



Reformulation of anti-money laundering policy on crypto assets through the integrated criminal justice system with global regulatory standards

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ABSTRACT

Background: The emergence of crypto assets as a digital asset has transformed the global financial system, offered innovation but also generated new risks, particularly money laundering (ML). In Indonesia, crypto assets are not recognized as legal tender but has shifted from being classified as a commodity under Commodity Futures Trading Supervisory Agency/*Badan Pengawas Perdagangan Berjangka Komoditi* (BAPPEBTI) to a digital financial asset under the supervision of Financial Services Authority/*Otoritas Jasa Keuangan* (OJK) through the enactment of the Law on Development and Strengthening of the Financial Sector/*Undang-Undang Pengembangan dan Penguatan Sektor Keuangan* (UU P2SK), PP No.49/2024, and POJK No.27/2024. However, the current Anti Money Laundering (AML) framework, especially Law on the Prevention and Eradication of Money Laundering/*Undang-Undang Pencegahan dan Pemberantasan Tindak Pidana Pencucian Uang* (UU PPTPPU), has not fully integrated Financial Action Task Force (FATF) recommendations, especially regarding Virtual Assets (VA) and Virtual Asset Service Provider (VASP). **Method:** This study employs a doctrinal legal research method utilizing statute, comparative, and conceptual approaches to analyze the reformulation of the Indonesian Anti-Money Laundering Law in alignment with Lawrence Friedman's legal system theory. The analysis follows a deductive logic by synthesizing primary and secondary legal materials to develop a policy framework that integrates an Integrated Criminal Justice System (ICJS) with machine learning technology for detecting crypto-based money laundering. **Finding:** Findings reveal that the absence of VA and VASP in Indonesian Anti-Money Laundering Law creates legal gaps that may be exploited by criminals. Reformulation is urgently needed by incorporating VA and VASP definitions, strengthening reporting obligations, and integrating technology such as machine learning in the PPATK's goAML platform. **Conclusion:** An Integrated Criminal Justice System (ICJS) model is required to harmonize regulation, institutional coordination, and law enforcement culture. Such a framework is expected to create an adaptive AML system against cryptocurrency-based ML while maintaining financial integrity and supporting sustainable economic development. **Novelty/Originality of this article:** This research introduces a "techno-legal" transition model for Indonesia's AML regime, bridging the legislative gap between the new Law on Development and Strengthening of the Financial Sector and the outdated Indonesian Anti-Money Laundering Law.

KEYWORDS: crypto assets; money laundering; integrated criminal justice system.

1. Introduction

The accelerating current of globalization has significantly advanced technological transformation, profoundly reshaping the global financial landscape. One of the most disruptive innovations is the emergence of crypto assets, which function as electronic

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currencies secured through cryptographic algorithms. These assets operate on blockchain technology, a decentralized system designed to ensure transaction security, transparency, and immutability. This technological structure allows users to conduct peer-to-peer transfers without intermediaries such as banks, fostering an environment characterized by pseudonymity and decentralization (Songtinus et al., 2023). While this offers new opportunities for innovation and financial inclusion, it also presents substantial challenges for regulators and law enforcement agencies in tracking transactions and verifying user identities.

In Indonesia, crypto assets are not recognized as legal tender. Their use as a means of payment is strictly prohibited under several Bank Indonesia Regulations, including Regulation 11/12/PBI/2009 on Electronic Money, Regulation 18/40/PBI/2016 on Payment Transaction Processing, and Regulation 19/12/PBI/2017 on Financial Technology Implementation. Initially, crypto assets were classified as futures commodities under Regulation of the Commodity Futures Trading Supervisory Agency/*Badan Pengawas Perdagangan Berjangka Komoditi (BAPPEBTI)* Number 8 of 2021, allowing their trading on futures exchanges. Regulatory authority was later transferred to Financial Services Authority/*Otoritas Jasa Keuangan (OJK)* to integrate oversight and enhance legal certainty. This transfer was legitimized through Law Number 4 of 2023 on Development and Strengthening of the Financial Sector/*Undang-Undang Pengembangan dan Penguatan Sektor Keuangan (UU P2SK)*, Government Regulation Number 49 of 2024, and Financial Services Authority regulation Number 27 of 2024, redefining crypto assets as digital financial assets (Tambun & Putuhena, 2022).

This rapid regulatory evolution underscores the increasing significance of crypto assets within the financial system while simultaneously exposing systemic vulnerabilities. Globally and domestically, crypto assets have become highly attractive tools for money laundering due to their decentralized and pseudonymous nature, which allows illicit actors to disguise and transfer criminal proceeds across borders with limited detection. In Indonesia, the Financial Transaction Reports and Analysis Center/*Pusat Pelaporan dan Analisis Transaksi Keuangan (PPATK)* recorded suspicious crypto related transactions amounting to approximately IDR 800 billion between 2022 and 2024 (Nugroho, 2024). A large-scale case in 2021 involving PT X reached IDR 22.7 trillion. On a global scale, crypto based money laundering totaled an estimated USD 8.6 billion in 2021 (Harry, 2024). These figures illustrate the magnitude of the threat when crypto assets are used as instruments for financial crime.

Indonesia's legal framework for combating money laundering is primarily governed by Law Number 8 of 2010 on the Prevention and Eradication of the Crime of Money Laundering/*Undang-Undang Pencegahan dan Pemberantasan Tindak Pidana Pencucian Uang (UU PPTPPU)*). However, this law has not fully adapted to the rapid technological changes that facilitate crypto-based money laundering. Indonesia's accession as a member of the Financial Action Task Force (FATF) through Presidential Decree Number 14 of 2024 places the country under an obligation to comply with international standards, particularly FATF Recommendation 15 on New Technologies (Ferreira, 2025). This recommendation requires states to identify and assess risks related to emerging technologies including virtual assets, before their adoption. Despite these obligations, gaps remain between Indonesia's AML framework and FATF standards, especially regarding the regulation of virtual assets (VAs) and virtual asset service providers (VASPs).

Technological transformation in the era of Society 5.0 requires legal frameworks that are adaptive, responsive, and technology-driven. Traditional legal mechanisms alone are insufficient to effectively address crypto-related money laundering. To strengthen AML enforcement, Indonesia has adopted technological solutions such as the goAML platform developed by Financial Transaction Reports and Analysis Center/*Pusat Pelaporan dan Analisis Transaksi Keuangan (PPATK)* to enhance suspicious transaction reporting. However, its current functionality is limited to reporting and registration, lacking advanced detection capabilities. In contrast, emerging machine learning technologies provide

stronger tools to identify suspicious transaction patterns in real time, even under pseudonymous identities (Hanin & Dewayanto, 2024).

This context highlights the urgency of reformulating Indonesia's AML legal framework by integrating technological innovations and strengthening institutional coordination. The adoption of machine learning systems can enhance early detection of crypto-related money laundering in line with FATF's risk-based approach. Moreover, implementing an Integrated Criminal Justice System (ICJS) model which emphasizes structural, substantive, and cultural synchronization can foster more coordinated and effective law enforcement (Setiadi et al., 2017). This integrated approach aims not only to close legal loopholes but also to support financial system stability, economic growth, and responsible digital transformation in Indonesia.

2. Methods

The authors employ a doctrinal legal research method to address the research problem. This method examines statutory provisions and legal doctrines to formulate solutions to contemporary legal challenges (Marzuki, 2017). The primary focus of this study is the reformulation of the Indonesian Anti Money Laundering Law/*Undang-Undang Pencegahan dan Pemberantasan Tindak Pidana Pencucian Uang (UU PPTPPU)* as the legal foundation for AML policy, particularly its integration with the Integrated Criminal Justice System (ICJS) and the use of machine learning technology to detect and prevent money laundering involving crypto assets. The research also applies multiple approaches, including the statute approach to analyze Indonesian laws and regulations, the comparative approach to contrast them with frameworks from other FATF member states such as the United States, and the conceptual approach, which draws on Lawrence Friedman's legal system theory to emphasize the alignment of legal substance, institutional structure, and legal culture (Friedman, 1975).

In addition, the study relies on secondary data sources consisting of primary legal materials such as laws, regulations, and official documents, as well as secondary legal materials including scholarly books, journal articles, and academic papers (Marzuki, 2017). A deductive method is used to analyze the data, starting with general legal principles and moving toward specific case applications. This analytical approach enables the development of concrete conclusions and policy recommendations, particularly regarding the reformulation of Law on the Prevention and Eradication of Money Laundering/*Undang-Undang Pencegahan dan Pemberantasan Tindak Pidana Pencucian Uang (UU PPTPPU)*, to strengthen Indonesia's AML measures against crypto asset-based money laundering through regulatory alignment, technological innovation, and institutional coordination.

3. Results and Discussion

3.1 Existing anti-money laundering policies on crypto assets in Indonesia

In Essence, technology will continue to develop in line with changes and advancements in the times. One of the impacts of technological progress currently being experienced is the global expansion of the crypto assets market in the financial sector. The widespread use of crypto assets globally represents a positive response to the transformation of digital financial systems. Recent data from 2024 shows that the number of crypto users worldwide has reached 562 million (Widowati, 2024). A similar trend is occurring in Indonesia, where crypto growth continues to increase significantly, as shown in the Figure 1.

Based on the data above, the development of crypto asset usage over the last four years shows consistent dynamics from 2021 to 2024, with the number of users nearly doubling. This increase is inseparable from the public's focus on digital finance, viewing crypto assets as a viable digital investment instrument. In addition, the legality of crypto assets in Indonesia has strengthened public confidence in it. Referring to Article 1 of the Minister of Trade Regulation Number 99 of 2018 concerning the General Policy for the Implementation

of Futures Trading of Crypto Assets, cryptocurrency has been legitimized as a commodity traded on the futures exchange (Fitriana & Nuraini, 2023). Implicitly, this regulation affirms that crypto assets are a tradable commodity, and therefore its use is not recognized as a legitimate means of payment (Rohman, 2021). This is consistent with Article 2 of the Currency Law, which stipulates that the currency of the Republic of Indonesia is the “Rupiah,” making it the only legal tender in Indonesia and a symbol of national sovereignty. Furthermore, the regulation of the Rupiah as the official means of payment is reaffirmed in Article 8 of Bank Indonesia Regulation Number 19/12/PBI/2017 concerning the Implementation of Financial Technology, which states that financial technology providers are required to use the Rupiah in all financial transactions.

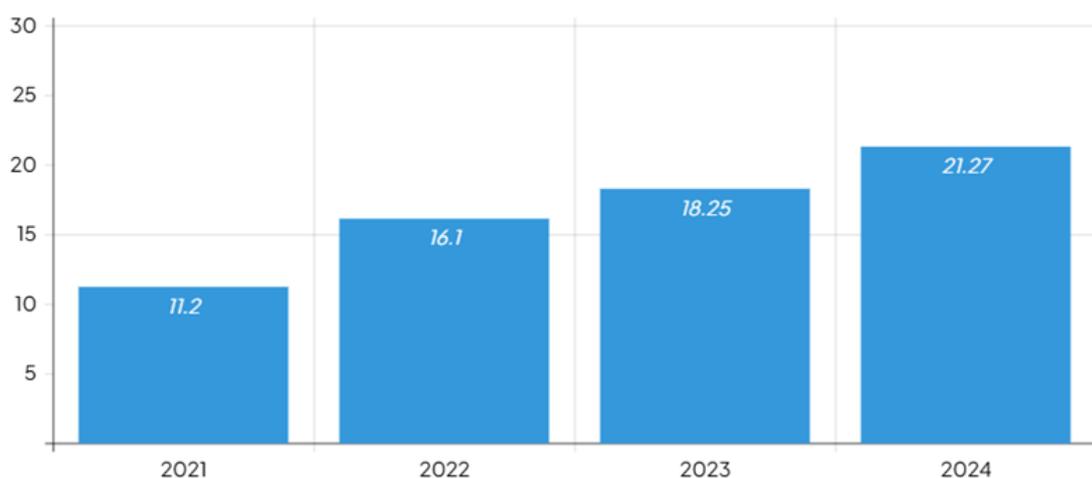


Fig. 1. Total crypto asset users in Indonesia (in millions)

The prohibition of crypto assets use in the payment system reflects the government’s concerns regarding potential risks to monetary stability. First, the use of crypto assets would disrupt the effectiveness of Rupiah value management. Second, the volume of crypto assets transactions has the potential to trigger uncontrollable capital outflows. Third, the complexity of crypto assets transactions involving the banking sector poses a threat to the stability of Indonesia’s financial system. Fourth, the crypto assets market could undermine the effectiveness of Anti-Money Laundering and Counter-Terrorism Financing (AML-CFT) regulations. Fifth, there are concerns regarding violations of consumer protection and vulnerabilities to the misuse of personal data (Sam et.al. 2022).

To enhance the use of crypto assets and establish an integrated financial system in Indonesia, the government, under the Law on Development and Strengthening of the Financial Sector/*Undang-Undang Pengembangan dan Penguatan Sektor Keuangan (UU P2SK)*), has transferred the authority over cryptocurrency from Commodity Futures Trading Supervisory Agency/*Badan Pengawas Perdagangan Berjangka Komoditi (BAPPEBTI)* to the Financial Services Authority/*Otoritas Jasa Keuangan (OJK)*. This transfer also reclassifies crypto assets from a commodity asset to a digital financial asset, as regulated under Government Regulation Number 49 of 2024 and Financial Services Authority Regulation Number 27 of 2024. With this transition, several aspects need to be considered, such as the implications for the existing regulatory framework of crypto assets where Financial Services Authority has regulated crypto assets trading to provide legal certainty while continuing to use Commodity Futures Trading Supervisory Agency’s regulatory framework, the adaptation of supervisory systems by regulatory bodies, and the necessity of having human resources with expertise in crypto assets technology. Without preventive measures, this shift has the potential to create legal loopholes that could be exploited by criminals, including money laundering activities based on crypto assets (Budhi & Kade, 2021).

In addition to its implications for the regulatory framework, the transfer of authority from Commodity Futures Trading Supervisory Agency/*Badan Pengawas Perdagangan*

Berjangka Komoditi (BAPPEBTI) to the financial services authority also impacts supervisory dynamics. The financial services authority must meet the necessary resource capacities, such as specialized experts capable of understanding blockchain technology and big data analysis. However, the transfer of supervisory authority to the financial services authority is still in a transition period, as stipulated by Government Regulation 49/2024, which has been in effect since January 2025. Implementing adjustments to the supervisory framework presents a challenge, given the capabilities required to achieve supervision that can comprehend potential risks. This aligns with the criteria for traded crypto assets set forth in Financial Services Authority Regulation 27/2024, which serves as the foundation for anticipating crypto-asset-based Money Laundering crimes.

Crypto assets have different characteristics from fiat money. Crypto assets enable transactions to be carried out without the involvement of third parties and are not centralized in financial service providers, making it difficult for law enforcement officials to identify, track, and prove the flow of criminal assets. In 2021, the misuse of crypto assets in the form of money laundering globally reached US\$8.6 billion (Thorpe, 2022). Crypto asset-based money laundering has also occurred in Indonesia, as shown in the following Table 1.

Table 1. Crypto-asset-based money laundering cases in Indonesia

No.	Year	Money Laundering Case	Assets Involved
1.	2021	Heru Hidayat Case	IDR 22.78 trillion
2.	2022	Indra kenz Case	IDR 83.36 billion
3.	2023	Rafael Alun Trisambodo Case	IDR 16.6 billion

The data above indicates that crypto-asset-based ML practices have become a focal point of attention in recent years. This phenomenon reflects that crypto assets have been utilized not only as investment instruments but also as a means to disguise the proceeds of crime. Perpetrators attempt to use these assets by exchanging laundered crypto assets and then returning them to their original form to create the illusion that wealth was acquired through legitimate means (Arnone et al., 2025). Crypto asset-based money laundering crimes possess a level of complexity in tracing wealth flows that is far more difficult than traditional cash-based ML crimes. Tracking crypto asset transactions is complex due to their pseudonymity and decentralized nature. These characteristics allow transactions to be conducted without the involvement of a third party. Meanwhile, cash transactions are centralized through financial service providers, making it easier to track the flow of transactions. This difference presents a significant challenge for law enforcement agencies in identifying and tracing the flow of assets, as well as in proving the criminal elements of money laundering.

Indonesia has responded to the dynamics of money laundering with an initial step in the form of the enactment of Law Number 15 of 2002 on Money Laundering Crimes. However, this was considered to be in conflict with the forty recommendations first drafted by the FATF in 1990 as a form of resistance against the abuse of the financial system by perpetrators of money laundering from criminal activities (Karmila, et.al, 2021). In order to comply with the FATF recommendations, Indonesia amended the Prevention and Eradication of Money Laundering Law/*Pencegahan dan Pemberantasan Tindak Pidana Pencucian Uang* (UU TPPU), which was then replaced by Law Number 25 of 2003 concerning Amendments to Law Number 15 of 2002 concerning Money Laundering Crimes. Then in 2010, the revention and Eradication of Money Laundering Law was again amended by the Law on the Prevention and Eradication of Money Laundering/*Undang-Undang Pencegahan dan Pemberantasan Tindak Pidana Pencucian Uang (UU PTPPU)*, which focused on a series of measures to strengthen the prevention and eradication of money laundering crimes. However, with the rise of money laundering crimes internationally, new FATF Recommendations were issued in 2012. In line with this, from February 2013 to February 2025, the FATF recommendations continue to be updated in order to keep pace with developments and international standards (OJK, 2025).

The massive growth of crypto assets in Indonesia has created an urgent need for regulatory adjustments. The Law on the Prevention and Eradication of Money Laundering/*Undang-Undang Pencegahan dan Pemberantasan Tindak Pidana Pencucian Uang (UU PPTPPU)*, and FATF Recommendations have yet to be harmonized. One of the provisions of the Law on the Prevention and Eradication of Money Laundering that has not been harmonized with the FATF recommendation is recommendation 15, which emphasizes the regulation of virtual assets (VA) and virtual asset service providers (VASP). The term VA is similar to crypto assets, both of which are assets traded through digital systems that are vulnerable to misuse in money laundering crimes (Rachmahdani, 2023). The transition of crypto assets into digital financial assets creates a legal vacuum for reporting parties, as stated in Article 17 of the Law on the Prevention and Eradication of Money Laundering/*Undang-Undang Pencegahan dan Pemberantasan Tindak Pidana Pencucian Uang (UU PPTPPU)*.

Aligning the Law on the Prevention and Eradication of Money Laundering, with FATF Recommendations on crypto assets regulation must be carried out promptly as a progressive step to combat crypto-based money laundering. In line with this, the Indonesian Financial Transaction Reports and Analysis Center/*Pusat Pelaporan dan Analisis Transaksi Keuangan (PPATK)*, as the institution responsible for preventing and eradicating money laundering, has introduced the goAML application. goAML serves as a reporting platform for reporting entities and represents a form of digital transformation in the era of Society 5.0. It is an integrated software system used by Financial Intelligence Units (FIU) to combat money laundering, enabling report submission through uploaded data, risk assessment analysis, and dissemination of analytical results (PPATK, 2020). Efforts to strengthen the effectiveness of the goAML application through the implementation of machine learning could serve as an innovative step toward enhancing the prevention of money laundering crimes. Machine learning functions to analyze data with relative speed and accuracy. With the capability to recognize suspicious patterns more rapidly, it will assist the Financial Transaction Reports and Analysis Center in analyzing reports more efficiently (Garnasih, 2016). This not only accelerates report analysis but also increases the precision of the analytical results.

The problem of money laundering cannot be resolved solely through harmonizing the Law on the Prevention and Eradication of Money Laundering, to avoid regulatory gaps or through the application of machine learning to increase the speed and accuracy of report analysis. Rather, progressive and integrative steps are required steps that encompass not only regulatory alignment but also strengthened inter-agency coordination and the effective use of digital technology in the era of Society 5.0. Such measures aim to support the harmonization of international standards within Indonesia's anti-money laundering system, thereby fostering legal progressivity and realizing an inclusive digital financial system (Nasution, 2008).

3.2 The mechanism of the integrated criminal justice system model in the progressivity of anti-money laundering (AML) policy on cryptocurrency and virtual assets to advance national economic development

The progressivity of Indonesia's Anti-Money Laundering and Countering the Financing of Terrorism Law/*Undang-Undang Pencegahan dan Pemberantasan Tindak Pidana Pencucian Uang (UU PPTPPU)* in addressing money laundering through cryptocurrency remains far from optimal. From the perspective of supervision and regulation, the Law on the Prevention and Eradication of Money Laundering lags in its treatment of crypto assets. This gap is caused by the misalignment between the substantive provisions of the Law on the Prevention and Eradication of Money Laundering and the recommendations of the Financial Action Task Force (FATF), which creates potential legal loopholes that perpetrators of money laundering may exploit, particularly crimes closely tied to crypto assets. According to the 2021 Crypto Readiness Index, which measures a country's preparedness to adopt cryptocurrency, the United States ranked first with a total score of

7.13/10 (Harahap, 2025). A review of U.S. regulations reveals significant differences in the regulation and supervision of cryptocurrency compared to Indonesia, as detailed in the appendix.

The contrast between the two countries lies in their regulatory, classificatory, and supervisory approaches to cryptocurrency. The United States, as a full member of FATF, has implemented a comprehensive and sectoral approach to crypto regulation. The substantive content of its regulations has been adapted according to the form and function of crypto assets. By contrast, Indonesia continues to limit its regulatory framework to the classification of crypto as a digital commodity. The Law on the Prevention and Eradication of Money Laundering has not yet explicitly incorporated cryptocurrency as a potential medium for money laundering. Therefore, reformulation of the Law on the Prevention and Eradication of Money Laundering is required to include provisions on virtual assets (VA) and to designate virtual asset service providers (VASP) as reporting entities to the Indonesian Financial Transaction Reports and Analysis Center/*Pusat Pelaporan dan Analisis Transaksi Keuangan (PPATK)*.

The existence of money laundering (ML) crimes facilitated through crypto assets in Indonesia has become an unavoidable reality, thereby necessitating explicit recognition and reinforcement within the framework of the Anti-Money Laundering and Countering the Financing of Terrorism Law/*Undang-Undang Pencegahan dan Pemberantasan Tindak Pidana Pencucian Uang (UU PPTPPU)*. Such recognition is essential for creating a regulatory framework that is both inclusive and humanistic, while at the same time strengthening the overall architecture of Indonesia's criminal law, particularly with respect to the prevention and prosecution of money laundering through crypto assets (Hotta, 2025).

Indonesia's unanimous acceptance as the 40th full member of the Financial Action Task Force (FATF) marks a pivotal moment, as it reflects the country's global commitment to the prevention and eradication of money laundering and related financial crimes. This commitment has been formally established through Presidential Decree No. 14 of 2024. International recognition of Indonesia's FATF membership signifies not only acknowledgment of its efforts but also a binding obligation to adopt and internalize international standards set forth by FATF into its domestic legal framework, especially the Law on the Prevention and Eradication of Money Laundering.

This obligation becomes particularly urgent in light of FATF's revisions in 2018, which amended Recommendation No. 15 and introduced two new definitions in its General Glossary. The urgency was further heightened in 2019 with the issuance of an interpretive note to Recommendation No. 15, which explicitly mandates the application of FATF standards to virtual asset (VA) activities and virtual asset service providers (VASP). These changes underscore the global consensus that crypto assets and related service providers must be brought under the same robust anti-money laundering and counter-terrorism financing (AML/CFT) regimes that apply to traditional financial systems.

Substantively, however, the Law on the Prevention and Eradication of Money Laundering has yet to incorporate terminology explicitly recognizing crypto assets or virtual assets. At present, Article 1 of the Law on the Prevention and Eradication of Money Laundering/*Undang-Undang Pencegahan dan Pemberantasan Tindak Pidana Pencucian Uang (UU PPTPPU)* only regulates "*Harta Kekayaan*" (assets or property) in general terms, without extending its scope to digital financial assets or cryptocurrencies (Raharjo, 2022). This omission creates a substantive gap in Indonesia's legal framework. In contrast, the interpretive note to FATF Recommendation No. 15 emphasizes that any member jurisdiction must consider virtual assets as property or assets subject to AML/CFT measures and must explicitly regulate VASPs as reporting entities. Building upon this obligation, Indonesia must reformulate the Law on the Prevention and Eradication of Money Laundering by incorporating substantive provisions grounded in FATF's General Glossary (FATF, 2025). According to FATF in below.

"A virtual asset is a digital representation of value that can be digitally traded, or transferred, and can be used for payment or investment purposes. Virtual assets do not

include digital representations of fiat currencies, securities and other financial assets that are already covered elsewhere in the FATF Recommendations.” (FATF, 2025).

This definition clarifies that virtual assets encompass a wide spectrum of digital values, while carefully distinguishing them from traditional forms of money, securities, or already-regulated financial instruments. Accordingly, Article 1 point 13 of the Law on the Prevention and Eradication of Money Laundering should be reformulated to align with this international standard. A proposed amendment would redefine “*Harta Kekayaan*” as follows.

“All movable and immovable property, digital financial assets, and crypto assets, whether directly or indirectly owned.” (Article 1 point 13 of the Law on the Prevention and Eradication of Money Laundering).

This formulation would not only harmonize Indonesia’s legal framework with FATF’s standards but also strengthen the inclusivity and adaptability of its anti-money laundering regime in the face of evolving technological realities. Strengthening Compliance Obligations for Virtual Asset Service Providers (VASPs) in the Law on the Prevention and Eradication of Money Laundering Framework. In addition to the proposed amendments to Article 1 of the Law on the Prevention and Eradication of Money Laundering further alignment with international standards is necessary, particularly with respect to Recommendation No. 15 of the FATF. This recommendation emphasizes the importance of strengthening compliance obligations for virtual asset service providers (VASPs) to mitigate the heightened risks of money laundering that arise from the use of virtual assets. Translating this mandate into Indonesia’s legal framework requires substantive provisions that explicitly integrate VASPs within the scope of reporting entities under the Law on the Prevention and Eradication of Money Laundering.

Article 17 of the Law on the Prevention and Eradication of Money Laundering/*Undang-Undang Pencegahan dan Pemberantasan Tindak Pidana Pencucian Uang (UU PPTPPU)*, enumerates reporting parties, which currently include Financial Service Providers (VASPs) and Providers of Goods and/or Other Services (Non-Financial Businesses and Professions/*Penyedia Barang dan/atau Jasa*). However, a closer examination reveals that among the 21 categories of reporting entities listed under Financial Service Providers/*Penyedia Jasa Keuangan (PJK)* and Non-Financial Businesses and Professions/*Penyedia Barang dan/atau Jasa (PBJ)* no one specifically references crypto-asset economic actors. The provision that comes closest is found in point 12, which refers to “e-money and/or e-wallet providers.” Yet, crypto assets cannot be subsumed under this category, as they lack a physical form and have been formally classified as digital financial assets under the Financial Sector Development and Strengthening/*Undang-Undang Pengembangan dan Penguatan Sektor Keuangan (UU P2SK)*, in conjunction with Financial Services Authority regulation Number 27 of 2024, redefining crypto assets as digital financial assets.

Similarly, point 15 of Article 17 refers to “companies engaged in commodity futures trading.” This too cannot reasonably encompass crypto-asset actors, since cryptocurrencies are no longer classified as commodity futures in Indonesia but have instead been recognized as digital financial assets. Consequently, there is no substantive linkage between either of these provisions and the economic activities associated with crypto assets.

This legal gap indicates that the current Law on the Prevention and Eradication of Money Laundering leaves unresolved questions regarding the reporting obligations of actors in the crypto economy. Such ambiguity not only weakens regulatory oversight but also risks increasing the incidence of money laundering facilitated through crypto assets. Furthermore, the absence of explicit obligations for VASPs to report to the Indonesian Financial Transaction Reports and Analysis Center/*Pusat Pelaporan dan Analisis Transaksi Keuangan (PPATK)* undermines compliance with the FATF standards, which demand that VASPs be subjected to equivalent reporting, licensing, and monitoring requirements as

traditional financial institutions. Addressing this gap requires a targeted amendment to Article 17 of the Law on the Prevention and Eradication of Money Laundering, ensuring that VASPs are explicitly included within the category of reporting parties. The FATF's General Glossary provides clear guidance, defining a "virtual asset service provider" as follows.

"Any natural or legal person who is not covered elsewhere under the Recommendations, and as a business conducts one or more of the following activities or operations for or on behalf of another natural or legal person: (i) exchange between virtual assets and fiat currencies; (ii) exchange between one or more forms of virtual assets" (FATF, 2025).

Incorporating this definition into Indonesia's legal framework would harmonize domestic law with international best practices, while also ensuring that crypto-asset actors cannot exploit regulatory blind spots to facilitate illicit financial flows. This definition highlights the necessity of explicitly regulating VASPs within national legislation to prevent gaps in compliance with anti-money laundering (AML) and counter-terrorist financing (CFT) frameworks. A legislative reformulation is therefore required by amending Article 17 paragraph (1) letter (a) of the Law on the Prevention and Eradication of Money Laundering, to read: "financial service providers, digital financial assets, and crypto assets." Such reformulation is consistent with FATF Recommendation No. 15, which requires that VASPs be licensed or registered and subjected to effective systems for monitoring and ensuring compliance with FATF measures. Embedding this provision into Indonesia's legal framework would significantly enhance the capacity to regulate VASPs in accordance with international AML/CFT standards.

To ensure the effectiveness of such legislative adjustments, institutional coordination must also be strengthened through a robust supervisory infrastructure. In parallel, the Financial Services Authority/*Otoritas Jasa Keuangan (OJK)* has been formally designated as a Supervisory and Regulatory Institution/*Lembaga Pengawas dan Pengatur (LPP)* within the *goAML* system, pursuant to Financial Transaction Reports and Analysis Center Regulation No. 6 of 2020 concerning Procedures for the Use of the *goAML* Application by Supervisory and Regulatory Institutions for Compliance Oversight (Hidayat et al., 2024). The coordinated role of Financial Transaction Reports and Analysis Center and financial services authority within this framework represents a significant advancement in the monitoring of reports submitted by reporting entities. Moreover, it reflects a broader commitment to compliance supervision, creating a collaborative oversight mechanism that not only enhances efficiency in reporting but also strengthens preventive measures against money laundering through crypto assets.

However, despite these structural developments, reporting through *goAML* remains largely aggregated into broad categories such as Suspicious Transaction Reports (STRs), Cash Transaction Reports (CTRs), and Cross-Border Funds Transfer Reports. While essential, these categories remain too general and insufficient to effectively address the complexities of money laundering facilitated through crypto assets, particularly given their pseudonymous and decentralized nature. Law enforcement authorities continue to face difficulties in applying suspicious transaction indicators as outlined in Article 23 of the Law on the Prevention and Eradication of Money Laundering. For instance, the statutory transaction threshold of IDR 500,000,000 remains challenging to apply effectively to crypto transactions due to their decentralized and borderless features.

To overcome these challenges, it is imperative to adopt machine learning as a complementary tool to enhance the efficiency and accuracy of crypto-related AML efforts. Machine learning has proven to be a powerful driver in building integrated systems, particularly due to its demonstrated ability to detect suspicious transactions and uncover complex patterns that may otherwise evade traditional monitoring methods (Ardiano et al., 2022). In practice, machine learning algorithms analyze large volumes of transactional data and generate predictive outputs capable of identifying high-risk activities.

Broadly, machine learning operates through three main approaches: supervised learning, unsupervised learning, and reinforcement learning. For AML in crypto-asset

transactions, an unsupervised learning model is particularly suitable, as it allows the system to process reporting data and classify it according to the type of crypto asset or relevant risk indicators without the need for pre-labeled datasets. This methodology could be applied, for example, to determine thresholds for suspicious transactions by identifying unusual clustering patterns in transaction data that deviate from expected norms.

The integration of such models within the Integrated Criminal Justice System (ICJS) would allow Indonesian authorities not only to improve real-time monitoring but also to adapt dynamically to the evolving risks posed by crypto assets. By combining FATF-compliant legislative reforms with advanced technological tools such as machine learning, Indonesia would be well-positioned to establish a robust and forward-looking AML framework that effectively addresses the challenges of money laundering in the digital era.

Based on the diagram, the working mechanism of unsupervised learning begins with the input of raw data, which then undergoes interpretation, algorithmic processing, and systematic analysis, ultimately producing outputs in the form of simplified classifications. In this context, reports submitted by reporting entities through *goAML* can be integrated into the machine learning system, where they are categorized according to pre-determined indicators or classifications. This process functions as an early detection tool for identifying the flow of virtual assets used to facilitate money laundering, such as sudden, large-value transactions.

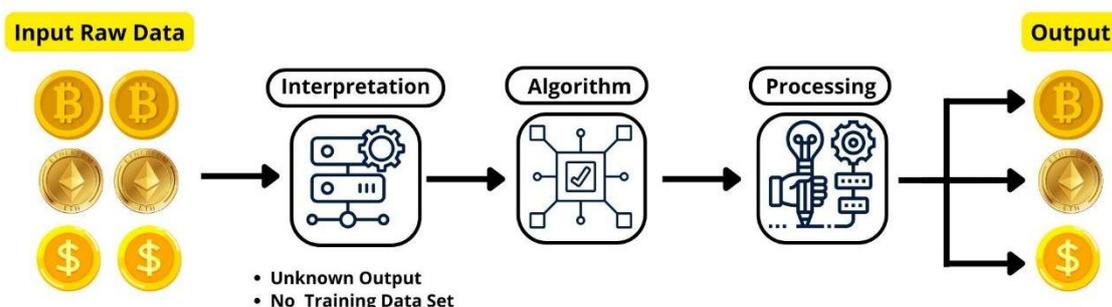


Fig. 2 The working mechanism of unsupervised learning in machine learning

The machine learning system employs algorithms designed to identify hidden patterns or structures within the data, including Hierarchical Clustering, K-Means, and Density-Based Spatial Clustering of Applications with Noise (DBSCAN) (Piternalis et al., 2024). Through these algorithms, the system can automatically group transactions with similar characteristics while simultaneously isolating transactions that fall within illegal or suspicious activities. Consequently, the application of machine learning analyzes crypto-asset transactions more efficiently and effectively, thereby accelerating the detection and response process to money laundering activities facilitated through virtual assets.

Once the classification process through machine learning has been completed, the next stage requires verification and analysis by Financial Transaction Reports and Analysis Center/*Pusat Pelaporan dan Analisis Transaksi Keuangan (PPATK)* analysts. This serves as a secondary layer of validation, ensuring the accuracy of the reports submitted by reporting parties before advancing to the investigation phase. If suspicious transactions or indications of money laundering through crypto assets are identified, Financial Transaction Reports and Analysis Center's role is to review the machine learning outputs, conduct analytical assessments, and, if necessary, suspend or terminate the transactions through the *goAML* platform. This stage also represents a coordinated flow between Financial Services Authority/*Otoritas Jasa Keuangan (OJK)* and Financial Transaction Reports and Analysis Center, designed to address complex crypto-related modus operandi with greater scrutiny. The statutory mandate for Financial Transaction Reports and Analysis Center in performing these functions is stipulated under Article 44 of the Law on the Prevention and Eradication of Money Laundering. Therefore, coordination between Financial Transaction Reports and

Analysis Center and Financial Services Authority in the preventive stages of crypto-related AML enforcement must be continuously optimized.

Following preventive measures, the results of Financial Transaction Reports and Analysis Center’s analysis or examinations must be forwarded to investigators as part of Indonesia’s AML enforcement framework. In this regard, Financial Services Authority acts as an investigator alongside the Indonesian National Police, as provided in Government Regulation No. 5 of 2023 and Financial Services Authority/*Otoritas Jasa Keuangan (OJK)* Regulation No. 16 of 2023. Within this framework, Financial Services Authority is tasked with following up on financial intelligence provided by Financial Transaction Reports and Analysis Center/*Pusat Pelaporan dan Analisis Transaksi Keuangan (PPATK)*. Although Financial Services Authority lacks prosecutorial authority, it is obligated to submit investigation results to the public prosecutor’s office for further legal processing under the applicable procedural laws.

Efforts to prevent and combat the misuse of crypto assets cannot rely solely on structural and substantive synchronization. Cultural synchronization is equally important, serving as a supporting variable that ensures responsible use of crypto assets in Indonesia while aligning technological development with humanistic economic progress. Culturally, such synchronization can be approached from two dimensions, internal and external.

From an internal perspective, adjustments involve capacity building for law enforcement authorities/*Aparat Penegak Hukum (APH)*, particularly in understanding the characteristics of crypto-asset transactions and the evolving modus operandi of associated crimes. Considering the proposed solution of explicitly embedding crypto assets within the Law on the Prevention and Eradication of Money Laundering and utilizing machine learning in *goAML*, law enforcement agencies must be adequately trained to effectively adapt to these developments. From an external perspective, the focus should be on public education and awareness campaigns. These efforts aim to foster digital literacy, raise awareness of the potential risks of crypto-asset misuse, and encourage compliance with legal and ethical standards.

Fundamentally, the criminal justice system serves as one of the most systematic and clearly defined legal mechanisms governing societal conduct. Within this system, the Integrated Criminal Justice System (ICJS) facilitates coordination across law enforcement agencies. ICJS plays a dual role, first, as a system, it embodies functional and institutional interrelationships among its subcomponents in law enforcement; and second, as a process, it requires criminal proceedings to adhere to established substantive and procedural laws (Amin et al., 2024). According to Muladi, ICJS embodies three forms of synchronization: structural synchronization, substantial synchronization, and cultural synchronization (Muladi, 2017). The integration of these dimensions creates a unified mechanism that enhances the effectiveness of preventing and combating money laundering in Indonesia, particularly within the realm of crypto assets.

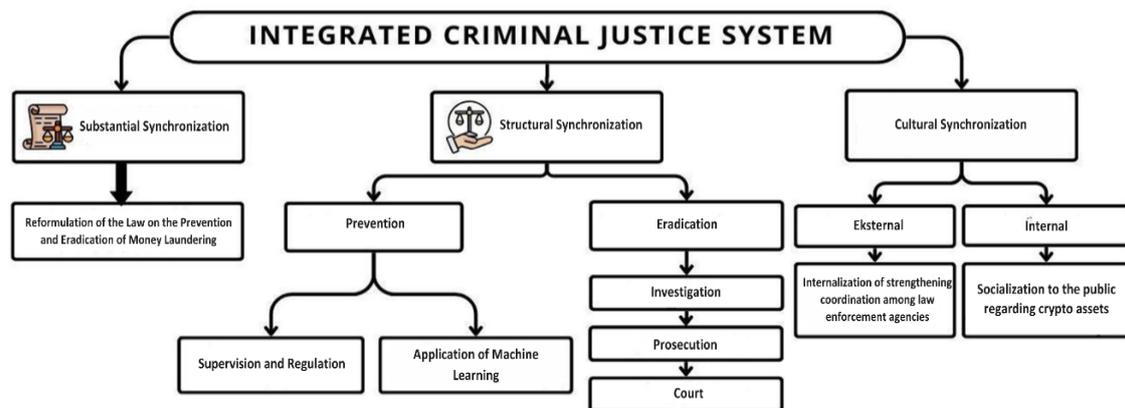


Fig. 3 The Mechanism of the integrated criminal justice system in addressing money laundering through crypto assets

This coordinated innovation represents a holistic approach to strengthening AML frameworks through both legal reform and technological integration, as will be further illustrated in the subsequent figure. Second, structural synchronization entails inter-institutional coordination among authorities with jurisdiction over crypto-related cases. This synchronization aims to optimize the effectiveness of both prevention and enforcement measures against money laundering through crypto assets. It includes the alignment of functions, mandates, and the exchange of data and information among institutions within the Integrated Criminal Justice System (ICJS). The primary institutions engaged in the ICJS framework include the Financial Services Authority, the Indonesian Financial Transaction Reports and Analysis Center/*Pusat Pelaporan dan Analisis Transaksi Keuangan (PPATK)*, the National Police, the Office of the Attorney General, and the judiciary. The specific forms of coordination among these institutions are illustrated in the annex.

Third, optimization must also occur internally within law enforcement agencies and externally within the broader society. Internally, capacity building and institutional reform are essential to strengthen investigative and analytical capabilities, while externally, public education and awareness initiatives are critical to fostering digital literacy and enhancing public resilience to the misuse of crypto assets. Together, these measures are intended to establish a synergistic and humanistic system that balances technological advancement with societal safeguards.

From this analysis, it can be concluded that the ICJS holds significant potential to become the frontline mechanism for building an integrated and inclusive system to prevent and combat money laundering involving crypto assets. Building upon the preceding discussion, it is emphasized that addressing money laundering risks in the crypto-asset sector requires substantial, structural, and cultural synchronization. The proposed solutions focus on prevention by reformulating Article 1(13) and Article 17 of the Law on the Prevention and Eradication of Money Laundering/*Undang-Undang Pencegahan dan Pemberantasan Tindak Pidana Pencucian Uang (UU PPTPPU)*, while simultaneously integrating technological innovation, particularly the use of machine learning within the *goAML* application. The incorporation of the ICJS model provides a comprehensive response to the demands of an inclusive digital financial system. Thus, these measures collectively support the progressive development of AML law in addressing the emerging challenges posed by money laundering through virtual assets in Indonesia.

4. Conclusions

Based on the discussion presented in the previous sections, several conclusions can be drawn. The Anti-Money Laundering (AML) policy on crypto assets in Indonesia has undergone significant development in response to the increasing risks of crypto-based money laundering (ML). The transfer of authority from the Commodity Futures Trading Supervisory Agency/*Badan Pengawas Perdagangan Berjangka Komoditi (BAPPEBTI)* to the Financial Services Authority (OJK) strengthens the supervisory system, shifting crypto assets from tradable commodities on futures exchanges to digital financial assets. The pseudonymous and decentralized nature of crypto transactions creates potential loopholes for ML activities. Unlike centralized fiat money transactions, crypto transactions are difficult to trace, posing challenges for law enforcement authorities in identifying, tracking, and proving the criminal elements of ML offenses. Therefore, harmonization between the Indonesian Anti-Money Laundering Law (Law on the Prevention and Eradication of Money Laundering) and the Financial Action Task Force (FATF) Recommendations is urgently required. To avoid regulatory gaps and enhance analytical speed and accuracy through the adoption of machine learning, a coordinated mechanism among institutions is essential to strengthen both the prevention and eradication of ML within the criminal justice system, promoting legal progressivity and realizing an inclusive digital financial system in Indonesia.

The progressivity of the AML Law in addressing ML crimes through crypto assets in Indonesia remains suboptimal, particularly in terms of supervision and regulation. The

absence of explicit provisions on crypto assets in the AML Law creates legal loopholes that can be exploited by perpetrators (Yanuar, 2022). Thus, a reformulation of the AML Law is necessary to include crypto assets in the definition of “property” and to designate Virtual Asset Service Providers (VASPs) as reporting entities for crypto-related transactions. Moreover, strengthening the reporting system through the integration of the goAML platform with machine learning, particularly unsupervised learning can increase the effectiveness of identifying suspicious transactions. To support this effort, structural coordination among Financial Services Authority/*Otoritas Jasa Keuangan (OJK)*, the Indonesian Financial Transaction Reports and Analysis Center/*Pusat Pelaporan dan Analisis Transaksi Keuangan (PPATK)*, the National Police, the Attorney General’s Office, and the judiciary is essential. Additionally, enhancing the capacity of law enforcement personnel and raising public awareness are crucial cultural measures in combating crypto-based ML crimes. In this way, the proposed solution represents the implementation of the Integrated Criminal Justice System (ICJS), encompassing substantial, structural, and cultural synchronization to reinforce both the prevention and eradication of ML through crypto assets.

Several recommendations and suggestions can be proposed based on the foregoing analysis as follows. Reformulation of the AML Law (Law on the Prevention and Eradication of Money Laundering/*Undang-Undang Pencegahan dan Pemberantasan Tindak Pidana Pencucian Uang (UU PPTPPU)*). The government should urgently amend the AML Law by explicitly including the terms “virtual assets” or “crypto assets” in Article 1, point 13, as part of the definition of “property.” Furthermore, Virtual Asset Service Providers (VASPs) should be explicitly included in Article 17, paragraph (1), as reporting entities. This would serve as a concrete governmental effort to prevent ML crimes involving crypto while simultaneously closing potential legal loopholes that perpetrators might exploit. Optimization of reporting through goAML and machine learning. The effectiveness of suspicious crypto transaction detection should be enhanced by integrating goAML with machine learning technology, especially unsupervised learning models capable of detecting unusual transaction patterns. Strengthening interagency coordination through ICJS. Effective collaboration among Financial Services Authority/*Otoritas Jasa Keuangan (OJK)*, Financial Transaction Reports and Analysis Center/*Pusat Pelaporan dan Analisis Transaksi Keuangan (PPATK)*, the National Police, the Attorney General’s Office, and the judiciary is essential to implement the ICJS model. Such coordination must also be accompanied by capacity-building programs for law enforcement officials and continuous public education initiatives. This dual approach ensures the creation of an integrated and inclusive system capable of responding to the challenges of ML crimes involving crypto assets.

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Author Contribution

The authors contributed to the literature search, interpretation, writing, and proofreading of the manuscript. The authors have read and agreed to the published version of the manuscript.

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Not available. This study relied solely on secondary data and literature reviews concerning money laundering through cryptocurrency assets. It did not involve humans, animals, or issues concerning public health and safety; therefore, no ethical clearance was required.

Informed Consent Statement

Not available. The study did not involve human participants.

Data Availability Statement

Not available. All data analyzed in this study were derived from publicly accessible online sources and institutional reports on cryptocurrency and money laundering risks.

Conflicts of Interest

The authors declare no conflict of interest

Declaration of Generative AI Use

The authors declare that no generative artificial intelligence tools were used in the preparation, writing, analysis, or editing of this manuscript. All contents were produced entirely through the authors' own reasoning, interpretation, and analysis based on existing data and published literature.

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