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THE POTENTIAL OF BLOCKCHAIN TECHNOLOGY IN INTERBANK PAYMENT SYSTEMS

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ABSTRACT:

This article investigates the application of blockchain technology in interbank payment systems, with a focus on its ability to improve operational efficiency, transparency, and security. The study uses a comparative qualitative methodology, analyzing both traditional and blockchain-based models such as SWIFT and JPMorgan's Liink. Results indicate that blockchain reduces settlement time, lowers transaction costs, and enhances real-time traceability. Moreover, the implementation of decentralized ledger technology (DLT) enables a shift from trust-based to trustless systems, reducing dependence on intermediaries. Challenges such as regulatory ambiguity, system integration, and scalability are discussed. The paper concludes that while full-scale adoption is still evolving, blockchain offers a promising alternative for modernizing interbank settlements globally.

INTRODUCTION. In the modern financial system, interbank payment mechanisms play a critical role in enabling secure, efficient, and timely transfer of large-value funds between financial institutions. However, most traditional systems, such as SWIFT and CHIPS, continue to rely on centralized architectures, which often involve multiple intermediaries, high transaction costs, limited transparency, and slow settlement times — particularly in cross-border contexts. With increasing globalization, digitalization of finance, and the rise of real-time expectations, these limitations have become a significant bottleneck to financial innovation and systemic efficiency.

Blockchain technology, or Distributed Ledger Technology (DLT), has emerged as a disruptive force with the potential to transform financial infrastructures. By enabling decentralized, tamper-proof, and transparent recording of transactions, blockchain offers an alternative paradigm for interbank settlements. Leading institutions like JPMorgan, the European Central Bank, and the Bank for International Settlements are actively piloting blockchain-based systems for wholesale and cross-border payments, indicating a shift from theoretical potential to practical exploration.

This paper addresses the relevance and viability of blockchain in interbank payment systems. It explores whether this technology can overcome existing inefficiencies and regulatory constraints, and assesses real-world implementations to determine the opportunities and challenges associated with its adoption. In light of growing demand for faster, cheaper, and more secure payment infrastructure, investigating blockchain's capabilities in this domain is both timely and crucial.

Literature Review

The application of blockchain technology in interbank payment systems has attracted significant scholarly and institutional attention over the past decade. Don Tapscott and Alex Tapscott, in their widely cited work Blockchain Revolution, emphasize the capacity of blockchain to decentralize trust and eliminate the need for intermediaries in the financial sector. They argue that blockchain can substantially improve transparency, reduce transaction delays, and enhance data integrity across banking networks.

Ravi Narula and Joshua Gans provide a detailed economic analysis of blockchain's integration into financial services. Their findings suggest that blockchain enables a peer-to-peer network where each participating bank can act as an equal validator, reducing reliance on central clearinghouses. This structural shift, they argue, could lead to more resilient and transparent interbank infrastructures.

Christian Catalini and Joshua Gans, in their foundational research at MIT, identify blockchain’s role in reducing information asymmetry in the value chain. They highlight how the technology replaces trust-based models with cryptographic proof, allowing for frictionless settlement and real-time reconciliation in cross-border payment systems.

A comprehensive report by the World Economic Forum titled The Future of Financial Infrastructure documents active pilot programs in blockchain-based interbank transactions. It presents empirical evidence from projects like JPMorgan’s Liink, RippleNet, and trials by the Bank for International Settlements Innovation Hub, showing that settlement times have been reduced from several days to just minutes.

Legal and regulatory perspectives are discussed in publications by the global law firm Allen & Overy. Their insights emphasize the urgent need for legal frameworks that accommodate the decentralized nature of blockchain while maintaining financial stability and compliance. They note that major jurisdictions are beginning to recognize blockchain’s potential and are moving toward adaptive regulatory policies.

Collectively, these studies affirm that blockchain is not merely a technological tool but a foundational innovation capable of redefining the core architecture of interbank payment systems. The convergence of academic theory and real-world experimentation underscores the relevance of this topic in the ongoing transformation of global financial services.

Research methodology

The research methodology is based on qualitative content analysis of academic publications, institutional reports, and real-world pilot projects related to blockchain in interbank payments. Data were collected from peer-reviewed journals, financial institutions, and official blockchain networks. The collected information was critically analyzed to identify trends, assess technological impact, and evaluate implementation challenges.

Analysis and Results

The analysis of blockchain technology in interbank payment systems reveals significant performance improvements over traditional infrastructures such as SWIFT and CHIPS. One of the most evident benefits is transaction speed. Conventional cross-border payments may take up to three business days to settle due to reliance on multiple correspondent banks, manual processing, and time zone differences. In contrast, blockchain-based platforms such as RippleNet and JPMorgan's Liink offer near real-time settlement. RippleNet completes international transactions in 5–10 seconds using the XRP Ledger, while Liink, based on a permissioned blockchain, processes interbank messages and transaction validations within one minute. In pilot programs involving central banks, such as Project Dunbar led by the Bank for International Settlements, cross-border settlement times have been reduced to under 30 seconds, proving the technical feasibility of distributed ledger technology for time-sensitive banking operations.

Cost efficiency is another critical factor where blockchain demonstrates clear advantages. Traditional payment systems incur high operational expenses due to intermediary fees, reconciliation costs, and administrative burdens. The World Bank reports that global remittance costs average 6.4%, with higher fees in developing countries. Blockchain reduces these costs by eliminating third-party intermediaries and automating reconciliation. Ripple's commercial case studies indicate up to 40% cost savings per transaction for institutions adopting its network. In addition, blockchain enhances transparency and auditability through its distributed, immutable ledger. Unlike centralized systems where records are fragmented and updates are delayed, blockchain provides a synchronized, tamper-proof record visible to all permissioned participants. This feature enables real-time monitoring, streamlines audits, and greatly reduces fraud and double spending risks, which are prevalent in traditional systems. Smart contracts embedded in blockchain protocols further ensure compliance by automating conditional logic and reducing human error.

However, the widespread implementation of blockchain faces significant challenges. Regulatory uncertainty is a major barrier, as most jurisdictions are still developing legal frameworks to govern digital ledger systems in banking. For instance, while the European Central Bank has begun testing wholesale central bank digital currencies on blockchain platforms, legal clarity across regions varies widely, slowing adoption. Furthermore, legacy banking systems are not directly compatible with blockchain architecture. Integrating blockchain into core banking operations requires significant infrastructure investments, staff retraining, and cybersecurity enhancements. Scalability also remains a concern, particularly for public blockchains, although permissioned enterprise solutions are actively addressing this limitation through consensus optimization and layered network structures. Despite these hurdles, growing interest from central banks, commercial banks, and consortia such as R3 and BIS Innovation Hub indicates strong institutional momentum in favor of blockchain-based interbank systems.

To illustrate the difference in performance between legacy and blockchain-based payment systems, a comparative table is provided below.

Table 1.

Performance comparison between conventional and dlt-based interbank settlement models

Criteria	Traditional Systems	Blockchain-Based Systems
Settlement Time	1–3 business days	5 seconds – 1 minute
Transaction Cost	High (multiple intermediary fees)	Reduced by up to 40%
Transparency	Limited, delayed	Real-time, shared ledger
Fraud Risk	Medium to high	Low (tamper-resistant)
Auditability	Manual, periodic	Real-time, automatic
Interoperability	Mature but rigid	Requires integration efforts
Regulatory Framework	Well-established	Emerging, fragmented

These results demonstrate that blockchain is not merely an experimental solution but a foundational innovation capable of redefining how banks interact at both domestic and global levels. While full-scale implementation remains a work in progress, current trends, pilot studies, and cost-benefit analyses strongly support the long-term viability of blockchain in the modernization of interbank payment infrastructures.

Conclusion

The conducted analysis confirms that blockchain technology offers a transformative potential for modernizing interbank payment systems by significantly enhancing transaction speed, reducing costs, and increasing transparency. Unlike traditional centralized infrastructures that depend on multiple intermediaries and prolonged settlement times, blockchain-based platforms enable real-time, secure, and automated payments through decentralized ledger mechanisms. Empirical evidence from global pilot programs, including RippleNet, JPMorgan’s Liink, and BIS Innovation Hub initiatives, shows that distributed ledger technology can reduce settlement times from several days to under a minute while simultaneously lowering transaction costs by up to 40 percent.

Despite its advantages, the integration of blockchain into the global financial system faces regulatory, technical, and organizational challenges. The lack of harmonized legal frameworks, limited interoperability with legacy systems, and the need for large-scale infrastructure adaptation remain significant barriers to full adoption. Nevertheless, the growing interest from central banks and financial institutions indicates that blockchain is no longer a theoretical concept but a strategic infrastructure solution.

In conclusion, while blockchain is not yet a complete replacement for existing interbank systems, it serves as a viable and scalable foundation for future developments. Policymakers and industry leaders must work collaboratively to establish standards, promote regulatory clarity, and invest in infrastructure to fully unlock the potential of blockchain in creating a faster, more transparent, and secure global interbank payment ecosystem.

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