

IMPROVING SECURITIES OPERATIONS IN COMMERCIAL BANKS
THROUGH DIGITAL TECHNOLOGIES

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Abstract

This article examines the role of digital technologies in transforming securities-related operations conducted by commercial banks, including custody services, brokerage, underwriting, settlement, and portfolio management. The rapid evolution of financial markets, combined with growing regulatory demands and rising customer expectations, has compelled commercial banks to modernize their securities infrastructure through technologies such as blockchain, application programming interfaces (APIs), artificial intelligence, robotic process automation, and cloud-based trading platforms. The article analyzes the current state of securities operations in commercial banks, identifies operational inefficiencies inherent in traditional models, and explores how digital tools enhance speed, transparency, accuracy, and risk management. Based on international experience and empirical observations, the article proposes practical recommendations for accelerating digital transformation of securities operations, particularly within emerging banking markets such as Uzbekistan.

Keywords

Commercial banks, securities operations, digital technologies, blockchain, distributed ledger technology, fintech, custody services, brokerage, settlement, financial market infrastructure, automation, digital transformation.

Introduction

Commercial banks have historically served as central intermediaries within securities markets, performing functions such as custody, clearing, settlement, brokerage, underwriting of new issues, and asset management on behalf of clients. These operations traditionally relied on paper-based documentation, manual reconciliation procedures, and fragmented communication channels among banks, depositories, exchanges, and regulators. As global financial markets have become increasingly interconnected and transaction volumes have grown exponentially, the limitations of legacy systems have become more pronounced, manifesting in settlement delays, higher operational costs, elevated counterparty risk, and reduced transparency for end investors. The emergence of digital technologies over the past two decades has fundamentally altered the operational landscape for securities

transactions. Distributed ledger technology (DLT), cloud computing, application programming interfaces, artificial intelligence (AI), machine learning, and robotic process automation (RPA) now provide commercial banks with tools to re-engineer securities operations from end to end. These technologies enable near real-time settlement, automated compliance checks, predictive risk analytics, and seamless integration between front-, middle-, and back-office systems. This article aims to analyze the impact of digital technologies on securities operations performed by commercial banks, to identify the principal challenges associated with digital transformation in this sphere, and to formulate recommendations for improving the efficiency, security, and competitiveness of bank securities departments through technological modernization.

Literature Review

A substantial body of research addresses the digitalization of financial market infrastructure. Scholars have noted that distributed ledger technology offers the potential to compress settlement cycles from the conventional T+2 standard toward near-instantaneous settlement, thereby reducing counterparty and liquidity risk. Other researchers have emphasized that application programming interfaces allow banks to integrate with external trading venues, custodians, and regulatory reporting systems without the need for costly proprietary connections, fostering an open and interoperable financial ecosystem. Additional studies have focused on the application of artificial intelligence and machine learning in securities operations, particularly for fraud detection, anti-money laundering (AML) screening, algorithmic trading, and portfolio optimization. Robotic process automation has been widely documented as a means of eliminating repetitive manual tasks such as trade confirmation matching, corporate action processing, and regulatory reporting, thereby reducing operational errors and freeing staff for higher value analytical work. Within the context of emerging markets, researchers highlight that commercial banks face additional barriers to digital transformation, including limited capital market depth, underdeveloped regulatory frameworks for digital assets, legacy IT infrastructure, and a shortage of specialized human capital. Nevertheless, these same markets often present significant opportunities for leapfrogging, as banks can adopt modern cloud-native and DLT-based platforms without being constrained by decades of legacy investment.

Traditional Securities Operations in Commercial Banks: Key Challenges

Securities operations within commercial banks traditionally encompass several interrelated functions, including trade execution and order management, clearing and settlement, custody and safekeeping of securities, corporate action processing (dividends, coupon payments, stock splits, voting rights), portfolio

accounting and valuation, regulatory and tax reporting, and client relationship management for brokerage and asset management services.

In conventional setups, these functions are frequently supported by disparate legacy systems that do not communicate efficiently with one another. The following table summarizes the principal challenges associated with traditional, non-digitalized securities operations.

Challenge	Description
Settlement delays	Reliance on T+2 or longer settlement cycles increases counterparty and liquidity risk.
Manual reconciliation	Trade confirmations and corporate actions are matched manually, increasing error rates and processing time.
Fragmented systems	Front-, middle-, and back-office platforms operate on separate databases with limited interoperability.
Limited transparency	Investors and regulators have restricted real-time visibility into ownership records and transaction status.
High operating costs	Paper-based documentation and manual labor increase the cost per transaction processed.
Compliance burden	Manual AML and KYC checks slow client onboarding and increase regulatory risk exposure.

Digital Technologies Transforming Securities Operations

Application Programming Interfaces (APIs) and Open Banking

APIs allow commercial banks to connect their internal systems with external stock exchanges, clearing houses, custodians, and fintech platforms in a standardized, secure manner. This connectivity supports straight-through processing (STP), wherein a trade order flows from initiation to settlement without manual intervention. Open banking frameworks also enable banks to offer integrated investment services through third-party platforms, expanding distribution channels for brokerage and wealth management products.

Artificial Intelligence and Machine Learning

AI-driven analytics are increasingly applied to portfolio management, risk scoring, fraud detection, and compliance monitoring within bank securities departments. Machine learning models can identify anomalous trading patterns indicative of market manipulation or money laundering far more rapidly than manual review. Robo-advisory platforms, powered by AI algorithms, enable banks to offer automated, low-cost portfolio management services to retail clients, broadening access to securities investment.

Robotic Process Automation (RPA)

RPA tools automate rule-based, repetitive back-office tasks such as trade reconciliation, settlement instruction generation, corporate action notifications, and regulatory report preparation. By deploying software robots to handle these processes, banks significantly reduce processing time, minimize human error, and lower operating costs associated with securities back-office functions.

Cloud Computing and Digital Trading Platforms

Cloud-based infrastructure provides commercial banks with scalable computing resources necessary for high-frequency data processing, real-time risk calculations, and large-scale data storage required for securities operations. Digital trading platforms, accessible via web and mobile applications, allow clients to place orders, monitor portfolios, and receive market data directly, reducing reliance on traditional branch-based brokerage services.

Comparative Analysis: Traditional versus Digitalized Securities Operations

Operational Aspect	Traditional Approach	Digitalized Approach
Settlement cycle	T+2 or longer, manual confirmation	Near real-time or T+0 via DLT-based atomic settlement
Trade processing	Manual order entry and matching	Straight-through processing via APIs
Custody records	Paper certificates, centralized registries	Tokenized digital records on distributed ledgers
Risk monitoring	Periodic manual review	Continuous AI-driven monitoring and alerts
Back-office tasks	Manual	RPA-driven

	reconciliation and reporting	automated processing
Client access	Branch-based, paper instructions	Mobile and web-based digital platforms

International Experience and Practical Examples

Several international financial centers provide instructive examples of digital transformation in securities operations. In the European Union, the implementation of the Central Securities Depositories Regulation has driven harmonization of settlement cycles and encouraged adoption of DLT-based settlement pilots by major custodian banks. In Singapore and Switzerland, regulatory sandboxes have enabled commercial banks to experiment with tokenized bond issuances and blockchain-based custody solutions under controlled regulatory oversight. In emerging markets, including those in Central Asia, commercial banks are gradually upgrading depository and brokerage infrastructure by adopting electronic trading platforms integrated with national stock exchanges and central securities depositories. Such initiatives reduce reliance on paper-based share certificates, shorten settlement cycles, and improve transparency of ownership registries, thereby increasing investor confidence and attracting both domestic and foreign capital into local securities markets.

Challenges and Risks of Digital Transformation

Despite the considerable benefits, the digital transformation of securities operations also introduces new categories of risk that commercial banks must manage. Cybersecurity risk increases as systems become more interconnected and exposed to external networks, requiring banks to invest substantially in encryption, intrusion detection, and incident response capabilities. Operational risk may arise during the transition period when legacy and digital systems operate in parallel, increasing the potential for reconciliation discrepancies. Regulatory risk is also significant, as legal frameworks governing digital assets, electronic signatures, and automated decision-making may lag behind technological capabilities, creating uncertainty regarding the enforceability of digitally executed securities transactions. Furthermore, the adoption of AI-driven decision-making in portfolio management and credit assessment raises questions of algorithmic accountability and the need for explainable AI models that can be audited by regulators. Finally, human capital constraints present a persistent challenge. Commercial banks require staff with combined expertise in finance, information technology, and data science, a skill set that remains scarce in many markets. Without adequate investment in

training and recruitment, even well-designed digital systems may underperform due to inadequate operational support.

Recommendations for Commercial Banks

- Develop a phased digital transformation roadmap for securities operations, prioritizing high-impact areas such as settlement automation and client onboarding before expanding to more complex applications such as tokenization.
- Invest in API-based integration architecture to connect internal securities systems with national stock exchanges, central securities depositories, and regulatory reporting platforms, enabling straight-through processing.
- Pilot distributed ledger technology for specific use cases, such as bond issuance or repo transactions, in cooperation with regulators through controlled sandbox environments before broader implementation.
- Deploy robotic process automation for repetitive back-office functions, including trade matching, settlement instructions, and corporate action processing, to reduce operational costs and errors.
- Strengthen cybersecurity frameworks through continuous monitoring, regular penetration testing, and adoption of multi-factor authentication for all securities-related systems.
- Establish dedicated training programs and cross-functional teams combining financial expertise with technological competence to support sustainable digital operations.
- Collaborate with national regulators and capital market authorities to update legal frameworks governing electronic securities transactions, digital signatures, and tokenized assets.

Conclusion

Digital technologies are fundamentally reshaping the manner in which commercial banks conduct securities operations. Blockchain and distributed ledger technology offer pathways toward near-instantaneous settlement and reduced counterparty risk; application programming interfaces enable seamless integration with broader financial market infrastructure; artificial intelligence enhances risk management and client service capabilities; and robotic process automation eliminates inefficiencies inherent in manual back-office processes. While these technologies offer substantial benefits in terms of speed, cost reduction, transparency, and client experience, their implementation must be accompanied by robust cybersecurity measures, updated regulatory frameworks, and sustained investment in human capital. For commercial banks operating in emerging markets, digital transformation of securities operations represents not merely an operational upgrade but a strategic imperative for remaining competitive within increasingly globalized and technologically sophisticated capital markets. A

measured, phased approach to digital adoption, supported by close cooperation between banks, technology providers, and regulators, offers the most sustainable pathway toward modernized, efficient, and resilient securities operations.

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