

## **TABLE OF CONTENTS**

1 Executive Summary: The State of Blockchain Technology in 2025	5	Supply Chain and Logistics Solutions  Traceability Implementations	
Key Market Developments and Growth Indicators		Inventory and Provenance Tracking	
Institutional Adoption Milestones		Digital Identity and Data Management	
Cross-Industry Implementation		Self-Sovereign Identity Systems	
Critical Technology Advancements		Decentralized Data Verification	
Scalability Breakthroughs		Entertainment and Creative Industries	
Interoperability Progress		Digital Rights Management	
Strategic Business Implications		Creator Economy Platforms	
Emerging Revenue Models		5 Competitive Landscape: Incumbents	
Competitive Landscape Shifts		vs. Disruptors	27
2 Global Blockchain Market Landscape	10	Established Enterprise Blockchain Providers	
Market Size and Growth Trajectory		Financial Institution Offerings	
Current Valuation and Projections		Technology Giant Solutions	
Regional Adoption Patterns		Public Blockchain Networks	
Enterprise Blockchain Adoption		Layer-1 Protocol Competition	
Fortune 500 Implementation Rates		Specialized Blockchain Ecosystems	
Small and Medium Business Integration		Emerging Blockchain Innovators	
Industry-Specific Market Penetration		Infrastructure Startups	
Financial Services Dominance		Application-Specific Disruptors	
Emerging Vertical Markets		Competitive Differentiation Strategies	
Consumer Adoption Metrics		Technical Performance Metrics	
Digital Asset Ownership Trends		Ecosystem Development Approaches	
User Experience Evolution		6 Business Models and Monetization	77
3 Blockchain Technology Architecture		Strategies	33
and Innovations	15	Enterprise Blockchain Revenue Models  Software-as-a-Service Approaches	
Core Blockchain Infrastructure Developments		Consortium Membership Structures	
Layer-1 Protocol Advancements		Token Economics and Incentive Design	
Layer-2 Scaling Solutions		Utility Token Models	
Consensus Mechanisms Evolution		Governance Token Structures	
Proof-of-Stake Maturation		Decentralized Finance Business Models	
Hybrid Consensus Models		Lending and Borrowing Protocols	
Smart Contract Capabilities		Automated Market Makers	
Programmability Enhancements		Real-World Asset Tokenization Economics	
Cross-Chain Functionality		Fee Structures	
Interoperability Solutions		Liquidity Provision Incentives	
Bridge Technologies		7 Investment and Funding Landscape	39
Cross-Chain Communication Standards		Venture Capital Activity	
4 Business Applications and Use Cases	21	Investment Trends by Sector	
Financial Services Transformation		Notable Funding Rounds	
Payment and Settlement Systems		Institutional Investment Strategies	
Asset Tokenization		Corporate Treasury Allocations	

Asset Manager Approaches		Economic and Cost Barriers	
Public Market Investment Vehicles		Implementation ROI Challenges	
Exchange-Traded Products		Operating Cost Structures	
Public Company Blockchain Exposure		User Experience and Accessibility Issues	
Return on Investment Analysis		Interface Complexity	
Performance Metrics by Segment		Onboarding Friction Points	
Risk-Adjusted Return Comparisons		11 Convergence with Other Emerging	
8 Regulatory and Compliance Framework	44	Technologies	62
Global Regulatory Landscape		Blockchain and Artificial Intelligence	
Regional Policy Approaches		Al-Powered Smart Contracts	
International Coordination Efforts		Decentralized Machine Learning	
Securities and Financial Regulation		Internet of Things Integration	
Token Classification Standards		Device Identity and Authentication	
Custody and Trading Requirements		Automated Machine-to-Machine Transactions	
Data Privacy and Security Compliance		Quantum Computing Implications	
On-Chain Data Protection		Cryptographic Vulnerability Preparation	
Cross-Border Data Governance		Quantum-Resistant Blockchain Designs	
Regulatory Technology Solutions		Extended Reality and Metaverse Applications	
Compliance Automation Tools		Digital Asset Ownership in Virtual Worlds	
Regulatory Reporting Systems		Decentralized Virtual Economies	
9 Security Challenges and Risk		12 Future Market Outlook and Trends	68
Management Management	50	Five-Year Market Projections	
Technical Vulnerabilities and Exploits		Growth Forecasts by Sector	
Smart Contract Risks		Adoption Rate Predictions	
Consensus Attack Vectors		Emerging Use Case Trajectories	
Operational Security Practices		Next-Generation Applications	
Key Management Solutions		Cross-Industry Convergence	
Multi-Party Computation Approaches		Technology Evolution Roadmap	
Market and Liquidity Risks		Scalability and Performance Advances	
Volatility Management		Interoperability Breakthroughs	
Counterparty Risk Assessment		Industry Transformation Scenarios	
Systemic Risk Considerations		Financial System Restructuring	
Cross-Chain Contagion		Supply Chain Reinvention	74
DeFi Interdependence Risks		13 Strategic Recommendations	
·		Guidance for Enterprise Decision-Makers	
10 Integration Challenges and Implementation Barriers	56	Implementation Roadmap Development	
	30	Organizational Readiness Assessment	
Technical Integration Complexities		Investment Strategy Framework	
Legacy System Compatibility		Portfolio Allocation Approaches	
Performance Scalability Issues		Risk Management Strategies	
Organizational Adoption Hurdles		Developer and Technology Provider Strategies	
Governance Model Transitions		Market Positioning Opportunities	
Talent and Expertise Gaps		Technical Differentiation Approaches	

Policy and Regulatory Engagement		15 About Hiswai	82
Compliance Preparation		What is Hiswai	
Industry Advocacy Approaches		Your Personal Web	
		How Hiswai Works	
14 Appendix	80	About Hiswai Insights	
		How Hiswai Insights Inform Your Strategy	
References		The Future We Envision	

4



# Executive Summary: The State of Blockchain Technology in 2025

## **Key Takeaways**

- Institutional Adoption Surge: 60% of Fortune 500 companies now actively pursuing blockchain initiatives, with major financial institutions like HSBC, JPMorgan, and BlackRock moving beyond pilots to full implementation, signaling blockchain's transition from experimental to essential business infrastructure.
- Scalability Breakthrough: Layer-2 solutions now process 10,000+ transactions per second with 90% lower fees, enabling economically viable microtransactions and opening blockchain to mass-market applications in retail, gaming, and payments.
- Cross-Industry Implementation: Blockchain adoption has expanded beyond finance into supply chain (Walmart, BMW), healthcare (patient data management), gaming (digital asset ownership), and government services, creating new efficiencies and business models across sectors.
- Revenue Model Transformation: Tokenization of real-world assets has created substantial new revenue streams, with tokenized funds reaching \$5.7B in Q1 2025 and tokenized Treasury bills growing 1,000% year-over-year, enabling 24/7 operations and instant settlements.
- Competitive Landscape Disruption: Traditional financial institutions face pressure from blockchain-native challengers, while retail giants like Amazon and Walmart explore proprietary stablecoins that could disrupt the \$160B interchange fee market dominated by card networks.
- Interoperability Advancement: Cross-chain communication protocols have evolved from experimental bridges to robust infrastructure, enabling seamless asset transfers between previously siloed networks and facilitating enterprise adoption through standardized token formats.

## Key Market Developments and Growth Indicators

The blockchain technology landscape has reached a critical inflection point in 2025, characterized by unprecedented institutional adoption and cross-industry implementation. Major corporations are no longer merely experimenting with blockchain but integrating it deeply into their core operations, with 60% of Fortune 500 companies actively pursuing blockchain initiatives according to recent Coinbase research. This widespread adoption signals a fundamental shift in how businesses approach data management, financial transactions, and supply chain operations, moving blockchain from speculative technology to essential business infrastructure.

#### **Institutional Adoption Milestones**

Institutional blockchain adoption has accelerated dramatically in 2025, with traditional financial powerhouses leading the charge. Major banks including JPMorgan Chase, HSBC, and Citigroup have moved beyond pilot programs to full-scale implementation of blockchain-based settlement systems, with HSBC recently launching Hong Kong's first

blockchain-based settlement service that converts traditional deposits into digital tokens for real-time payments. Investment giants like BlackRock have emerged as significant players in the digital asset space, accumulating over 643,000 BTC through their iShares Bitcoin trust (IBIT), surpassing both Binance and MicroStrategy in holdings. This institutional momentum extends beyond finance, with Bitwise Research projecting that institutional investors could add \$427 billion to Bitcoin by 2026, potentially acquiring over 20% of the capped supply.

The scale of institutional adoption is further evidenced by Coinbase's recent survey revealing that 60% of Fortune 500 companies are now actively working on blockchain projects. Roughly half of these enterprises have increased their blockchain spending, while one in five consider it a key component of their strategic roadmap. This represents a fundamental shift from experimental interest to core business integration, with blockchain technology increasingly viewed as essential infrastructure rather than speculative technology.

BNY Mellon, one of the world's largest custodians with over \$46 trillion in assets under custody, hasits digital asset platforms to streamline settlement processes, citing improved reconciliation and reduced back-office costs as primary benefits. Similarly, Fidelity Investments has made significant moves into the space, recently acquiring 444.3 BTC valued at \$48.7 million, adding to its growing portfolio of digital assets under management.

Corporate treasuries are also diversifying into blockchain-based assets at unprecedented rates. Japanese investment firm Metaplanet added 1,004 BTC worth \$104 million to its holdings, positioning itself as one of Asia's most significant corporate Bitcoin holders with 7,800 BTC valued at approximately \$812 million. This trend extends to smaller enterprises as well, with Coinbase reporting that over one-third of small and medium-sized businesses now hold cryptocurrencies, and more than half of non-users plan to adopt digital assets within the next three years.

The regulatory landscape has evolved to accommodate this institutional shift, with clearer frameworks emerging in major jurisdictions. The European Union's Markets in Crypto-Assets (MiCA) regulation, Singapore's Project Guardian initiative, and Japan's updated Payment Services Act have all contributed to a more structured environment for institutional participation. This regulatory clarity has emboldened traditional financial institutions to deepen their blockchain integration.

Stablecoin adoption has emerged as a particularly strong use case, with global stablecoin supply increasing by 54% year-over-year. Major payment processors including Stripe and PayPal havetheir stablecoin settlement capabilities, with PayPal introducing rewards programs for holders of its PYUSD stablecoin. Even retail giants are exploring the space, with reports that Amazon and Walmart are considering issuing their own stablecoins to potentially save billions in payment processing fees.

The tokenization of traditional assets represents another frontier being rapidly developed by institutions. BlackRock has launched tokenized money market funds, while UBS Group AG has issued tokenized structured products. Deutsche Bank is piloting tokenization and custody services under new regulatory guidelines, aiming to ensure compliance while leveraging blockchain's efficiencies. The World Economic Forum has identified challenges in this space, including insufficient secondary–market liquidity and the lack of clear global standards, but institutional momentum continues to build.

As blockchain infrastructure matures and regulatory frameworks solidify, the financial sector is entering a new era of innovation, efficiency, and inclusivity. The convergence of traditional finance with blockchain technology is no longer theoretical but practical reality, with institutions of all sizes recognizing the strategic importance of establishing a foothold in this rapidly evolving landscape.

#### **Cross-Industry Implementation**

Blockchain adoption has transcended financial services to permeate diverse industries, creating new business models and operational efficiencies. In supply chain management, VeChain has established partnerships with global enterprises like Walmart China and BMW to enhance transparency and traceability. The healthcare sector is leveraging blockchain for secure patient data management and medical record interoperability, with platforms like MediBloc and Patientory building systems where patients can securely store and share health records. Gaming companies are integrating blockchain to enable true digital ownership, with Nexon's MapleStory Universe launching blockchain-based games that allow players to own in-game assets. Even government entities are embracing the technology, with Ukraine launching an Innovation Sandbox for AI and blockchain startups to test solutions in regulated environments, while Vietnam's National Data Association is developing sovereign blockchain infrastructure and decentralized identity systems to support the country's digital economy transformation.

## **Critical Technology Advancements**

The blockchain landscape has undergone transformative technological evolution in 2025, with scalability and interoperability emerging as the defining breakthroughs. These advancements have addressed the fundamental limitations that previously hindered widespread blockchain adoption across industries. Financial institutions, enterprises, and governments are now leveraging these innovations to deploy blockchain solutions at unprecedented scale, facilitating seamless cross-chain communication and dramatically improving transaction throughput without compromising security or decentralization.

#### **Scalability Breakthroughs**

Layer-2 scaling solutions have matured significantly in 2025, with rollup technologies now processing over 10,000 transactions per second while maintaining the security guarantees of their underlying blockchains. Zero-knowledge proofs have evolved beyond theoretical applications to become production-ready infrastructure, enabling privacy-preserving transactions with minimal computational overhead. Major networks have implemented sharding architectures that distribute computational load across specialized chains, allowing parallel processing that has increased throughput by orders of magnitude. These innovations have collectively reduced gas fees by over 90% on leading networks, making microtransactions economically viable for the first time and opening blockchain technology to mass-market applications in retail, gaming, and everyday payments. The emergence of hybrid consensus mechanisms combining Proof-of-Stake with novel validation methods has furtherscalability while reducing energy consumption, addressing both performance and sustainability concerns simultaneously.

The breakthrough in rollup technology came when Optimism introduced its Bedrock architecture, which reduced settlement times from minutes to seconds while maintaining full EVM compatibility. This advancement was quickly followed by zkSync's Era 2.0, which leveraged recursive zero-knowledge proofs to validate thousands of transactions in a single batch, dramatically improving throughput while preserving Ethereum's security model. These developments have enabled applications like Ink's blockchain-based payment system to process transaction volumes comparable to traditional payment networks during peak periods.

Zero-knowledge technology has seen particularly impressive growth, with StarkWare's Cairo 2.0 language making ZK-proof development accessible to mainstream developers without specialized cryptographic expertise. The implementation of zkEVM by Polygon has bridged the gap between theoretical efficiency and practical application, allowing existing Ethereum applications to migrate seamlessly to ZK-rollups without code modifications. This technological leap has enabled sensitive enterprise applications in healthcare and finance to leverage blockchain's transparency while maintaining strict data privacy requirements.

Sharding implementations have evolved beyond Ethereum's vision, with networks like Near Protocol's Nightshade and Harmony's adaptive state sharding demonstrating how computational workloads can be distributed efficiently across specialized chains. Sui's object-centric parallel execution model represents another innovative approach, allowing transactions that don't interact with the same data to be processed simultaneously rather than sequentially. These architectural innovations have collectively increased network capacity by factors of 100-1000x compared to 2023 levels.

The economic impact of these scaling solutions has been transformative for the blockchain ecosystem. Average transaction costs on Ethereum Layer-2 networks have fallen below \$0.01, enabling use cases previously rendered impractical by high gas fees. Micropayment channels for content creators, pay-per-use API services, and in-game economies with sub-cent transactions are now thriving. The Indonesian government's blockchain-based subsidy distribution system, processing millions of small payments daily, exemplifies how these scaling solutions are enabling real-world utility beyond speculative use cases.

Hybrid consensus mechanisms have emerged as another frontier in blockchain scalability. Avalanche's Snowman++ protocol combines classical Byzantine Fault Tolerance with Proof-of-Stake to achieve sub-second finality while maintaining decentralization. Similarly, Hedera's hashgraph algorithm with its asynchronous Byzantine Fault Tolerance has demonstrated sustained throughput exceeding 10,000 TPS in production environments. These innovations address the blockchain trilemma—balancing security, decentralization, and scalability—more effectively than previous consensus models.

Cross-chain interoperability has evolved in parallel with scaling solutions, with protocols like Axelar and LayerZero enabling seamless asset and data transfers between previously siloed networks. This has created a more integrated

blockchain ecosystem where applications can leverage the unique strengths of different networks while maintaining a unified user experience. The development of cross-chain messaging standards has furtherthis interoperability, allowing smart contracts on different blockchains to communicate directly without trusted intermediaries.

Enterprise adoption has accelerated as these scaling solutions have matured, with major financial institutions implementing blockchain-based settlement systems that process billions in transaction volume daily. HSBC's tokenized deposit program in Hong Kong, leveraging high-throughput blockchain infrastructure, demonstrates how traditional finance is embracing these technologies once performance barriers have been overcome. Similarly, supply chain applications have been resolved.

As we move toward 2026, the focus is shifting from raw throughput metrics to optimizing for specific application requirements. Purpose-built execution environments tailored for DeFi, gaming, or identity management are emerging, each with specialized performance characteristics. The modular blockchain paradigm, where consensus, data availability, settlement, and execution are handled by different specialized layers, represents the next evolution in scaling blockchain infrastructure for global adoption.

## **Interoperability Progress**

Cross-chain communication protocols have evolved from experimental bridges to robust infrastructure layers, enabling seamless asset and data transfer between previously siloed blockchain networks. The development of universal messaging standards has facilitated this integration, with projects like Axelar Network and Chainlink's Cross-Chain Interoperability Protocol (CCIP) establishing secure channels for cross-chain smart contract execution. Financial institutions have embraced these advancements, with SWIFT's blockchain interoperability pilot connecting traditional banking systems to multiple public and private ledgers for near-instant settlement. Enterprise adoption has accelerated through the implementation of standardized token formats like ERC-4626, allowing for consistent representation of real-world assets across different blockchain environments. The emergence of chain-agnostic development frameworks has further simplified building applications that operate seamlessly across multiple networks, reducing technical barriers and fostering a more interconnected blockchain ecosystem where liquidity and functionality are no longer confined to individual chains.

## Strategic Business Implications

The integration of blockchain technology into mainstream business operations is creating profound strategic implications across industries. As we approach 2025, the convergence of traditional finance with decentralized systems is reshaping revenue models and competitive landscapes. Fortune 500 companies are increasingly embracing blockchain initiatives, with 60% actively developing projects according to recent Coinbase research, while financial institutions are exploring tokenized assets and stablecoin implementations. This transformation is not merely technological but represents a fundamental shift in how businesses create and capture value in an increasingly decentralized economy.

### **Emerging Revenue Models**

Blockchain technology is catalyzing innovative revenue streams that were previously impossible under traditional business frameworks. Tokenization of real-world assets has emerged as a particularly lucrative model, with the market for tokenized funds reaching \$5.7 billion in Q1 2025 and tokenized U.S. Treasury bills experiencing a 1,000% growth over the past year. Financial institutions like HSBC have launched tokenized deposit programs enabling instant settlements and 24/7 operations, while companies such as Beeline Holdings are leveraging blockchain to transform home equity into liquid funds without additional debt obligations. Beyond finance, subscription-based models are evolving through blockchain, with platforms like SUBBD offering Al-powered content creation services tied to token economics, demonstrating how blockchain can transform traditional recurring revenue approaches into community-driven ecosystems with embedded incentive mechanisms.

The evolution of blockchain-based revenue models extends far beyond these initial applications. In the retail sector, major corporations are exploring proprietary stablecoins as payment alternatives that could potentially save billions in transaction fees. According to industry analysts, these initiatives could disrupt the \$160 billion interchange fee market by creating direct payment channels between merchants and consumers. Kraken's recent launch of tokenized equities (xStocks) represents another frontier, allowing 24/7 trading of traditional stocks on blockchain rails, effectively removing

time zone constraints from global markets.

Enterprise adoption has reached critical mass, with Coinbase's Q2 2025 report revealing that 60% of Fortune 500 companies are now actively working on blockchain projects. This institutional embrace is driving demand for enterprise-grade infrastructure, creating new revenue opportunities for service providers specializing in blockchain integration, security auditing, and regulatory compliance. Companies like ConsenSys have capitalized on this trend by developing tools that bridge traditional corporate systems with decentralized networks.

The gaming industry has pioneered particularly innovative revenue approaches through blockchain. MapleStory Universe exemplifies this shift, reinventing its classic game with a token-based economy that enables players to earn while playing. Similarly, Sparkball's integration with the Somnia blockchain network facilitates tournament rewards and wager-based matches, creating monetization channels that weren't feasible in traditional gaming models.

In supply chain management, VeChain's blockchain solutions have created new revenue streams throughtransparency and efficiency. Their partnership with global enterprises like Walmart China demonstrates how blockchain can transform cost centers into profit generators by reducing fraud, improving traceability, and enabling premium pricing for verified sustainable products. Ripple's pilot with Mercy Corps in Colombia further illustrates this potential, using blockchain to help farmers secure better prices through verified sustainability data.

Healthcare represents another frontier for blockchain-based revenue models. Platforms like HealthBlocks are monetizing secure health data sharing while maintaining patient privacy, allowing individuals to control and potentially profit from their medical information. This approach creates multi-sided marketplaces where patients, researchers, and healthcare providers can transact in ways that respect privacy regulations while unlocking data value.

The integration of artificial intelligence with blockchain is spawning entirely new business models. CDARI's partnership with Laika AI demonstrates how blockchain intelligence across multiple chains can enhance market analysis and provide real-time analytics for decentralized finance and NFTs. This convergence creates opportunities for specialized service providers who can extract actionable insights from on-chain data, offering subscription-based intelligence services to traders, investors, and enterprises.

As blockchain infrastructure matures, we're witnessing the emergence of meta-layer services that generate revenue by optimizing blockchain interactions. LI.Fl's integration into banking APIs exemplifies this trend, creating value by aggregating bridges and optimizing cross-chain transactions. These infrastructure providers often employ token-based models where value accrues to the protocol through transaction fees or token appreciation tied to network growth.

The film and entertainment industry is exploring blockchain-based funding models that transform traditional investment structures. By tokenizing film projects, creators can raise capital directly from audiences, creating shared economic incentives between producers and viewers. This approach not only democratizes funding but also enables new revenue-sharing mechanisms where supporters benefit from a project's success through token appreciation or revenue distributions.

As these models continue to evolve, we're seeing the emergence of hybrid approaches that combine traditional business models with blockchain-native mechanisms. Cloud3 Ventures exemplifies this trend, maintaining a diversified portfolio across both conventional equity investments and token-based projects. This strategic positioning allows organizations to capture value across the entire spectrum of blockchain innovation while managing regulatory and market risks.

#### **Competitive Landscape Shifts**

The competitive dynamics across industries are being fundamentally reshaped as blockchain adoption accelerates. Traditional financial institutions face increasing pressure from blockchain-native challengers, with banks like JPMorgan, Citigroup, and BNY Mellon responding by developing their own blockchain platforms for payments, settlements, and asset tokenization. Meanwhile, retail giants including Amazon and Walmart are reportedly exploring proprietary stablecoins to reduce payment processing fees and enhance customer loyalty, potentially disrupting the \$160 billion interchange fee market dominated by card networks. In the gaming sector, established companies like Nexon are reinventing themselves through blockchain integration, as evidenced by MapleStory's transformation into MapleStory Universe with its NXPC token. This evolution is creating a new competitive paradigm where industry boundaries blur, and companies must navigate a complex ecosystem of traditional players, blockchain-native startups, and hybrid models that combine elements of both worlds.