

Research on the Mechanisms and Strategies of Financial Product Innovation in Chinese Commercial Banks under the Background of Digital Finance

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ABSTRACT

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With the rapid development of digital finance, commercial banks are facing increasing pressure from fintech firms, internet platforms, and evolving customer demands. In this context, this study develops a theoretical framework grounded in dynamic capabilities and institutional theories. The framework emphasizes external drivers, internal transmission mechanisms, and capability reconfiguration, exploring how these elements collectively shape the mechanisms and pathways of financial product innovation in commercial banks.

The study finds that technological advancements, industry competition, and evolving customer needs are the primary drivers of financial product innovation in commercial banks. Simultaneously, strategic orientation and organizational restructuring serve as the key internal pathways for innovation. These pathways enable banks to reconfigure three core capabilities: data-driven operations, agile innovation, and ecosystem collaboration. Together, these capabilities support a shift from incremental business optimization to a comprehensive redesign of digital systems. In addition, the study identifies significant challenges related to technological iteration, data governance, organizational structure, market competition, and customer service. It proposes a set of integrated innovation strategies, including modernizing the technological architecture, enhancing data governance, aligning organizational talent, transforming business models, and enhancing customer service. The research concludes that banks should approach digital transformation strategically, strengthen their innovation culture, and build organizational capabilities to achieve sustainable financial product innovation and long-term competitive advantage.

1. Research Background and Problem Statement

The global financial system is undergoing a pivotal phase of digital transformation. Technologies such as big data, artificial

intelligence, blockchain, and cloud computing are fundamentally reshaping financial structures and service models (Osei et al., 2023). Recent statistics from the Bank for International Settlements show that cashless payment methods continued to grow globally in 2023, with consumers increasingly opting for

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digital payments, even for small-value transactions (Committee on Payments and Market Infrastructures, 2025). According to Insights on China's FinTech Ecosystem Development (2024) published by the China Academy of Information and Communications Technology, China's fintech market is projected to reach 675 billion yuan in 2024, with a compound annual growth rate of over 25 percent over the past three years. The People's Bank of China further reports that more than 85 percent of major financial institutions have adopted big-data-based risk management systems, and artificial intelligence has achieved over 60 percent penetration in applications such as intelligent customer service and risk control. Collectively, these developments are steering financial services toward technology-driven and ecosystem-oriented models.

The rapid expansion of fintech firms and internet platforms in payments, credit, and wealth management is exerting increasing competitive pressure on traditional commercial banks (Liu et al., 2024). In 2023, online payment transactions handled by non-bank payment institutions rose by 16.5 percent year-on-year, accounting for 26.1 percent of all electronic payments. Consumer credit facilitated by internet platforms is expected to exceed 10 trillion yuan by the end of 2024, representing more than 35 percent of total consumer lending. Simultaneously, customer expectations are evolving. Data from the China Internet Network Information Center indicate that China had 892 million digital finance users in 2024, with 83.5 percent citing response speed and recommendation accuracy as the primary criteria when selecting financial services (Hu et al., 2025).

In this context, understanding the mechanisms driving financial product innovation in commercial banks is both theoretically and practically significant. Much of the existing literature remains descriptive and lacks a comprehensive analytical framework. In practice, banks also require systematic guidance to enhance innovation efficiency. Drawing on dynamic capability theory and institutional theory, this study presents an analytical framework centered on external drivers, internal transmission mechanisms, and capability reconfiguration. The framework illustrates how banks perceive environmental changes and convert them into innovation capabilities, offering a novel perspective on innovation in the digital finance era.

This study integrates theoretical development with analytical reasoning. By reviewing existing research and relevant case studies, it identifies key innovation challenges across technology, data governance, organizational structure, market competition, and customer needs, and offers strategic recommendations in response. Consequently, the study not only develops a comprehensive theoretical framework but also provides practical guidance for the digital transformation of commercial banks.

2. Literature Review and Theoretical Foundation

2.1. Definition and Characteristics of Digital Finance

Digital finance represents a transformative financial model that significantly alters traditional paradigms of financial services through the use of digital technologies, such as the internet, big data, artificial intelligence, and blockchain (Xie & Wang, 2023). Several key features characterize it. First, technological innovation is the primary driver of advances in digital finance (Hasanul et al., 2021). The rapid development of technologies, including big data, artificial intelligence, and blockchain, enables banks to offer more efficient and accessible financial services. Zhu et al. (2020) observe that for commercial banks, this technological foundation allows the development of more sophisticated risk management

systems, streamlined operational processes, and personalized financial products, fundamentally transforming traditional methods of financial product development and service delivery.

A central characteristic of digital finance is data empowerment (Wen & Liang, 2025). By analyzing customer behavior and accurately assessing credit risk, banks can provide more precise services and improve risk management (Hung et al., 2020). Furthermore, as early as 2015, a Deutsche Bank Research report suggested that banks transitioning into platform-based entities or digital banking ecosystems could leverage open APIs, big data, and interoperability standards to enhance both customer experience and operational efficiency (Deutsche Bank Research, 2015). Diamond et al. (2019) further emphasize that most banking executives view adopting a platform business model as crucial for achieving sustainable differentiation and gaining a competitive edge. As a result, platform-based operations have increasingly become a defining feature of digital finance. Moreover, several studies underscore the growing convergence between banks and other financial institutions, such as insurance and securities firms (Oliver, 2017; McKinsey & Company, 2017), leading to the development of interconnected financial ecosystems (Kabakova & Plaksenkov, 2018). These ecosystems not only enhance banks' competitiveness but also reshape their interactions with customers (Li et al., 2023).

2.2. Drivers of Financial Product Innovation in Commercial Banks

The drivers of financial product innovation in commercial banks stem from multiple sources, including both external environmental changes and internal strategic adjustments. First, as customer demands increasingly favor more personalized and efficient financial services, traditional financial products are increasingly unable to meet these evolving needs. For example, Sun and Zhang (2024) observe that younger consumers are increasingly inclined toward services such as smart investing, personalized wealth management, and real-time payments—areas in which traditional banking services often lack personalization, flexibility, and responsiveness.

Second, the rapid advancement of emerging technologies further accelerates product innovation within commercial banks. These technologies enable banks to redesign and innovate their financial offerings (Chen et al., 2021). Examples include advanced investment advisory services and automated asset allocation, both of which significantly enhance the efficiency of banking products and improve the customer experience (Modesti et al., 2025). This exemplifies the theory of dynamic capabilities, illustrating how banks swiftly adapt to market changes through technological innovation, continuously adjusting and optimizing their product portfolios to enhance competitiveness (Ambrosini & Bowman, 2009).

Furthermore, digital finance facilitates the transformation of banks toward platform-based and ecosystem-oriented models. Chen and Wang (2024) suggest that banks can integrate financial services with various sectors, including e-commerce, healthcare, and transportation, through platform-based operations, thereby delivering one-stop solutions. Gomber et al. (2018) also propose that banks establish supply chain finance platforms. For example, Ping An's intelligent supply chain finance platform uses blockchain technology to integrate information, commercial, and capital flows efficiently, optimizing the supply chain financing process. This platform-based development not only strengthens banks' core positions within ecosystems but also expands the application scenarios for financial products (Kabakova & Plaksenkov, 2018). As a result, banks are expanding their service

boundaries, evolving from passive service providers to ecosystem enablers (Zhou et al., 2020), thus facilitating diversified development.

2.3. Impact of Digital Finance on Commercial Bank Product Innovation

Given the characteristics of digital finance, its influence on commercial bank product innovation can be analyzed through three key areas: technology-driven innovation, data-driven capabilities, and platform-based operations. First, technology-driven innovation has the most direct impact on banking products. For example, AI-powered robo-advisors offer personalized asset allocation recommendations based on clients' risk tolerance and investment goals. Additionally, blockchain technology enhances the transparency and security of financial transactions, particularly in cross-border payments and the digital currency domain (Liu et al., 2024). Hu et al. (2025) further argue that emerging technologies enable banks to improve product precision and service efficiency, while also reducing operational costs and risks.

Second, another significant impact of digital finance is its role in driving banking product innovation through data empowerment. Zhu et al. (2020) propose that banks can accurately identify customer needs through in-depth analysis of client data. This analysis also enhances risk control capabilities and supports the optimization of product portfolios. For example, by analyzing consumer spending records and social data, banks can offer microcredit services to customers without traditional credit histories, thereby advancing inclusive finance (Hasanul et al., 2021).

Furthermore, digital finance facilitates the transformation of banks toward platform-based and ecosystem-oriented models. Chen and Wang (2024) suggest that banks can integrate financial services with daily e-commerce, healthcare, transportation, and other sectors through platform-based operations, delivering one-stop solutions. Gomber et al. (2018) also propose that banks establish supply chain finance platforms. For instance, PingAn's intelligent supply chain finance platform leverages blockchain technology to efficiently integrate information, commercial, and capital flows, optimizing supply chain financing processes. Such platform-based development not only strengthens banks' core positions within ecosystems but also broadens application scenarios for financial products (Kabakova & Plaksenkov, 2018). In this process, banks expand their service boundaries, evolving from passive service providers to ecosystem enablers (Zhou et al., 2020), thereby facilitating diversified development.

2.4. Research Gap

The existing literature extensively discusses the concept of digital finance and its impact on traditional financial products and services. However, most analytical frameworks focus on a single aspect, such as external drivers or internal banking mechanisms. Some studies examine how technological advances and customer demands drive innovation in banking products. In contrast, others explore how banks adjust their strategies and organizational structures through internal mechanisms to adapt to external changes, or how banking products and business models evolve.

However, current research has yet to provide a comprehensive framework that reveals the interactive relationship among external drivers, internal transmission mechanisms, and banks' innovation capabilities.

Furthermore, existing studies have not sufficiently explored the integration of dynamic capabilities and institutional theory. As a result, a theoretical synthesis and in-depth examination of how banks innovate in the digital finance era remains unresolved. Future research should develop a more comprehensive, multidimensional analytical framework to address this gap.

2.5. Theoretical Framework for the Impact of Digital Finance on Financial Product Innovation in Commercial Banks

To address these research gaps, this study developed a three-layer framework to elucidate the underlying mechanisms of financial product innovation in commercial banks within the context of digital finance. The framework consists of three layers: an external driver layer, an internal transmission layer, and a capability reconfiguration layer. It is grounded in dynamic capability theory and institutional theory. Dynamic capability theory emphasizes an organization's ability to perceive, adapt to, and reconfigure capabilities in rapidly changing environments (Teece, 1997). In contrast, institutional theory explains how external institutional environments constrain and shape organizational behavior, primarily focusing on three types of pressures: coercive, normative, and mimetic (Powell, 1983).

The first layer of the theoretical framework in this study is the external driver layer, which focuses on analyzing the pressures that the digital financial environment exerts on commercial bank innovation. According to institutional theory, coercive pressures primarily stem from government regulations and legal frameworks that compel banks to engage in compliance-driven innovation. Normative pressures arise from industry competition and standards, while mimetic pressures emerge from competitors' innovations and customer demands. These pressures force banks to adjust their strategies and products in order to maintain market competitiveness.

The second layer is the internal transmission layer, which explains how banks translate external pressures into internal innovation actions. At this level, the influence of the institutional environment is channeled through internal transmission mechanisms. Banks must identify key drivers, such as technological progress and market competition, to establish effective mechanisms that convert external pressures into concrete innovation strategies and decisions. This process involves making necessary adjustments to internal organizational structures, employee training, and strategic decision-making.

The third layer is the capability reconstruction layer, which analyzes the core competencies that drive banks' innovative development. At this level, banks enhance their innovation capabilities through the three key competencies outlined in dynamic capability theory. Capability reconstruction involves not only how banks improve operational efficiency through innovative technologies and processes, but also how they develop data-driven strategies, agile innovation processes, and ecosystem collaboration capabilities.

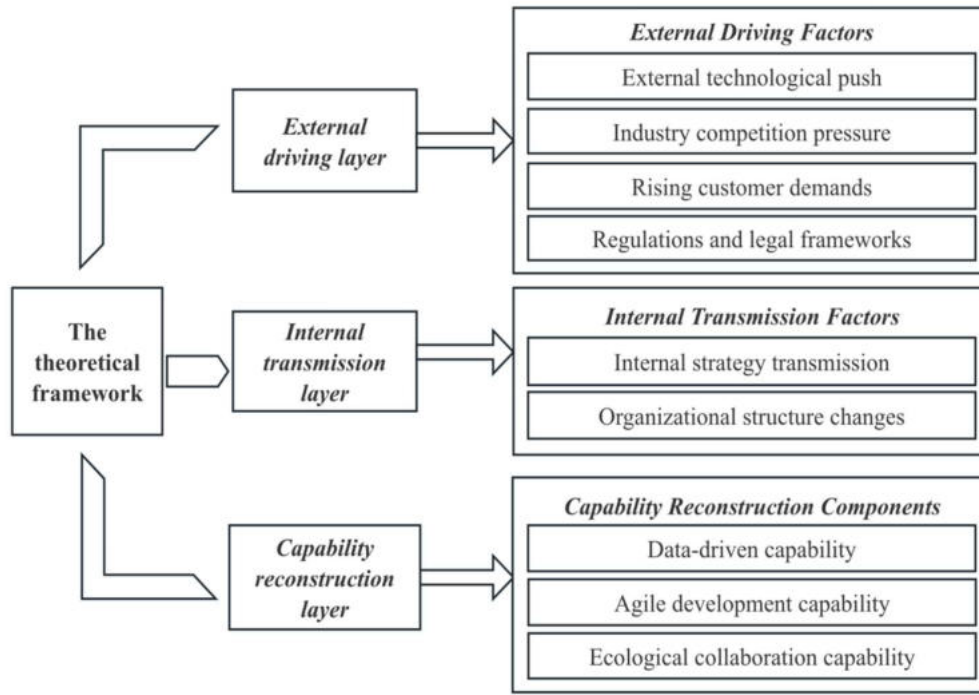


Fig. 1. The Theoretical Framework for the Impact of Digital Finance on Financial Product Innovation

As shown in Fig.1, the arrows in the diagram represent causal relationships and conceptual transmission mechanisms. The arrows from the external driver layer to the internal transmission layer indicate the driving forces of external factors, such as technology, industry competition, and customer demands. The arrows from the internal transmission layer to the capability reconfiguration layer indicate that banks enhance their innovation capabilities by adjusting internal strategies and restructuring organizational arrangements. In this process, internal transmission mechanisms transform external pressures into reconfigured innovation capabilities. This occurs through processes of sensing, seizing, and reconfiguring, which is consistent with dynamic capability theory.

Existing research typically focuses on the impact of either dynamic capabilities or institutional environments on organizational innovation, and often fails to integrate both factors effectively. This study, however, combines the concepts of sensing, seizing, and reconfiguring from dynamic capability theory with external pressures from institutional theory, thereby offering a new comprehensive framework. This framework emphasizes the interaction between external pressures and internal capabilities, particularly in the context of banking innovation. It explains how banks adjust their strategies and resource allocation within complex institutional environments. This integrated approach provides greater explanatory power. It not only examines how external pressures influence bank behavior but also elucidates how banks adapt their dynamic capabilities to respond to these external changes, thereby sustaining innovation and competitiveness in evolving environments.

2.6. Methodology

This study constructs a three-tiered framework comprising external drivers, internal transmission mechanisms, and capability reconfiguration, based on a systematic literature review and inductive reasoning. For literature collection, databases such as Web of Science, Scopus, and CNKI were used. Searches focused on terms like digital finance, financial product innovation, dynamic capabilities, and institutional theory, incorporating high-quality literature relevant to bank innovation and dynamic capabilities, while excluding articles with weak thematic relevance. Analysis of core literature revealed the interactive relationship between external environmental pressures and internal mechanisms. It also integrated this relationship with the perceive-grasp-reconfigure logic from dynamic capabilities.

For case selection, financial technology companies such as China Merchants Bank, Industrial and Commercial Bank of China, and Alipay were chosen as representative examples of digital transformation and product innovation. These examples demonstrate the practical application of the theoretical framework. The study focuses on the digital transformation of Chinese commercial banks, with future research expanding the framework's applicability through international comparisons or studies of different types of banks.

3. Mechanism Analysis of How Digital Finance Influences Financial Product Innovation in Commercial Banks

3.1. External Innovation Pressure in the Digital Finance Environment

Technological progress is a central driver of financial product innovation in commercial banks. It arises from advances in big data, artificial intelligence, blockchain, and cloud computing, as

well as their increasing integration into financial services. These technologies are reshaping the production and delivery of financial products and play a critical role in supporting innovation (Kim, Batten, & Ryu, 2020). In 2024, the six central state-owned banks invested 125.459 billion yuan in financial technology, reflecting an increase of about 2.15 percent from 2023. Some banks recorded relatively high technology expenditure-to-operating income ratios, with the Bank of Communications at 5.41 percent and China CITIC Bank at 5.12 percent. Digital technologies enable automated asset allocation, continuous service availability, and broader financial inclusion. They lower entry barriers for users, improve decision-making, reduce operating costs, and enhance customer experiences. In supply chain finance, information fragmentation remains a significant challenge (Wang, 2025). Blockchain technology can address this problem by enabling core firms, suppliers, distributors, banks, and logistics providers to operate on a shared network. Transaction records, from ordering and production to delivery and financing, can be accessed and verified by all relevant parties in real time. This mechanism helps prevent fraudulent activities, such as the repeated pledging of duplicate accounts receivable.

Competitive pressure in the financial industry is another key driver of innovation. Fintech firms, supported by agile structures and advanced technologies, have rapidly expanded in payment services, consumer lending, and wealth management (Ranjan, 2023). In the payment sector, non-bank payment institutions accounted for 28.5 percent of total electronic payments in the first quarter of 2024. In the credit sector, the pattern of loan growth has shifted. In 2023, corporate loans accounted for 79.12 percent of new lending at listed banks, while personal loans accounted for only 17.90 percent. This shift indicates that new financial service providers are diverting retail lending demand away from traditional banks. These firms also enhance the customer experience by streamlining interfaces, simplifying procedures, and improving service efficiency, thereby intensifying pressure on conventional banking models.

Changes in customer demand represent another significant source of innovation pressure. As digital lifestyles become more widespread, consumers are placing greater emphasis on convenience, personalization, and integrated financial services. These preferences are increasingly shaping the innovation strategies of commercial banks (Zhou et al., 2020). Customers expect financial services to be available anytime and anywhere. According to the 2024 China Digital Banking Survey Report, the proportion of users engaging in mobile banking reached 88 percent, up two percentage points from 2023. More than 70 percent of users now view mobile banking as a comprehensive platform offering multiple functions, rather than merely a transaction tool, marking a 10.4 percentage-point increase from 2023. This shift in perception has accelerated the development of mobile banking applications and driven their evolution from simple transaction channels to integrated financial service platforms.

Government regulation and legal frameworks have also played a significant role in driving innovation in banking and financial products. Regulatory bodies, through the establishment of laws such as data privacy protection and anti-money laundering requirements, compel banks to ensure compliance throughout their innovation processes. This forces banks to adopt new technologies to enhance transparency, reduce compliance risks, and ensure that innovative activities align with industry standards and regulatory mandates. As a result, government oversight and policies not only promote compliance in banking product innovation but also accelerate digital transformation in the sector.

3.2. Internal Drivers of Innovation in Commercial Bank

In the context of digital finance, strategic orientation serves as a key link between external pressures and internal innovation activities in commercial banks. In traditional business areas, banks often adopt incremental innovation strategies that enhance competitiveness through process optimization and technological upgrading. In digital business areas, they pursue more radical innovation by establishing dedicated innovation funds to support new business models and products (Li et al., 2023). This differentiated approach enables banks to maintain stable operations while proactively responding to opportunities created by digital transformation.

Many commercial banks have also established systematic governance structures for innovation. At the head office level, specialized coordinating bodies have been established, including the FinTech Committee of the Industrial and Commercial Bank of China, the Digital Transformation Office of China Construction Bank, and the Technology and Innovation Committee at Citigroup. These bodies are responsible for strategy development, resource coordination, and overall implementation. Their efforts help align innovation initiatives with the bank's broader business strategy. Through such mechanisms, banks can direct innovation resources toward market-relevant areas and strengthen their position in a competitive financial environment (Zhou et al., 2020).

Commercial banks are increasingly investing in employees' digital literacy and innovation capabilities. Examples include ICBC University, founded by the Industrial and Commercial Bank of China, and HSBC's institution-wide Data Core program for data literacy certification. Banks also strengthen workforce capabilities by recruiting talent with expertise in both technology and finance. These efforts help build organizational capacity and enable banks to convert external innovation pressures into internal drivers of innovation (Osei et al., 2023).

3.3. Core Capability Building for Innovation in Commercial Banks

3.3.1. Data-Driven Capability

In the digital finance era, developing data-driven capabilities is essential for improving the efficiency and effectiveness of product innovation in commercial banks. This capability should be cultivated in three key areas: data governance, algorithmic application, and organizational coordination. Banks need to address information fragmentation by establishing unified data platforms that support cross-departmental data integration and sharing. With these platforms in place, machine learning and deep learning algorithms can be used to analyze customer behavior, credit risk, and market trends.

At the organizational level, dedicated data units and data-oriented evaluation systems can help integrate data into decision-making processes and foster a culture of data-driven innovation. Data-driven capabilities enable banks to implement product innovation more efficiently. Through data models, banks can conduct targeted marketing, dynamic pricing, and risk identification, allowing for rapid iteration and continuous optimization from product design to promotion.

3.3.2. Agile Innovation Capability

Agile innovation capability is crucial for enhancing the responsiveness and market adaptability of banking products. It relies on short development cycles that incorporate continuous feedback. In a rapidly evolving digital finance environment, this approach enables banks to adjust products in response to market developments and customer needs, often playing a decisive role in product success. Banks can support agile innovation by establishing innovation laboratories and cross-departmental

project teams that foster project-centered, collaborative work structures. Streamlined development processes further help align product design with shifting market demands.

Agile innovation is particularly well-suited to fast-growing areas such as digital payments, mobile banking, and personalized financial products. For example, digital payment platforms like Alipay and WeChat Pay were not fully developed at launch. Through rapid iteration based on user feedback, they improved their functions and service quality. Alipay initially did not offer QR code payments but added this feature soon after identifying user demand. These payment platforms now serve hundreds of millions of users. This model of agile, feedback-driven innovation is increasingly viewed as a strategic direction for commercial banks.

3.3.3. Ecosystem Collaboration Capability

In the digital finance environment, the boundaries of financial services are expanding, and innovation in commercial banks is shifting from closed systems to open collaboration. Ecosystem collaboration capability refers to banks' ability to integrate external resources and technological strengths through multi-party cooperation. This capability enhances innovation efficiency and expands market coverage.

Commercial banks should develop innovation pathways that emphasize platform and ecosystem models. Collaboration with fintech firms, internet platforms, and partners from other industries can facilitate the joint development of financial solutions and integrated service delivery. For example, banks can partner with e-commerce platforms to offer installment payments, consumer loans, and wealth management products within a single service scenario. Open platforms also attract external developers, increasing innovation diversity and flexibility.

Ecosystem collaboration accelerates product iteration, enhances the compatibility of banking products with diverse application scenarios, and strengthens customer engagement. Through ecosystem collaboration, commercial banks can transition from being providers of isolated financial services to becoming central participants in value co-creation. This capability has become a significant source of competitiveness and a key driver of innovation in the digital finance era.

4. Challenges of Product Innovation in Commercial Banks under Digital Finance

4.1. External Technological, Regulatory and Demand Pressures

Although emerging technologies such as big data, artificial intelligence, and blockchain continue to advance, many traditional commercial banks struggle to adapt because their existing technology architectures cannot support rapid technological change. Some banks still rely on outdated core systems, which restrict their ability to upgrade and innovate in line with market and customer needs (Li, 2024). Many institutions depend on traditional servers and database management systems that are inefficient and incompatible with new technologies. Upgrading these systems requires substantial investment and, in some cases, a complete reconstruction of the technology infrastructure. These transformations have direct operational and financial implications. In 2024, the six central state-owned banks invested a total of 125.459 billion yuan in financial technology. Although the investment scale increased, the growth rate declined from 5.38 percent to 2.15 percent, underscoring the pressure associated with technological upgrading and legacy system restructuring.

Customer needs have become more diverse in the digital finance environment, and service expectations have risen significantly. From the perspective of service channels and touchpoints, customers are increasingly relying on mobile and intelligent service scenarios. According to the 2024 annual report of China Merchants Bank, the combined monthly active users of the CMB App and the "Life in Palm" App reached 123 million. This indicates that digital channels have become the primary service channel rather than a supplementary one. As a result, banks must maintain high levels of user activity while improving service quality. Mobile users now expect not only basic services such as account inquiries and transfers but also more intelligent, personalized, and scenario-based financial products. From a customer segmentation perspective, banks must better understand the needs of different customer groups, including young consumers, users in lower-tier markets, and elderly customers. The key challenge lies in effectively translating these differentiated needs into tailored products and services through data analytics and precise customer profiling.

Commercial banks face significant challenges in data governance, particularly in integrating internal data. Reports indicate that a typical commercial bank operates approximately 28 independent data systems, each with different data standards. For example, one joint-stock commercial bank maintains separate customer data systems for retail banking, corporate banking, and financial markets. Creating a unified customer view requires extensive data cleaning and conversion. However, due to the complexity of data sources and systems, data quality cannot always be guaranteed, even after cleaning and standardization. As a result, the effectiveness of risk management for innovative products is diminished. As digital finance evolves, regulatory requirements for data protection, anti-money laundering, anti-fraud, and consumer rights protection have become increasingly stringent. Commercial banks must fully comply with these evolving legal frameworks and continuously enhance their data governance and compliance capabilities (Jiang, 2024).

4.2. Internal Organizational Structure and Talent Challenges

During digital transformation, a significant challenge for commercial banks is the misalignment between traditional hierarchical structures and the demands of digital innovation. Most banks still follow a three-tier structure comprising headquarters, branches, and sub-branches. In practice, innovative products often require multiple rounds of approval, leading to lengthy development cycles that do not keep pace with the fast-moving digital era. Industry research shows that digital innovation typically involves coordination across multiple departments. Differences in decision-making processes and potential conflicts of interest are key factors that undermine innovation efficiency.

Talent structure is another critical issue. Many banks report a shortage of professionals with integrated expertise in both finance and digital technology, which limits their capacity for product innovation (Zaal et al., 2019). Training programs at some banks also fail to align with practical business needs fully. Additionally, current performance evaluation systems often fail to provide strong incentives for innovation, thereby undermining organizational vitality.

4.3. Agile Innovation and Business Model Transformation Pressures

Fintech companies and internet platforms continue to erode banks' traditional business boundaries. According to industry statistics, by June 2024, China had approximately 953.86 million mobile payment users. In the third quarter of 2023, Alipay and WeChat Pay recorded transaction volumes of 118.19 trillion yuan

and 67.81 trillion yuan, respectively, accounting for more than 94 percent of the mobile payment market. This dominance highlights the intense competition banks face in terms of payment access, user engagement, and transaction frequency. Consequently, banks must not only compete for market share but also address the pressures arising from platform-based and ecosystem-based competition.

Business model transformation is another significant challenge. Traditional models rely heavily on physical branches and intermediary services, but high costs and slow response times increasingly constrain them. Research indicates that digital wallets accounted for approximately 72.72 percent of China's payment transaction value in 2024 (Zhang, 2024). If banks continue to rely on traditional intermediary models, it will become increasingly complex to compete with new entrants that use data-driven, platform-based, and scenario-based approaches.

5. Strategies for Product Innovation in Commercial Banks under Digital Finance

5.1. Innovation Strategies for Banks under External Pressures

In the digital financial landscape, commercial banks face external pressures arising from technology, regulation, and evolving customer demands. To address these challenges, banks must accelerate the modernization of their technical architecture, overhaul core systems, and progressively migrate to the cloud to resolve issues such as parallel systems and data fragmentation. By establishing a unified data platform, banks can improve internal collaboration efficiency and drive deeper integration of technological and business innovation.

To address customers' diversifying needs, banks should establish a refined customer segmentation system and use customer profiling to deliver personalized services. Tailored financial products can be developed for specific demographics, such as young users, senior citizens, and emerging markets. Additionally, through artificial intelligence and big data, banks can improve service efficiency and user experience by offering 24/7 automated services that meet customers' increasing demands for convenience and customization. These measures will enable banks to sustain innovation and strengthen market competitiveness amid external pressures.

In data governance and compliance management, banks must establish a unified data governance framework, regularly assess data accuracy and completeness, and incorporate data quality into performance evaluations. Additionally, banks should adopt intelligent compliance technologies to enhance risk monitoring and response capabilities, while promoting cross-border regulatory coordination. Compliance extends beyond technical considerations to include organizational management and cultural development. Banks must transform compliance management into an enabler of innovation, creating a virtuous cycle between the two.

5.2. Organizational and Talent Development Strategies

To address the mismatch between traditional hierarchies and digital innovation, banks should streamline management layers and improve decision-making efficiency. Cross-department collaboration mechanisms are necessary to connect business, technology, and risk management units. Agile, cross-functional innovation teams can shorten the process from demand identification to product launch by reducing communication and approval bottlenecks.

Talent development requires both external recruitment and internal training. Banks should hire professionals with expertise in both finance and technology while enhancing the digital skills of existing staff through targeted programs. Clear innovation incentives tied to project outcomes can further motivate employees and strengthen organizational support for digital innovation.

5.3. Strategies for Agile Innovation and Business Model Transformation

To compete with platforms such as Alipay and WeChat Pay, commercial banks must accelerate their digital transformation across payment services and online channels. Building open banking platforms and collaborating with fintech firms and internet platforms can help create new payment scenarios and product forms, thereby improving user acquisition and activity.

At the business model level, banks should transition from traditional intermediary-based models to platform-based, service-oriented models. Establishing digital finance subsidiaries with more flexible structures is one option. In terms of revenue, banks need to reduce their reliance on interest spreads and basic service fees while expanding value-added services such as digital advisory, intelligent risk management, and integrated financial solutions.

6. Conclusion and Limitations

This study constructs a theoretical framework encompassing external drivers, internal transmission, and capability reconstruction, systematically revealing the internal mechanisms of financial product innovation in commercial banks within the context of digital finance. The findings show that innovation in commercial banks is a systematic process driven by technological advancement, competitive pressure, and customer demand. Through strategic orientation and organizational structure transformation, banks ultimately reconstruct three core capabilities: data-driven operations, agile development, and ecosystem collaboration. This process marks a paradigm shift in commercial banks, from passively adapting to actively building digital innovation capabilities. The theoretical contribution of this study lies in the construction of an integrated analytical framework that provides a systematic perspective on banking innovation in the digital finance era.

At the practical level, commercial banks should adopt a systematic approach to innovation, elevating digital transformation from a technological initiative to a strategic priority. By optimizing organizational structures, fostering an innovation-oriented culture, and strengthening talent development, banks can shift from isolated product innovation to building sustainable innovation capabilities. Meanwhile, banks should actively advance data governance and develop an open, collaborative financial ecosystem, thereby establishing differentiated competitive advantages in an increasingly dynamic and competitive market environment.

This study has several limitations. First, it is primarily theoretical, relying on literature analysis and logical deduction, without large-sample empirical validation of the proposed framework. Second, commercial banks are treated as a relatively homogeneous group, and differences in innovation pathways among state-owned, joint-stock, digital-only, rural commercial, and other types of banks are not examined in detail. Third, the model focuses on external pressures, internal transmission mechanisms, and capability building, but does not explicitly consider other potentially important factors, such as ownership structure, governance quality, organizational culture, and regional regulatory or technological conditions. Fourth, the analysis is

based on the Chinese banking system and does not include systematic cross-country comparisons, which may limit the generalizability of the framework to other institutional and market environments. However, its core logic may apply to other settings, subject to adaptation to local ownership structures, regulatory regimes, and technological infrastructures. Future research could test and refine the proposed framework through empirical and comparative analyses that consider these factors and cross-country differences.

Author Contribution

Wenlu Zhou was responsible for the overall conceptualization, design of the research framework, and theoretical analysis of the paper. She completed the majority of the writing, including the introduction, theoretical framework, literature review, and the sections on challenges and countermeasures.

Ting Chen was responsible for the literature review and integration, providing theoretical support for the development of the framework.

Compliance with Ethical Standards

Not Required

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Competing Interest declaration

The author declare that, to their knowledge, they have no financial, personal, or professional relationships that could be construed as a potential competing interest regarding the work described in this manuscript.

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