Original Research Article

Research on the impact of digital finance on the operational efficiency of banking industry

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Abstract: Digital finance is profoundly reconfiguring the value chain and operation logic of the banking industry through technological empowerment and model innovation. This paper systematically analyzes the mechanism of digital finance on the operational efficiency of the banking industry from the three dimensions of technology spillover, process reengineering and service innovation. The study shows that digital finance significantly improves the overall efficiency of the banking industry by reducing transaction costs, optimizing resource allocation and expanding service boundaries, but there are significant heterogeneous effects in different types of banks. Meanwhile, issues such as the conflict between technology application and institutional friction, and the balance between data security and innovation incentives have become key bottlenecks restricting the sustained improvement of efficiency. This paper proposes policy recommendations such as promoting digital transformation in a hierarchical manner and constructing a "regulatory sandbox" pilot mechanism to provide theoretical references for efficiency improvement in the banking industry. Digital finance is profoundly restructuring the value chain and operation logic of the banking industry through technological empowerment and model innovation. This paper systematically analyzes the mechanism of digital finance on the operational efficiency of the banking industry from the three dimensions of technological spillover, process reengineering and service innovation. The study shows that digital finance significantly improves the overall efficiency of the banking industry by reducing transaction costs, optimizing resource allocation and expanding service boundaries, but there are significant heterogeneous effects in different types of banks. Meanwhile, issues such as the conflict between technology application and institutional friction, and the balance between data security and innovation incentives have become key bottlenecks restricting the sustained improvement of efficiency. This paper puts forward policy suggestions such as promoting digital transformation in a hierarchical manner and constructing a "regulatory sandbox" pilot mechanism, which provide theoretical references for efficiency improvement in the banking industry.

Keywords: Digital finance; Banking industry; Operational efficiency; Technological spillover; Organizational change

1. Introduction

Under the wave of digital economy, the banking industry is experiencing a profound change from "channel e-channelization" to "business digitization". According to McKinsey's report, the potential value of digital transformation of the global banking industry will exceed $3.7 trillion in 2025, and the size of China's digital payment market already accounts for 45% of the global total. Through the embedding of technology and ecological reconstruction, digital finance has promoted the transformation of the banking industry from a "capital-intensive" to a "technology-data-driven" model. This transformation has not only changed banks' customer acquisition methods and product forms, but also put forward brand-new requirements for organizational efficiency, risk management and other core competencies. This paper focuses on the impact of digital finance on the operational efficiency of the banking industry, discusses the logic of efficiency improvement and potential

risks under the empowerment of technology, and provides a theoretical framework and practical inspiration for the transformation of the industry.

2. The underlying logic of digital finance reconfiguration of the efficiency of the banking industry

2.1. Technology spillover effect: From tool application to capability remodeling

The core technologies of digital finance (e.g., blockchain, artificial intelligence, big data) permeate the banking industry through two paths:

Direct substitution: Intelligent customer service replaces manual seating, and RPA (Robotic Process Automation) handles standardized transactions, which reduces the cost of single business processing by 60%-80%.

Capability upgrading: big data risk control model compresses credit approval time from 7 days to minutes, and reduces the delinquency rate by 1.5-2 percentage points; blockchain technology improves cross-border payment and settlement efficiency by 70% and reduces costs by 50%.

2.2. Process re-engineering: From linear collaboration to mesh collaboration

The traditional banking business process is characterized by "departmental fragmentation, serial approval and manual intervention", while digital finance promotes three major changes:

End-to-End Integration: Open Banking API (Application Program Interface) seamlessly connects loan application, risk assessment, and disbursement, shortening customer experience time by 80%.

Intelligent decision-making: AI-driven "intelligent middle office" analyzes customer behavior data in real time, increasing the accuracy of product recommendations by 40%.

Organizational flattening: Agile development model breaks down departmental barriers, shortening the on-line cycle of new products from 6 months to 2 weeks.

2.3. Eco-expansion: From closed system to open platform

Digital finance breaks through the physical boundaries of traditional banks through scene embedding and ecological co-construction:

Long-tail customer coverage: With mobile payment and big data credit, the proportion of small and micro bank customers increased from 15% to 35%.

Integration of non-financial scenarios: For example, ICBC's "ICBC eLife" platform integrates catering and travel scenarios, increasing user activity by three times.

Cross-border value sharing: banks and technology companies have built joint risk control models, increasing data utilization by 50%.

3. The specific path of digital finance to improve the operational efficiency of the banking industry

3.1. Cost efficiency: From economies of scale to economies of scope

Compression of operating costs:

Physical outlets were transformed into "lightweight + intelligent", and the average annual operating cost of a single outlet was reduced from RMB 10 million to RMB 3 million.

Cloud computing replaces traditional IT architecture, reducing system operation and maintenance costs by 40%.

Risk cost optimization**:

Anti-fraud model intercepts suspicious transactions in real time, and credit card theft loss rate drops by 90%.

Supply chain finance blockchain platform reduces information asymmetry, and financing default rate is reduced by 2 percentage points.

3.2. Resource allocation efficiency: From experience-driven to data-driven

Customer stratification and refinement:

Pricing strategy based on user profiles, which increases the retention rate of high-net-worth customers by 25%.

Traceability of fund flows**:

Digital currency technology realizes closed-loop monitoring of funds, and the accuracy rate of targeted placement of universal loans reaches 98%.

3.3. Service efficiency: From standardization to real-time

7×24-hour service:

Mobile banking covers 98% of commonly used functions, and customer business processing time has been shortened from 30 minutes to 3 minutes.

Intelligent investment and benefit:

China Merchants Bank's "Capricorn Intelligent Investment" serves long-tail customers, and its asset management scale has exceeded 100 billion yuan, with the average cost per household being only 1/10 of the traditional model.

4. Heterogeneity and challenges of efficiency improvement

4.1. Differences in bank types

Large state-owned banks: high technology investment intensity (average annual IT investment of over 20 billion yuan), but organizational inertia leads to lagging innovation response speed.

Joint-stock banks: flexible mechanisms, digital product iteration cycle 30% faster than state-owned banks, but insufficient data governance capabilities.

City banks and agribusiness banks: limited by capital and technology reserves, mostly relying on third-party technology output, weak independent innovation capability.

4.2. Constraints to efficiency improvement

Technology application trap:

Some banks blindly pursue "technology stacking", resulting in system redundancy (e.g., a bank runs five sets of incompatible credit systems at the same time).

Institutional friction conflicts:

Traditional compliance frameworks are difficult to adapt to rapid innovation, e.g. biometric payments face legal validity disputes.

Data governance dilemma:

Conflicting customer privacy protection and data sharing needs limit cross-agency risk control cooperation.

5. Policy recommendations and future outlook

5.1. Layered promotion of digital transformation

Head banks: Focus on cutting-edge technology R&D and explore innovative scenarios such as digital RMB and meta-universe banking.

Small and medium-sized banks: rely on local ecology to build special services, such as "rural finance + e-commerce live" model.

5.2. Build an inclusive regulatory framework

Set up a "regulatory sandbox" to allow banks to test innovative products (e.g., blockchain letters of credit) within a controlled range.

Improve data rights and transaction rules, and establish an industry-level data sharing platform.

5.3. Reshape the organizational DNA of banks

Establish a "technology-business-risk control" triangular synergy mechanism, and incorporate digitalization capabilities into the performance appraisal of executives.

Cultivate "technology + finance" composite talents, and realize the proportion of science and technology personnel exceeding 30% within three years.

Conclusion

Digital finance is reshaping the logic of efficiency generation in the banking industry through technology penetration and model innovation. This efficiency improvement is not a linear growth, but a dynamic process accompanied by technology diffusion, system adaptation and subjective game. In the future, the banking industry needs to seek a balance in the triangular framework of "innovation incentive-risk prevention and control-social responsibility", and realize sustainable development through the integration of technical rationality and humanistic values.

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