implemented without AI. Fintech without AI is the same as a digital bank.

The next challenge is the concern regarding decisions from AI that should not be taken by the AI. One example is the face recognition technology issued by HSBC Bank, this technology makes bank information and all Fintech activities accessible by simply showing the face to the camera, but AI cannot recognize the same person when the person concerned has significant changes such as wounds or stitches, surgery results or other significant changes to the face then the AI will assume that the person is a different person. This results in the person not being able to access their own bank. Then there is also a case where there is a bank customer who spends a lot of money in one night due to a need and then the AI from Fintech assesses that the customer is not eligible to get a loan from the bank.

[17] Cao, Yang, and Yu, *Ibid.*
[18] L. O. Durodola, 2021, *Towards A Responsible Use of Artificial Intelligence (AI) and Fintech in Modern Banking," In FinTech, Artificial Intelligence and the Law: Routledge*, London, p. 262–78.

This indicates that the process to the results of an AI action cannot be intervened by a human (in this case a bank officer)[19]. With this challenge, it will certainly change the dynamics of the regulations required by a country regarding AI in Fintech.

After discussing the various challenges of implementing AI regulations in the Fintech sector, researchers will now discuss the various opportunities that AI has in its implementation. First, AI can facilitate Fintech's work, which if specified can be seen in the risk management of something. AI can easily predict whether or not stock prices will fall for a bank (one of which is an AI called Kensho. Second, as given in the example above, where AI can provide an assessment of a person regarding whether or not someone is worthy of getting credit or a loan from a bank, with this AI, it will certainly facilitate and accelerate the assessment process for a customer. This used to have to be checked one by one by bank officers which would take a very long time in the process. Third, AI can also help a customer in terms of providing advice regarding the customer's finances, AI can help provide recommendations on what should be chosen regarding the needs and desires of a customer, this will help customers maintain their value when they are going to get credit or a loan. Fourth, AI will easily detect fraud and anomalies from customer data, this can happen because AI will not be able to see the data incorrectly, in other words, AI will know if the data is wrong or strange in the customer data, with this detection, the bank will not lose money to be given to a fraudster. Fifth, AI can provide an evaluation of the bank itself or a customer, this is because AI has transparency for itself but can also provide data desired by customers and banks to facilitate evaluation of their performance. The performance referred to here also includes performance in maintaining the credit value of a customer to the performance of a bank itself regarding the provision of credit and other bank activities. Sixth, AI performance that will not be affected by news, emotions or visualizations. An AI will work in such a complex way but will not have emotions that will interfere with its performance, this will be very helpful

[19] *Ibid.*

for banks when they are going to provide credit, then instead of stopping because of news or news, AI will actually act to deal with the news if the AI feels that it will be affected by the news, which in other words, AI can analyze a network and make decisions about what needs to be done so as not to result in losses for the bank, then the bank will also be able to study the causal relationship of losses or actions to be taken and AI will also be able to study patterns of behavior. Seventh, AI can help the verification process to maintain security for both customers and banks. For customers, AI will be able to maintain bank data and bank activities that will be carried out by a customer by using face recognition as mentioned above or by using fingerprints or other security systems, although it has shortcomings as mentioned above, but with this verification, customers will feel safer from bank break-ins and their money stored in Fintech. While for the bank itself, it will also be safe from hacking and also illegal withdrawals from both outside and inside the bank. Finally, AI will make it easier for a customer to make transactions, transactions here will be faster for customers, in the past where customers were required to go to the bank to make transactions then changed to being able to make transactions by coming to an ATM, now it can be done via mobile phones or other technologies that are easy for a customer to carry. With the ease of this transaction, AI will be very beneficial because it will also cut travel costs, operational costs and other costs that must be incurred by a customer when making a transaction[20].

D. Conclusion

Indonesia currently doesn't have specific regulations focused on the use of AI, but there are some related regulations such as the Ministry of Communication and Information Technology Regulation No.3 of 2021 and The Financial Services Authority (OJK) guidelines on responsible and trustworthy AI in the fintech industry.

[20] *Ibid.*

While Indonesia has taken initial steps toward regulating AI in the fintech sector, there is still significant room for improvement. The author concludes that the lack of specific regulations on AI in Indonesia poses challenges and opportunities in implementing AI in fintech regulations. The absence of specific and comprehensive AI-focused regulations hinders the nation's ability to address pressing challenges effectively. The challenges in implementing AI regulations include potential bias and lack of transparency in AI-based decision making, complexity of AI algorithms, and issues around data privacy and security. There are also concerns about AI-based decisions overriding human judgment. Without clear accountability mechanisms, companies may evade responsibility for errors or consumer losses caused by AI, further eroding trust in financial technologies.

At the same time, Indonesia stands at a unique juncture to harness the full potential of AI in fintech. The article identifies the opportunities of AI in fintech include increased efficiency, better risk assessment, fraud detection, evaluated bank performance, and improved customer service. AI can also help with scalability and security of financial services. The technology offers transformative opportunities, from streamlining operational efficiencies to advancing financial inclusion for underserved populations. By leveraging AI's capabilities, fintech companies can provide personalized financial services, enhance fraud detection systems, and improve overall customer experience. However, these benefits must be tempered with ethical considerations and a strong commitment to protect consumer rights.

To address the challenges, the author suggests the need for more specific regulations on AI accountability, transparency, and robustness in the fintech sector in Indonesia. Collaboration between regulatory authorities, academic institutions, and fintech stakeholders is essential to develop a balanced approach to AI regulation. Regulatory bodies like the Financial Services Authority (OJK) should prioritize creating binding legal instruments that address the unique challenges of AI, such as its opaque decision-making processes and potential to perpetuate systemic inequalities. Furthermore, these regulations should be adaptable, allowing for continuous updates in line with technological advancements.

Moving forward, education and awareness campaigns will also play a crucial role in ensuring that all stakeholders, including fintech companies and consumers, are well-versed in the ethical use of AI. Transparency initiatives, such as mandatory disclosure of AI systems' methodologies and potential risks, can further build public confidence in these technologies. Equally important is the need to invest in local talent and expertise in AI, as a skilled workforce is critical for the development and implementation of responsible AI systems. Indonesia can draw inspiration from international best practices in AI governance. Countries like Singapore and the United Kingdom have established comprehensive guidelines and frameworks that balance innovation with ethical responsibility. Adapting such frameworks to the Indonesian context can help the nation address its unique challenges while fostering a globally competitive fintech ecosystem.

Lastly, as fintech continues to evolve, the regulatory focus should extend beyond the present concerns of AI accountability and transparency. Emerging trends, such as the integration of quantum computing and blockchain in fintech, will present new legal and ethical dilemmas. Proactive policymaking and forward-thinking strategies are crucial to ensure that Indonesia remains at the forefront of technological innovation while safeguarding its economic and social fabric. By addressing these dimensions comprehensively, Indonesia has the potential to set a benchmark in AI regulation for emerging economies. Striking the right balance between fostering innovation and ensuring legal compliance will be key to unlocking the transformative potential of AI in fintech. With concerted efforts from all stakeholders, Indonesia can create a regulatory environment that not only supports technological advancements but also aligns with the principles of fairness, accountability, and consumer protection.

References

Books

Durodola, L. O., 2021, *Towards A Responsible Use of Artificial Intelligence (AI) and Fintech in Modern Banking*, First Edition, In FinTech, Artificial Intelligence and the Law: Routledge, London.

Graham, J., 2021, *Risk of Discrimination in AI Systems: Evaluating the Effectiveness of Current Legal Safeguards in Tackling Algorithmic Discrimination*, In FinTech, Artificial Intelligence and the Law: Routledge, London.

Journal Article

Ali, Salim Ibrahim, et. all., "Legal Research of Doctrinal and Non-Doctrinal", *International Journal of Trend in Research and Development,* Vol. 4, No. 1, 2023, p. 493–502, http://www.ijtrd.com/ViewFullText.aspx?Id=6653

Ashta, A., and H. Herrmann, "Artificial Intelligence and Fintech: An Overview of Opportunities and Risks for Banking, Investments, and Microfinance", *Strategic Change,* Vol. 30, No. 3, 2021, p. 211–22, http://dx.doi.org/10.1002/jsc.2404.

Cao, L., Q. Yang, and P. S. Yu., "Data Science and AI in FinTech: An Overview", *International Journal of Data Science and Analytics,* Vol. 12, No. 2, 2021, p. 81–99, https://doi.org/10.1007/s41060-021-00278-w.

Disemadi, H. S., "The Urgency of Special Regulations and the Use of Artificial Intelligence in Realizing Personal Data Protection in Indonesia", *Journal of Wawasan Yuridika,* Vol. 5, No. 2, 2021, p. 177–99, https://doi.org/10.25072/jwy.v5i2.460.

Fauzan, I., "Artificial Intelligence (AI) pada Proses Pengawasan dan Pengendalian Kepegawaian: Sebuah Eksplorasi Konsep setelah Masa Pandemi Berakhir", Civil Service Vol. 14, No. 1, 2020, p. 31–42, https://jurnal.bkn.go.id/index.php/asn/article/view/261.

Gonçalves, A. R., et. all., "Artificial Intelligence (AI) in FinTech Decisions: The Role of Congruity and Rejection Sensitivity", *International Journal of Bank Marketing,* Vol. 41, No. 6, 2023, p.1282–1307, https://doi.org/10.1108/IJBM-07-2022-0295.

Hasan H. H. Aldboush., and M. Ferdou, "Building Trust in Fintech: An Analysis of Ethical and Privacy Considerations in the Intersection of Big Data, AI, and Customer Trust", *International Journal of Financial Studies,* Vol. 11, No. 3, 2023, p. 90–105, https://doi.org/10.3390/ijfs11030090.

Kato, Y., "AI/FinTech and Asset Management Businesses", *Public Policy Review*, Vol. 16, No. 4, 2020, p. 1–28.

Ngwoke, Rita Abhavan, et. all., "A Critical Appraisal of Doctrinal and Non-Doctrinal Legal Research Methodologies in Contemporary Times",

International Journal of Civil Law and Legal Research, Vol. 3, No. 1, 2023, p. 8–17, https://www.doi.org/10.22271/civillaw.

Nuraziza, S., and W. F. R. Sudirman, "Literature Study: Artificial Intelligence (AI) Integration in Financial Management (Regulatory Challenges and Compliance)", *Money: Journal of Financial and Islamic Banking,* Vol. 2, No. 1, 2024, p. 47–57, https://doi.org/10.31004/money.v2i1.21438.

Suryadarma, F. R., and M. Faqih, "Fintech Regulation in Indonesia: Encouraging Innovation and Protecting Consumers in the Digital Ecosystem", *Islamic Banking Student Scientific Journal (JIMPA),* Vol. 4, No. 1, 2024, p. 117–26, doi:10.36908/jimpa.

Wahyudi, T., "Studi Kasus Pengembangan dan Penggunaan Artificial Intelligence (AI) sebagai Penunjang Kegiatan Masyarakat Indonesia", *Indonesian Journal on Software Engineering (IJSE),* Vol. 9, No. 1, 2023, p. 28–32, https://doi.org/10.31294/ijse.v9i1.15631.

Internet

Aprilia, Ajeng H. Z. C., "Artificial Intelligence", Kementerian Keuangan Republik Indonesia, 2023, *https://www.djkn.kemenkeu.go.id/kpknl-bandaaceh/baca-artikel/16443/Artificial-Intelligence.html#:~:text=Pada%20tahun%201956%2C%20McCarthy%20mengadakan,sebagai%20bidang%20ilmu%20yang%20mandiri,* accessed on 7 December 2024.

M. Irfan Dwi Putra, "Regulasi AI di Indonesia Belum Cukup, Perlu Aturan yang Lebih Spesifik", The Conversation: Disiplin Ilmiah, Gaya Jurnalistik, 2024, *https://theconversation.com/regulasi-ai-di-indonesia-belum-cukup-perlu-aturan-yang-lebih-spesifik-219827,* accessed on 7 December 2024.

OJK, "Panduan Kode Etik Kecerdasan Buatan (Artificial Intelligence/AI) yang Bertanggung Jawab dan Terpercaya di Industri Teknologi Finansial", https://ojk.go.id/id/berita-dan-kegiatan/publikasi/Pages/Panduan-Kode-Etik-Kecerdasan-Buatan-AI-yang-Bertanggung-Jawab-dan-Terpercaya-di-Industri-Teknologi-Finansial.aspx, accessed on 7 December 2024.