Research on the Development of Open Banking in China under the Background of Internet Finance

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Abstract—Open banking is a product of transformation and upgrading of traditional banks under the background of internet finance, aiming to provide customers with "one-stop" integrated services by opening up data and business. By methods of literatures review and cases comparative study, this paper summarizes the characteristics of open banking and gets following conclusions. The new rules of internet finance and FinTech are the important motivation for the development of open banking. With open API as the technology and platform cooperation as the form, open banking has realized the "seamless connection" between financial services and production scenarios. Driven by internet finance, Chinese commercial banks have formed three different modes of open banking including scenario access, platform export and integrated mode. In order to promote the further development of open banking in China, it is necessary to strengthen the strategic thinking of win-win symbiosis, improve the platform and open IT architecture, release the value of data elements, and shape the new ecology of FinTech.

Keywords-internet finance; FinTech; open banking; open platform; API

1 INTRODUCTION

In recent years, with the deepening of artificial intelligence, blockchain, cloud computing, big data, mobile internet and other information technology applications in the financial industry, internet finance and FinTech have developed rapidly, bringing challenges and providing new development opportunities for the financial industry, mainly banks. On the one hand, the development of internet finance has intensified competition in the financial industry and broken the monopoly position of traditional banks; on the other hand, the empowerment of FinTech has also provided technical support and innovative power for the transformation and upgrading of

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the banking industry. In order to meet the challenges and seize the opportunities, commercial banks have started to explore a new banking business model called "Open Banking" in the context of internet finance, which has gradually attracted widespread attention in the industry. Open banking has not yet formed a unified definition, and one of the more convincing views is that of Gartner, a leading consulting and analysis firm, which believes that open banking is essentially a platform business model. By sharing data, algorithms, transactions, processes, and other business functions with business ecosystem participants, banks provide services for ecosystem customers, employees, third-party developers, FinTech companies, suppliers, and partners, enabling banks to create new value and build new core competencies [1]. It can be seen that open banking essentially embodies a platform strategy, i.e., banks open their own data ports and attract external partners to join them, aggregating various scenarios and providing "one-stop" services for customers. According to Lu Minfeng and Zhang Huan (2018), with the rapid development of FinTech, it has forced and empowered the innovation of financial service models, and promoted the transformation of commercial banks to open banking, realizing the integration of finance and scenarios, and creating a new financial architecture of self-help, scenario-based, online and offline integration [2]. At the same time, open banking also promotes the transformation and upgrading of internet finance to FinTech and broadens the development space of FinTech. Yvon Moysan and Margaux Rudnicki (2019), by studying the structural changes triggered by open banking and its underlying motives, point out that FinTech innovations such as application programming interface (API) brought by the development of internet finance will structurally exert a lasting impact on the banking industry, creating new partnerships. The development of traditional banks to open banking is also expected to reshape the new ecology of FinTech openness [3].

In summary, the existing literature focuses on the concept of open banking, the impact of internet finance on open banking, and the relationship between FinTech and open banking, but there is a lack of in-depth research on the construction mode and development path of open banking. Based on the theories of internet finance and FinTech, this paper firstly analyzes how the new rules of internet finance and the underlying technology of FinTech drive the development of open banking and summarizes the essential features of open banking; then, taking the open banking practice of fast-developing Chinese representative commercial banks as an example, it focuses on analyzing and comparing various construction models of open banking and their advantages and disadvantages; finally, on the basis of multiple case studies, we propose suggestions to promote the further development of open banking in China in the context of internet finance, with a view to improving the ability to build a FinTech ecology and a high-quality open banking platform, and better promoting the deep integration of finance and the real economy.

2 CHARACTERISTICS OF OPEN BANKING

2.1Internet Finance as a Motivation for Development

Open banking is a new type of banking organization and business model launched by traditional banks to meet the challenges of internet finance and FinTech competition, and to adapt to the new rules of internet finance, such as "work better together", "borderless operation" and "establishing influence for customers". Internet finance has the characteristics of openness,

sharing, equality and inclusiveness [4], which promotes the market operation rules of banking industry from "homogeneous competition" to "work better together". Traditional banks can build an open banking platform through internet finance and cooperate with internet communities and FinTech companies to integrate resources from multiple industries and enhance their competitiveness in the industry chain. The development of open banking in the context of internet finance has gradually realized the full-license hybrid operation of the financial industry and even "Internet+" cross-border operation, which means "borderless operation" instead of "bounded operation". In other words, "borderless operation" replaces "bounded operation". Therefore, open banks, also known as "borderless banks", are able to provide customers with a variety of comprehensive services in the same or different industries through an open platform and an open ecology, thus satisfying customers' needs in many aspects and establishing influence for them. Internet finance, as the development motive of open banking, not only provides new operation rules for open banking, but also provides important underlying technology of FinTech. FinTech, as the 2.0 version of internet finance, is a financial innovation driven by underlying technologies such as artificial intelligence, blockchain, cloud computing and big data. Using these emerging technologies, open banking can improve operational efficiency, reduce transaction costs, take advantage of data resources, deploy and expand the service coverage of the "cloud platform", thus broadening the boundaries of openness on the basis of effective risk prevention and control, and truly realizing the "seamless connection" between open banking and production and life scenarios. The "seamless connection" between open banking and production and life scenes makes financial services "ubiquitous".

2.2Open API as Technology

The essence of open banking is the sharing of banking data, and APIs are the most direct technical means to achieve this goal. Application Programming Interface (API) primarily predefined functions that are designed to give developers the ability to access a set of routines based on a piece of software or hardware without having to access the source code or understand the details of the inner workings. APIs play the role of "technical glue" between the supply side and the demand side, so they meet the requirements of open banking and are suitable to serve as a bridge for traditional banks to "go global" and third-party institutions such as internet companies. Therefore, it meets the requirements of open banking and is suitable to serve as a bridge for traditional banks to integrate with third-party institutions such as internet companies. At the same time, the security advantage of API is obvious compared with screen capture. Banks can serve third parties with their own technology output without worrying about the leakage of core technology and privacy details. Third parties can simply obtain the API they need from the bank without having to develop and research the specific technology service themselves. Thus, the use of open APIs as a technology significantly improves the efficiency and security of open banking cooperation and services.

2.3Data Mining and Sharing as the Essence

Open banking data is a collection of multi-dimensional data such as financial institution data, socialized data, and behavior set data. Based on this huge volume of data, it is the essential feature of open banking to fully explore the data and share it. On the one hand, open banking reassemble and allocate data as valuable production resources and social factors, and use

technologies such as big data, cloud computing and artificial intelligence to digest, absorb and dig deep into massive data, develop financial products and services that can meet customers' potential financial needs or create new ones, and build core competitiveness. On the other hand, sharing data is also the direct purpose of open APIs. Only by sharing data can open APIs have value and thus realize platform cooperation. Open banking can be understood as a sharing phenomenon in the banking field, and the content of its sharing is the mined customer data, which is generated by a series of behaviors such as payment, credit and savings. By sharing data, it can lay the foundation for open banking to aggregate various scenario-based services and export and empower external platform-based services.

2.4Platform Cooperation as a Form of Performance

Unlike traditional banking, open banking adopts the expression of Bank-as-a-Platform. Banks no longer communicate their products and services directly to customers as they did in the past, but graft various different business ecologies onto the platform, and then provide various financial services to customers indirectly through these business ecologies, thus forming a shared and open integrated platform. The form of platform cooperation becomes the basis for cross-border integration and creating an open and borderless bank on the one hand; on the other hand, it guarantees the implementation of open API technology and data sharing. If platform cooperation is lost, open API technology and data sharing will also lose their value. Platform cooperation is conducive to smoothly connecting back-end resources, establishing and enhancing core competencies such as strategic thinking ability, ecological construction ability and technology development ability, so that banking financial services can be seamlessly integrated into all aspects of enterprise production and operation and public social life, and customers can invoke banking APIs whenever they have needs to obtain services and meet financial needs at the first time and the first contact point.

3 CONSTRUCTION MODES AND TYPICAL CASES OF OPEN BANKING IN CHINA

Unlike the regulation-driven open banking that originated in Europe, the flourishing development of open banking in China is market-driven, integrating various financial products and services and non-financial service capabilities of banks with government, enterprise and industry platforms to provide ubiquitous and seamless services to users in various production and life scenarios. The construction of China Open Banking consists of two parts: "open platform" and "open ecology", which are positioned differently and together form the open banking, as shown in Figure 1. The open platform is the support of the open ecology and is more oriented to the IT technology concept, which is often manifested by opening APIs, exporting SDKs and other ways to open the bank's own data and services to third-party partner institutions and customers, so as to promote business model innovation. The open ecology, on the other hand, faces customers directly and is more oriented to model innovation at the financial business level, exploring new financial service models and business ecology around business scenarios such as personal life consumption and enterprise production and operation to achieve customer value creation. Its construction can be for the bank to app aggregation services to guide third-party technology enterprises to participate in the construction of business scenarios [5].

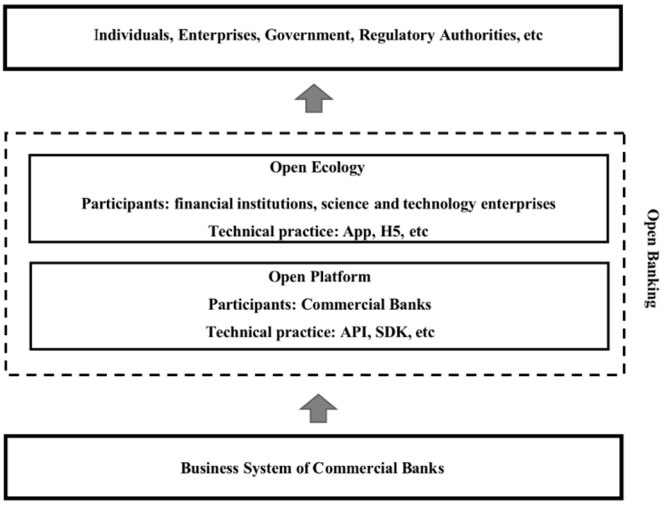

Figure 1. The framework of open banking constructive modes

According to the classification of Chinese commercial banks' practice of building open banking, the construction modes of open banking are mainly divided into three categories: scenario access mode, platform export mode and comprehensive mode.

3.1Scene Access Mode

Scene access mode commercial banks focus on the aggregation and access of financial service scenarios, customers' differentiated financial service needs and business scenarios, and aggregating third-party services, products and data into their own apps or platforms through H5, applets and other technical means, so as to build a closed business ecology and provide services directly to customers. For example, Bank of Communications in China has launched personal mobile banking and credit card "Pay For It" app for retail business, both of which have their own focus and cover various scenarios such as consumer finance, mobile payment, life payment and wealth management. The mobile banking app is presented from the user's perspective, with more than 20 scenarios across China and nearly 1,500 water, electricity and gas payment services connected to mobile banking, with a transaction processing capacity of 29,000 transactions per second, focusing on customer experience; the "Pay For It" app is focused on the most important benefits and welfare for users, integrating and upgrading the welfare club, coupon center and activity center. The "Pay For It" App integrates and upgrades the benefits club, coupon center, activity center and other preference, and launches new products such as flexible repayment, ETC, one-click card registration for mobile payment, account security manager and calendar bill. The two apps provide users with one-stop "finance+life" services, with nearly 48 million monthly active customers (MAU) by the end of 2019.

This constructive mode makes it easier for banks to grasp new opportunities that may arise from the development of open banking, such as innovative business models in aggregating financial status data, enhancing credit risk assessment and cash management. However, the main disadvantage of scene access mode is the high exploration costs.

3.2Platform Export Mode

Platform export mode commercial banks focus on the construction of underlying APIs, SDKs and other technical platforms. By opening APIs and exporting SDKs, they open services and share data with third-party partner institutions, thereby driving the construction and innovation of financial service scenarios. For example, China Pudong Development Bank launched API Bank Borderless Open Banking in 2018 and continues to promote its construction as a strategic high point, with the intention of creating an open and shared digital business model. API Bank fully opens banking services and seamlessly integrates into all aspects of social life, production and management, so that as long as customers have demand, they can access the services through enterprise portals, ERP management systems, WeChat app and partner apps. API Bank can be embedded into the community apps, so owners can directly use the apps to pay property fees, get discounts at community merchants and make reservation for cleaning services. Banks are behind the payments, equity concessions, points and other services. The API Bank is also embedded with various travel websites. When customers order air tickets or hotels on travel websites, they do not need to switch to the bank's app or website, and can directly access the bank's payment services through the API. Combined with IOT, artificial intelligence, AR/VR and other technologies, when customers book air tickets or hotels on the website, banks can also actively provide products such as installment, credit adjustment and insurance packages according to their preferences, and can sense their location and push practical information such as preferential merchants around them and flight delay information in real time. API Bank not only opens up traditional financial services, but also opens up the bank's professional financial management and risk management capabilities to corporate customers, and through the platform, it encapsulates new service interfaces such as market forecasting, risk assessment and data analysis to empower small and micro enterprises to improve their business management and help them grow. By the end of 2019, Pudong Development Bank has opened 400 API interfaces and docked 210 partners such as China UnionPay and Jingdong Digital Technology.

3.3Integrated Mode

Integrated commercial banks put equal emphasis on open platform and business ecology construction, not only building open business scenarios and ecologies around customers' own apps and other open business scenarios, but also building open platforms through APIs and SDKs to stimulate the enthusiasm of third-party partner institutions to participate and jointly build open business ecologies. For example, as the first private internet bank in China, WeBank is the pioneer of comprehensive open banking in China, and has realized both scenario access and platform export mode. In terms of scenario access, it is mainly manifested in WeBank-micro loan, WeBank-floating loan and Direct Banking app, where customers are mainly obtained from online financial scenarios. For example, a large number of micro and small business customers are connected to the enterprise version of WeBank, and more than 20 million customers have been acquired through the direct marketing banking scenario. WeBank has also integrated third-party public welfare financial donation programs into the bank's app, aggregating and accessing public welfare scenarios into internet banking. In terms of platform export, the main performance is the B2B2C model of micro car loan. WeBank cooperates with internet used car platforms and relies on their traffic to export financial services such as micro car loans to used car platforms. When customers look at cars, select cars, do valuation on the used car platform and need financial services, the service interface of WeBank will pop up. In

the process of platform export, WeBank directly open-sources the technology to the partner institutions, and the partner car dealers can use the open-source technology provided by WeBank to build their own special platform services, thus greatly saving the customer's input.

As a comprehensive open bank, WeBank has different access scenarios and output platforms and different customer experiences, so it has to be supported in different ways, which puts higher requirements on the bank's capabilities, mainly including the need to have strong underlying FinTech technology capabilities, agile product launch capabilities, excellent IT operation and maintenance cost control capabilities, and high concurrency support capabilities. WeBank's comprehensive open banking combines the open platform and open ecology in Figure 1. Among them, the open platform is built based on APIs, SDKs and other technologies, while the open ecology has built a distributed business infrastructure through blockchain technology, winning advantages in verticals such as micro finance and auto finance.

There are some advantages for integrated mode of open banking. At first, commercial banks can grasp the channel and entrance of network flow. Secondly, it is also easier to grasp new business opportunities. However, compared with the scenario access and platform export models, the integrated mode requires commercial banks to invest long-term and huge resources such as capital, manpower and technology.

Above all, based on the characteristics and typical cases, the advantages and disadvantages of different modes of open banking can be summarized in Table 1.

TABLE 1. ADVANTAGES AND DISADVANTAGES OF DIFFERENT MODES OF OPEN BANKING

Modes	Advantages	Disadvantages
Scene acess	1.Grasp the channel and entrance of network flow to build and control the open ecology 2.Be easier to grasp new opportunities from innovative business models	1.Be restricted by traditional business thinking 2.High cost of exploration and uncertainty of profit transformation
Platform export	1.Stimulates the enthusiasm of the FinTech companies to participate in the construction of open banking 2.Banks focus on more professional financial services to gain comparative advantages	It is easy to further lead to "financial disintermediation"
Integrated	1.Grasp the channel and entrance of network flow 2.Be easier to grasp new opportunities 3.Stimulates the enthusiasm of the third-party partners	1.Higher cost investment 2.The focus of attention is easily dispersed

4 SUGGESTIONS FOR THE FURTHER DEVELOPMENT OF OPEN BANKING IN CHINA UNDER THE BACKGROUND OF INTERNET FINANCE

4.1Follow the New Trend of the Development of Internet Finance, Strengthen the Strategic Thinking of Win-Win Coexistence

The further development of open banking needs to firstly follow the new trend of internet finance and FinTech innovation and strengthen the strategic thinking of win-win symbiosis from the top-level design height. Open banking is an important direction and strategic high ground for the transformation and development of commercial banks. To seize such a strategic high ground, the top management of banks should reach a high level of consensus on open banking strategy, completely change the traditional "me-oriented" closed thinking at the strategic level, and cultivate a symbiotic and win-win thinking. We should make open banking development strategy at a high level, choose a suitable building model and implement strategic deployment, strongly promote the transformation of all business units, front, middle and background in all aspects, at all levels and links in the bank, and decompose and implement the open strategy into daily work through technical support, organizational mechanism, talent team, platform cooperation and inspection and assessment. Ultimately, the win-win and coexistence thinking is rooted in the corporate culture, and the open strategy initiative is transformed into the conscious action of every employee of the bank, thus promoting the sustainable development of open banking.

4.2Improve Platform, Open IT Architecture, Realize Digital and Intelligent Operation

Open banking should establish a new platform-based and open IT architecture from the perspective of ecological market and customers, so as to better provide digital support for external cooperation and flexible ecological embedding of banks. It should establish a developer community with open ecology, widely attract social resources to join the construction of open banking platform and promote business ecology development. At the same time, we will actively introduce agile R&D organization mechanism, process control system and whole-process tool chain to build a highly available, easily scalable and low-cost digital technology platform and form a rapid iteration and delivery capability. On the basis of open IT architecture, open banking should build an intelligent operation system and use digital technology to improve the efficiency of organization, management and decision-making; they should build an intelligent risk control system that is compatible with the online operation environment and prospectively prevent and control new types of risks in response to the privacy leakage, platform monopoly, reputation risk and data confirmation problems that may be encountered in the process of open data and business. With the development of artificial intelligence, the application of network group intelligence can further improve the wisdom and digital operation capability of open banking. In network population intelligence, the control is distributed and there is no centralized control, i.e., the group's solution to the whole problem will not be affected by the failure of some individuals, which can provide important technical support for the development of open banking toward a large operation platform with wisdom, efficiency and robust sharing.

4.3Use Intelligent Technology to Advance Digital Assetization, Release Data Elements Value

Data has become an important production factor and a core asset of banks in the context of internet finance. In the "digital intelligence era", open banking should use intelligent technology to promote digital assets in all aspects, transform "static" data acquisition and analysis to "dynamic" data mining based on scenarios. Open banking in China should make up for the "shortcomings" in data accumulation and application, quickly promote data intelligence construction by doing a good job in data collection, data storage, data analysis, data security and privacy protection, realize high-efficiency customer acquisition and low-cost risk control, and fully release the important value of data production factors.

4.4Enhance Ecological Construction Capabilities, Build an Open and Borderless Financial Business Ecosystem

Ecological building capability is the core capability of open banking development, whether it is scene access or platform output, the purpose is to build a good financial business ecosystem. Open banking can improve its ecological construction capability in terms of FinTech empowerment, partner management, customer operation, products and services. In terms of FinTech empowerment, it can explore the innovative features of applying blockchain and other technologies, build an alliance chain with open banking as the main body and the supply chain of the industry chain in synergy, create a new FinTech ecology that is intelligent and trustworthy, open and borderless, and promote the deep integration of FinTech and the real economy. In terms of partner management, it should establish access and service opening standards for third-party partner institutions, develop incentive-compatible cooperation mechanisms, and design reasonable profit distribution models. In terms of customer management, it should explore potential customer needs, develop differentiated service strategies, strengthen customer lifecycle management, and enhance customer experience and value. At the same time, it should promote the modular construction and innovative design of products and services, build a perfect product system, realize the transformation from "financial service provider" to "integrated service provider", and better serve the high-quality development of the real economy.

5 CONCLUSION

By methods of literatures review and cases comparative study, this paper summarizes the characteristics of open banking and discusses the development of open banking in China. The main conclusions are as follows: (1) with open API as the technology, deep data mining and sharing as the essence, and platform cooperation as the form, open banking has realized the "seamless connection" between financial services and production or life scenarios; (2) driven by internet finance, Chinese commercial banks have formed three constructive modes of open banking including scenario access mode, platform export mode and integrated mode; (3) different open banking constructive modes have different advantages and disadvantages in practice; (4) in order to promote the further development of open banking in China, it is necessary to strengthen the strategic thinking of win-win symbiosis, improve the platform and open IT architecture, release the value of data elements, and shape the new ecology of FinTech.

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