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Evaluating Blockchain Infrastructure for Institutional Finance: A Comparative Assessment of Scalability, Regulatory Compliance, and Financial Market Adoption

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Abstract:

Purpose: *This research assesses the key blockchain infrastructures utilized in decentralized finance, tokenized asset markets, institutional settlement systems, and the development of new digital financial ecosystems. The paper focuses on both Layer 1 and Layer 2 networks, emphasizing scalability, institutional uptake, privacy frameworks, transaction traceability, and alignment with regulations.*

Design/Methodology/Approach: *The study adopts a qualitative comparative research design. Ethereum, Solana, Avalanche, Arbitrum, Optimism, Base, Monero, and Zcash are evaluated using data from peer-reviewed literature, official blockchain documentation, institutional announcements, regulatory publications, industry research reports, and publicly available market data. The analysis uses five criteria: scalability and transaction efficiency; institutional adoption and ecosystem development; regulatory compatibility and AML compliance; privacy and traceability; and suitability for tokenized asset and financial market infrastructure.*

Findings: *The assessment indicates that Ethereum remains the leading platform for decentralized finance and tokenized asset infrastructure. Solana has shown significant institutional growth through stablecoin settlements, tokenizing real-world assets, and enterprise collaborations. Avalanche occupies a distinct position through its configurable subnet architecture. Layer 2 ecosystems such as Arbitrum, Optimism, and Base enhance Ethereum's scalability while maintaining settlement security through Ethereum Layer 1. Privacy-oriented chains face substantial institutional barriers because of transaction-traceability and AML requirements.*

Practical Implications: *The findings suggest that financial institutions seeking blockchain infrastructure should evaluate technological performance together with governance, regulatory compatibility, auditability, identity controls, and traceability transaction. Hybrid architecture combining public settlement with compliance and governance frameworks offers a practical pathway for institutional adoption.*

Originality/Value: *The study provides a comparative regulatory and operational assessment of Layer 1, Layer 2, and privacy-oriented blockchain architectures for institutional financial services, addressing a gap identified in the existing literature.*

Keywords: *Blockchain infrastructure, institutional finance, decentralized finance, tokenization, regulatory compliance, AML, Layer 1, Layer 2, financial market infrastructure.*

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1. Introduction

Blockchain technology has progressed from being primarily associated with speculative digital currencies to a meaningful incorporation into regulated financial systems. Financial institutions are progressively utilizing blockchain systems for various applications, including tokenized securities, cross-border settlements, decentralized finance, digital identity management, and stablecoin frameworks.

However, blockchain architectures vary significantly in terms of governance structures, scalability, privacy features, transaction transparency, and their appropriateness for institutional use. This paper analyzes key blockchain ecosystems by examining verified adoption metrics, records of institutional participation, assessments of regulatory compatibility, and available technical documentation.

2. Literature Review

Blockchain technology has emerged as a foundational infrastructure for digital financial services, enabling decentralized transactions, programmable financial instruments, and tokenized asset ecosystems. Early research focused primarily on cryptocurrencies as alternative payment systems; however, recent studies have shifted toward the role of blockchain in institutional finance, including tokenized securities, stable coins, decentralized finance (DeFi), and cross border settlement systems.

Existing literature highlights three critical factors influencing institutional blockchain adoption: scalability, regulatory compliance, and governance structures. Ethereum has been widely recognized as the dominant smart-contract platform due to its extensive developer ecosystem and leadership in tokenized asset issuance.

Recent studies have also identified growing institutional interest in alternative blockchain networks such as Solana and Avalanche, which offer higher throughput and lower transaction costs. At the same time, privacy-oriented blockchain networks have generated significant debate among regulators. While privacy-enhancing technologies strengthen user confidentiality, they may also reduce transaction transparency required for anti-money laundering (AML) and counter-terrorist financing (CTF) compliance.

Regulatory bodies, including the Financial Action Task Force (FATF), have emphasized the importance of traceability and compliance controls within virtual asset ecosystems.

Despite increasing research on blockchain adoption, limited studies have comparatively assessed the suitability of Layer 1, Layer 2, and privacy focused blockchain architectures for institutional financial services. This study seeks to address that gap by evaluating major blockchain ecosystems using a regulatory and operational perspective.

3. Research Methodology

This study adopts a qualitative comparative research design to evaluate the suitability of selected blockchain infrastructures for institutional financial services. The analysis focuses on Ethereum, Solana, Avalanche, Arbitrum, Optimism, Base, Monero, and Zcash due to their significant market presence, technological relevance, and varying approaches to scalability, governance, and privacy.

Data were collected from multiple sources, including peer-reviewed literature, official blockchain documentation, institutional announcements, regulatory publications, industry research reports, and publicly available market data.

The triangulation of multiple sources was applied to improve the reliability of findings and reduce dependence on a single data provider. The blockchain networks were assessed against five evaluation criteria.

1. Scalability and transaction efficiency.
2. Institutional adoption and ecosystem development.
3. Regulatory compatibility and AML compliance.
4. Privacy and transaction traceability.
5. Suitability for tokenized asset and financial market infrastructure.

The study does not seek to identify a single superior blockchain network. Instead, it evaluates the strengths and limitations of different blockchain architectures in relation to institutional financial services and regulatory expectations.

4. Comparative Framework

To facilitate systematic evaluation, the selected blockchain networks were assessed using a comparative framework consisting of operational, regulatory, and institutional dimensions.

The framework enables comparison of public blockchain infrastructures based on characteristics most relevant to financial institutions, including operational performance, regulatory alignment, and institutional adoption.

Table 1. *Comparative Assessment of Blockchain Networks*

Network	Scalability	Institutional Adoption	AML Compatibility	Privacy Features	Financial Services Suitability
Ethereum	Medium	High	High	Low	High
Solana	High	High	Medium-High	Low	High
Avalanche	High	High	Medium	High	Medium
Arbitrum	High	High	Medium	High	Low
Optimism	Medium-High	High	Medium	High	Low
Base	Medium-High	High	Growing	High	Low
Monero	Medium-High	Medium	Low	Low	Very High
Zcash	Low	Medium	Low	Low-Medium	High

Source: *Own study.*

5. Key Findings

The comparative assessment indicates that Ethereum continues to dominate institutional blockchain adoption due to its mature ecosystem, extensive tokenized asset infrastructure, and strong integration with Layer 2 scaling solutions. Solana demonstrates the strongest growth trajectory, particularly in tokenized real-world assets and enterprise payment applications.

Avalanche occupies a distinct position by offering configurable subnet architectures suitable for regulated financial environments. Privacy-oriented networks provide enhanced confidentiality but face substantial barriers to institutional adoption due to regulatory expectations regarding transaction transparency and AML compliance.

- Ethereum continues to be the leading decentralized finance ecosystem, holding a dominant position in smart contract infrastructure and the global settlement of tokenized assets.
- By the end of December 2025, Solana's tokenized real-world assets reached a record high of $873.3 million (RWA.xyz), marking a 325% increase year-on-year and capturing 4.57% of the global RWA market share.
- Avalanche has enhanced its institutional presence with a configurable subnet architecture tailored for regulated blockchain settings.
- Layer 2 ecosystems such as Arbitrum, Optimism, and Base enhanced Ethereum's scalability while maintaining settlement security through Ethereum Layer 1.
- Chains that prioritize privacy, such as Monero and Zcash, face regulatory hurdles because of their restricted transaction traceability and their lack of alignment with anti-money laundering (AML) regulations. Permissioned

systems like Hyperledger Fabric and Corda continue to be favored by banks for settlement and trade finance that are under enterprise control.

6. Ethereum and Institutional Financial Infrastructure

Ethereum continues to be the leading smart contract blockchain for decentralized finance and institutional tokenization. It provides the essential infrastructure for both decentralized finance and the tokenization of institutional assets, with major financial institutions relying significantly on its framework.

The transition from Proof of Work to Proof of Stake in September 2022 greatly reduced energy consumption and enhanced long term scalability prospects. As of early January 2026, the global market for tokenized real-world assets, excluding stable coins, reached around $19.08 billion, with Ethereum accounting for $12.3 billion (65.26% market share), as confirmed by RWA.xyz data published in January 2026.

Layer 2 networks such as Arbitrum, Optimism, Base, and zkSync have increased Ethereum's transaction capacity while ensuring security through Ethereum's settlement layer.

7. Solana and Institutional Expansion

7.1 Real-World Asset Tokenization

Tokenized real-world assets on Solana achieved a record high of $873.3 million by the end of December 2025, marking a 10% increase from the previous month and a remarkable 325% growth compared to around $200 million at the beginning of 2025 (source: RWA.xyz, validated by Coinedition, January 2026).

The number of unique RWA holders increased by 18.42%, reaching 126,236 individuals. Solana secured its position as the third-largest blockchain for RWA tokenization, holding a 4.57% share of the global market, while Ethereum maintained the lead with a 65.26% share.

7.2 Solana Developer Platform Launch (March 2026)

On 24 March 2026, the Solana Foundation launched the Solana Developer Platform (SDP), an API-based institutional infrastructure toolkit enabling enterprises to build financial applications on Solana. Early adopters included Mastercard (stablecoin settlement), Western Union (cross-border payment orchestration), and Worldpay (merchant settlement and tokenized assets).

The platform integrates infrastructure from more than 20 technology partners and includes AI coding tools from Anthropic (Claude Code) and OpenAI (Codex).

Sources: CoinDesk, Decrypt, Finextra, The Block, and the Solana Foundation press release, all published 24–25 March 2026.

7.3 J.P. Morgan Commercial Paper Issuance (December 2025)

On December 11, 2025, J.P. Morgan facilitated the issuance of US commercial paper (USCP) for Galaxy Digital Holdings LP on the Solana blockchain, with Coinbase and Franklin Templeton acting as buyers.

The settlement was executed entirely in USDC, marking it as one of the first debt issuances on a public blockchain in the United States and a pioneering instance for the USCP market utilizing on-chain delivery-versus-payment settlement (source: Business Wire / J.P. Morgan press release, December 11, 2025; corroborated by CoinDesk, Davis Polk, and Ledger Insights).

8. Avalanche and Enterprise Blockchain Architecture

Avalanche has positioned itself as an institutional blockchain platform through configurable subnet architecture, enabling organizations to construct customized blockchain environments with selective governance, permissioned participation models, and tailored regulatory controls.

Institutional interest has grown particularly in tokenized asset infrastructure and regulated DeFi environments. The subnet model differentiates Avalanche from purely public blockchain ecosystems by supporting customized operational environments while preserving interoperability with broader blockchain networks.

9. Privacy-Oriented Blockchain Systems

Privacy-centric blockchains such as Monero and Zcash utilize sophisticated cryptographic methods including ring signatures, stealth addresses, RingCT, and zk-SNARK proofs to obscure transaction identities, amounts, and histories of transfers.

The adoption by institutions is still limited due to anti-money laundering (AML) regulatory obligations. Regulators and financial entities emphasize the importance of transaction traceability, auditability, and verifying customer identities. The Financial Action Task Force's Sixth Targeted Update on VA/VASP Implementation (June 2025) highlighted that technologies enhancing privacy pose significant compliance risks. Zcash has encountered delisting from exchanges in various jurisdictions, while Monero is not available on regulated exchanges in many markets.

10. Conclusions

This study examined the suitability of major blockchain infrastructures for institutional financial services by comparing Layer 1, Layer 2, and privacy-oriented

blockchain networks. The findings indicate that Ethereum remains the dominant institutional platform, while Solana and Avalanche continue to expand their presence through scalable architecture and enterprise-focused initiatives. In contrast, privacy-oriented networks face persistent regulatory challenges that limit institutional adoption.

The evidence suggests that future financial market infrastructure is likely to be built upon hybrid blockchain models that combine public settlement capabilities with robust compliance, governance, and identity frameworks.

The confirmed evidence indicates that the adoption of blockchain technology in financial services has transitioned from speculative applications to the development of institutional infrastructure. Ethereum remains the leader in decentralized finance and tokenized settlement systems.

Solana has shown significant institutional growth, highlighted by the $873.3 million RWA achievement in December 2025, the issuance of commercial paper by J.P. Morgan in December 2025, and the launch of the Solana Developer Platform in collaboration with Mastercard, Western Union, and Worldpay in March 2026. Avalanche has bolstered its institutional standing through its configurable subnet architecture.

The future of financial infrastructure is expected to integrate public blockchain settlement with permissioned compliance controls, regulated digital identity systems, and selective privacy features that align with AML/CFT regulations.

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