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Research on Improving the Efficiency by Digital Operations in Commercial Bank Branches

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ABSTRACT

Business operations, as the fundamental support for various businesses of commercial banks, are the cornerstone of supporting the realization of the value of commercial bank products and services. In recent years, the rapid development of new digital technologies represented by big data, artificial intelligence, and blockchain has promoted the optimization and improvement of data collection, analysis, and processing capabilities, creating favorable opportunities for digital operations. As a frontline channel for banks to provide services, branches have always been a top priority in the implementation of digital transformation strategies. Digital operation of branches can not only help commercial banks improve customer experience, improve quality and efficiency, optimize risk management, but also enable banks to better adapt to market changes, respond to peer challenges, and build core competitiveness. In recent years, major commercial banks both domestically and internationally have laid out the path of digital transformation in operational management. The traditional branch operation and management model is no longer suitable for the digital economy era. How to promote digital transformation and upgrading, improve digital operation efficiency, has become an urgent problem for commercial banks. At the same time, scientifically and accurately evaluating the digital operation efficiency of bank branches is also of great significance for promoting high-quality development of banking business and enhancing business value. This study proposes an optimization path and direction for the digital operation of commercial bank branches by constructing an evaluation index system for digital operation efficiency and analyzing relevant mechanisms.

KEYWORDS

Commercial bank branches; Digital Operations; Efficiency improvement

1 Introduction

From the perspective of the development trend of the banking industry, digitization has gradually become the mainstream direction of network operation and management. In recent years, with the continuous development of digital forces represented by artificial intelligence, big data, blockchain, cloud computing, and the Internet of Things, state-owned commercial banks are facing unprecedented changes in financial services, operation management, channel construction, risk control, and other aspects. According to the White Paper on the Development of China's Digital Economy, the scale of the digital economy reached 45.5 trillion yuan in 2021, a year-on-year increase of 16.2%. Industrial digitization has become the main engine for the development of the digital economy. The 2023 Government Work Report points out the need to vigorously develop the digital

economy and accelerate the digital transformation of traditional industries and small and medium-sized enterprises. The digital economy has been included in the government work report for six consecutive years, which markets that with the development of the digital economy, the traditional operational models of commercial banks are no longer applicable, and the significant significance of digital transformation is increasingly evident. As a frontline channel for banks to provide services, branches have always been a top priority in the implementation of digital transformation strategies. In recent years, major commercial banks both domestically and internationally have laid out the path of digital transformation in operational management. Citibank began implementing the "mobile first" digital path in 2012, and in 2017, it also implemented the "simplification, digitization, and globalization" digital banking strategy, significantly increasing the transaction volume and customer number of its digital platform. JPMorgan Chase proposed the goal of "putting mobile first and digitizing everything" in 2017, comprehensively building digital banks from product services, security services, convenient services, and personalized services to create value for customers. Traditional major banks in China, including Industrial and Commercial Bank of China, Bank of China, and Bank of Communications, have also successively proposed digital transformation strategies based on their own characteristics to assist in the operation and development of banks.

Digital operation is an effective way to improve the efficiency of grassroots branches.Facing the constantly developing domestic and international financial situation, it is crucial for commercial banks to deepen the transformation of bank branches, explore new models of branch management, and meet the core requirements for improving branch efficiency in the fierce market competition environment.

2 Literature Review

2.1 Related concepts of digitization

2.1.1 Digitization

Currently, there is no unified definition of "digital transformation" among different countries and industries. The Development Research Center of the State Council pointed out that digital transformation refers to the use of the latest IT technology to form a comprehensive mechanism for data collection, dissemination, storage, analysis, and feedback, eliminate data barriers between various fields, improve the overall operational efficiency of the industry, and ultimately form a complete digital economy system. Boston Consulting believes that digital transformation has four significant characteristics: firstly, utilizing leading technologies to optimize core businesses, improve enterprise operations, and promote sustainable development; Secondly, increase the attention of customers with high digital participation and sensitivity to changes in the digitization level of enterprises, provide personalized services, and improve the efficiency of customer acquisition and retention; Thirdly, utilizing cutting-edge technologies such as big data analysis, artificial intelligence, and networking to build basic business models and develop more opportunities for sustainable development; Fourthly, introduce emerging technologies within the organization to optimize the overall organizational capabilities of the enterprise.

2.1.2 Enterprise digitization

Enterprise is the micro component of the macro economy, and digitization of enterprises is the micro manifestation of the digital economy. There is currently no consensus in the academic community on the connotation of digitization. Chanias et al. (2019) and Legner et al. (2017) believe that enterprises choosing to achieve transformation and upgrading through information

technology can be considered as carrying out digital transformation. Fitzgerald et al. (2018) explained enterprise digitization as the use of digital technologies such as social media and embedded devices for significant business reshaping, such as improving user experience, simplifying operational models, and creating new business models. Liu Shuchun (2021) defined the concept and connotation of enterprise digitization from the perspective of management. She pointed out that the essence of the digital process in enterprises is the widespread application of digital technology to multiple key links related to enterprise growth, such as production and manufacturing, technology replacement, operation management, market sales, etc. Digital transformation requires enterprises to transform their existing management thinking logic and break through the path dependence of traditional industrialization systems when entering the digital arena (Chen Jian et al., 2020). Vial's (2019) study regards enterprise digitization as a transformation process, in which various economic organizations fully utilize digital technology to explore ways to change their value creation and realization, and achieve significant changes in the business process by integrating key technologies such as communication, computing, networking, and intelligence. Qi Yudong and Cai Chengwei (2020) viewed the digitization of manufacturing industry from the perspective of resource-based theory as a strategic behavior that utilizes the introduction and integration of digital technology to digitize various links such as research and development, production, sales, and management, enhance the competitiveness of manufacturing enterprises to cope with fierce market competition and uncertain technological progress, and achieve sustained growth in short-term and long-term benefits. In summary, digitization of enterprises can be understood as "enterprise+technology+data" and has a series of characteristics such as model innovation, value creation, and new economic forms.

2.1.3 Digitization of Commercial Banks

With the rapid development of the digital economy and the in-depth implementation of the "Internet plus" strategy, the digital transformation of commercial banks has become the key content of the strategic transformation of banks. Introducing new generation information technologies such as big data, cloud computing, virtual reality, and artificial intelligence to strengthen risk control, data mining, and precise profiling of financial institutions, in order to achieve efficient operation of financial services, has become the development goal of banks (Jiang Zengming et al., 2019; Zhu Yanyan, 2020; Wang Wenqian, 2020). In recent years, with the development of the global economy, more and more enterprises, organizations, governments, and experts have been striving to explore how to achieve the digital transformation of commercial banks. According to the International Financial Stability Council (2019), this process involves utilizing advanced financial technology to develop, optimize, and upgrade customer experiences, as well as achieving more efficient and convenient customer management. The study by IBM (2020) indicates that in order for banks to truly move towards digitization, it is necessary to establish a comprehensive omnichannel business strategy, including a digital vision, goals, clear customer positioning, comprehensive technical reserves, and precise product portfolio. Wang Jiong (2019) delved into how digitization can promote the development of bank financial services. He believed that data drives banks to achieve endogenous growth, emphasizing the use of digital technology by banks to improve customer service quality, meet personalized needs, and facilitate communication paths between banks and customers. According to Gomber's (2017) research, with the digitization of customer interfaces and backend processes, the delivery methods of financial services are also continuously improving. Therefore, in the process of implementing digitization, banks need to strengthen their connections with cutting-edge financial technology companies to explore more business opportunities. Chen Weihe (2019) pointed out that utilizing advanced information, such as the internet, virtualization,

blockchain, and artificial intelligence, can effectively promote the digital transformation of the internet in commercial banks, greatly improving their internal efficiency and best adapting to customer needs. Li Guangxin (2019) emphasized that by applying advanced financial science, traditional economic models can be completely overturned, making them more flexible and efficient. Therefore, the improvement and reengineering of the entire process is the goal of commercial banks' digital transformation. Wang Jiong (2019) stated that by building a complete digital platform, one can gain insight, collect, process, and analyze customer needs, improve the efficiency of customer acquisition and activation, effectively manage customers, and promote banks to achieve value leaps. In summary, the digital transformation of commercial banks not only involves financial innovation, but also further development of technology. Its core concept is to apply advanced technology to practical operations, thereby promoting financial innovation, process optimization, and model reform in commercial banks, and improving the efficiency of financial services.

2.2 Digitization of branches and operational efficiency

Currently, the impact of digital transformation on commercial banks is still in the theoretical research stage (Stulz, 2019). Quantitative research is more focused on exploring bank information, such as reducing costs (Altunbasetal., 2001), improving profitability (Beccalli, 2007; KoetterandNoth, 2013), enhancing loan availability (Ahnert et al., 2022), and reducing the probability of risk events such as financial crises.

Peng Huixin (2018) pointed out that the development of digital operations, especially mobile banking, has provided more convenient financial service channels for individual customers; The coverage of intelligent machines and tools in branches has saved labor costs and improved the efficiency of branches; Intelligent risk control makes risk prevention and control more precise and forward-looking, reducing the risk losses of banks. Yang Jianwen and Yan Zheng (2020) pointed out that physical branches of banks should implement a development strategy of "moderately compressing the total amount, optimizing and adjusting the layout, implementing comprehensive classification policies, accelerating transformation and development, and assisting digital transformation", using physical branches as the starting point for digital transformation services to achieve improved branch efficiency. Liu Xiangyuan (2022) believes that new smart outlets are playing an increasingly important role in acquiring customers, maintaining customers, and enhancing customer loyalty. The banking industry should continuously improve its service capabilities in serving elderly and vulnerable groups, and achieve the transformation to smart outlets. Lan Weidong and Li Zhaoliang (2022) analyzed the main characteristics and connotations of the digital era, and proposed to promote the reform of various production factors such as data, products, technology, branches, and human resources, in order to enhance banks' digital transformation and build core competitiveness. Wu Gang and Shen Yixing (2022) believe that serving customers through network outlets is crucial, focusing on five aspects: network layout, customer service, efficiency improvement, fine management, and risk prevention and control, to promote high-quality transformation and development of network outlets.

2.3 Digital measurement methods

Digitization is a systematic, comprehensive and complex process, so measuring it is quite challenging. In recent years, relevant research on the measurement of digital transformation at the enterprise level can be divided into three categories: case study, questionnaire method, and quantitative statistical method.

Case study refers to a systematic and in-depth summary of the digital transformation process of an enterprise. For example, Qi Yudong et al. (2021) explored the transformation practices of state-owned enterprises such as State Grid, PetroChina, and OCT to study the mechanisms and paths of digital transformation. Jiao Hao et al. (2021) pointed out that although case study can deeply explore the specific digital transformation process of enterprises and the interaction mechanism between various elements, this method has strong subjectivity and weak universality.

The questionnaire method mainly measures digitization through the use of scales. For example, Dai Yishu et al. (2020) used 172 questionnaires targeting enterprise managers to measure their data-based integration capabilities; Yang Zhenning et al. (2021) designed 14 questions for 7 types of digital technologies and collected 615 questionnaires nationwide to measure the digital technology level and application scope of enterprises. Xie Huali and Wang Shihui (2022) believe that the questionnaire method has three shortcomings, including difficulty in conducting dynamic tracking research, small data sample size, and limited representativeness. Although it is expected to delve into the details of digitization, its problems are still prominent.

Quantitative methods come in various forms and are constantly being enriched. One is to use archival data to measure the digitization of enterprises. For example, Wang Yongjin et al. (2017), Liu Zheng et al. (2020), and Liu Shuchun et al. (2021) use investment indicators such as information system construction to measure the degree of digitization of enterprises. The second is to comprehensively collect public texts of listed companies, including annual reports, performance conferences, business registration information, etc., and capture information related to digitization for measurement. Bai Peiwen, Yu Li (2021), Huang Hongbin et al. (2021) used this method for their research. The third is to measure digital transformation by building a digital keyword vocabulary and calculating the frequency of mentioning these keywords in the enterprise annual report text. For example, Chen and Srivasan (2019) constructed six categories of digital related keywords for non tech listed companies in the United States, and described the digital transformation of enterprises by analyzing the mention of these keywords in performance conference speeches and annual report texts. Qi Yudong and Cai Chengwei (2020), Wu Fei et al. (2021) conducted word segmentation and vocabulary construction on the annual reports of Chinese listed companies, screened a series of keywords and counted them to measure the digital transformation of enterprises. Yuan Chun et al. (2021) used a similar method to segment and manually identify 30 national level policy documents related to the digital economy, identifying 197 keywords related to enterprise digitization, and calculating the frequency of these keywords appearing in annual reports. Xie Huali and Wang Shihui (2022) pointed out that although text analysis can objectively describe digital transformation behavior, there are still two shortcomings. Firstly, digital transformation is a systematic strategic change.

2.4 Comment on literature

With the development of digital technology, promoting the digital construction and transformation of commercial bank operations has become a common topic faced by commercial banks. The digital practice of domestic and foreign commercial banks has attracted numerous related research and exploration. These studies mainly focus on the current status of digital operations in commercial banks, the influencing factors and implementation paths of digitization, the technical service support for digitization in commercial banks, and the construction of digital platforms. Through sorting and analyzing the above literature, the following summary can be drawn from this topic:

Firstly, research on the concepts of digitization, enterprise digitization, and commercial bank digitization. At present, domestic and foreign scholars have different definitions of the concept of

digitization, and generally interpret it from the perspective of information technology, that is, through the application of new generation information technology, to improve productivity, optimize core businesses, and enhance organizational capabilities. In this regard, this topic integrates the research results of existing literature both domestically and internationally, and extends the concept of digitization to the level of enterprise digitization and commercial bank digitization. It understands enterprise digitization as the superposition and integration of enterprise, technology, and data. Commercial bank digitization is essentially the application of a series of emerging technological capabilities in the financial field, which has an impact on financial markets, institutions, and services, And promote financial innovation, process optimization, and model reform in commercial banks.

Secondly, research on the relationship between digitization and network efficiency improvement. The existing research literature generally believes that digital operation of commercial banks can bring new opportunities for the improvement and development of operational efficiency of commercial banks. Relevant research has also involved the mechanism of the impact of digital degree of commercial banks on network operation and efficiency improvement. However, these studies mainly focus on theoretical exploration, and quantitative research is relatively insufficient. At the same time, there is a lack of overall grasp of the digital transformation of commercial banks at the macro level. In order to make up for this deficiency, this project explores and proposes optimization plans for the digital operation efficiency of commercial banks from the perspectives of application depth, coverage breadth, and service support. It is hoped that this can provide reference for the optimization and improvement of digital operation efficiency of commercial banks.

Thirdly, research on relevant measurement methods for the degree of digitization. Due to the limited literature on digitization in commercial banks, in addition to the field of commercial banks, this topic also includes measurement methods for digitization at the enterprise level. The relevant research mainly includes three types of measurement methods: case study, questionnaire method, and quantitative statistical method. However, these measurement methods have limitations such as one-sidedness, subjectivity, and weak universality. In order to address the above shortcomings, Xie Huali and Wang Shihui (2022) constructed a comprehensive digital transformation indicator system for commercial banks with strategy, business, and management as the main dimensions. Afterwards, the principal component analysis method was used to determine the weights, and the digital measurement results were obtained by summarizing the index through bottom-up weighted averaging. Based on this, this project constructs a digital operation efficiency evaluation index system for commercial banks at the branch level, starting from four aspects: strategic operation digitization, business operation digitization, management operation digitization ability, and channel operation digitization.

3 Analysis of the Mechanism of Improving Efficiency through Digital Operation of Bank Branches

3.1 Customer group management

In the trend of online transformation, branch 2 is still a key fulcrum for establishing and maintaining customer trust, and trust relationships are crucial for bank operations. It can be seen that branch 2 is a key fulcrum for establishing trust relationships and successfully conducting customer group operations.

In addition, regarding customer base management, IBM's "Digital Transformation Action Plan for Commercial Banks" points out the need to achieve the ultimate refinement of customer oriented

operations, achieve unlimited classification of all customers, establish a predictive analysis and monitoring system for customer experience, and provide different targeted services for each customer. Therefore, various banks have adopted digital means to enhance the ability of customer base management in their branches.

China Construction Bank aims to manage its branch customer base by laying out digital compass tools and building a "digital craftsman" team in some branches. The digital compass tool refers to a tool that visualizes data like a compass. The specific data includes comprehensive evaluation indicators for deposits and loans, key products, and network integration, including daily increase, monthly increase, trend, and ranking classification. It integrates online reporting, summary reporting, message push, and reporting reminders. The digital compass not only helps account managers to have a more comprehensive and specific understanding of customer needs and preferences, but also assists in quantitative management of employee performance and improves management efficiency (Wang Kun, 2022). Building a "digital craftsman" team deep into the network is a pioneering initiative of China Construction Bank Dongguan Branch. At the branch level, innovate and establish customer models based on factors such as customer needs, customer models, and demand products, strengthen the interconnectivity of the three, and strengthen the top-level design centered on users; At the branch level, promote the fighter first and ground docking mode, and achieve the marketing landing of fighter data after receiving customers; At the team level, the focus is on summarizing the experience of top soldiers, setting a model and benchmark, using points to guide areas, and improving the digital strength of all employees in the branch.

Create a "digital craftsman" to promote the fighter first and ground docking mode, and achieve the marketing landing of fighter data after receiving customers; At the team level, the focus is on summarizing the experience of top soldiers, setting a model and benchmark, using point to area, and improving the digital strength of all employees in the branch.

Agricultural Bank of China has developed a marketing app for branch customer managers based on the "Digital People" platform of its headquarters. This app can push the expiration clues of wealth management products, but the tool relies more on the independent judgment of the customer manager and cannot directly analyze the potential needs of customers based on multidimensional data within the system, such as the maturity dates and historical purchase records of a certain customer or customer group, and then recommend suitable wealth management products to customers. Chen Rujiao's (2021) research shows that such marketing methods do not reflect the concept of differentiated marketing on business trips, and lack precision in mining the true needs of customers, making it difficult to achieve the target effect. In addition, data shows that a certain business department of Agricultural Bank of China, relying on financial technology tools, combines customers' personalized needs with various financial products, and has launched different types of financial products such as "new customers", "private banking", and "exclusive", as well as different financial management methods such as "current financial management", "regular financial management", and "consignment financial management" (Guo Xinrui, 2022).

Some banks are creating characteristic branches for elderly care in their branches and launching elderly friendly renovations. TA Bank has a large number of middle-aged and elderly people, accounting for nearly 60%, with deposits and financial assets accounting for about 83%, making it its key customer group. The bank vigorously develops elderly care finance, promotes the transformation of network software and hardware facilities for the elderly, and creates characteristic branches of elderly care finance. For example, equipping the branch with medical first aid kits or safety seats. In order to better serve and market the elderly customer base, we also provide comprehensive services for the elderly from various aspects such as legal consultation and consumption discounts (Zhang Yang, 2021).

3.2 User experience

China Construction Bank Smart Bank utilizes a service model that combines financial technology with financial services. Based on advanced technologies such as 5G, Internet of Things, and AI, it has transformed traditional desktop outlets into smart outlets focused on marketing and services. It has developed 15 innovative applications, including intelligent call processing, remote banking VTM, electronic banking service area, and intelligent interactive desktop, fully utilizing user interaction and experience devices, emphasizing online Reduce the number of user operations and achieve convenient and efficient business processing.

Human machine interaction significantly improves business processing efficiency. The interactive VTM machine is equipped with virtual employees who can assist customers in handling various basic businesses through dialogue. It utilizes technologies such as artificial intelligence, speech recognition, and facial recognition to provide interactive services such as business consulting, product recommendations, and complaint suggestions. During the busy hours of the branch, customers only need to present their ID card on the VTM to complete business processing based on dialogue guidance, saving waiting time and reducing the tedious application form filling. Next, VTM will also promote 24-hour service.

Optimize the experience and accurately explore customer needs to attract wealth management customers. The smart desktop of China Construction Bank attracts customers to browse, try out, and compare various financial products. Through the four screen linkage system, personalized financial management solutions are recommended to suitable customers at the appropriate time and through the appropriate channels. In the VIP room, the products introduced by the wealth manager can be instantly projected onto the wall mounted screen by clicking and sliding the smart table, and all product introductions that interest customers can be synchronously sent to mobile banking for easy recording. In the precious metal display window, the glass screen will also scroll the price of the precious metal in real-time. As long as you click on a certain gold bar or glass, its image will appear and automatically rotate 360 °, presenting a 3D three-dimensional effect, giving customers a more intuitive feeling and greatly improving their experience.

Highly integrated business space, experiencing diverse and thoughtful services. Huaxia Bank has created a new generation of intelligent counter products, integrating more interactive experiences, social elements, and humanistic care through professional design to build new branches. It has completed the comprehensive transformation and upgrading of 8 branches and 19 branches. For example, through the design of mobile, modular, and open hall facilities, Kunming Branch quickly switches its branches to salon mode, activity mode, conference mode, etc., allowing customers to enjoy diverse scene financial services in the same space, effectively improving customer autonomy and convenience service experience. Customers enter smart service outlets, and the facial recognition system verifies and locates their identity through facial information. After scanning, customer data will be displayed on the iPad mobile terminal, facilitating customer managers to improve work efficiency and provide personalized services and product recommendations for customers.

Personalized design of interactive activity scenes to enhance customer stickiness. The design of Industrial Bank's smart network breaks the physical boundaries of time and space, starting from the details of customer experience, and creating a "warm" bank through scene interconnection. Chen Jinguang, Vice President of Industrial Bank, said, "Although people's consumption habits are constantly changing, basic human needs such as convenience, emotion, and respect will not change. Industrial Bank continues to build a scenario ecosystem and achieves more efficient services through the mechanism of "attraction, interaction, and maintenance". In terms of the layout design of smart outlets, firstly, Industrial Bank has optimized the design flow guidance,

appropriately extending the customer experience and staying time for new services; Secondly, smart outlets are equipped with more customer interaction areas and customized smart devices and props, providing services such as financial business introduction, smart medical experience, and children's 3D printing experience. Through natural and interesting device settings, they continuously explore the potential financial needs of different customer groups; Finally, we focus on emotional connection with customers and continuously enrich customer maintenance activities, such as setting up financial intelligence courses for school-age children for customers of different ages in the family, conducting professional investment market strategy reports for adult customers, and sharing knowledge on "Consumer Rights Protection" at Anyu Life Club (elderly customer group). In addition, small customer activities such as handicrafts and Tai Chi have also attracted many customers. The colorful activities of smart outlets have become a powerful link connecting customer relationships.

3.3 Employee Management

In terms of employee management, a branch in Jiangxi has made improvements to the selection of new employees and the performance of in-service employees. The branch has proposed that in the process of digital transformation, not only should the cultivation of new digital talents be emphasized, but also the motivation of old employees should be emphasized. One is to optimize employee assessment and evaluation. The performance evaluation of each branch should be formulated in conjunction with the branch, and cannot be uniform. Similarly, personnel evaluation between different positions should also be matched with job objectives, and a scientific employee performance evaluation system should be established. The second is to adjust the personnel structure in a timely manner. In the process of employee management, it is necessary to monitor changes in the personnel and job structure in a timely manner. For positions with pressure drop trends, such as front desk tellers, the recruitment threshold should be raised or the recruitment quantity should be reduced; At the same time, in combination with the background of digital transformation, we will increase the recruitment of digital technology talents, establish a special recruitment channel for digital talents, and meet the development needs of digital transformation. The third is to focus on the reserve of digital talents. On the one hand, strengthen talent cooperation with universities, carry out digital talent recruitment plans, identify talents from the source, and introduce talents; On the other hand, in places where digital talents gather such as universities and governments, digital talent incubation bases should be established to accelerate the cultivation of digital talents with diversified favorable conditions and reserve fresh digital talents for the industry.

In terms of personnel allocation, a branch in Henan Province has made improvements from four aspects by analyzing the personnel allocation situation and reasons of its own branch halls, in response to its existing problems. Firstly, it has enriched the talent team in the halls. Continuously identify and select outstanding talents, establish a talent team, and achieve dynamic personnel allocation and supply. At the same time, attention should be paid to the cultivation of existing employees in the industry to ensure that there is a group of well-trained and experienced talents in the industry who can quickly adapt to and take over important positions in the future when needed. The second is to improve the loyalty of hall staff. Only with a stable talent team can we ensure the loyalty of personnel to their positions and thus maximize their value. In terms of personnel management, branches should pay attention to communication with employees, understand their demands, strive to meet reasonable and urgent work needs, actively care for employees, and enhance their sense of belonging. The third is to improve the matching degree of personnel and positions in the hall. The precise matching of personnel and positions is the key to optimizing

human resource management. The implementation of digital transformation will inevitably accompany the adjustment of personnel and positions. Therefore, job responsibilities should be reorganized, personnel arrangements should be coordinated, and the degree of personnel position matching should be continuously improved. The fourth is to strengthen the digital thinking ability of hall personnel. In the process of digital transformation of branches, not only should we focus on cultivating personnel's business abilities, but also the cultivation of digital thinking is equally important. Strengthening the transformation of digital business thinking and deepening application capabilities can promote personnel growth and improve work efficiency. At the same time, branches should also accelerate the process of technological transformation, upgrade smart halls, and achieve hardware support for technical equipment.

In terms of employee assessment, taking DBS Bank of Singapore as an example, the bank incorporates digital learning into KPI assessment and organizes employees to participate in the construction of digital services in batches through the "Hacker Marathon" activity, including exploring end-to-end process digitization, customer marketing APP design, etc., allowing employees to participate in the digital operation and service process from a customer perspective, gradually deepening their understanding and identification with digital transformation. Hangzhou United Bank accelerates the digital transformation of its branches by improving relevant mechanisms. Firstly, improve the working mechanism, encourage frontline personnel to provide demand, and achieve a normalized problem collection mechanism and closed-loop problem management mechanism; Establish regular communication meetings and agile project teams for technology projects, and encourage frontline employees of the branch to deeply participate in the construction of technology systems and problem optimization. Secondly, establish an assessment mechanism for mutual assessment of technology and business. The business department assesses the development efficiency and user experience of the technology department's system; The technology department assesses the promotion and use of the business department's system. Assess the support of branch frontline technology and business departments to branch frontline. Finally, establish a reward mechanism. In order to encourage frontline employees of branch offices to participate in project construction and system optimization, an agile team mechanism consisting of technology, business, and frontline employees has been established. An excellent project reward mechanism has been established, which directly rewards individuals and mobilizes frontline enthusiasm.

3.4 Data application

With the rapid development of technologies such as big data, artificial intelligence, and mobile internet, data has become a key production factor. The banking industry has generally placed digitization at the core of its strategy, investing in digital transformation and upgrading, and accelerating the construction of a comprehensive and widely covered data system. Mining the value of data has become a systematic and long-term task for the banking industry in the future. Overall, large commercial banks are relatively well-established in terms of basic support construction such as cloud computing and big data, and their development focus has shifted towards intelligence. The initial stage of transformation in offline branches, online business layout, and data governance has been basically completed, with a greater focus on intelligent ecosystems, intelligent platforms, smart channels, and operational construction.

In terms of data acquisition and mining, Suzhou Rural Commercial Bank has conducted a series of explorations in organizational structure setting, data warehouse and platform construction, data analysis, and other aspects. One is to establish functional departments for data governance and data value mining. Specifically, Suzhou Rural Commercial Bank has set up a secondary department

of the data center in the Financial Technology Department, adjusting the electronic banking department to the digital banking department, and collaborating with the risk management department and related business lines to ensure that the responsibilities of digital transformation work include data architecture planning, data model management, data platform and data mart system architecture, data quality management, external data collection, business analysis modeling, data product promotion Application system construction, innovation scenario exploration, etc., while unifying the access, storage, and integration of internal and external data, providing reporting, query, and data exchange services. The second is to build an independent data warehouse to fully integrate and apply internal data. In recent years, Suzhou Rural Commercial Bank has made a series of progress in digital transformation. By building an independent external data exchange platform, it has achieved the convergence and integration of internal and external data, and applied this data to multiple business scenarios. Thirdly, at the technical level, Suzhou Rural Commercial Bank relies on technologies such as big data analysis and artificial intelligence to fully integrate and analyze data, and applies these analysis results to various aspects such as business process reengineering, marketing, risk control, and management.

In terms of data integration and application, China Merchants Bank has promoted a series of tasks in building data and insight capabilities. Firstly, in the data infrastructure layer, China Merchants Bank has built a data center to continuously connect internal and external data and improve the big data governance system; Secondly, in terms of insight capability, China Merchants Bank upgraded its big data cloud platform and built a data application tool platform for business personnel to lower the threshold for insight analysis; Thirdly, in the insight application layer, China Merchants Bank has built and optimized intelligent analysis and decision-making systems such as the risk control platform "Tianwei System" and the retail customer experience monitoring "Fengling System". It relies on big data and Al technology to create intelligent robots, which are used to undertake intelligent services, traffic distribution decision-making, intelligent agent assistants, service analysis, quality inspection, and other tasks. Jiangsu Bank is building a basic management system for big data applications in intelligent risk control. One is to integrate internal and external data, including 27 categories of personal data information and 16 categories of enterprise data information. The second is to establish an overall and effective data governance architecture, create a "Rongchuang Think Tank" big data platform at the processing level, and launch a "Big Data Risk Control Moonlight Treasure Box" data product at the application data level, including a blacklist treasure box, pre loan treasure box, credit limit treasure box, pricing treasure box, etc., to achieve credit technology innovation with core intellectual property rights.

4 Evaluation Index System for Digital Operation of Bank Branches

4.1 Digital indicators for strategic operations

Strategic operation digitization refers to the combination of digital technology and strategic goals by enterprises, utilizing data, algorithms, artificial intelligence and other means to improve operational efficiency and effectiveness, and create new value and competitive advantages. The layout of digital technology in the strategic panoramic view of banks reflects their attention and innovation awareness towards emerging technologies such as artificial intelligence, blockchain, cloud computing, and big data. The digitization of strategic operations requires banks to elevate the application of digital technology to a strategic level, reasonably set overall goals based on business operations, attach importance to the value and security of data, and utilize new technologies to improve business efficiency and innovation capabilities. This topic refers to the "Financial Technology Development Indicators" released by the People's Bank of China, and selects key digital

technology indicators from six aspects: blockchain, cloud computing, artificial intelligence, online, mobile, and big data. Based on the annual reports of the six state-owned banks from 2020 to 2022, the frequency of key digital technology indicators is calculated through text collection, manual screening, and other steps to reflect the bank's strategic digital transformation degree of operation.

4.2 Digital indicators for business operations

Pay attention to the extent to which banks apply digital technology to business expansion and product development. In terms of business activities, the advancement of digitalization will significantly improve the efficiency of bank operations, thereby enhancing the overall competitiveness of the bank's business. This project measures the digitalization of banking business through four dimensions: digital products, digital research and development, digital scale, and digital risk control. In terms of digital products, one is to calculate the proportion of digital products such as digital loans and internet wealth management, and the other is to select keywords such as "digital", "internet", "online", and "new products" in the annual report to statistically describe the digitization of products. In terms of digital research and development, firstly, the proportion of technology investment in commercial banks to operating revenue is calculated. Secondly, the number of patents (excluding the number of unpublished patents applied for) disclosed by the selected banks through the patent database incoPat between 2020 and 2022 is calculated. In terms of digital scale, the annual report includes statistics on the proportion of digital channel transactions and the proportion of online customers of the bank. The Baidu search index website is used online to search and count related words such as the bank's online banking. In terms of digital risk control, select three indicators in the annual report: non-performing loan ratio, provision coverage ratio, and capital adequacy ratio. The descriptive statistics of the specific indicators in the above four aspects are shown in the table below.

4.3 Digital indicators for management operations

The development of digital productivity has brought fundamental changes in production operation mode, organizational management mode, service mode, etc. This study measures the digitalization of commercial bank management from four aspects: organizational mechanism, team building, investment assessment, and communication and cooperation. Firstly, in terms of digital organizational mechanisms, the main focus is on digital innovation in the organizational structure of banks, including whether they have flexible organizational forms of financial technology, as well as the establishment of digital finance related departments and the number of financial technology subsidiaries. Secondly, in terms of digital team construction, the main focus is on the proportion of financial technology personnel in commercial banks, the average number of financial technology related training personnel, as well as the proportion of executives and directors with information technology backgrounds in the executive team and board of directors. Among them, the proportion of fintech personnel is calculated based on the disclosure in the annual report. The average number of fintech related training personnel is the ratio of the number of employees participating in fintech related training by the bank to the total number of employees of the institution. The information technology background is based on whether the board of directors, supervisors, and senior high school background introduced in the annual report have computer science and technology, software engineering Judge based on information such as whether one has previously worked in the aforementioned department in a major or work experience related to information and computing science. Thirdly, in terms of digital investment assessment, the main focus is on the proportion of financial technology investment in commercial banks and the number of digital KPI

Table 1 Description and Measurement Method of Digital Indicators for Business Operations

Primary indicators	Secondary indicators	Third level indicators	Indicator hierarchy	Method for selecting tertiary indicators	data sources
Business digitization	Digital scale	Product scale	head office	Select the launch of internet wealth management, internet credit, and e-commerce to depict the digitalization of bank products. This information is positioned by searching for keywords such as "Internet", "new products", and "new services" in the bank's annual report, and then manually identifying whether the bank has launched the above related products	Annual report disclosure
		Number of mobile banking customers (100 million)	head office	Specifically, it refers to the number of mobile banking customers in commercial banks, among which Bank of Communications has not announced the usage of monthly active data	Annual report disclosure
		Online banking search index	head office	Baidu Index website, relevant word search values	internet
	Digital R&D	Number of open patents	head office	incoPat Patent Database, Number of Patents Published by Banks between 2020 and 2022	Annual report disclosure; internet
		Proportion of technology investment	head office	the proportion of technology expenses invested by commercial banks in operating revenue	Annual report disclosure
	Digital risk control	Provision coverage	head office	Annual report disclosure	Annual report disclosure
		Non performing loan ratio	head office	Annual report disclosure	Annual report disclosure
		capital adequacy ratio	head office	Annual report disclosure	Annual report disclosure

indicators. Among them, the proportion of financial technology investment is calculated based on the proportion of financial technology investment in operating revenue disclosed in the annual report. The number of digital KPI indicators is the number of digital related KPI indicators developed by the bank for assessing branches. Fourthly, in terms of digital communication and cooperation, the number of investment and cooperation with external technology companies over a period of time is calculated by searching for relevant keywords in the annual report. The descriptive statistics of the specific indicators in the above four aspects are shown in the table below.

4.4 Digital indicators for channel operation

Digital operation runs through the entire network service and is an important means of

Table 2 Description and measurement methods of digital indicators for management and operation

Primary indicators	Secondary indicators	Third level indicators	Indicator hierarchy	Method for selecting tertiary indicators	data sources
Digitization of Management Operations	Digital organizational mechanism	Flexible organizational form of fintech	head office	Does the bank establish flexible organizational forms related to fintech (including but not limited to incubators, accelerators, laboratories, research institutes, etc.)	annual report
		Digital finance related departments and financial technology subsidiaries	head office	The number of digital finance related departments and fintech subsidiaries established by the bank	Annual report, official website
	Digital team construction	Proportion of directors with information technology background in the board of directors	head office	Judge the information technology background of directors or executives based on their educational background and work experience	Annual report, official website
		The proportion of executives with information technology backgrounds in the executive team	head office		Annual report, official website
		Proportion of FinTech personnel	head office	The proportion of the number of fintech personnel in the bank to the total number of employees in the institution	Annual report
		Average number of financial technology related training participants	head office	The ratio of the number of employees participating in fintech related training at the bank to the total number of employees at the institution	Annual report
	Digital investment assessment	Proportion of financial technology investment	head office	The proportion of financial technology investment in operating income	Annual report
		Number of digital KPI indicators	head office	The number of digital related KPI indicators developed by the head office for evaluating branches	internal data
	Digital communication and cooperation	Investment and cooperation with technology companies	head office	Number of technology companies invested and cooperated	Annual report

improving the quality and efficiency of the network. The digitization of channel operation can be distinguished from the inside and outside of the network, as well as the front and back platforms. The external aspects of the network involve two major indicators: digital site selection and ecosystem construction. Internally, it can be further divided into front-end operational indicators and back-end operational indicators. The frontend operation indicators include digitization of operation channels and digital marketing, while digitization of operation channels includes

intelligent queuing machine settings, checkout rate, mobile banking performance, intelligent equipment settings, paperless rate of counter business, etc; Digital marketing includes the frequency of mobile exhibition industry usage and the comprehensiveness of CRM function usage. Backend operations include employee management, digital risk control, and digital network management, among which digital network management includes three indicators: the paperless rate of business supervisor accounts, the paperless rate of branch head accounts, and the frequency of digital training applications. The specific results are shown in the table below.

Table 3 Description and measurement methods of digital indicators for channel operation

Primary indicators	Secondary indicators	Third level indicators	Indicator hierarchy	Method for selecting tertiary indicators	data sources
Digitization of channel operation	Digital site selection	Digital site selection	Head Office	Number of branches for digital site selection	internal data
	Ecosystem construction	Number of social platform ecosystem construction outlets	Head Office	Number of outlets that collaborate with digital solution providers such as Lakala or develop relevant scenario mini programs on their own	internal data
	Digitization of operational channels	Intelligent queuing machine settings	Head Office	Is an intelligent queuing machine set up	internal data
		Intelligent queuing machine settings	Head Office	Ratio of completed business of intelligent machines to total counter business	internal data
		Download volume of mobile banking	Head Office	Number of mobile banking apps downloaded	internal data
		Mobile banking monthly activity	Head Office	Monthly active customers of mobile banking	annual report
		Number of registered customers for mobile banking	Head Office	Total number of registered mobile banking customers	annual report
		Point average intelligent equipment	Head Office	The average number of intelligent machines and tools (ITM/STM) equipped in national branches	internal data
		Upgrade frequency of intelligent tools	Head Office	Monthly upgrade frequency of smart tools	internal data
		Upgrade frequency of intelligent tools	Head Office	Electronic ratio of customer filling out business	internal data
	Digital marketing	Mobile exhibition use	Head Office	Monthly usage days of mobile exhibition equipment	internal data
		Comprehensive use of CRM system functions	Head Office	Statistics of the number of crm functions used	internal data
	Digitization of employee management	Digital Employee Management	Head Office	Proportion of branches using electronic ledger management for employees	internal data
	Digital risk control	Digitalization of internal control case prevention	Head Office	Are monitoring and other devices connected to the system	internal data
	Digital branch management	Sales Supervisor Ledger Paperless Rate	Head Office	Is the business supervisor's ledger paperless	internal data
		Sub branch ledger paperless rate	Head Office	Is the branch head ledger paperless	internal data
		Digital Training Frequency	Head Office	Digital training for branch employees	internal data

5 Optimization Path for Digital Operation of Commercial Bank Branches

5.1 Strategy: Strengthen technological collaboration and highlight technological support

Strengthen organizational support and strengthen scientific and technological collaboration. Conduct in-depth research on the application of financial technology in the field of operations management, and further comprehensively promote the digital transformation of operations management. One is regular communication, strengthening research and mastery of technology applications, and conducting regular digital transformation business and technical exchanges. The second is dynamic iteration, dynamic updates, iterative upgrades, and dynamic optimization of digital transformation tasks based on cutting-edge technology and advanced industry practices. The third is technological collaboration, combining the advantages and achievements of system construction, to do a good job in building an operation management system platform and provide technological support for digital transformation of operations.

Utilize big data technology to highlight technological support. The most significant feature of the financial field in the digital era is the deep integration of technology and finance. Firstly, it applies big data technology to achieve comprehensive data acquisition, automatic processing, and intelligent analysis. Promote the construction of cloud service capabilities, build a full stack service cloud that includes basic services, container services, and platform services, create a "intensive, standardized, and digital" hybrid multi cloud management platform, and accelerate digital transformation. The second is to build an operation and maintenance big data platform, based on operation and maintenance big data and intelligent algorithms, to establish a unified and standardized operation and maintenance data structure through digital transformation work, achieve mobility and sharing, use computing power for correlation analysis, build intelligent operation and maintenance scenarios and ecology, continuously improve IT management through digital transformation, build full scene intelligent operation and maintenance, enhance data service capabilities, and highlight digital value.

5.2 Business: Optimize business processes and improve service efficiency

Optimizing business processes and connecting the intelligent service chain for business processing. One is to design and optimize an integrated online and offline business process that covers multiple channels, covering various forms of business acceptance, processing, and delivery. This will further transform the traditional single channel operation mode such as branch counter and self-service into a multi-channel mode such as online+offline collaboration, hall+self-service+centralized, online+centralized+mailing. The second is to introduce the application of electronic identity cards and electronic business licenses, reduce the dependence on physical media and carriers in the business processing process, deepen the application of biometric technology in front-end transaction acceptance channels, expand the scope of self-service device "face swiping" transactions, simplify manual operations, promote senseless operations, and improve and optimize the experience of branch channels and mobile banking channels through circular improvement. The third is to improve the professional support of the counter, launch the intelligent assistant function of the counter, apply technologies such as knowledge base and knowledge graph, achieve "thousands of people and thousands of faces" training content, actively and accurately push, and improve the operating experience and business processing efficiency of the counter.

Building a digital business operation team and establishing a digital business operation system with excellent risk control, experience, quality and efficiency, and cost. One is to attract talents with professional knowledge and skills in multiple fields, explore the "digital technology+X

business" talent cultivation model, adhere to cultivating talents in the construction of information technology projects, strengthen the construction of basic and cross disciplinary disciplines, and establish a multi role digital operation professional team including financial experts, technical architects, digital marketing experts, and user experience designers. The second is that the main body of implementing digital transformation in branches is branches. To achieve digital transformation in branches, it is necessary for the middle and back ends to fully utilize and analyze data, and combine data analysis to provide marketing and service support for the front end. The third is to strengthen technology investment, increase the proportion of middle and back-end technology personnel, and provide strong guarantees for the digital transformation of outlets. Establish a quantitative management system for information technology outsourcing, achieve online management of outsourced personnel and activity information, and continuously improve the refinement and scientific level of information technology management.

5.3 Management: Make good use of management tools and strengthen the application of assessment

Making good use of digital operation management tools and strengthening organizational support. The digital transformation of network outlets is a systematic project that needs to fully consider various issues such as employee awareness, customer service, product development, marketing and sales, and network operation while solving the problem of intelligence. Multiple lines should form a joint force of departments, and provide guarantee measures from organizational division of labor, organizational cooperation, and organizational promotion. One is to build a unified portal for information technology engineering management, strengthen the full lifecycle management of information technology engineering, create a unified tool for the full lifecycle management of information technology engineering, and promote refined management of information technology engineering construction. Improve the working methods of post engineering evaluation, enhance the intelligence and automation level of IT planning and management, and enhance the level of technology empowerment. The second is to use the information technology comprehensive management system as a starting point to further strengthen engineering management, refine existing management processes, and continuously improve the refinement and informatization level of project management.

Providing assessment and training mechanisms to strengthen the application of digital transformation achievements assessment. By setting clear key performance indicators, matching them with digital business goals, and conducting regular evaluations and assessments. Establish and improve daily reporting and assessment management mechanisms, and form a joint control force. Improve the internal reporting mechanism, strengthen external communication and reporting, clarify the standards and requirements for accountability and incentive management, strictly implement accountability and incentives, and promote the continuous implementation of digital transformation of operation management through a sound assessment and evaluation mechanism. In addition, with the continuous acceleration of digital transformation, it is necessary to keep up with technological and market development trends, organize business promotion and training, combine self-learning and remote training, and provide continuous digital related training and development opportunities.

5.4 Channel: Expand channel construction and improve risk control

Building and expanding digital service channels to achieve technological empowerment. With the application of cloud computing, big data, artificial intelligence, blockchain, and other

technologies in the banking industry, operational and decision-making tools have shifted from manual to intelligent. One is to promote the intelligent transformation of offline branches, apply 5G, biometric technology, and intelligent machine technology to innovate branch services, and promote the transformation of branches from providing services to providing experiences. The second is to promote the transfer of business services to online digital service channels, providing customers with anytime, anywhere services. Create collaborative services between online and offline channels to provide customers with a consistent and high-quality experience across all channels. Thirdly, the standardization part utilizes digital technology to achieve automated processing, while the non-standard part utilizes artificial intelligence technology and some manual intervention to further optimize human resource allocation, reduce costs, and generate economic value.

Improving the operational risk management system and achieving intelligent transformation of operational risk management. Implement centralized operation of high-risk businesses in branches, strengthen risk prevention and control during and after the event supervision. Firstly, under the comprehensive risk management system, we will coordinate and implement risk management such as operational risk, anti money laundering, consumer protection, outsourcing, and business continuity. Based on the analysis and support role of the data center, we will rely on system identification, data analysis, and backend intervention to achieve the prediction of operational risks in branch operations, achieve diagnosis of branch operations and pre risk prediction, and further improve the intelligent risk prevention level of branch operations. The second is to increase data level governance, strengthen customer data level governance, improve customer databases and data extraction capabilities, create consistency in the underlying logic of bank data, and achieve data level improvement and modeling through technical interfaces with external institutions such as industry and commerce, public security, taxation, and housing provident fund. The third is to promote the transformation from due diligence and audit supervision to comprehensive risk management, and to achieve the advancement of risk identification and control through the continuous application of data, systems, and technology, improving the ability to identify customers, screen businesses, and control risks.

6 Guarantee Measures for Digital Operation of Commercial Bank Branches

6.1 Accelerating the construction of intelligent platforms for network outlets and improve the level of intelligent operation

Firstly, accelerating the construction of an intelligent operation and management platform for branches. In terms of user management, based on job responsibilities, corresponding work projects and authorization management are set up for branch staff. In terms of scheduling management, real-time updates of scheduling information, optimization of personnel position arrangements, and dynamic intelligent scheduling are achieved. In terms of form management, the traditional paper registration book is replaced by a system electronic registration book, which records the handover of teller positions, online verification, authorization information, and other registration matters.

Secondly, improving the intelligent operation level of business outlets. In terms of intelligent devices, the business hall has set up intelligent machines such as call machines, mobile PADs, and ITMs to improve the diversion rate of counter business. In terms of information systems, establish a branch backend management system, update branch business data in real-time, and regularly analyze the operational efficiency of the branch. In terms of hall management, establish a monitoring mechanism to achieve integrated supervision of branch personnel management, equipment management, and other aspects.

Thirdly, establishing a classification system based on the different needs of different customers. Improve the financial ecosystem, deeply integrate customer financial information data, and help account managers to have a more comprehensive and specific understanding of customer needs and preferences. Deeply explore the potential needs of customers and provide strong support for the marketing work of bank outlets in the later stage. Firmly grasping where customers are, the business is where they are, accurately judging and selecting customers through big data, depicting a panoramic view of customers, thus achieving effective positioning of target customers, deeply understanding their actual needs, achieving accurate data profiling of customers, creating a comprehensive sales model, and providing personalized modern financial services to customers.

6.2 Consolidating customer trust relationships and creating accurate customer portraits

First is to strengthen customer trust relationships. Bank branches are the most fundamental channel for financial services and the main window for bank staff to communicate with customers. In the context of digital operations, although banks' online operational capabilities are valued and supported, communication and processing from offline to face-to-face are still the fundamental support for the development of bank business. Banks should always practice the digital transformation concept of "online+offline", based on the actual situation of branches, and optimize their structural layout, Based on physical outlets, closely link the surrounding ecology of the outlets, strengthen interaction with customers, and consolidate the trust relationship foundation for the comprehensive implementation of digital transformation.

The second is to create accurate customer portraits. Portrait mid to high-end customers in the branch, relying on massive data such as bank basic information, transaction information, historical habits, and product configuration information, and accurately portray each mid to high-end customer through modeling. Based on the portrait, marketing personnel can have a comprehensive understanding of the customer's information and habits, and carry out precise touch marketing for the customer according to the system portrait prompts. By accurately portraying, we aim to enhance marketing accuracy and success rate, and provide tools to empower digital operations in our outlets.

6.3 Establishing a customer-centric service philosophy and do a good job in product research and development

First is to establish a customer-centric service philosophy. One of the important purposes of achieving digital operation of branches is to better serve customers, so establishing a customer-centric service concept is of great significance. It is necessary to promote and implement the customer-centric approach throughout the entire bank, so that all employees can correctly understand the correct connotation of the concept. Excellent service not only provides customers with a high-quality financial service experience, but also brings a trustworthy sense of security belonging to the bank. Customer centeredness means thinking from the customer's perspective, analyzing problems from the customer's perspective, solving problems from the customer's perspective, and ultimately creating an excellent service experience for customers.

Second is to improve customers' precise analysis ability and do a good job in product research and development. The business philosophy of the front, middle, and back offices of banks should shift from 'what products do I sell' to 'what products do customers need'. To truly achieve customer-oriented product development, it is necessary to strengthen customer analysis, think from the customer's perspective about what customers truly need and what their pain points are. Strengthen market analysis, understand current market hotspots, combine market hotspots and customer pain

points, analyze customer demand trends and potential future demand points, in order to achieve the goal of developing popular products, leading customer demand The purpose of increasing customer visits to the store. In the process of using the product, it is necessary to follow up on the customer's experience and feedback on changes during the use of the product, identify problems in a timely manner based on market and customer changes, optimize product performance and design, maintain a good level of customer experience, accelerate the innovation and iteration of existing products, and achieve relative product not falling behind or falling behind.

6.4 Improving the level of data application in multiple aspects and focus on risk monitoring

First is to do a good job in risk prevention and control through data application. During the digital operation of bank branches, a large amount of transaction data and user behavior data will be generated. By monitoring and analyzing these data in real-time, banks can timely detect abnormal transactions and risk behaviors, strengthen risk control and anti fraud capabilities, and ensure the safety and trust of customer funds. In addition, data applications can also help improve risk warning capabilities, enabling banks to identify potential risks earlier and take corresponding measures to prevent them.

The second is to optimize internal management through data application. Through data-driven decision-making, bank branches can more efficiently allocate resources, optimize operational processes, and improve work efficiency. Branches can use data application technology to conduct performance evaluation and business monitoring, timely identify problems and improve space. In addition, data applications can help support strategic planning and business development, help banks expand business boundaries, and achieve better business growth and profitability.

Thirdly, focus on monitoring data application risk points. Data applications also face some challenges and risks. Firstly, data privacy and security issues are aspects that banks must pay attention to in the process of data application. Bank branches must strengthen data security monitoring and fully protect customer information. Secondly, the complexity and investment cost of data application technology are also one of the challenges faced by banks. Banks need to increase technological investment and talent cultivation to ensure the smooth implementation of data applications.