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Application of Financial Technology Innovation in Commercial Banks: A Case Study of Bank of China

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Absrtact: *With the development of financial science and technology, big data, artificial intelligence, blockchain and other technologies are becoming more and more mature. As the core sector of China's financial industry, the innovative application of financial technology in domestic commercial banks has gradually become the focus of the financial industry, after studying the application of financial technology in commercial banks and introducing the benign interaction mechanism between finance and technology, from four aspects of system innovation, organization innovation, Channel Innovation and technology innovation, this paper analyzes the application status of its financial technology in the Bank of China, finally, from the angle of the bank itself and the external environment, it provides the corresponding countermeasures and suggestions for the innovative application of financial science and technology in Chinese commercial banks.*

Keywords: *Financial technology innovation, Commercial bank, Bank of China*

1. Introduction

In recent years, the rapid development of financial technology in China, Yu'e Bao and a number of emerging financial technology tools are slowly changing the way people manage their money, causing a lot of academic discussion (Huang Yiping, 2018)[4] . Compared with the regulated interest rate of traditional bank deposits, internet wealth management products have the characteristics of interest rate marketization, convenient transaction and so on. Yu'e Bao, for example, has grown rapidly since its launch in 2013, becoming the world's largest monetary fund in 2017 and reaching 1.689 trillion yuan in the first quarter of 2018. The rapid development of financial technology has accelerated the process of interest rate liberalization, which will inevitably impact the traditional financial industry (Zhanminghua et al., 2018) [16]. In this context, it is of great theoretical and practical significance to explore the relationship between the emerging financial technology innovation and domestic commercial banks.

2. Literature Review

In terms of business models, Pentathur and Rajan (2010)[19] have found that internet finance affects the intermediary and off-balance sheet activities of commercial banks. Li Feng (2018)[7] considers that the rapid development of financial technology has given birth to the innovative form of business of commercial banks, namely the financial system of Internet commercial banks. In this system, not only has the content of the commercial bank service operation and the economic development pattern changed, but also has the optimization improvement to the financial service efficiency, it is of great value to the transformation of China's overall economic productivity[15].

In the strategic layout, Yang Fei (2016)[12] believes that the integration of finance and technology, upgrade the customer experience, reduce transaction costs, commercial banks should fully realize the diversified development of commercial banks. Cao Tong (2016)[1] studies the innovations in financial products, services, trading models, organizational structures and so on in the context of financial technology development, and points out that in the context of financial technology, commercial banks should promote the reform of Securitization, the interconnection of deposit and financial management, the interconnection of account and payment and the process of business. In terms of profitability, Li Simin (2017)[9] pointed out that the increase in financial efficiency has been accompanied by a reduction in financial costs, as a result, commercial banks face the severe challenges such as high transaction cost, high business risk and lack of policy dividend.

In terms of service thinking, Alexandre Momparler et al. (2013)[18] pointed out that the advantages

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of internet finance lie in the efficiency of its services, and therefore commercial banks should continuously improve the efficiency of their services and actively change their existing development model. Cui Ziteng, Umagoshi, Wu Han (2017)[2] point out that financial technology is conducive to the transformation and innovation of traditional commercial banking, and is conducive to improving the quality of financial services. Commercial banks should make full use of the advantages brought by financial technology, perfect their financial functions, reshape their organizational structure and improve service efficiency so as to meet the challenges of financial technology and achieve long-term development. Lu Minfeng and Yu Pengfei (2017)[6] point out that with the exploration of various emerging technologies, major breakthroughs have been made, the integration of technology and finance is of great significance for improving the service efficiency of financial industry and innovating the products and services of commercial banks.

In this context, it is of great theoretical and practical significance to explore the application of emerging financial technology in domestic banks. The Bank of China attaches great importance to the innovation-driven role of financial technology and actively integrates financial technology and financial business, the future research on blockchain, virtual reality, Internet of things and quantum communication is immeasurable, so this paper chooses bank of China as a case study.

3. The Related Concepts and Operation Mechanism of Financial Science and Technology Innovation

3.1 Concept of Fintech

Chinese scholar Tang Li et al. (2016)[10] argue that the term Fintech is an exotic, foreign derived term from Fintech, a compound word that stands for 'finance + technology' and means 'Fintech' in English, it means to provide financial services for customers with the support of high and new Internet technology. Li Miao (2016)[5] proposed that fintech is a new business model based on cloud computing and Big Data Innovation, which subverts the traditional business model to form a new form of financial intermediation, make the financial channel more smooth. At present, the most broad definition is the international financial stability council in March 2016, "Financial Technology is technology to bring about financial innovation.". "The essence of fintech is the application of new and high technologies in the financial field," said Wu Xiaoling, dean of the Wudaokou School of Finance at Tsinghua University. It can be said that the essence of financial technology is that modern technology enables finance [14].

This paper holds that fintech innovates the products and services of the traditional financial industry by means of big data, blockchain, artificial intelligence, etc. , improve the efficiency at the same time to achieve the reduction of operating costs, so as to better serve customers. In essence, fintech remains finance, and advocates that technology should serve the development of financial business. China's financial science and Technology is currently experiencing rapid development, and many financial institutions have actively explored the integration of traditional financial business with new and emerging technologies, commercial banks should strengthen the application of financial technology in Operation Mode, process management and internal structure, improve the efficiency of financial service, reduce the cost of financial service, and realize diversified development to enhance user experience.

3.2 Analysis of the Operation Mechanism of Financial Science and Technology Innovation

In the early 1990s, western economist Romer (P. Romer, 1990) and others put forward the endogenous growth theory, which differs from Suono's model in that it internalizes technological factors. The representative of this theory introduces four basic inputs: Labor, capital, technology and human capital. At the same time, R & D Department, Intermediate Product Department, the final product department three departments. It holds that the R & D Department is responsible for R & D to form the patent, and thus become the basis of the intermediate product department's design products The final product department produces the final product and puts it on the market. In order to clarify the relationship between technology and finance, the financial sector is introduced as a supplement to the three sectors. The financial sector provides financial support for a series of activities, especially for technological innovation.

Economic development can not be separated from technological innovation, technological innovation will make the use of resources continue to improve the rate of economic development. But

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because technological innovation is characterized by high investment, high risk and Information asymmetry, this determines that scientific and technological innovation needs a highly efficient and stable financial system to provide financial support and risk diversification and a series of services.

Capital allocation function: In 1934, Schumpeter, a foreign scholar, pointed out that the central role of financial markets is to increase the efficiency of the allocation of social resources through a series of financial competitions. The function of capital allocation can be realized through the indirect financing channel of financial intermediary on the one hand, and the financing service can be provided directly by financial market on the other.

Risk diversification function: Technological innovation is characterized by both profitability and risk, and often corresponds to high-risk and high-return. The main body of technological innovation can not bear all the risks in the process of innovation, so it is necessary to disperse the risks by means of financial power and transfer the risks to different bodies. In the financial market, the financial intermediary institutions represented by banks can provide diversified product portfolios to disperse risks, and provide technical innovation funds and technical innovation subjects to share technical risks, the main body of technological innovation can be better engaged in innovation activities.

Information disclosure function: the financial system under financial science and technology has a strong function of information disclosure, investors can make a comprehensive evaluation of technological innovation projects, thus realizing the transfer of funds to high-quality technological innovation projects, and promote the virtuous circle of technological innovation activities. Investors can make decisions based on publicly available and transparent information in the capital markets, and when earnings do not meet expectations, they can withdraw their funds and invest in other technological innovations, thus the optimized allocation of funds is realized.

4. The Application of Financial Science and Technology Innovation in Bank of China

4.1 Highlights of Bank of China's Fintech Development

The bank of China actively grasps the development trend of bank digitalization, implements the "Mobile first" strategy, expands the online channel vigorously, continuously upgrades the mobile phone bank, and promotes the online business fast growth. In 2020, the substitution rate of bank of China's electronic channel to network business reached 95.31 percent, and the volume of electronic channel transactions reached 274.97 trillion yuan, up 12.80 percent year-on-year. Among them, mobile banking transactions reached 32.28 trillion yuan, up 14.14% year-on-year, becoming the most active customers online trading channels.

As the most global and integrated bank in China, the bank of China adheres to the technology-led strategy, has completed the big data platform, the artificial intelligence platform as well as the distributed architecture private cloud these three major platforms construction. At the same time, the bank of China's application of financial technology development and transformation results are obvious. Its financial technology invention patent application volume ranks the 2nd in the global financial industry, its strength is quite strong, and it has maintained the global leading position, especially in the area of blockchain application, in 2017 SWIFT organization Global Payment Innovation platform project launched the "Bank of China Global Zhihui" international remittance products, significantly enhance the customer cross-border payment experience. Up to the corresponding patents, technology, to the cooperation with Tencent, down to the application, are involved. According to the Bank of China's annual report, the bank has been working on the application of blockchain technology in practical areas such as trade finance, bio-authentication technology, housing renting and poverty alleviation, and has been continuously deepening the application of data, using fintech to enhance the service level of electronic channels, promote the innovation of financial products and develop scenario finance. And by using technologies such as fingerprint authentication, OCR, face recognition, Face ID, etc. , the security and convenience of the corresponding operation of the mobile phone bank have been enhanced, and the customer-centered all-round integration has been realized, effectively improve the customer experience, making customer experience far ahead of the industry.

4.2 The Status Quo of the Application of Fintech Innovation in Bank of China

4.2.1 Institutional Innovation

On the one hand, it is clear that science and technology will lead the digital transformation in the

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first place of strategic planning. The slogan of "1234-28"for digital development is put forward: "1"means to take digitalization as the main axis, to integrate scientific and technological elements into the whole bank and to construct a new banking state; "2"means to build two major structures, enterprise business architecture and technology architecture, driven by a double helix structure; "3"for building three platforms, namely Big Data Platform, cloud computing platform and artificial intelligence platform; "4-28"for focusing on four areas, 28 projects in progress. On the other hand, from the level of the system to change the past business philosophy, to train the bank's sense of change. In terms of institutional and institutional innovation, it has promoted the establishment of a three-level innovation management system; in terms of talent team building, it has implemented the "Talent plan"and established a cross-departmental talent exchange and training mechanism based on the science and technology system, reserve Force for Bank of China financial technology development.

4.2.2 Channel Innovation

Bank of China has also carried on many upgrades to the electronic bank, and has taken the lead in introducing the enterprise mobile banking. Since then, it has launched a "Micro-finance, micro-life, micro-services" as the theme of the Wechat Bank, using Wechat's driving capacity to further expand the channel business. The Bank of China first launched Wechat Bank, which has realized a healthy interaction among multiple channels, covering financial services such as inquiry, credit card repayment, wealth management and online booking, and receiving feedback and online complaints from users, it brings us closer to our clients. In addition, the Bank of China focuses on the research of Internet of things finance, with a view to providing situational financial services to customers and enhancing customer experience. The Bank of China has also actively promoted business cooperation with companies such as Orient Fortune Net, Tencent, Tu Niu and Qunar net, further broadening the channels for customers and enriching the service scene.

5. Problems in the Application of Financial Science and Technology Innovation

5.1 Institutional Level

One is that thinking has not yet completely changed. Data and technology are the core elements in the background of financial science and technology. Although the bank of China is also actively embracing financial science and technology at present, it has a strong traditional thinking of management and development, and it is difficult to achieve an effective reversal in the short term, in addition, the application of fintech is still in the stage of formal development, which needs to strengthen the cultivation of "Cooperation, opening and sharing" internet thinking. Second, facing the constraints of talent. The essence of competition under the background of financial science and technology is the competition of talents. Talent also determines the success or failure of the development of the bank. Although the bank of China has established the corresponding talent exchange and training mechanism and incentive mechanism, it still needs to introduce scientific and technological talents in related fields to enhance its comprehensive competitiveness.

5.2 Organizational Level

The rapid development of financial technology innovation has led to market diversion. Forced by the loss of profits, banks began to try the application of financial technology gradually. However, due to the short time for commercial banks to develop financial technology, and mainly patch-style update adjustment, not from the top-level design point of view to focus on the development of financial technology, so did not form an effective top-level design framework. The Bank of China, for its part, has not established a functional department dedicated to the development of fintech, the functions of financial science and technology innovation are scattered among the relevant departments such as corporate financial business, personal financial business, financial accounting, and information technology, thus increasing the internal communication and coordination costs, thus, to a certain extent, the financial innovation cycle is prolonged and it is difficult to adapt to the rapidly changing market environment.

5.3 Channel Level

In the process of channel innovation, there is also the problem of high cost of special equipment. The bank itself has relatively rich data resources and experience in using them, cloud computing and

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the spread of big data have also helped reduce the cost of computing for banks. But with the popularization of application scenario, deep learning, machine learning and so on involve more complex algorithms, which put forward higher request to data operation[13].

5.4 Technical Aspects

The development of data supply market lags behind and the algorithm has blind spots. The three major technology platforms of the bank of China need different dimensions of data to support them. In addition to obtaining internal data such as basic customer information, consumer preferences, and transaction behavior, they also need to obtain certain external data, most of these external data come from the government, the third party organization or the Internet. Although there is a huge data system in China, there are some rules in the data supply market, which hinder the effective integration of information. At the same time, the degree of data disclosure at the government level is limited, and when it comes to cross-platform data ecosystem analysis, it is often abandoned due to lack of data. With the development of financial science and Technology, algorithms also put forward higher requirements, so it is necessary to continue to innovate the forward development of technology.

6. Countermeasures and Suggestions on Promoting the Application of Financial Science and Technology Innovation in China's Commercial banks

6.1 Strengthening the Construction of Financial Ecological Environment

We will improve the legal system of supervision and establish a regulatory coordination mechanism. The innovation of Financial Science and technology has brought the function of disintermediation, transparency and democratization to the commercial bank of our country, but it also leads to the risk of seeking for excellence and information security, and may lead to the new systematic risk. In the face of these risks, the traditional passive regulatory model leads to the uncertain institutional environment of moving governance for financial science and Technology Innovation, the backwardness of supervision technology also makes the traditional prudential supervision unable to effectively deal with the systemic risks caused by financial science and technology innovation. Therefore, the prudential supervision of commercial banks needs to unify the "Inclusive supervision model, modern supervision technology and cooperative international supervision", form a "Trinity" regulatory system (Emperor Xiaowu of Liu Song and Zeng Jia, 2021)[8] , build a system of legal rules governing the use of Technology [17] . On the premise of ensuring security, enough space is reserved for financial science and technology innovation.

6.2 Countermeasures and Suggestions for Commercial Banks to Strengthen the Application of Fintech

6.2.1 Improving the Organizational Structure of Commercial Banks

In order to apply financial technology innovatively, commercial banks should establish an organization form which is suitable for financial technology, so as to promote the development and application of financial technology.

Establish and improve the organizational structure to promote the effective integration of resources. First of all, a good organizational structure makes the division of labor clear, cooperation will become close; second, the implementation of the project is likely to involve other third parties, at this time with a good organizational structure, at last, the management should pay attention to the virtuous circle and the binding of interests, grasp the direction of key construction, and actively coordinate the cooperation among various departments[11].

Set up a special operation organization to realize the specialization of Operation Mode. At present, many domestic commercial banks have experimented with the "Credit factory"-style innovative financial model, and set up a professional examination and measurement organization between the enterprise loan and the bank loan. Within the "Credit Factory", all the equipment and technical tools are characterized by specialization, and the principles of serving the small and medium- sized enterprises of science and technology are determined, it can be a beneficial reference for commercial banks that have not applied the innovative model and build a credit structure model suitable for the region. It should be noted that in the operation of the organization, but also as far as possible use of big data, artificial intelligence and other information processing technology, so as to improve the efficiency of

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business.

6.2.2 Enhancing the Channel Effectiveness of Commercial Banks

In order to realize the virtuous circle of finance and science and technology innovation, commercial banks should develop "Four-modernization" type commercial banks with the combination of new technology, and further widen the electronic channel for commercial banks.

Virtual Bank based on mobile internet. First, the integration of online banking, mobile phones, wechat, SMS and other channels to build a 24-hour vertical service chain; second, pay attention to the collection of all-channel behavior data to provide data resources for big data analysis; The third is to innovate payment methods, improve the electronic payment chain, in the pursuit of convenience while ensuring the security of payment[20].

Digital Bank based on blockchain technology. The characteristics of low cost and high efficiency of blockchain are suitable for commercial banks with long process and many links. One is to intelligently reshape the bank's business processes and strengthen the links between the layers; the other is to enhance the data interaction with customers; and the third is to actively focus on the application of blockchain technology in banks. Information Bank based on big data. Only a steady increase in the amount of data available through various banking channels can provide a full picture of financial services to customers. One is to set up a big data processing center to analyze comprehensive data information; the second is to analyze comprehensive data using comprehensive external data, such as sesame credit score; and the third is to combine customer portraits, such as behavior preference, potential demand, etc, to make targeted introduction, improve the efficiency of big data decision-making banks[3].

Intelligent Bank based on artificial intelligence. The commercial bank should take the customer experience as the leading factor, construct the real-time meets the customer demand the intelligent bank. The first is to promote the weak network point; the second is to improve the service level of the network point by using the intelligent self-service equipment; the third is to actively lay out the intelligent investment and improve the customer experience with the intelligent decision-making analysis, so as to accumulate customer resources.

6.2.3 Deepening Technical Support for Commercial Banks

Emerging Technologies urge the transformation and development of commercial banks, and provide a way out for the upgrading and transformation of banks.

Strengthen the support of software and hardware, make use of blockchain to build core competitiveness. The development and application of financial science and technology needs strong infrastructure, which includes hardware environment and software environment. The perfect software and hardware environment has provided the basic environment for the bank's financial creation. At the same time, commercial banks should make use of the characteristics of block chain traceable, not tamper, accelerate the development and application of block chain technology, and build their own core competitiveness. First, trade settlement and cross-border payment, block chain point-to-point settlement to achieve the disintermediation; second, the bill settlement, block chain can not tamper with the characteristics of effective reduction of the corresponding risk. In addition, foreign exchange, precious metals and other transactions can also become blockchain technology applications.

Pay close attention to the development trend, vigorously research and development of core technology. Commercial banks should pay close attention to the development trend of artificial intelligence, blockchain and other emerging technologies, enhance their own technological hard strength, focus on advantages to achieve breakthroughs in key technological areas. With the development of big data, data has become an important strategic resource for banks, so big data system plays the role of infrastructure, banks should strengthen their own data construction and application capacity, carding and integrating the internal and external data, creating the characteristic data analysis ecological chain, and strengthening the data support to the financial business. At the same time, VR technology, speech recognition and machine learning technology should be combined to enhance cross-border data fusion and application exploration, to provide customers with personalized and intelligent products and services.

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