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## “DIGITAL ASSETS AND ARBITRATION IN INSOLVENCY PROCEEDINGS: CHALLENGES IN A BORDERLESS BLOCKCHAIN ERA”

**AUTHORS** – SAGAR DUTTA & HARSHITA DUBEY, STUDENTS OF ST. XAVIER’S UNIVERSITY, KOLKATA

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### Introduction

Digital assets, which include cryptocurrencies, tokens, non-fungible tokens (NFTs), and other blockchain-based assets, pose unique challenges under insolvency laws. Unlike traditional assets, digital assets often exist on decentralized platforms, making them intangible and difficult to categorize within existing legal frameworks.<sup>25</sup> Insolvency laws across jurisdictions have struggled to define these assets uniformly, leading to fragmented approaches. For example, some jurisdictions classify cryptocurrencies as property, while others view them as commodities or even securities. This lack of harmonization complicates the resolution of insolvency cases where digital assets form a significant part of the debtor’s estate. At the national level, countries like the United States have begun to integrate digital assets into their legal systems, categorizing them under property law for insolvency purposes. In contrast, the European Union has adopted the Markets in Crypto-Assets Regulation (MiCA) to provide a more cohesive regulatory approach. However, the international landscape remains inconsistent. The United Nations Commission on International Trade Law (UNCITRAL) has not yet provided clear guidelines for digital asset classification in insolvency cases, leaving practitioners to rely on bilateral or regional frameworks. This divergence complicates cross-border insolvencies, as courts may struggle to determine the legal status of digital assets held across jurisdictions.<sup>26</sup>

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<sup>25</sup> Sharma R. Non-Fungible Token (NFT): What it means and how it works. Investopedia. <https://www.investopedia.com/non-fungible-tokens-nft-5115211>. Published June 12, 2024.

<sup>26</sup> Insolvency | United Nations Commission on International Trade Law. <https://uncitral.un.org/en/texts/insolvency>.

Identifying and valuing digital assets in insolvency proceedings is fraught with difficulties. Digital assets often reside in anonymous wallets, requiring forensic blockchain analysis to trace ownership. Furthermore, their valuation is highly volatile, influenced by market fluctuations and liquidity issues. Insolvency practitioners must contend with the lack of standardized valuation methods, as well as the risk of asset loss due to private key mismanagement. These factors make it challenging to accurately determine the value of a debtor's digital holdings and distribute them equitably among creditors.<sup>27</sup>

### Cross-Border Jurisdictional Complexities

Blockchain technology operates without geographic boundaries, presenting significant jurisdictional challenges in insolvency cases. Traditional legal principles, such as territoriality and domicile, are often ill-suited to address disputes involving decentralized assets. Courts may struggle to assert jurisdiction over assets stored on global blockchain networks, particularly when the debtor operates in multiple jurisdictions. Furthermore, the pseudonymous nature of blockchain transactions complicates the identification of parties involved, leaving creditors and insolvency practitioners at a disadvantage. The enforcement of arbitral awards in cases involving digital assets is further complicated by the borderless nature of blockchain technology. While international agreements such as the New York Convention facilitate the recognition and enforcement of arbitral awards, digital assets often fall outside traditional enforcement mechanisms. For example, a debtor could transfer assets to an inaccessible jurisdiction or use decentralized finance (DeFi) platforms to obscure ownership. To address these issues, arbitral tribunals must adapt their procedures to account for the unique attributes of digital assets, including the use of blockchain-based enforcement mechanisms like smart contracts.

Case studies highlight the complexities of jurisdictional disputes involving digital assets. For instance, the Mt. Gox insolvency in Japan demonstrated the challenges of resolving cross-border claims for cryptocurrency holdings. Creditors from multiple countries sought to recover their funds, necessitating cooperation between jurisdictions with divergent legal frameworks. Similarly, the QuadrigaCX case in Canada raised questions about jurisdiction over cryptocurrency assets stored on private wallets. These examples underscore the urgent need for international cooperation and harmonized legal standards to address jurisdictional conflicts in blockchain-related insolvencies.<sup>28</sup>

### Blockchain's Impact on Insolvency Processes

The role of blockchain in automating insolvency resolution through smart contracts

Blockchain technology is transforming insolvency processes by introducing automation through smart contracts. These self-executing contracts, powered by blockchain, can streamline insolvency resolution by eliminating manual intervention in certain steps. For instance, smart contracts can automate the distribution of assets among creditors based on pre-agreed terms, ensuring faster resolution and reducing administrative costs. Moreover, blockchain's immutable ledger provides a transparent, real-time record of transactions, facilitating accurate debt verification and claim prioritization. This level of efficiency could potentially address delays and inaccuracies often associated with traditional insolvency frameworks. However, challenges such as integrating legal requirements into code and ensuring enforceability in cross-jurisdictional contexts remain unresolved.<sup>29</sup>

Decentralized Finance (DeFi) platforms and Decentralized Autonomous Organizations

<sup>27</sup> Kostoula T. Valuation of cryptoassets in EU insolvency: Challenges and prospects. *International Insolvency Review*. 2023;32(1):8-40. doi:10.1002/iir.1490

<sup>28</sup> Team I. What was Mt. Gox? Definition, history, collapse, and future. Investopedia. <https://www.investopedia.com/terms/m/mt-gox.asp>. Published April 23, 2024.

<sup>29</sup> Insolvency and Bankruptcy Code - Civildaily. Civildaily. <https://www.civildaily.com/story/insolvency-and-bankruptcy-code/>. Published January 4, 2025.

(DAOs) introduce new complexities into insolvency proceedings. In DeFi, the lack of central intermediaries complicates asset recovery, as transactions occur on self-executing protocols with no single entity to hold accountable. DAOs, governed by decentralized governance models and often spanning multiple jurisdictions, pose similar issues. Identifying stakeholders and determining liability in insolvency scenarios is challenging, particularly when DAO tokens are held anonymously.<sup>30</sup> Moreover, smart contracts in these ecosystems may lack provisions for insolvency, leaving creditors with little recourse. These decentralized structures demand innovative legal and technological frameworks to handle insolvency effectively. Insolvency proceedings involving blockchain assets require robust tools for tracing and recovering digital assets. Blockchain's inherent transparency provides a foundation for asset tracing, but advanced analytics tools are necessary to track complex transactions across multiple chains. Technologies such as blockchain forensic tools and AI-driven transaction analyzers can identify asset flows and pinpoint holdings, even in cases involving mixing services or privacy coins. These tools can work alongside court orders and regulatory cooperation to enforce asset recovery. However, to achieve transparency and accountability, legislative frameworks must evolve to mandate compliance with asset tracing measures across blockchain platforms.<sup>31</sup>

### Arbitration Mechanisms for Resolving Insolvency Disputes

Exploring arbitration as an alternative to court-led insolvency resolution for digital assets

Arbitration offers a flexible and efficient alternative to traditional court processes for resolving disputes in digital asset insolvency cases. Unlike court proceedings, arbitration

allows parties to select arbitrators with expertise in blockchain technology and digital finance, ensuring informed decision-making. It also enables faster resolution, confidentiality, and enforceability across borders under international frameworks like the New York Convention. As insolvency cases involving cryptocurrencies often span multiple jurisdictions, arbitration provides a neutral ground for dispute resolution, reducing the complications of conflicting national laws. However, challenges include ensuring the arbitrability of insolvency disputes and integrating arbitration outcomes with formal insolvency frameworks. To address the unique challenges of digital asset disputes in insolvency, arbitration rules must be specifically designed for these cases. Such rules could include provisions for valuing volatile cryptocurrencies, handling disputes involving smart contracts, and ensuring compliance with blockchain-specific norms. For instance, arbitral tribunals could adopt guidelines for verifying digital wallets and enforcing claims on decentralized platforms. Additionally, institutions like the International Chamber of Commerce (ICC) or specialized blockchain arbitration bodies could establish protocols tailored to digital asset cases, providing clarity and predictability for parties involved. Clear procedural rules and technology-savvy arbitrators are essential to the effectiveness of such systems.<sup>32</sup>

Best practices in arbitral proceedings involving insolvent entities holding cryptocurrencies

Best practices in arbitration involving insolvent entities with digital assets focus on transparency, expertise, and adaptability. Arbitrators must be well-versed in blockchain technology and the legal complexities of digital assets. Parties should ensure comprehensive disclosure of all relevant wallets and transactions, leveraging blockchain's

<sup>30</sup> Harvey CR, Rabetti D. International business and decentralized finance. *Journal of International Business Studies*. 2024;55(7):840-863. doi:10.1057/s41267-024-00705-7

<sup>31</sup> Stolen Asset Recovery Initiative (StAR). Legal Tools for Asset Recovery | Avenues to tackle cases involving recovery of stolen assets. Stolen Asset Recovery Initiative (StAR). <https://star.worldbank.org/focus-area/legal-tools-asset-recovery>.

<sup>32</sup> 2021 Arbitration Rules - ICC - International Chamber of Commerce. ICC - International Chamber of Commerce. <https://iccwbo.org/dispute-resolution/dispute-resolution-services/arbitration/rules-procedure/2021-arbitration-rules/>. Published July 10, 2023.



transparency while respecting confidentiality. Tribunals should adopt secure, blockchain-based platforms for submitting evidence and managing arbitral proceedings. Additionally, valuation mechanisms for cryptocurrencies must account for price volatility, ensuring fair outcomes. Coordination with insolvency administrators and courts is also critical to align arbitration outcomes with broader insolvency proceedings, ensuring enforceability and equitable distribution.<sup>33</sup>

Recovering digital assets in insolvency proceedings is particularly challenging due to the decentralized nature of blockchain platforms. Assets may be spread across multiple wallets, exchanges, and jurisdictions, making identification and recovery complex. Advanced forensic tools are necessary to trace transactions and link them to specific wallets. However, decentralized exchanges (DEXs) and privacy-enhancing technologies like mixers complicate this process. Insolvency practitioners must often rely on legal orders, collaboration with exchanges, and blockchain analytics firms to retrieve assets. Establishing international frameworks for cooperation among jurisdictions can further enhance the effectiveness of digital asset recovery.<sup>34</sup>

Protecting creditors' rights in cases of anonymity and pseudonymity on blockchain

Blockchain's anonymity and pseudonymity present significant hurdles in protecting creditors' rights during insolvency. Identifying the owners of wallets containing insolvent entities' assets can be difficult without legal and technical interventions. Courts may require subpoenas to exchanges to unmask pseudonymous users, but such measures depend on the jurisdiction's regulatory environment. Creditors also face challenges in proving claims when counterparties' identities are obscured. To safeguard their rights,

creditors need legal mechanisms for compelling disclosure and tracing, supported by robust identification protocols on blockchain platforms.<sup>35</sup> Implementing Know Your Customer (KYC) requirements in DeFi ecosystems can help mitigate these issues. Private key mismanagement is a critical risk in blockchain insolvency, as losing a key renders the associated assets irretrievable. For creditors, this can mean permanent loss of claims. Legal remedies in such cases are limited, as the decentralized nature of blockchain often precludes recovery. However, courts may hold fiduciaries or custodians liable for negligence if private keys were mishandled. Insolvency practitioners may also explore options such as reconstructing keys through multi-signature arrangements or other recovery technologies. To mitigate future risks, entities managing digital assets must implement stringent key management policies and ensure comprehensive insurance coverage for custodial losses.<sup>36</sup>

### Role of Smart Contracts and On-Chain Arbitration

Smart contracts, self-executing agreements coded onto blockchain platforms, have emerged as transformative tools in managing insolvency proceedings. These contracts automate complex processes, ensuring transparency and reducing the need for manual intervention. For instance, smart contracts can automatically distribute assets among creditors according to predefined priorities, eliminating disputes over fund allocation.<sup>37</sup> They can also freeze debtor assets, ensuring that resources are preserved for equitable distribution. However, the rigidity of smart contracts can sometimes hinder flexibility, especially in cases requiring human

<sup>33</sup> Kostoula T. Valuation of cryptoassets in EU insolvency: Challenges and prospects. *International Insolvency Review*. 2023;32(1):8-40. doi:10.1002/iir.1490

<sup>34</sup> Benson V, Turksen U, Adamyk B. Dark side of decentralised finance: a call for enhanced AML regulation based on use cases of illicit activities. *Journal of Financial Regulation and Compliance*. 2023;32(1):80-97. doi:10.1108/jfrc-04-2023-0065

<sup>35</sup> Ogier. Demystifying jurisdiction and ownership of crypto assets. *Ogier*. <https://www.ogier.com/news-and-insights/insights/demystifying-jurisdiction-and-ownership-of-crypto-assets/>. Published October 30, 2023.

<sup>36</sup> South Square. Cryptocurrency and the claim in debt. South Square. <https://southsquare.com/articles/cryptocurrency-and-the-claim-in-debt/>. Published July 11, 2024.

<sup>37</sup> Cole J. Smart Contracts 101: Designing Self-Executing Agreements - BlockApps Inc. *BlockApps Inc*. May 2024. <https://blockapps.net/blog/smart-contracts-101-designing-self-executing-agreements/>.

discretion or negotiation, underscoring the need for hybrid solutions that combine automation with traditional oversight mechanisms. On-chain arbitration refers to resolving disputes directly on blockchain platforms using smart contracts and decentralized protocols. This approach promises efficiency, speed, and cost-effectiveness, making it an attractive option in insolvency scenarios. However, its feasibility depends heavily on the integration of enforceable arbitration clauses within blockchain systems. Challenges arise in ensuring that decisions made by decentralized arbitration bodies are recognized by courts across jurisdictions. The lack of standardized rules and the varying levels of legal recognition for blockchain-based arbitrations globally further complicate enforceability. Nevertheless, as jurisdictions adapt to the digital economy, on-chain arbitration could play a pivotal role in insolvency resolution. Automated arbitration via smart contracts presents unique risks. For instance, the immutability of blockchain transactions can amplify errors, leaving little room for rectification if a smart contract is flawed or exploited. Moreover, the lack of human judgment can hinder nuanced decision-making, particularly in insolvency cases involving complex financial arrangements. The potential for biased code, governance issues in decentralized arbitration frameworks, and limited recourse mechanisms for aggrieved parties further highlight the limitations of automation. Addressing these challenges requires robust governance, transparent coding standards, and a harmonious integration of human oversight with blockchain-based tools.<sup>38</sup>

### **Interplay Between Insolvency Laws and Blockchain Protocols**

Traditional insolvency laws were designed for centralized systems, focusing on tangible assets and legal entities within specific jurisdictions.

Conversely, blockchain protocols operate on a decentralized, borderless basis, often lacking a clear locus of control. This dichotomy creates significant friction. Insolvency laws emphasize creditor protection, yet decentralized finance (DeFi) platforms may prioritize protocol rules or token-holder voting mechanisms. In some cases, insolvency laws conflict with the decentralized governance of blockchain platforms, raising questions about jurisdiction, accountability, and enforceability.<sup>39</sup> Bridging this gap requires legislative reforms and clearer regulatory frameworks to align traditional laws with blockchain protocols. Consensus mechanisms, such as Proof of Work (PoW) or Proof of Stake (PoS), play a crucial role in digital asset insolvency. They govern the validation of transactions and the creation of new assets, influencing how resources are allocated during insolvency proceedings. For instance, in PoS systems, staked assets might be locked, complicating their liquidation for creditor repayment. Similarly, in PoW systems, insolvency may disrupt mining operations, affecting the value of the remaining assets. Understanding these mechanisms is essential for courts and insolvency practitioners to develop effective strategies for managing digital assets in distressed situations. The unique characteristics of blockchain-based activities, such as staking and mining, introduce complexities in insolvency proceedings. Staked assets, often held as collateral to validate transactions, may be inaccessible during insolvency, creating legal ambiguities about ownership and control. Mining rewards, which depend on ongoing operations, pose valuation challenges, especially when market conditions fluctuate. Additionally, tokens, with their diverse structures and purposes, complicate asset classification and prioritization among creditors. Addressing these challenges requires courts and practitioners to adopt a nuanced understanding of blockchain operations and

<sup>38</sup> Ramos S, Ellul J. Blockchain for Artificial Intelligence (AI): enhancing compliance with the EU AI Act through distributed ledger technology. A cybersecurity perspective. *International Cybersecurity Law Review*. 2024;5(1):1-20. doi:10.1365/s43439-023-00107-9

<sup>39</sup> Orderly and effective insolvency procedures. <https://www.imf.org/external/pubs/ft/orderly/>. Published August 2, 1999.

develop frameworks that balance innovation with creditor protections.<sup>40</sup>

Protecting Retail Investors During the Insolvency of Cryptocurrency Exchanges

The collapse of cryptocurrency exchanges poses significant risks to retail investors, who often lack the resources to recover lost assets.<sup>41</sup> Ensuring consumer protection in such scenarios requires robust regulatory oversight and clear safeguards, such as mandatory segregation of client funds and regular audits. In jurisdictions lacking these protections, investors face prolonged uncertainty and limited recourse. Educating consumers about the risks of exchange insolvency and promoting decentralized custody solutions can mitigate exposure while improving overall market resilience. Legal Remedies for Users in Decentralized Lending Platforms and Wallets Decentralized lending platforms and wallets operate without traditional intermediaries, complicating legal recourse for users in insolvency situations.<sup>42</sup> Users may be classified as unsecured creditors, with limited claim priority over platform assets. Innovative legal solutions, such as tokenized insurance mechanisms or automated asset recovery protocols, can provide additional protection. Additionally, integrating user-friendly dispute resolution processes into DeFi platforms can enhance accountability. Legislative efforts to establish clear legal standards for decentralized platforms are crucial to ensuring fairness and transparency. The rapid growth of digital assets has outpaced regulatory frameworks, leaving significant gaps in consumer protection. Many jurisdictions lack clear rules governing the insolvency of digital asset platforms, resulting in

inconsistent outcomes for consumers. Key challenges include the absence of standardized custody requirements, limited transparency in platform operations, and inadequate mechanisms for compensating affected users. Addressing these gaps requires coordinated international efforts to harmonize regulations, coupled with proactive measures to ensure that platforms prioritize consumer interests in their operational designs.<sup>43</sup>

### Ethical Implications of Arbitration Choices in a Decentralized Ecosystem

The decentralized nature of blockchain introduces ethical complexities in arbitration processes, especially in insolvency proceedings involving digital assets. Decentralization often diminishes the role of centralized authorities, raising questions about the impartiality and fairness of arbitrators selected within blockchain ecosystems. For instance, when disputes arise in decentralized autonomous organizations (DAOs), stakeholders might choose arbitrators based on reputation within the network rather than formal credentials. This raises concerns about bias, unequal access to justice, and the potential for undue influence by powerful entities within the network. Moreover, the pseudonymous nature of blockchain participants complicates the enforcement of ethical standards, as identifying parties and arbitrators can be challenging. Ethical frameworks must evolve to address these issues, ensuring transparency, fairness, and accountability in a system where traditional legal norms may not always apply. Digital assets operate across borders, often outside the scope of any single jurisdiction, creating a need for regulatory harmonization to manage arbitration and insolvency proceedings effectively. The lack of consistent legal frameworks for recognizing digital assets as property, and the varying definitions of ownership and creditor rights across

<sup>40</sup> Wang X, Wu YC, Ma Z. Blockchain in the courtroom: exploring its evidentiary significance and procedural implications in U.S. judicial processes. *Frontiers in Blockchain*. 2024;7. doi:10.3389/fbloc.2024.1306058

<sup>41</sup> European Central Bank. Understanding the crypto-asset phenomenon, its risks and measurement issues. European Central Bank. [https://www.ecb.europa.eu/press/economic-bulletin/articles/2019/html/ecb.ebart201905\\_03~c83aea44c.en.html](https://www.ecb.europa.eu/press/economic-bulletin/articles/2019/html/ecb.ebart201905_03~c83aea44c.en.html). Published August 7, 2019.

<sup>42</sup> Crypto needs comprehensive policies to protect economies and investors. IMF. <https://www.imf.org/en/Blogs/Articles/2023/07/18/crypto-needs-comprehensive-policies-to-protect-economies-and-investors>. Published July 18, 2023.

<sup>43</sup> Atrizadeh BLO of S. Blockchain technology: state, federal, and international laws. Internet Lawyer Blog. <https://www.internetlawyer-blog.com/blockchain-technology-state-federal-and-international-laws/>. Published April 13, 2024.



jurisdictions, pose significant challenges. To address these discrepancies, regulatory bodies must work toward unified standards for governing digital asset arbitration. This could include recognizing smart contracts as enforceable agreements, establishing rules for asset valuation in insolvency cases, and defining jurisdictional boundaries in cross-border disputes. Harmonization efforts must also ensure that regulatory frameworks balance innovation with consumer protection, fostering trust and predictability in digital asset markets. International organizations like UNCITRAL (United Nations Commission on International Trade Law) and FATF (Financial Action Task Force) are beginning to address the challenges posed by digital assets in arbitration and insolvency.<sup>44</sup> UNCITRAL has introduced model laws and legislative guides to harmonize cross-border insolvency laws, which could be adapted to include provisions for digital assets. FATF, on the other hand, focuses on anti-money laundering (AML) and counter-terrorism financing (CTF) regulations, which are critical in addressing illicit activities associated with blockchain transactions. Emerging guidelines from these organizations emphasize the need for global cooperation in establishing legal and regulatory standards, including mechanisms for identifying and tracing digital assets in insolvency cases and ensuring compliance with AML/CTF requirements in arbitration processes.<sup>45</sup>

### Conclusion

Blockchain technology is reshaping the landscape of insolvency and arbitration laws by introducing new mechanisms for asset tracking, transparency, and automation. Smart contracts, for instance, can streamline arbitration by

automating dispute resolution processes and ensuring compliance with pre-agreed terms. However, these innovations also necessitate updates to existing legal frameworks to address issues such as the enforceability of smart contracts and the recognition of digital assets as legal property. Future laws must accommodate the dynamic nature of blockchain ecosystems, where assets can rapidly change value and jurisdictional boundaries are fluid. The integration of blockchain into insolvency proceedings could enhance efficiency and reduce costs but requires robust mechanisms to address technical vulnerabilities and ensure fairness.

The global nature of blockchain technology calls for international treaties to standardize arbitration practices for digital assets. These treaties could establish a unified legal framework for resolving disputes, defining jurisdictional authority, and recognizing arbitration awards across borders. Key elements might include rules for identifying digital asset ownership, guidelines for asset valuation during insolvency, and provisions for safeguarding participants' rights in decentralized systems. International treaties could also incorporate mechanisms for collaboration between jurisdictions in tracing and recovering digital assets involved in cross-border insolvency cases. Such agreements would provide much-needed legal certainty and facilitate smoother resolution of disputes in the borderless blockchain ecosystem.

To fully harness the potential of blockchain in cross-border insolvency proceedings, policy frameworks must address both technological and legal challenges. These frameworks should include standards for interoperability between blockchain networks, enabling seamless data exchange and real-time asset tracking across jurisdictions. They should also incorporate provisions for regulatory compliance, including adherence to AML/CTF standards and mechanisms for dispute resolution in decentralized systems. Governments and international organizations must collaborate to

<sup>44</sup> The Harvard Law School Forum on Corporate Governance. An introduction to smart contracts and their potential and inherent limitations. The Harvard Law School Forum on Corporate Governance. <https://corpgov.law.harvard.edu/2018/05/26/an-introduction-to-smart-contracts-and-their-potential-and-inherent-limitations/>. Published May 26, 2018.

<sup>45</sup> Sagar FA. Time to harmonize AML control systems for global, commercial Indian companies | Dispute Resolution Blog. Dispute Resolution Blog. <https://disputeresolution.cyrilamarchandblogs.com/2024/11/time-to-harmonize-aml-control-systems-for-global-commercial-indian-companies/>. Published November 12, 2024.





develop guidelines for the responsible use of blockchain in insolvency, ensuring that technological advancements do not compromise legal principles or ethical standards. By integrating blockchain into cross-border insolvency regimes, policymakers can create a more transparent, efficient, and equitable system for managing digital assets in financial distress.

