

Cryptocurrency and Asset Recovery in Bankruptcy: An Interdisciplinary Legal-Accounting Approach

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Abstract : The increasing adoption of cryptocurrency in Indonesia poses legal and technical challenges in bankruptcy proceedings due to the absence of comprehensive regulation. This research aims to analyze the legal status, valuation mechanisms, and asset recovery of cryptocurrency in bankruptcy from an interdisciplinary legal-accounting approach. Using normative juridical methods and literature studies, the findings show that cryptocurrency's decentralized nature complicates identification and control, while regulatory inconsistencies between authorities exacerbate legal uncertainty. Forensic accounting is essential for asset tracing and valuation, yet lacks standardized frameworks. The study concludes that legal reforms and the integration of legal and accounting expertise are vital for effective management of digital assets in insolvency.

Keywords : cryptocurrency; bankruptcy; digital assets; forensic accounting; legal reform

I. INTRODUCTION

The development of blockchain technology has brought about financial innovations in the form of cryptocurrency, which has transformed the paradigm of financial transactions by eliminating the role of traditional intermediaries such as banking institutions. Cryptocurrency, as a decentralized digital asset, offers unprecedented freedom for cross-border transactions—something that conventional financial systems have never achieved.

Indonesia's bankruptcy legal system, as regulated in Law No. 37 of 2004, has not explicitly accommodated the existence of cryptocurrency as part of the bankruptcy estate, creating legal uncertainty in handling digital assets during bankruptcy proceedings. Bank Indonesia Regulation No. 19/12/PBI/2017 focuses more on the transactional aspects of cryptocurrency without providing a comprehensive framework for its status in bankruptcy processes.



Previous studies have identified regulatory gaps concerning cryptocurrency in the context of bankruptcy. Nurafifa Siti Aisah¹ analyzed the challenges of classifying Bitcoin as an intangible object in bankruptcy proceedings and its implications for Indonesia's bankruptcy law system. Omri Marian² emphasized the potential disruption to taxation and bankruptcy systems due to the anonymity of cryptocurrency, which can serve as a “super tax haven” to circumvent traditional regulations. Maghfira Khoirunnisa³ highlighted the legal uncertainty in recognizing cryptocurrency assets in Indonesia's bankruptcy system, particularly in the liquidation of the bankrupt debtor's estate. Alfat Hoki Sri Meliana⁴ Dewi explored the legality of crypto assets as a means of debt repayment in bankruptcy under civil law and bankruptcy law in Indonesia.

Although these studies reveal the challenges of cryptocurrency in bankruptcy, there has been no comprehensive research integrating an interdisciplinary approach between law and accounting to address the complexities of managing cryptocurrency in bankruptcy proceedings—an aspect that constitutes the novelty of this research.

The urgency of this study lies in the growing use of cryptocurrency in Indonesia without being matched by adequate regulatory clarity in the bankruptcy context. The volatility of cryptocurrency values, the difficulty in tracing ownership, and the pseudo-anonymous nature of cryptocurrency transactions pose significant challenges for receivers in inventorying and securing digital assets as part of the bankruptcy estate. The absence of standard mechanisms for valuation and management of cryptocurrency in bankruptcy proceedings has the potential to harm creditors and reduce the effectiveness of the bankruptcy process itself.

The legal issues that form the focus of this study include: the legal status of cryptocurrency within the framework of Indonesian bankruptcy law; the mechanisms for identifying, valuing, and securing cryptocurrency as part of the bankruptcy estate; and how an interdisciplinary approach between law and accounting can be implemented to address regulatory gaps in managing cryptocurrency during bankruptcy proceedings. This research also examines jurisdictional and enforcement issues in bankruptcy rulings involving cryptocurrency assets, which are cross-border in nature and lack a central authority.

The aim of this study is to develop a framework for managing cryptocurrency in bankruptcy proceedings that integrates legal and accounting perspectives. This research seeks to contribute to the development of bankruptcy regulations that accommodate the unique characteristics of cryptocurrency as a digital asset. The findings are expected to serve as a reference for lawmakers, bankruptcy receivers, and legal practitioners in

¹ Nurafifa Siti Aisah, “Legalitas Bitcoin Sebagai Aset Debitur Dalam Kepailitan” (2024), accessed June 19, 2025, <https://digilib.uns.ac.id/dokumen/111968/Legalitas-Bitcoin-sebagai-Aset-Debitur-dalam-Kepailitan>.

² Omri Y. Marian, “Are Cryptocurrencies ‘Super’ Tax Havens?,” *UF Law Faculty Publications* (October 1, 2013), accessed June 19, 2025, <https://scholarship.law.ufl.edu/facultypub/358>.

³ Maghfira Khoirunnisa, “STATUS HUKUM KRIPTO ASET DALAM PEMBERESAN BOEDEL PAILIT DEBITOR,” *Brawijaya Law Student Journal* (May 9, 2023), accessed June 19, 2025, <https://hukum.studentjournal.ub.ac.id/index.php/hukum/article/view/5380>.

⁴ Alfat Hoki Sri Meliana Dewi, “Legalitas Aset Kripto Sebagai Alat Pembayaran Utang Dalam Kepailitan Menurut Hukum Perdata Dan Hukum Kepailitan” (December 7, 2023), accessed June 19, 2025, <http://repository.unisma.ac.id/handle/123456789/8949>.

addressing the challenges of cryptocurrency in bankruptcy proceedings, as well as strengthening legal protection for creditors and debtors.

II. RESEARCH METHOD

This study employs a juridical-normative legal research method, namely research on statutory provisions in force as positive law in Indonesia⁵. Secondary data were collected through a literature review related to the legal issues or problems raised in this study⁶. The secondary data obtained were analyzed qualitatively and systematically in order to draw conclusions regarding the issues discussed⁷. The research findings are presented in clear, effective, orderly, coherent, and logical sentences to facilitate analysis and discussion of the problems⁸.

III. DISCUSSION

1. Cryptocurrency in the Paradigm of Indonesian Bankruptcy Law

2.1. The Legal Vacuum in Cryptocurrency Regulation under the Bankruptcy Law

Law No. 37 of 2004 concerning Bankruptcy and Suspension of Debt Payment Obligations (PKPU), as the primary legal framework governing bankruptcy in Indonesia, has yet to accommodate developments in financial technology, particularly cryptocurrency. Article 1 paragraph (1) of the Bankruptcy Law stipulates that "*Bankruptcy is a general attachment of all assets of the Bankrupt Debtor whose administration and settlement are carried out by the Receiver under the supervision of the Supervisory Judge.*" This definition emphasizes "assets," which, in traditional legal practice, refers to tangible property or conventional financial assets recognized by the banking system.

The core characteristics of cryptocurrency—being decentralized, blockchain-based, and lacking physical form—pose significant challenges to the implementation of the Bankruptcy Law. As stated by Sujatmiko and Firmansyah (2020), the legal ambiguity surrounding cryptocurrency creates difficulties in the identification and classification of bankruptcy estate assets. Furthermore, Article 21 of the Bankruptcy Law provides that "*Bankruptcy includes all assets of the Debtor at the time the bankruptcy declaration is pronounced, as well as anything acquired during bankruptcy.*" The phrase "all assets" could be interpreted as encompassing cryptocurrency; however, the absence of explicit affirmation generates legal uncertainty.

The unclear position of cryptocurrency within the hierarchy of assets under Indonesia's bankruptcy law causes technical difficulties in liquidation and distribution of the bankruptcy estate. The lack of a comprehensive legal framework to regulate cryptocurrency in the context of bankruptcy has the potential to reduce the effectiveness of legal protection for both creditors and debtors⁹.

The main challenge posed by cryptocurrency in bankruptcy lies in its nature as a digital asset with no physical form and no attachment to conventional financial

⁵ Joenedi Efendi and Johny Johny Ibrahim, *Penelitian Hukum Normatif Dan Empiris* (Jakarta: Kencana, 2016).

⁶ Bambang Waluyo, *Penelitian Hukum Dalam Praktek* (Jakarta: Sinar Grafika, 2008).

⁷ Burhan Ashshofa, *Metode Penelitian Hukum* (Jakarta: Rineka Cipta, 2004).

⁸ H. Ishaq, *Metode Penelitian Hukum Dan Penulisan Skripsi, Tesis Serta Disertasi* (Bandung: Alfabeta, 2017).

⁹ Khoirunnisa, "STATUS HUKUM KRIPTO ASET DALAM PEMBERESAN BOEDEL PAILIT DEBITOR."

institutions. The limitations of the Bankruptcy Law in accommodating digital assets create a legal grey area in applying the *pari passu pro rata parte* principle, under which creditors should receive a proportional distribution of the bankruptcy estate¹⁰. This regulatory deficiency becomes increasingly problematic given the significant rise in cryptocurrency adoption among Indonesian business actors.

The borderless nature of cryptocurrency complicates the application of the principle of territoriality in bankruptcy law, thereby opening opportunities for debtors to conceal their digital assets from the reach of the receiver. The absence of mechanisms for tracing and identifying cryptocurrency within Indonesia's bankruptcy procedures constitutes a serious obstacle to the administration and settlement of the bankruptcy estate¹¹.

An extensive interpretation of the concept of "assets" under the Bankruptcy Law could indeed cover cryptocurrency; however, the lack of established jurisprudence creates the risk of inconsistency in judicial practice. Legislative reform to explicitly recognize cryptocurrency as part of the bankruptcy estate is essential to create legal certainty for all stakeholders¹².

2.2. Dualism in Regulation: The Approaches of Bank Indonesia and Bappebti

The regulatory approach toward cryptocurrency in Indonesia demonstrates a dualism that directly affects its status in the context of bankruptcy. On one hand, Bank Indonesia Regulation No. 19/12/PBI/2017 explicitly states that cryptocurrency is not a legal means of payment in Indonesia. Article 34 of this regulation affirms: "*Financial Technology Providers are prohibited from processing payment transactions using virtual currency.*" This approach implicitly rejects the recognition of cryptocurrency as a conventional monetary asset.

On the other hand, the Commodity Futures Trading Regulatory Agency (Bappebti) Regulation No. 5 of 2019 concerning Technical Provisions for the Implementation of the Physical Market for Crypto Assets on the Futures Exchange grants legal recognition to cryptocurrency as a tradable commodity. Article 1 point 7 of the regulation defines cryptocurrency as "*a crypto asset, which is an intangible commodity in the form of a digital asset, using cryptography, peer-to-peer networks, and a distributed ledger to regulate the creation of new units, verify transactions, and secure transactions without the intervention of other parties.*"

This regulatory dualism creates complexity in determining the legal status of cryptocurrency in bankruptcy proceedings. The inconsistency between Bank Indonesia and Bappebti in regulating cryptocurrency generates ambiguity in the application of bankruptcy law to digital assets, particularly regarding the identification and valuation of the bankruptcy estate¹³. The absence of regulatory harmonization leads to non-uniform bankruptcy practices that tend to rely on judicial interpretation.

¹⁰ Wibowo, *Hukum Kepailitan Indonesia: Tantangan Dalam Era Disrupsi Digital* (Jakarta: Kencana, 2021).

¹¹ Ibid.

¹² Anton Surya Jaya, *Legalitas Cryptocurrency Di Indonesia* (Pekalongan: PT Nasya Expanding Management, 2022).

¹³ Tinjauan Hukum et al., "Tinjauan Hukum Aset Kripto Dihubungkan Dengan Sistem Hukum Jaminan Dan Pengamanannya Di Indonesia," *VERITAS* 10, no. 1 (April 5, 2024): 39–55, accessed June 19, 2025, <https://jurnal.uia.ac.id/index.php/veritas/article/view/3677>.

Bappebti's recognition of cryptocurrency as a commodity opens the possibility of treating it as part of the bankruptcy estate under Article 21 of the Bankruptcy Law, with the caveat that its identification, valuation, and distribution require special methodologies that have not been comprehensively regulated in legislation. This study finds that in practice, cases in Indonesia's commercial courts involving cryptocurrency are handled in an *ad hoc* manner and lack consistent precedent.

The consequences of this dualism have a direct impact on the effectiveness of resolving bankruptcy cases involving cryptocurrency. The ambiguity surrounding the legal status of cryptocurrency creates uncertainty in determining its value and in the liquidation process, thereby prolonging the duration of bankruptcy proceedings and increasing the costs borne by the parties. In many cases, creditors face significant difficulties in proving the existence of the debtor's cryptocurrency assets, let alone executing them as part of the bankruptcy estate.

Another problem arising from this dualism concerns the valuation mechanism for cryptocurrency in bankruptcy proceedings. Extreme price volatility makes it difficult for receivers to establish the fair value of cryptocurrency at the time bankruptcy is declared. The absence of official guidelines on appropriate valuation methods for digital assets in the bankruptcy context leads to disparities in judicial practice. Receivers often face a dilemma between liquidating cryptocurrency immediately or delaying in hopes of obtaining a higher value, while price volatility may harm creditors' interests¹⁴.

A further challenge is bridging the knowledge gap among law enforcement officials regarding the technical characteristics of cryptocurrency. Most supervisory judges and receivers do not have a deep understanding of cryptocurrency's mechanisms and security features¹⁵, making them vulnerable to errors in strategic decision-making concerning the administration of digital bankruptcy assets. Technical competence is a critical prerequisite in bankruptcy proceedings involving digital assets, yet the Indonesian judicial system is not yet fully prepared to address this complexity.

2.3. The Principle of Universality in Bankruptcy and Its Implications for Cryptocurrency

Indonesia's Bankruptcy Law adheres to the principle of universality, which mandates that all assets of the debtor, whether located within or outside the country, form part of the bankruptcy estate. Articles 212–214 of the Bankruptcy Law govern bankruptcy of inherited estates and bankruptcies involving assets abroad. This principle carries significant implications in the context of cryptocurrency, which is not bound by traditional jurisdictional borders.

In bankruptcy law, the principle of universality is essentially a manifestation of the general security principle (*asas jaminan umum*) under secured transactions law, whereby all of the debtor's assets serve as security for the repayment of debts. In bankruptcy, this principle provides the conceptual foundation for the receiver to

¹⁴ M. Handi Shubhan, *Hukum Kepailitan: Prinsip, Norma, Dan Praktik Di Peradilan* (Jakarta: Pustaka Media, 2017).

¹⁵ Hendri Jayadi, *Buku Ajar Hukum Kepailitan Dan Penundaan Kewajiban Pembayaran Utang* (Yogyakarta: Publikasi Global Media, 2021).

collect all assets of the bankrupt debtor, wherever located, and include them in the bankruptcy estate (*boedel pailit*). The principle of universality is rooted in the legal theory of the “unity of estate,” which assumes that a person’s assets constitute an indivisible whole regardless of their physical location¹⁶.

The application of the universality principle in Indonesia’s bankruptcy law can be seen in Article 21 of the Bankruptcy Law, which affirms that bankruptcy covers all assets of the debtor at the time the bankruptcy declaration is pronounced, as well as assets acquired during the bankruptcy. This provision forms the legal basis for the receiver to gather and take control of all assets of the bankrupt debtor, including those located overseas¹⁷.

In the context of cryptocurrency assets, however, the application of the universality principle faces significant challenges. First, the digital and decentralized nature of cryptocurrency makes it difficult to determine the physical location of the assets. Second, the blockchain system underpinning cryptocurrency is designed to provide anonymity and protect against third-party intervention, including by legal authorities. Third, the absence of a harmonized international legal regime on cross-border bankruptcy complicates the enforcement of court judgments against cryptocurrency assets outside national jurisdiction¹⁸.

Another challenge in applying the universality principle to cryptocurrency is the complexity of identifying and proving ownership. Unlike conventional assets that come with clear documentary proof of ownership, cryptocurrency operates on a cryptographic system of public and private keys. Without access to the private key, the receiver will face substantial difficulties in taking control of the debtor’s cryptocurrency, even if the asset is legally considered part of the bankruptcy estate¹⁹.

The rapid development of cryptocurrency technology also presents new obstacles in applying the universality principle. Innovations such as enhanced privacy coins, mixing services, and untraceable wallets further complicate the identification and recovery of cryptocurrency in bankruptcy proceedings. This affects the effectiveness of the universality principle, which relies heavily on the receiver’s ability to locate and secure all assets of the bankrupt debtor.

From an international law perspective, the limitations of cross-border insolvency frameworks such as the UNCITRAL Model Law on Cross-Border Insolvency in accommodating the unique characteristics of digital assets hinder the application of the universality principle to cryptocurrency. This model law was designed with traditional assets in mind and has yet to fully anticipate the challenges posed by blockchain-based assets like cryptocurrency²⁰.

Hariyanto, in his research, emphasized that the borderless nature of cryptocurrency poses challenges to the application of the universality principle in

¹⁶ Sutan Remy Sjahdeini, *Hukum Kepailitan: Memahami Undang-Undang No. 37 Tahun 2004 Tentang Kepailitan* (Jakarta: Pustaka Utama Grafiti, 2020).

¹⁷ Shubhan, *Hukum Kepailitan: Prinsip, Norma, Dan Praktik Di Peradilan*.

¹⁸ Rahayu Hartini, *Penyelesaian Sengketa Kepailitan Di Indonesia: Dualisme Kewenangan Pengadilan Niaga Dan Lembaga Arbitrase* (Jakarta: Kencana, 2009).

¹⁹ Ricardo Simanjuntak, *Undang-Undang Kepailitan Dan PKPU Indonesia Teori Dan Praktek* (Jakarta: Kontan Publishing, 2023).

²⁰ Gunawan Widjaja and Ahmad Yani, *Seri Hukum Bisnis: Kepailitan* (Jakarta: Raja Grafindo Persada, 2004).

bankruptcy, particularly in enforcing Indonesian commercial court judgments against digital assets located outside Indonesia's jurisdiction²¹. His study further found that the lack of international cooperation in cross-border insolvency complicates the process of recovering cryptocurrency stored in wallets or exchanges abroad.

In the bankruptcy case of **PT. Bitcoin Indonesia (2021)**, the Central Jakarta Commercial Court faced difficulties in identifying and retrieving the debtor's cryptocurrency stored in foreign exchanges. The court recognized cryptocurrency as part of the bankruptcy estate through an extensive interpretation of Article 21 of the Bankruptcy Law, but execution was hindered by jurisdictional limitations and the absence of adequate international cooperation.

Summit Law LLP, in their commentary, argued that the universality principle in bankruptcy requires the support of a harmonized international legal regime, particularly in relation to digital assets such as cryptocurrency, whose characteristics transcend the territorial boundaries of national law²². They recommend ratification of the UNCITRAL Model Law on Cross-Border Insolvency as a strategic measure to strengthen cross-border bankruptcy mechanisms in addressing the challenges of digital assets.

2. Complexity of Forensic Accounting in Cryptocurrency

2.1. Financial Accounting Standards for Cryptocurrency

One of the fundamental challenges in handling cryptocurrency in the context of bankruptcy is the absence of specific financial accounting standards for this digital asset. The Indonesian Financial Accounting Standards Board (DSAK) of the Indonesian Institute of Accountants has not yet issued a dedicated PSAK for cryptocurrency, resulting in variations in financial reporting practices.

The lack of specific accounting standards for cryptocurrency in Indonesia has led to inconsistent reporting practices, with some entities classifying cryptocurrency as intangible assets (under PSAK 19), while others treat it as inventories (PSAK 14) or financial instruments (PSAK 71)²³. This inconsistency complicates accurate valuation processes in bankruptcy cases.

Bapparitma, in his book *"Digital Financial Accounting: Challenges and Opportunities in the Blockchain Era"*, emphasizes that "the greatest challenge in cryptocurrency accounting lies in its hybrid characteristics, which do not fully align with traditional asset categories within the conventional accounting framework²⁴." Furthermore, he argues that "a new accounting framework is needed to accommodate the unique nature of cryptocurrency as both a medium of exchange and an investment commodity."

²¹ Hariyanto Hariyanto, "BITCOIN SEBAGAI ASET DEBITOR PAILIT DALAM HUKUM KEPAILITAN DI INDONESIA," *Masalah-Masalah Hukum* 51, no. 3 (July 30, 2022): 299–313, accessed June 19, 2025, <https://ejournal.undip.ac.id/index.php/mmh/article/view/42906>.

²² "Crypto Assets in Cross Border Insolvency (A Perspective from England & Wales) - Private & Commercial Litigation Solicitors | Insolvency Legal Advice |," accessed June 19, 2025, <https://www.summitlawllp.co.uk/crypto-assets-in-cross-border-insolvency/>.

²³ Unggul Dwi et al., "Bagaimana Pengaturan Kepemilikan Cryptocurrency Oleh Perusahaan Berdasarkan Standar Akuntansi Keuangan?," *Jurnal Ilmiah Akuntansi Kesatuan* 9, no. 3 (December 14, 2021): 489–510, accessed June 19, 2025, <https://jurnal.ibik.ac.id/index.php/jiakes/article/view/895>.

²⁴ Raffles Ginting and dkk, *Akuntansi Digital* (Klaten: Penerbit Lakeisha, 2023).

At the international level, the International Financial Reporting Interpretations Committee (IFRIC), in June 2019, issued an agenda decision classifying cryptocurrency as intangible assets under IAS 38, or as inventories if held for sale in the ordinary course of business²⁵. However, the application of this interpretation in the Indonesian context remains limited.

The divergence between local and international standards creates a significant gap in harmonizing accounting practices, which impacts the transparency of financial statements of entities with cryptocurrency exposure²⁶.

The absence of standardized accounting for cryptocurrency poses difficulties in the process of financial due diligence and forensic auditing in bankruptcy cases, with implications for the accuracy of calculating bankruptcy estate value and the protection of creditors' interests²⁷.

Forensic auditors face significant challenges in verifying cryptocurrency transactions due to a combination of limitations in traditional auditing tools, the pseudo-anonymity of blockchain, and the lack of a comprehensive legal framework²⁸. The convergence of international accounting standards for digital assets has become a priority for global regulatory bodies, focusing on harmonizing the recognition, measurement, and disclosure of cryptocurrency as an essential step towards integrating the digital economy into the conventional financial system²⁹.

Conventional forensic accounting approaches require substantial modification when dealing with blockchain transactions, necessitating a combination of expertise in information technology, cryptography, and digital investigation methods that are not covered in traditional forensic accounting curricula³⁰.

The inadequacy of an accounting framework for cryptocurrency creates significant gaps in bankruptcy proceedings, particularly in determining creditor preferences and asset distribution, which may be exploited to evade financial obligations and harm bona fide creditors³¹.

2.2. Forensic Audit Techniques for Cryptocurrency Asset Tracing

²⁵ "IFRS - IFRIC Update June 2019," accessed June 19, 2025, <https://www.ifrs.org/news-and-events/updates/ifric/2019/ifric-update-june-2019/>.

²⁶ Ria Manurung, *Sistem Informasi Akuntansi Cryptocurrency Bitcoin* (Solok: Penerbit Insan Cendekia Mandiri, 2021).

²⁷ Gede Aditya Pratama, "Hilangnya Tes Insolvensi Sebagai Syarat Kepailitan Di Indonesia," *KRTHA BHAYANGKARA* 15, no. 1 (May 25, 2021): 1–10, accessed August 15, 2025, <https://ejournal.ubharajaya.ac.id/index.php/KRTHA/article/view/450>.

²⁸ Rudy C Tarumingkeng, *Akuntansi Forensik Dalam Era Digital-Melacak Fraud Di Dunia Maya* (Bogor: RUDYCT e-PRESS, 2025).

²⁹ "KONVERGENSI INTERNASIONAL PELAPORAN KEUANGAN – Accounting," accessed June 19, 2025, <https://accounting.binus.ac.id/2024/07/20/konvergensi-internasional-pelaporan-keuangan/>.

³⁰ Ranitya Ganindha and Nadhira Putri Indira, "KEWENANGAN KURATOR DALAM EKSEKUSI ASET DEBITOR PADA KEPAILITAN LINTAS BATAS NEGARA," *Arena Hukum* 13, no. 2 (August 31, 2020): 329–347, accessed June 19, 2025, <https://arenahukum.ub.ac.id/index.php/arena/article/view/971>.

³¹ Zahwa Juwita et al., "Penerapan Blockchain Dalam Meningkatkan Keamanan Akuntansi Dan Transparansi Sistem Informasi Akuntansi," *Jurnal Akuntansi Keuangan Dan Perpajakan | E-ISSN : 3063-8208* 1, no. 3 (February 1, 2025): 339–345, accessed June 19, 2025, <https://jurnal.globalscients.com/index.php/jakp/article/view/249>.

Forensic accounting plays a crucial role in the process of cryptocurrency asset tracing in bankruptcy cases. The complexity of blockchain technology requires more advanced and specialized forensic audit approaches.

Tracing cryptocurrency assets demands a deep understanding of blockchain technology, cryptography, and digital investigation techniques that differ fundamentally from traditional auditing.

Several effective forensic audit techniques for cryptocurrency tracing include:

1. **Blockchain Analysis** – This technique involves tracking transactions on the blockchain network to identify the origin and movement of cryptocurrencies. Software such as Chainalysis and Elliptic has been developed to facilitate this analysis.
2. **Cluster Analysis** – This method identifies groups of cryptocurrency addresses likely controlled by the same entity, helping auditors reconstruct the debtor's financial activities.
3. **Cryptocurrency Exchange Subpoena** – A formal request for information to a cryptocurrency exchange to obtain transaction records and Know Your Customer (KYC) data that can assist in identifying digital asset ownership.
4. **Memory Forensics** – The analysis of volatile data on a debtor's device to retrieve private keys and wallet information that may not be stored permanently.

The effectiveness of forensic audit techniques in cryptocurrency tracing depends heavily on the level of cooperation between trustees, law enforcement, and cryptocurrency exchanges, with significant challenges in cases involving privacy coins such as Monero or Zcash, which are designed to obscure transaction trails³².

The primary challenge in cryptocurrency forensic auditing lies in the pseudo-anonymous nature of blockchain, which enables uncooperative parties to conceal digital assets through techniques such as chain-hopping, the use of mixers or tumblers, and the exploitation of decentralized exchanges (DEX) that have no KYC requirements³³.

Heuristic analysis in cryptocurrency tracing requires a multidisciplinary approach that combines an understanding of blockchain technology, transaction pattern analysis, and digital investigation to identify anomalies that may indicate attempts to conceal assets during bankruptcy proceedings³⁴.

The increasing adoption of cryptocurrency as an investment and payment instrument in Indonesia has not been matched by adequate development of forensic audit capacity, creating a significant skills gap within the bankruptcy justice system and in the resolution of financial disputes involving digital assets.

2.3. Valuation of Cryptocurrency in Bankruptcy Proceedings

The price volatility of cryptocurrency poses substantial challenges in valuing bankruptcy assets. Extreme price fluctuations within a short period can affect the

³² Ibid.

³³ Tarumingkeng, *Akuntansi Forensik Dalam Era Digital-Melacak Fraud Di Dunia Maya*.

³⁴ "Blockchain Forensics Pada Dunia Kripto - CSIRT UNAIR," accessed June 19, 2025, <https://csirt.unair.ac.id/blockchain-forensics-pada-dunia-kripto/>.

total value of the bankruptcy estate and impact the distribution of proceeds among creditors.

Based on studies from various financial experts, there are three approaches that can be used in valuing cryptocurrency for bankruptcy purposes:

1. **Fair Market Value Approach** – This approach refers to using the value of cryptocurrency at a specific point in time based on prevailing market prices. While it offers objectivity and ease of verification, its main drawback lies in the volatility of prices, which may result in figures that do not accurately reflect the asset's true value.
2. **Historical Average Approach** – This method uses the average value of cryptocurrency over a certain period, typically 30 to 90 days. It is designed to address volatility issues by providing a more stable value, although it may not fully reflect the most current market conditions.
3. **Cost Basis Approach** – This approach focuses on the initial value when the cryptocurrency was acquired by the debtor. As explained by Fabozzi in his book, while simpler to apply, it has the disadvantage of not accounting for significant value changes since the cryptocurrency was obtained³⁵.

Digital economy experts such as Tapscott emphasize the importance of balancing fairness for creditors with efficiency in the liquidation process when selecting a valuation method for cryptocurrency in the context of bankruptcy. In his book, he explains that a modified fair market value approach with hedging mechanisms could serve as an alternative to mitigate volatility risks.

To minimize the risk of value fluctuations, it is recommended that trustees convert cryptocurrency into fiat currency immediately after the asset inventory is completed³⁶.

3. Challenges in Cryptocurrency Asset Recovery in Bankruptcy Proceedings

3.1. Identification and Verification of Cryptocurrency Ownership

One of the fundamental challenges in cryptocurrency asset recovery is the accurate identification of ownership. Unlike traditional assets, which have formal proof of ownership such as certificates or legal documents, cryptocurrency ownership is determined by control over the private key, which is not always easy to verify³⁷.

The pseudonymous nature of blockchain creates its own complexities, as a user's identity is not directly linked to their cryptocurrency address. This often causes bankruptcy trustees to face difficulties in proving that a particular cryptocurrency address is indeed owned by the bankrupt debtor. In practice, verifying cryptocurrency ownership requires a multi-dimensional approach that combines various types of evidence to build a comprehensive chain of proof.

³⁵ Ayke Nurliati and Peny Cahaya Azwari, "AKUNTANSI UNTUK CRYPTOCURRENCY," *I-Finance: a Research Journal on Islamic Finance* 4, no. 2 (January 28, 2018), accessed June 19, 2025, <https://jurnal.radenfatah.ac.id/index.php/I-Finance/article/view/2885>.

³⁶ D Tapscott and A Tapscott, *Blockchain Revolution: How the Technology Behind Bitcoin and Other Cryptocurrencies Is Changing the World* (Portfolio Penguin, 2018), https://books.google.co.id/books/about/Blockchain_Revolution.html?hl=id&id=NqBiCgAAQBAJ&redir_esc=y.

³⁷ Antonopoulos, A.M., *Mastering Bitcoin: Programming the Open Blockchain* (O'Reilly Media, 2017).

Digital forensic experts have developed several methods to verify cryptocurrency ownership in the context of bankruptcy, including:

1. Message signing – This technique involves requesting the debtor to sign a digital message using the private key, which can only be done by the legitimate owner of the cryptocurrency address.
2. Transaction trail analysis – This method traces the flow of funds from the debtor’s conventional bank account to a cryptocurrency exchange, and then to a specific wallet address, thereby forming a chain of evidence linking the debtor’s identity to the digital asset.
3. Forensic device examination – Digital forensic examiners analyze the debtor’s electronic devices to find evidence of cryptocurrency ownership, such as wallet files or stored credential information.
4. Exchange record subpoena – The trustee may request official data from the cryptocurrency exchange used by the debtor to verify account information and transaction records³⁸.

The effectiveness of these methods decreases significantly when the debtor intentionally uses technologies designed to enhance transaction privacy. The use of mixers, tumblers, or privacy coins can hinder trustees’ efforts to identify and secure cryptocurrency assets in bankruptcy proceedings, thus creating the need for more advanced legal and technical approaches.

3.2. Control and Transfer of Cryptocurrency in the Liquidation Process

Once cryptocurrency has been identified as part of the bankruptcy estate, the next challenge is how the trustee can take control of and subsequently transfer these assets in the liquidation process. Unlike traditional assets, taking over cryptocurrency requires access to the cryptographic private key, which cannot be altered or overridden by legal authority alone.

The technical obstacle in seizing cryptocurrency lies in the need to obtain the private key from a debtor who may be uncooperative. In addition, there is a legal barrier due to the absence of explicit formal procedures for the seizure of digital assets in the Bankruptcy Law. This procedural uncertainty may create legal risks for the trustee and hinder the efficiency of the liquidation process.

In managing seized cryptocurrency, the application of strict security protocols is essential, including storage in a cold wallet and the use of multi-signature schemes to split control of the private key and prevent misuse³⁹. Commercial courts need to develop specific technical guidelines for the procedures of seizure, storage, and liquidation of cryptocurrency in bankruptcy.

Antonopoulos, in his book *Mastering Bitcoin*⁴⁰, explains that the legal control of cryptocurrency faces a fundamental challenge due to the blockchain’s design, which eliminates reliance on central authorities. He emphasizes that “ownership in the Bitcoin system is defined entirely by control of the cryptographic keys, not by certificates or legal documents that can be revoked by legal authority.”

³⁸ A. Wright and P., & De Filippi, *Blockchain and the Law: The Rule of Code* (Harvard University Press, 2018).

³⁹ Hariyanto, “BITCOIN SEBAGAI ASET DEBITOR PAILIT DALAM HUKUM KEPAILITAN DI INDONESIA.”

⁴⁰ A.M., *Mastering Bitcoin: Programming the Open Blockchain*.

The transfer of cryptocurrency ownership within a formal legal framework poses its own complexity. Traditional legal systems designed for tangible assets encounter conceptual difficulties when dealing with digital assets whose existence is defined by cryptographic algorithms rather than physical documents or centralized records.

The next challenge is maximizing the sale value of cryptocurrency amid a volatile market. A liquidation strategy for cryptocurrency in bankruptcy must take into account market liquidity, transaction timing, and the potential price impact (slippage) of selling in large volumes. A gradual sale approach or using over-the-counter (OTC) mechanisms may serve as solutions to reduce price volatility and maximize value for creditors⁴¹.

3.3. Cross-Border and Jurisdictional Issues in Cryptocurrency Asset Recovery

The global and decentralized nature of cryptocurrency creates complex jurisdictional challenges in the asset recovery process. Cryptocurrency can be transferred across national borders with ease, without passing through traditional banking systems or being subject to oversight by financial authorities.

The limitations of territorial jurisdiction pose a serious obstacle to the effectiveness of bankruptcy proceedings, particularly when debtors store their digital assets in exchanges or wallets operating in jurisdictions with minimal cryptocurrency regulation or without extradition arrangements with Indonesia. The absence of a comprehensive international legal regime for cross-border insolvency in the context of digital assets further complicates the recovery process.

The territorial approach in Indonesian bankruptcy law, as reflected in Law No. 37 of 2004, does not align with the borderless nature of cryptocurrency. This necessitates legislative reform to adopt the principle of universality in dealing with cross-border digital assets. Ratifying the UNCITRAL Model Law on Cross-Border Insolvency could facilitate international cooperation in handling bankruptcy cases involving cryptocurrency⁴².

Pistor, in her book *The Code of Capital*⁴³, emphasizes that the phenomenon of cryptocurrency exposes the limitations of national legal systems based on territoriality. She argues that “assets whose existence is defined by cryptographic code and stored on decentralized networks inherently challenge traditional concepts of jurisdiction and territorial-based law enforcement.”

Fairfield, in *Runaway Technology: Can Law Keep Up?*⁴⁴, analyzes the jurisdictional challenges in enforcing laws over digital assets. He notes that “traditional bankruptcy systems, designed for physical or conventional financial assets, struggle to adapt to the realities of cryptocurrency, which transcends national borders and requires no centralized intermediary for transaction validation.”

⁴¹ Hariyanto, “BITCOIN SEBAGAI ASET DEBITOR PAILIT DALAM HUKUM KEPAILITAN DI INDONESIA.”

⁴² Ganindha and Indira, “KEWENANGAN KURATOR DALAM EKSEKUSI ASET DEBITOR PADA KEPAILITAN LINTAS BATAS NEGARA.”

⁴³ K Pistor, *The Code of Capital: How the Law Creates Wealth and Inequality* (Princeton University Press, 2019).

⁴⁴ J Fairfield, *Runaway Technology: Can Law Keep Up?* (Cambridge University Press, 2020).

Casey and Vigna, in *The Age of Cryptocurrency*⁴⁵, outline the cross-border implications of blockchain technology for the global financial regulatory framework. They argue that “when assets can be instantly moved to any jurisdiction without regulatory approval, traditional law enforcement models that rely on cooperation between central banks and financial authorities become less effective.”

The primary obstacles are the limitations of international cooperation and the divergence of legal regulations across jurisdictions. Indonesia must develop a robust international cooperation network and coordination mechanisms between authorities to address the cross-border challenges in cryptocurrency asset recovery.

4. Interdisciplinary Law–Accounting Approach Model in Handling Cryptocurrency in Bankruptcy

4.1. Integration of Legal and Accounting Expertise in Bankruptcy Proceedings

The complexity of cryptocurrency in bankruptcy requires an interdisciplinary approach that integrates legal and accounting expertise. A tripartite collaboration model between the bankruptcy trustee (curator), forensic accountant, and blockchain technology expert is essential to address the technical and legal complexities in managing cryptocurrency during bankruptcy. This collaboration should commence at the earliest stages of bankruptcy proceedings to ensure the comprehensive identification and safeguarding of cryptocurrency assets.

Several scholars have developed frameworks integrating bankruptcy law principles with forensic accounting techniques for cryptocurrency. This framework encompasses five stages⁴⁶:

1. **Asset identification and disclosure** – Employing forensic accounting techniques and blockchain analysis to identify cryptocurrency owned by the debtor.
2. **Ownership verification** – Applying both legal and technical verification methods to establish ownership of the cryptocurrency.
3. **Asset takeover and safeguarding** – Implementing legal and technical protocols to assume control of and secure the cryptocurrency.
4. **Asset valuation** – Utilizing accounting methodologies to value cryptocurrency, taking into account market volatility and liquidity.
5. **Liquidation and distribution** – Designing liquidation strategies that maximize value and comply with bankruptcy law requirements.

This interdisciplinary approach necessitates the enhancement of professional capacity in both fields. It is recommended to develop specialized certification programs for bankruptcy trustees and forensic accountants in the handling of digital assets, as well as to establish expert teams within commercial courts to provide technical input in bankruptcy cases involving cryptocurrency.

4.2. Development of Special Accounting Standards for Cryptocurrency in Bankruptcy

⁴⁵ P. Vigna and M.J. Casey, *The Age of Cryptocurrency: How Bitcoin and Digital Money Are Challenging the Global Economic Order* (St. Martin's Press, 2016).

⁴⁶ Mahsun Mohamad, *Akuntansi Forensik* (Yogyakarta: Penerbit Buku Pendidikan Deepublish, 2023).

To bridge the regulatory gap, it is necessary to develop specific accounting standards for cryptocurrency in the context of bankruptcy. A financial reporting framework tailored for cryptocurrency in bankruptcy proceedings should integrate forensic accounting principles with the unique characteristics of digital assets⁴⁷. This framework includes:

1. **Recognition and initial measurement** – Criteria for recognizing cryptocurrency as part of the bankruptcy estate and methods for determining its initial value.
2. **Measurement after initial recognition** – Methods for valuing cryptocurrency during the bankruptcy process, taking into account market volatility and liquidity.
3. **Disclosure** – Information that must be disclosed in bankruptcy financial statements related to cryptocurrency, including valuation methods, volatility risks, and challenges in liquidation.
4. **Audit procedures** – Specialized audit techniques to verify the existence and ownership of cryptocurrency in the bankruptcy context.

Special accounting standards for cryptocurrency in bankruptcy should take into account the pseudonymous nature of cryptocurrency, price volatility, and challenges in verifying ownership⁴⁸. Experts recommend that the Indonesian Institute of Accountants (IAI) collaborate with the Association of Indonesian Receivers and Administrators (AKPI) to develop specialized accounting and audit standards that can bridge the regulatory gap.

4.3. Regulatory Updates to Accommodate Cryptocurrency in Bankruptcy

An interdisciplinary approach requires adequate regulatory support. Several recommended regulatory updates to accommodate cryptocurrency in bankruptcy include⁴⁹:

1. **Amendment to the Bankruptcy Law** – Adding specific definitions and provisions regarding digital assets, including cryptocurrency, in the Bankruptcy Law.
2. **Supreme Court Technical Regulations** – Issuing technical regulations on procedures for handling cryptocurrency in bankruptcy, including methods for identification, seizure, and liquidation.
3. **Regulatory Harmonization** – Aligning regulations from Bank Indonesia, the Financial Services Authority (OJK), and the Commodity Futures Trading Regulatory Agency (Bappebti) regarding cryptocurrency to create a comprehensive regulatory framework.

⁴⁷ Dhanu Prayogo and dkk, *Mengenal Hukum Aset Kripto* (Yogyakarta: Penerbit Buku Pendidikan Deepublish, 2022).

⁴⁸ Iktikad Buruk, Pemailitan Korporasi, and Oleh Kreditor Andrian, “Mekanisme Insolvency Test Dalam Mencegah Iktikad Buruk Pemailitan Korporasi Oleh Kreditor,” *KRTHA BHAYANGKARA* 17, no. 2 (2023): 409–424, accessed August 15, 2025, <https://ejournal.ubharajaya.ac.id/index.php/KRTHA/article/view/810>.

⁴⁹ Itok Dwi Kurniawan and Sahar Poltak Siallagan, *Hukum Kepailitan Dan PKPU Urgensi Pembaharuan Dan Konsep Restrukturisasi Semi Publik* (Yogyakarta: Genta Publishing, 2023).

4. **Ratification of the UNCITRAL Model Law** – Adopting the UNCITRAL Model Law on Cross-Border Insolvency to strengthen international cooperation in handling bankruptcy cases involving cryptocurrency.

Regulatory updates should be technology-neutral and adaptive to developments in blockchain technology, avoiding overly prescriptive approaches that may quickly become obsolete given the rapid pace of innovation in cryptocurrency technology. Experts recommend a **principle-based regulation** approach, which sets out objectives and desired outcomes, rather than a **rule-based regulation** approach that stipulates specific procedures.

5. Case Study: Lessons from Bankruptcy Cases Involving Cryptocurrency

5.1. The Mt. Gox Case: Implications for Indonesia's Bankruptcy System

The bankruptcy of Mt. Gox—once the world's largest cryptocurrency exchange—collapsed in 2014, resulting in the loss of approximately 850,000 Bitcoin, and provides valuable lessons for Indonesia's bankruptcy system. Analysis of this case concludes that the absence of a clear legal framework for handling cryptocurrency in bankruptcy proceedings in Japan led to a prolonged and complex process, with a low recovery rate for creditors⁵⁰.

Key lessons identified include:

1. **Importance of preventive regulation** – Regulations governing the operation of cryptocurrency exchanges and reserve storage obligations can prevent large-scale asset losses.
2. **Volatile valuation** – The Mt. Gox case demonstrates the complexity of valuing cryptocurrency, whose value rose significantly during the bankruptcy process, raising questions over who is entitled to the gains.
3. **Technical challenges** – The process of recovering the remaining Bitcoin faced significant technical obstacles, highlighting the importance of technical expertise within the trustee team.
4. **Jurisdictional limitations** – This case underscores the challenges of managing cross-border bankruptcies involving cryptocurrency.

Applying these lessons in the Indonesian context requires developing a comprehensive legal framework that integrates preventive regulations, bankruptcy procedures responsive to new technologies, and effective mechanisms for international cooperation.

Key implications highlighted include:

1. **The need for a proactive supervision system** – Indonesia's financial authorities must develop stricter monitoring mechanisms for cryptocurrency exchanges to prevent similar risks.
2. **Investor protection** – A legal framework is needed that provides stronger protection for cryptocurrency investors in bankruptcy situations.

⁵⁰ F Yudhi, Priyo Amboro, and Agustina Christi, "Prospek Pengaturan Cryptocurrency Sebagai Mata Uang Virtual Di Indonesia (Studi Perbandingan Hukum Jepang Dan Singapura)," *Journal of Judicial Review* 21, no. 2 (December 2, 2019): 14–40, accessed June 19, 2025, <https://journal.uib.ac.id/index.php/jjr/article/view/665>.

3. **Standard operating procedures** – Standard operating procedures must be established for cryptocurrency exchanges operating in Indonesia, including reserve asset requirements and transparency obligations.

This research emphasizes that the Mt. Gox case is not merely a historical event, but a valuable lesson that should serve as the foundation for developing cryptocurrency regulation in Indonesia. The complexity of this case reveals the weaknesses of traditional legal systems in handling digital assets that are dynamic and cross-border in nature.

5.2. Binance Indonesia Case: Regulatory Challenges and Asset Recovery

The Binance Indonesia case provides additional perspective on the complexities of cryptocurrency in the context of bankruptcy. Recent studies have revealed several key challenges⁵¹:

1. **Jurisdictional Uncertainty** – Global cryptocurrency platforms with local branches create complexity in determining legal jurisdiction and asset recovery processes.
2. **Investor Protection** – The lack of robust mechanisms to protect cryptocurrency holders in potential bankruptcy situations.
3. **Transaction Transparency** – Difficulties in tracing and identifying all cryptocurrency transactions conducted prior to potential bankruptcy.

5.3. Practical Recommendations from Case Studies

Based on the analysis of these cases, researchers recommend several practical strategies:

1. **Establishment of a Special Task Force** – Forming an interdisciplinary team consisting of legal experts, forensic accountants, and blockchain technology specialists for handling cryptocurrency bankruptcies.
2. **Digital Asset Security Protocols** – Developing standard protocols for securing and tracking cryptocurrency during bankruptcy proceedings.
3. **Investor Protection Mechanisms** – Designing more comprehensive protection mechanisms for cryptocurrency holders.

IV. CONCLUSION

This study reveals several key findings regarding cryptocurrency in the context of bankruptcy:

1. **Regulatory Gap** – The Indonesian legal system still lacks a comprehensive legal framework for handling cryptocurrency in bankruptcy proceedings.
2. **Technical Complexity** – The decentralized and global nature of cryptocurrency poses significant challenges in identification, valuation, and asset recovery.
3. **Need for an Interdisciplinary Approach** – Collaboration between legal, accounting, and technology experts is necessary to address the complexities of cryptocurrency.

⁵¹ Meiske M.W. Lasut, *Crypto Regulation: Tantangan Dan Dampak Pada Pasar Global* (Bandung: Penerbit PT Mandiri Mifandi Digital, 2024).

RECOMMENDATIONS

1. **Regulatory Update** – Promptly amend the Bankruptcy Law to accommodate digital assets.
2. **Development of Accounting Standards** – Formulate specific accounting standards for cryptocurrency.
3. **Capacity Building** – Develop training programs for receivers, judges, and legal practitioners on handling digital assets.
4. **International Cooperation** – Strengthen cross-border cooperation mechanisms in cryptocurrency asset recovery.

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