

Digital frontier: A framework for smart contracts and virtual assets governance in Pakistan from the perspective of comparative analysis

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Abstract

The disruptive emergence of blockchain-based technologies particularly smart contracts and virtual assets has sparked a governance crisis in the global financial order. Pakistan exemplifies this crisis, caught between a rapidly growing multi-billion-rupee digital asset economy and a state apparatus marked by prohibition, institutional fragmentation, and regulatory ambiguity. This research investigates the resultant governance vacuum, characterized by the State Bank of Pakistan's (SBP) restrictive circulars, the Securities and Exchange Commission of Pakistan's (SECP) advisory warnings without enabling rules, and the Federal Board of Revenue's (FBR) silence on taxation. This disjointed posture constitutes a systemic failure: it has not achieved risk mitigation but has instead created a shadow economy where consumers face fraud, the exchequer forgoes revenue, and Pakistan's compliance with the Financial Action Task Force (FATF) Travel Rule is critically undermined. Employing doctrinal legal analysis and comparative policy evaluation, this paper deconstructs Pakistan's regulatory impasse. It delineates core doctrinal challenges, legal classification of virtual assets, smart contract enforceability, consumer protection, and jurisdictional ambiguities. The research compares three regulatory philosophies: China's dual-track model, the EU's MiCA Regulation, and Singapore's innovation-centric regime. The study further assesses Shariah compatibility examining prohibitions on *riba*, *gharar*, and *maysir* and explores tokenized sukuk within Pakistan's Islamic framework.

The central contribution is that Pakistan's optimal path is a strategic synthesis tailored to its context. This paper proposes a multi-pillar framework: a Digital Assets Act establishing legal certainty and functional taxonomy; a coordinated institutional framework integrating Shariah oversight and FATF compliance; and a strengthened regulatory sandbox

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for controlled innovation in tokenized sukuk and supply-chain finance. Ultimately, this paper provides an actionable blueprint for transitioning Pakistan from reactive prohibition to proactive governance securing financial sovereignty, unlocking blockchain's potential, and integrating responsibly into the global digital financial system.

Keywords: Smart Contracts, Virtual Assets, Pakistan, Governance Framework, FATF Compliance, Shariah Compliance,

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1. Introduction

Pakistan has an opportunity to leapfrog legacy systems and position itself among nations building the future financial architecture. The digitalization and tokenization of assets is not merely a technological shift but a strategic national opportunity to integrate Pakistan into emerging global digital capital networks. The world has entered the era of the digital virtual economy, challenging traditional banking, central bank sovereignty, and international monetary regulation. The concept of smart contracts originated with Szabo (Szabo, 1997), who envisioned event-driven programs deployed on shared databases that execute contractual terms when conditions are triggered. This vision materialized through blockchain technology a decentralized, tamper-resistant ledger introduced by Nakamoto which enables cryptographic assets (Nakamoto, 2008) including cryptocurrencies and Non-Fungible Tokens (NFTs), to represent value without central intermediaries (Antonopoulos, 2014). Smart contracts are now self-executing programs stored on a blockchain that automatically execute when conditions are met, while virtual assets are digital representations of value traded using distributed ledger technology. These innovations are transforming contractual relationships, yet their unique characteristics self-execution, immutability, and decentralization challenge established legal frameworks, particularly Pakistan's Contract Act 1872.

The legal status of smart contracts remains debated. Studies provided a paradigm shift challenging core principles of traditional contract law (Savelyev, 2017), while others contend, they can be accommodated within existing frameworks (Werbach et al., 2017). Studies conclude that their automated nature complicates true *consensus ad idem*, in contract law it refers to the meeting of minds, raising questions about mutual assent (Giancaspro, 2017). This analyzes whether smart contracts should be classified as traditional contracts, *sui generis* agreements (requiring a legally specialized treatment), or mere execution tools (Durovic et al., 2018). The concept of *lex cryptographica* code-based private ordering alongside state-enforced law further complicates jurisdictional authority and dispute resolution (Rohr & J. 2019). At the international level, the Financial Action Task Force (FATF) has established binding standards shaping virtual asset governance. Recommendation 15 requires jurisdictions to license Virtual Asset Service Providers (VASPs) and subject them to Anti-Money Laundering (AML)/ Counter financing of Terrorism (CFT) obligations, while Recommendation 16 (Travel Rule) mandates collection and transmission of originator and beneficiary information for every virtual asset transfer (FATF, 2012, updated 2025). Study highlights the central tension between legal certainty and innovation (Finck, 2019) while the European Union's Market Crypto Assets Regulations (EU's MiCA Regulations) provides a comprehensive licensing framework for crypto-assets across member states (European Parliament, 2023). Given Pakistan's Islamic character, Shariah compatibility emerges as a distinct dimension. Islamic contract theory rests on mutual consent (*sighah*), contracting parties, and subject matter (Ahmad, et al., 2020). Studies distinguish speculative cryptocurrencies, which raise *gharar* and *maysir* concerns, from asset-backed instruments that may align with Islamic principles (Zaher et al., 2001). Pakistan is establishing a Shariah-compliant digital economy through Pakistan Virtual Assets Regulations Authority (PVARA)'s Shariah Advisory Committee, with tokenized sukuk and asset-backed stablecoins offering viable pathways.

This study examines the conceptual and legal foundations of smart contracts and virtual assets, addressing jurisdictional and enforcement challenges, while identifying Pakistan's regulatory vacuum, institutional fragmentation between State Bank of Pakistan (SBP), Security Exchange Commission of Pakistan (SECP), and Financial Action Task Force (FATF) obligations (R.15 licensing, R.16 Travel Rule) as core governance challenges. The research further assesses Shariah compatibility (*riba*, *gharar*, *maysir*) and the potential of tokenized sukuk. Studies identified a structural mismatch between technologically neutral legislation and

autonomous blockchain systems, undermining legal coherence (Daudpota, 2026), and courts have directed committees to consider crypto regulation, as seen in *Waqar Zaka case* (Khan et al., 2023).

Despite the growing body of literature on smart contracts, virtual assets, and regulatory frameworks, a significant research gap persists. Existing studies focuses that no comprehensive governance framework exists specifically tailored to Pakistan's institutional, Islamic, and regulatory context also on technical aspects, the comparative models, or Shariah compliance is in isolation, rarely integrating institutional coordination, Financial Action Task Force FATF compliance, and Islamic finance principles into a coherent governance model tailored to Pakistan. Furthermore, consumer protection, data privacy, and capacity-building dimensions remain underexplored in the Pakistani context. This study aims to fill this gap by proposing a hybrid pillar governance framework integrating doctrinal legal analysis, comparative policy insights, and Shariah principles to address Pakistan's evolving virtual assets legal regime. The framework comprises: (1) a Digital Assets Act establishing legal certainty and a functional taxonomy (payment, security, utility tokens); (2) analyze comparative models China, European Union Markets Crypto Assets Regulations, (EU MiCA) and Singapore's a strengthened regulatory sandbox for controlled innovation in tokenized sukuk and supply-chain finance. (3) to evaluate Financial Action Task Force (FATF) obligations (R.15, R.16); (4) to propose a coordinated framework integrating institutional coordination, Shariah oversight, FATF compliance, and (5) to identify capacity-building requirements for implementation. While the Virtual Assets Act 2026 and PVARA provide a foundation, effective implementation requires capacity building, judicial education, public awareness, consumer protection, and Financial Action Task Force FATF-aligned enforcement. The findings inform policymakers, legal practitioners, and industry stakeholders in developing appropriate frameworks for Pakistan.

1.1 Research Question:

This study is guided by the central research question: *How can Pakistan design a governance framework for smart contracts and virtual assets that balances financial sovereignty, risk management, and innovation?* The analysis proceeds through multi stages: Mapping the regulatory vacuum and institutional fragmentation; examining comparative governance models (China, EU, Singapore), assessing Shariah compatibility challenges and opportunities; evaluating FATF compliance imperatives (R.15, R.16); and (5) proposing a twin-peaks framework with coordinated SBP-SECP oversight, Shariah governance, and capacity-building mechanisms. Each stage is grounded in statutory analysis, doctrinal legal research, and comparative policy insights, providing a comprehensive evidence base for answering the research question.

1.2 Research Methodology:

This study adopts a qualitative doctrinal legal methodology combined with comparative policy analysis to examine smart contract and virtual asset governance in Pakistan. It integrates multi distinct approaches: doctrinal legal analysis of statutes, regulations, and case law; comparative policy analysis of regulatory models in China, the EU, and Singapore; Shariah legal analysis grounded in Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) standards and Islamic contract principles (*riba, gharar, maysir*); and case law analysis of relevant judicial decisions, including *Waqar Zaka Case (Waqar Zaka v. Federation of Pakistan 2022 MLD 1134 Karachi High Court)*.

Primary sources include Pakistani legislation (Contract Act 1872, SBP Act 1956, AMLA 2010, ETO 2002, Virtual Assets Act 2026), regulatory circulars (SBP directives, SECP guidelines), judicial decisions, and international standards (FATF R.15 & R.16, MiCA Regulation, Singapore Payment Services Act, AAOIFI Shariah Standards). Secondary sources comprise peer-reviewed scholarly journals, institutional reports, and legal commentaries. Data is

analyzed thematically across dimensions including regulatory fragmentation and institutional coordination, doctrinal challenges to smart contract enforceability, Shariah compatibility, and international compliance obligations. The study is doctrinal and comparative in nature, without empirical fieldwork or quantitative analysis.

2. Governance Framework for Smart Contracts and Virtual Assets in Pakistan

2.1 The Rise of Blockchain and Virtual Assets:

Blockchain technology has transformed digital transactions through smart contracts, self-executing agreements that automate trades and asset management without intermediaries (Cong et al., 2019). As a decentralized peer-to-peer database, blockchain eliminates central authority, with nodes collaboratively securing records (Khan et al., 2023). Smart contracts execute code once conditions are met, enabling trustless enforcement (Buterin, 2014). Beyond finance, blockchain detects forgeries, secures medical records, and impacts construction (Makridakis and Christodoulou, 2019). Second-generation applications enable consensus on computation, not just data. Blockchain enables cryptographic assets cryptocurrencies and NFTs representing value without central intermediaries. Digital assets are information resources derived from the right to value, circulating on distributed ledgers as unique identifiers.

2.2 Pakistan's Regulatory Vacuum

Virtual assets challenge legislators globally, and Pakistan is no exception. Their anonymity, traceability challenges, and cross-border nature resist traditional legal frameworks. Regulating them within AML/CTF regimes and confiscating proceeds of crime remains complex. FATF guidelines offer direction, but national approaches lack uniformity, especially in smart contract governance. Studies highlight the tension between legal certainty and innovation. Resolving transaction security, owner rights, and market risks requires global standards and clear ownership identification. This is pressing in Pakistan, SBP's cautious stance drives crypto underground, exposing consumers to fraud without legal protection. Unlike the EU (MiCA), China, and Singapore with clear licensing regimes, Pakistan struggles with institutional fragmentation and persistent FATF scrutiny.

Virtual assets including cryptocurrencies, NFTs, and tokenized assets have disrupted traditional legal categories of money, property, and securities. While offering significant opportunities for financial inclusion and innovation, they also enable money laundering, fraud, and consumer harm. Despite having over 40 million users and an estimated \$300 billion in annual trading volume, Pakistan remained legally uncertain about the status of virtual assets for nearly seven years 2018 -2023 (The Express Tribune., 2025). Classification is critical, payment cryptocurrencies, security tokens, utility tokens, and asset-backed instruments each raise distinct legal and financial concerns. Pakistan's Virtual Assets Act 2026 provides a statutory definition, but interpretive and regulatory uncertainty persists. This reinforces the urgent need for a comprehensive governance framework capable of addressing both regulatory risks and technological innovation.

2.3 Conceptual and Theoretical Framework:

This study is grounded in regulatory theory, positing that effective governance must balance innovation, financial stability, and international compliance. The **regulatory perimeter** captures how SBP and SECP delineate lawful activities and how digital assets fall outside these boundaries. Pakistan's regulation is a dynamic interaction between: (i) formal prohibitions (SBP's 2018 circular, 2025 VA Ordinance); (ii) informal markets (\$25 billion unregulated crypto); and (iii) FATF obligations (AML/CFT, Travel Rule). This produces a **hybrid governance model** relying on overlapping instruments (SBP Act 1956, Securities Act 2015, PECA 2016, AMLA 2010).

Smart contract enforceability is central. Drawing on scholarly debates the study examines whether smart contracts fit traditional contract doctrines (offer, acceptance, consent,

frustration under Contract Act 1872) or require *sui generis* treatment. This is compounded by *lex cryptographic* code-based private ordering alongside state law raising jurisdictional questions. Given Pakistan's Islamic character, the framework integrates Shariah principles (*maqasid al-shariah*), assessing compliance with prohibitions on *riba*, *gharar*, and *maysir*, engaging AAOIFI standards and PVARA's Shariah Advisory Committee to evaluate tokenized sukuk and Islamic fintech pathways. The study situates Pakistan within developing economies digital finance discourse, where law enables innovation while containing macroeconomic risk. Absent coherent legal architecture, fragmentation and consumer vulnerability persist, but comparative learning from China's dual-track, EU's MiCA, and Singapore's licensing regime is possible. By synthesizing regulatory theory, legal doctrine, Islamic jurisprudence, and comparative analysis, the framework provides a comprehensive lens for evaluating Pakistan's virtual assets legal regime.

3 Smart Contracts and Virtual Assets: Conceptual & Legal Foundation.

3.1 Understanding Virtual Assets:

Virtual assets are defined by FATF as "a digital representation of value that can be digitally traded or transferred and can be used for payment or investment purposes", excluding fiat currencies and existing financial assets. They form a subcategory of digital assets focused on financial functions. Their legal status remains evolving, as they exist solely in digital environments, challenging conventional property concepts. Virtual assets are classified by economic function and regulatory treatment into cryptocurrencies/payment tokens, security tokens, asset-backed tokens, NFTs, and stablecoins.

3.2 Smart Contracts and block chain Governance:

Szabo proposed smart contracts in 1995 as event-driven programs executing terms via "If-Then" logic on shared databases (Szabo, 2017). Blockchain emerged in 2008 under Nakamoto as a tamper-resistant, cryptography-secured ledger. Smart legal contracts use self-executing blockchain programs but remain vulnerable to breach, coding errors, and lack of consent. Blockchain offers "trustless trust" trusting outputs without trusting actors but regulatory frameworks lag (Werbach, 2017). Validation uses peer-to-peer consensus, not third parties. Early use cases (Bitcoin, Decentralized Autonomous Organizations, DAO) show ideals remain aspirational, three issues persist, code reliability, centralization through expert reliance, and transparency gaps. Traditional governance emphasizes hierarchy, blockchain addresses principal-agent dilemmas and transaction costs. Smart contracts standardize rules in code, executing automatically. Governance shifts from courts to protocols, challenging legal authority (Lessig, 2000).

3.3 Blockchain Governance Models

Governance models fall into two categories. Public blockchains (Bitcoin, Ethereum) are open and permissionless, emphasizing decentralization but raising regulatory concerns. Permissioned (consortium) blockchains restrict participation to approved entities, offering greater oversight and accountability, used in banking and supply chains. For Pakistan, permissioned models offer a more practical framework for regulated integration (Coin WAcademy., 2026).

3.4 Challenges to Legal Doctrine

Pakistani law anchors on physical assets and written contracts, while blockchain relies on decentralization and code-based enforcement. Cross-border transactions clash with territorial jurisdiction. The Qanoon e Shahadat Ordinance QSO 1984, designed for paper-based proof, cannot accommodate decentralized validation (Jan, 2025). Courts rely on Article 164 and ETO 2002 provisions not designed for systems lacking single data-validating authority creating an evidentiary gap. Smart contracts challenge the Contract Act 1872, limiting equitable remedies. Jurisdictional uncertainty persists as decentralized transactions defy territorial jurisdiction. Scholars identify a structural mismatch between technologically

neutral legislation and autonomous blockchain systems. While the Contract Act 1872's requirements (offer, acceptance, consent, consideration) may be met through code-based interactions, and ETO 2002 recognizes electronic documents, tensions persist over consent, mistake (sections 13–22), and frustration (section 56), as self-executing code may perform despite errors (Electronic Transactions Ordinance, 2002).

4 Pakistan's Existing Regulatory Position:

In July 2025, the President promulgated the Virtual Assets Ordinance (Virtual Assets Ordinance, 2025) creating PVARA an independent body empowered to license VASPs, oversee a regulatory sandbox, and ensure Shariah compliance. The ordinance remains valid for 120 days unless ratified by Parliament. This study analyzes legal instruments SBP Act, Securities Act, AML Act, and FATF/IMF guidelines to evaluate Pakistan's alignment with international best practices such as EU MiCA and Singapore.

4.1 The State Bank of Pakistan (SBP)

The SBP's 2018 directive did not deem virtual assets illegal but was a precautionary advisory due to absent regulation. It advised regulated entities to refrain from crypto transactions. In a significant shift, SBP issued BPRD Circular No. 10 of 2026, replacing the 2018 ban (State Bank of Pakistan, Strategic Vision 2028). Under new guidelines, regulated entities may open accounts for PVARA-licensed VASPs, subject to strict AML/CFT compliance.

4.2 The Securities and Exchange Commission of Pakistan (SECP)

Pakistan lacks a dedicated crypto/ Virtual assets statute. The SECP has issued policy papers but no binding regulations, leaving its stance advisory. Both SBP and SECP frame crypto regulation through AML/CFT, emphasizing KYC (Know Your Customer) and FATF R.15. Without the Travel Rule, Pakistan risks scrutiny and blacklisting (Baloch et al., 2023). The Virtual Assets Ordinance 2025 establishes PVARA with a Shariah Advisory Committee, acknowledging crypto must be controlled and taxed (Kiani, 2025)

4.3 Taxation and the Federal Board of Revenue (FBR)

The FBR's stance is evolving toward formal taxation. Under the 2025 Ordinance and 2026 Act, licensed VASPs must comply with FBR obligations (Reuters. 2026). Crypto-related income is taxable under the Income Tax Ordinance 2001 profits from trading, mining, staking, or NFTs fall under capital gains or income tax (Income Tax Ordinance, 2001). PVARA holds rulemaking and investigative powers under Section 9 to classify assets. As of 2026, crypto is taxable exchanges must report users to FBR under Section 285BAA, with mandatory reporting from Q3 2026 under Crypto Assets Reporting Framework CARF (Qadri et al., 2023).

4.4 Judicial and Institutional Uncertainty:

Court jurisdiction is territorial, but digital assets are delocalized (Njord Law. 2021). Courts struggle with crypto volatility and unclear legal nature property, security, or payment leaving parties uncertain (Virtual Assets Act, 2026, Pakistan). Anonymity complicates identification, and blockchain's decentralized nature creates jurisdictional conflicts.

A key problem is the unclear SBP/SECP role; hybrid products fall into a regulatory void. A Virtual Assets Tribunal will resolve disputes but after conflicts arise (Haq and Shakoori, 2025b). The ordinance lacked consultation, and references to existing laws (AML Act 2010, Securities Act 2015, Companies Act 2017) do not address virtual currencies unique problems. Pakistan lacks GDPR-style data protection, creating misuse risks (Mettis Global. 2025). Crypto's decentralized nature challenges enforcement, as seen in the Mustafa case and a multibillion-rupee scheme. A \$25 billion informal crypto market operates unregulated; the Act imposes severe penalties, but enforcement remains questionable (Ovcharenko, 2020). Pakistan adopts a substance-over-form approach to classify assets. In *Waqar Zaka* 2022, courts directed committees to consider crypto regulation, with one recommending a complete ban (Savelyev, 2017).

5 THE CORE GOVERNANCE CHALLENGES FOR SMART CONTRACTS AND VIRTUAL ASSETS IN PAKISTAN

Smart contracts challenge fundamental assumptions about contract formation and execution. Their automated, self-executing nature blurs offer, acceptance, and performance, raising questions about human intent. In Decentralized Exchanges DEXs, traditional offer and acceptance may be replaced by automated matching, requiring reevaluation of formation. Immutability creates a new "performance" paradigm once initiated, contracts execute automatically, challenging duty, cure, and modification.

5.1. Legal and Doctrinal Challenges

The legal status of smart contracts remains debated. Some scholars argue they represent a paradigm shift, while others contend, they fit within existing frameworks (Giancaspro, 2017). Studies concludes automated nature complicates *consensus ad idem*. Classification challenges persist. Studies also showed whether smart contracts are traditional, sui generis, or mere tools (Nazarov, 2024).

5.2 Classification Challenge

Smart contracts occupy a unique legal position, their code-based nature challenging conventional classifications. *Lex cryptographica* code-based private ordering operates parallel to conventional law, creating jurisdictional ambiguities. Immutability conflicts with contract law's flexibility in modification and termination (Irshad, 2024).

5.3 Smart Contract Enforceability

Enforceability remains fundamental, courts struggle to interpret or rectify code-based agreements. Questions arise whether self-executing contracts constitute binding agreements, liability for coding errors, and application of remedies like rescission. Regulatory fragmentation hinders cross-border applications, necessitating harmonized standards and specialized frameworks.

5.4 Dispute Resolution and Jurisdiction and Consumer Protection Gap:

Blockchain's decentralized nature raises jurisdictional questions (Ortolani, 2019). Specialized dispute mechanisms are being explored. Smart contracts include automated remedies (e.g., DeFi liquidation) without judicial intervention, challenging court roles. Enforcement struggles due to pseudonymous transactions. The same features enabling efficiency automation, immutability, pseudonymity create a consumer protection gap. Unlike traditional finance with disclosure, cooling-off periods, and chargeback rights, smart contract users have no recourse after execution. Coding errors or unforeseen conditions cause irreversible losses. Absent identifiable service providers in DEXs, redress is difficult, especially for retail investors. Regulatory frameworks must introduce mandatory disclosure, audits, and alternative dispute resolution.

5.5 The Global Regulatory Imperative: FATF Compliance:

FATF has established binding standards: R.15 requires VASP licensing and AML/CFT obligations, while R.16 (Travel Rule) mandates collection and transmission of originator/beneficiary information for every transfer. As of June 2025, 85 of 117 jurisdictions enacted Travel Rule legislation (Financial Action Task Force, FATF 2022). For Pakistan, FATF compliance is imperative; failure risks renewed grey listing or blacklisting. Pakistan has integrated the Travel Rule domestically, VASPs must verify transfers exceeding Rs. 1 million. PVARA aligns with FATF standards, and SBP's 2026 circular permits licensed VASPs only upon strict AML/CFT compliance. Implementation faces challenges, technical interoperability (IVMS101) protocols remain unresolved; cross-border coordination is difficult where counterparties lack enforcement and regulatory fragmentation complicates application. Pakistan has adopted the Travel Rule on paper, but effective implementation requiring infrastructure, inter-agency coordination, and international cooperation remains a

governance test. Without capacity, the framework risks circumvention, exposing Pakistan to renewed scrutiny.

6 Comparative Governance Models

6.1 China's Dual Track:

China's "dual-track" model strictly prohibits private cryptocurrencies (Bitcoin, exchanges, mining, DeFi) while aggressively promoting state-controlled blockchain innovation, including the Digital Yuan (e-CNY) and permissioned blockchains. This approach protects monetary sovereignty and financial stability while harnessing blockchain efficiency. Mainland China bans crypto trading, but Hong Kong operates as a licensed regulatory hub for crypto innovation, separating domestic risk control from global competitiveness. Central bank digital currency research began with the PBOC in 2014, followed by global developments (Du, 2018).

China is at the forefront of digital finance innovation, Zhong explored blockchain for bond tokenization with a successful 2019 trial (Mazzochi et al., 2023), while Bank of China issued \$2.8 billion in bonds using its proprietary blockchain system. The China Central Depository & Clearing launched a blockchain digital bond issuance platform in 2022, selected for a national innovation pilot, and the Shanghai Stock Exchange has also explored bond tokenization. In 2023, Hong Kong's Securities and Future Commission SFC issued circulars on tokenization of authorized investment products and tokenized securities. These initiatives, often using consortium blockchains, demonstrate China's potential to transform traditional bond markets while maintaining centralized control.

6.2 The European Union's MiCA Framework:

The EU's Markets in Crypto-Assets Regulation (MiCA) is a comprehensive, unified legal framework for crypto-assets across member states. Adopted to fill regulatory gaps, it covers stablecoins, utility tokens, and asset-referenced tokens, creating a single licensing regime for Crypto-Asset Service Providers (CASPs) with passporting rights. MiCA aims to ensure legal certainty, consumer protection, market stability, and AML compliance, with phased applicability from 2024. The European Court of Justice's ruling in the Hedqvist case exempted virtual currency-to-fiat transactions from VAT, treating virtual currencies as a form of payment (Skatteverket v. David Hedqvist, European Court of Justice 2015). MiCA's legislative journey refined stakeholder feedback into a framework covering licensing, consumer protection, market abuse rules, stablecoin regulation, and supervisory collaboration among member states. The regulation aims to decrease market fragmentation, foster innovation, and maintain EU competitiveness. Continuous assessment and legislative agility remain crucial, making MiCA a landmark achievement toward a secure, harmonized crypto-asset market.

6.3 Singapore:

Singapore offers a key comparative model balancing innovation with compliance. Unlike China's restrictive dual-track or the EU's comprehensive MiCA, Singapore emphasizes controlled fintech innovation, licensing, and robust AML/CFT standards. Blockchain has enabled Initial Coin Offering ICOs as an innovative funding mechanism, functioning similarly to securities market share issuance (Land Forces Academic Review 2024). Under its Smart Nation initiative, the Monetary Authority of Singapore (MAS) adopted a smart financial center concept to enable better risk management and new digital financial services. In 2018, Singapore became the world's second-largest ICO fundraiser, raising over \$1.6 billion (Monetary Authority of Singapore, MAS, 2017). MAS classifies digital assets into three groups: payment tokens, utility tokens, and security tokens. Security tokens are regulated under the Securities and Futures Act, while payment tokens require licensing under the Payment Services Act. The framework excludes using digital payment tokens as a means of payment for goods or services, and providers must ensure AML/CFT governance. Singapore's

sandbox-based, phased regulatory strategy provides a practical model for controlled experimentation and gradual legal integration.

7 A Proposed Governance Framework for Pakistan

7.1 A Digital Assets:

Virtual assets lack uniform classification, leading to regulatory inefficiency. Pakistan should enact a Digital Assets Act establishing clear definitions, a functional taxonomy (payment, security, utility tokens), and recognizing virtual assets as property (Chuen and Lee, 2017). Smart contracts raise Shariah concerns, particularly *gharar*. Islamic contract theory rests on three pillars: mutual consent (*sighah*), contracting parties, and subject matter *Ijab qabul* (offer and acceptance) in smart contracts is permissible in written form if wording is clear. Non-compliance arises when blockchain autonomy conceals identities or permits prohibited transactions, creating *gharar*. Islamic contracts require KYC principles (Zaher and Hassan, 2001)

7.2 Controlled Innovation and Sandbox Governance:

A strengthened regulatory sandbox should test emerging virtual asset services before market integration, allowing regulators to assess risks and refine rules particularly for permissioned applications like tokenized sukuk, trade finance, and supply chains.

7.3 Public Awareness and Capacity Building:

Effective governance requires technical knowledge. Specialized training for SBP, SECP, PVARA, and FBR officials on blockchain, smart contracts, and AML is essential. Judicial education on enforceability and digital evidence is critical. Consumer awareness campaigns on legal status, risks, and compliance obligations protect the public from fraud and speculation.

7.4 Islamic Legal Compatibility:

A distinction exists between speculative and asset-backed assets. Cryptocurrencies face criticism for volatility and lack of intrinsic value. Scholars in Egypt and Turkey declare them impermissible due to *gharar*, while Gulf states and Malaysia permit them with conditions. AAOIFI distinguishes utility tokens from speculative coins (Samarah, 2024). Sukuk represent ownership in tangible assets, unlike conventional bonds. However, 90% of global sukuk remain asset-based complying in form, not substance raising fairness concerns (*A'dalah*) (Buterin, 2017) Pakistan should prioritize asset-backed sukuk for substantive Shariah compliance. Pakistan is establishing a Shariah-compliant digital economy. The Virtual Assets Act 2026 mandates PVARA's Shariah Advisory Committee (SAC) with binding rulings (Elasrag, 2019). Pakistan collaborates with Malaysia on Shariah-compliant assets. The SAC prohibits *riba*, *gharar*, *maysir*, and *haram*, approving *Mudarabah*-based vehicles and tokenized sukuk. Tokenization of real assets and *halal* stablecoins offer viable pathways.

8 Conclusion and Recommendations

This research has demonstrated that smart contracts and virtual assets governance represent a paradigm shift requiring urgent legal and institutional adaptation in Pakistan. The study identifies three interrelated governance challenges, **institutional fragmentation** between the SBP and SECP, doctrinal uncertainty under the Contract Act 1872 regarding smart contract enforceability and the emergence of *lex cryptographica*, and **compliance vulnerability** under FATF Recommendations 15 and 16 (the Travel Rule). These challenges have created a regulatory vacuum giving rise to informal crypto market, exposing consumers to fraud, depriving the exchequer of tax revenue, and undermining Pakistan's international compliance standing.

The study further assesses Shariah compatibility, concluding that while speculative cryptocurrencies raise *gharar* (excessive uncertainty) and *maysir* (gambling) concerns, tokenized sukuk (Islamic financial certificates) and asset-backed digital instruments offer viable pathways for innovation within Islamic finance principles, supported by PVARA's

Shariah Advisory Committee and Pakistan-Malaysia collaboration. The central contribution of this research is a **hybrid pillars governance framework** tailored to Pakistan's unique institutional and Islamic context.

The Virtual Assets Act 2026 and PVARA provide a foundation, but effective implementation requires capacity building, judicial education, consumer protection mechanisms, and FATF-aligned enforcement. With approximately 70 percent of Pakistan's population below 30, the country cannot afford to remain dependent on old economic models. A balanced, adaptive regulatory approach drawing from China's sovereignty-centric clarity, MiCA's procedural rigor, and Singapore's innovation-oriented supervision would enable Pakistan to secure financial sovereignty, unlock blockchain's economic potential, and integrate responsibly into the evolving global digital financial system.

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