The Resource Aggregation and Integration Platform for Shared Development of the Direct Bank

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ABSTRACT: Direct Banks is critical to provide online users a novel investment path without the intermediation of traditional banks and financial institutions. However, a massive resources are underutilized due to dearth of sharing concepts. The objective of this study was to propose a Direct Bank resource integration platform (DBRIP) by addressing the problem of non-circulating user resources and data resources, and enhance the resource utilization rate among the Direct Banks, including three main layers: first, data layer, multiple data resources is aggregated in this layer; second, function layer, it’s the core of DBRIP architecture that provides a lot of necessary functions for Direct Banks and customers; finally, service layer that provides a series of service functions and ensures customers and Direct Banks have a good user experience. We believe this study provides valuable insights for the development of Direct Banks in era of sharing economy.

1. INTRODUCTION
Sharing economy can be defined as Internet mediated based on Internet platform which can share, swapping, trade, rent products or service, and it disrupts traditional business mode, generates new economy activity and potentially leads to environmental and social benefits. In the early stage, sharing products mainly are fixed assets, such as a house and a car \cite{1}. Nowadays, the sharing economy involves multiple areas, such as medical treatment, education, finance, resource, travel and accommodation.

The advancement of IT (information technology) has resulted in a rapid development of electronic economy markets. The key feature of these electronic economy markets is reducing and eliminating the traditional middlemen, so it’s very convenient for customers to connect the product providers and
product service directly [2]. A typical example is online P2P (peer-to-peer) lending (e.g., Kiva) and crowdfunding services (e.g., Kickstarter) [3-4] which is a novel financing model for the Internet users. P2P based activity including giving, obtaining and sharing the permission for products and services, coordinated through Internet online services. As the development of Internet finance, traditional banks borrowed the experience from other countries, and tried to develop the Internet finance by building Direct Banks.

Direct Banks are built based on the traditional banks that provide the financial products and services through online platforms, such as E-mail, telephone bank, mobile software, etc., without the intermediation of any financial institutions. However, the results produced by Direct Banks are not satisfied compared with P2P lending, because of resource limitation that is produced by the lack of Shared concepts. The development of IT alongside the growth of web 2.0 has enabled the online platforms that promote user sharing and collaboration [5]. As new application of IT entered in financial fields, Direct Banks has been able to reduce costs and provide all functions effectively to complete transactions like traditional banks.

The main contribution of this paper is as follows: (1) the essential characteristic of sharing economy is analyzed, and then, we introduce the relationship between sharing economy and Direct Banks; (2) we analyze the problems caused by dearth of understanding shared concept for Direct Banks; (3) system architecture of Direct Bank resource integration platform we proposed and illustrate the characteristics and advantages of it.

2. THEORETICAL CONTEXT

2.1 The Essential Characteristic of Sharing Economy

Sharing economy is a novel economic mode, the essential of which is sharing the permission of idle resources through the third-party Internet information technology platform. This economy mode has been expected to alleviate societal problems, such as pollution and hyper-consumption, it also can increase the utilization of resources and optimize the allocation of resources. The following we will describe more detail. The main characteristics of sharing economy includes three parts:

(1) Base on third-party Internet platform: sharing economy emerges from a number of information technological developments that have simplified sharing products and services through the availability of multiple information systems on the Internet. In the traditional society, instant messaging is difficult and expensive, through information technology platforms, communication cost will be significantly reduced and solving the problem of low utilization of resources. The business models of sharing economy are often platform-based to match demand and supply. As shown in Figure 1. As increasing use of the Internet, the possibilities of Internet enable online platforms cheaper and easier to access.

Figure 1. Structure of business model of sharing economy

(2) Reducing and eliminating the traditional middlemen: before the advent of the sharing economy, transaction costs might be quit high because direct interaction is costly, people need to find resources in your vicinity or through specific intermediary [6]. The Internet, laptop and mobile devices or other new technologies overcome parts of this problem, resources can be concentrated and integrated by sharing platforms. Especially information costs and decision costs are usually dramatically reduced compared with face to face interaction. Consumer can view and select the products in a uniform interface, and trading by themselves. Sharing platforms will greatly reduce the transaction costs for consumer. Table 1 demonstrates this using an example of sharing-based Direct Bank, comparing traditional bank with Internet-enable sharing bank.

Table 1. Advantages of Direct Banks in the sharing economy.

Activities in Direct Bank from the consumer point of view, for example.
Traditional Bank | Direct Bank
---|---
Search financial information costs | Finding the financial instructions in your vicinity |Finding the Internet platform that supply the financial products |
Trading and decision costs | Negotiating with a sales personnel and conditions of the deal individually | Checking the price and conditions specified by the platform Selecting and trading by self |
Enforcement costs | Organizing payment method and payment | Payment via the platform |

(3) Emphasize sharing rather than occupies: people used to regard possessions as symbols of wealth and social status. But now, with the improvement of the living standard, consumers are more prefer to enjoy the use of permission of the products than to possess them. Thus, the living costs can be reduced by resource sharing. The resources people like to share include car, house, money, knowledge and financial products.

2.2 The Relationship between Sharing Economy and Direct Banks
Direct Bank is a new Internet technology of selling efforts by banks, and the result of that in two interactive developments, (1) the computer technologies is changing; (2) the demand for personal selling efforts is changing. The personal contact between products seller and the customers in financial institutions is replaced by online communication between an online banking customer service and the customers. Hence, the high employee wage costs and the capital of the traditional branch are substituted by lower costs.

There is growing interest in Internet bank in the societies, due to traditional banks are time consuming and labor consuming. The advantages of Direct Banks, from the banks’ perspective: (1) the building expenses are lower due to the bank does not need to established many branches located in a density populated area; (2) the wage costs are lower because both a reduction in the number of employees and the wage rate of the staff [7]. From the customers’ perspective: (1) Direct Banks have the online financial experts who can give advice about the products for customers; (2) enable customers to search and purchase financial products anytime.

In Germany and America, the Direct Banking system has matured and widely spread in other countries [8]. Up to now, Direct Banks have reached 114 in China. Compare with P2P, Direct Banks have the stronger capability of risk resistance and the higher credibility. However, the low utilization of resources will be existence because of each Direct Bank develops independently. There are two mainly negative effects is described as: (1) user data without circulation, extremely easy to cause the waste of user resources; (2) product data without circulation, it will lead to inaccurate market positioning, high homogenization of financial products, coupled with make Direct Banks trapped in a vicious circle of price competition. Therefore, in order to improve resource utilization, Direct Banks need to borrow the concepts of sharing economy. The optimal allocation of user resources and data resources can be realized by promoting the circulation of resources with the resource integration platform. The ecological environment of Direct Banks is described in Figure 2.
3. THE DEVELOPMENT OF DBRIP WITH SHARING ECONOMY

Direct Banks in the sharing economy evolve round a resource integration platform base on sharing economy business that compete with other traditional banks or financial institutions. Therefore, this chapter first characteristics and advantages of Direct Bank resource integration platform is illustrated. In a second step, the system architecture of Direct Bank in the sharing economy in general is explained more detail.

3.1 The Advantages of DBRIP in Sharing Economy

The DBRIP is produced by the concepts of sharing economy business. The relationship between resource integration platform, Direct Bank and users is shown in Figure 3. The main function of the resource integration platform is aggregate data resources of a number of Direct Banks and integrate user history information. This platform fulfill supply demand between Direct Banks and customers as well as select demand between customers and financial products, and improving the utilization of customer resources and data resources.

The DBRIP breaks the service mode of single line connection between Direct Banks and customers. Through DBRIP users can invest or purchase financial products more freely and Banks can also offer more suitable products for customers. There are many opening functions are provided by resource integration platform for Direct Bank, such as, user management function, uniform data interface, data security, privacy protection, products recommendation, etc. We believe these functions could help Direct Bank to connect resource integration platform safely and efficiently, enable users to select financial products securely.

![Figure 3. The relationship between information sharing platform, Direct Bank and users](image-url)

The business model of the resource integration platform are basically virtual networks that connects user resources and data resources of a number of Direct Banks. Due to DBRIP is formed based on network and sharing economy, so we can borrow the characteristics of network and sharing economy [9] to describe the DBRIP, includes compatibility, consistency, regulations and economies of scale.

1. Compatibility: in software engineering, compatibility means that a piece of software can work steadily on several different operating systems. In DBRIP, The product resources and user resources of a lot of Direct Banks can be integrated on the platform.

2. Consistency: user purchase demand and product resource supply need to be consistent for a DBRIP. For example, a platform will not recommend futures when a user want to buy financial products with low risk.

3. Regulation: Another essential aspect of DBRIP is regulations. Generally speaking, agree on regulations within a transaction is need to coordination. In the sharing economy, a platform set the regulations for the transactions, such as payment, terms of privacy, communication and terms of business.

4. Economy of scale: economy of scale is a typical characteristic of network [10]. This also holds for sharing economy. DBRIP is able to attract a large number of users through integrate financial...
products of multiple banks. In consequence, it is fairly cheap for DBRIP to reach a large number of suppliers and customers. For example, a bank needs to possess a significant number of capital and financial products to attract users. But in DBRIP, this threshold is basically nonexistent, because a large number of resources is easily reached through integrate banks and sharing information. Most important of all, the platform need not to purchase any money to provide this supply. This is the reason why sharing economy companies is quite easy to competition with the incumbents.

The advantages of DBRIP is described as: (1)DBRIP provides a place for customers and Direct Banks to deal anywhere and anytime; (2)DBRIP will save a large amount of manpower and material resources for banks, because they do not need to build an internet bank respectively; (3)User-friendly design, customers need not to download App of each bank, because all banks can be included in DBRIP and they can view and purchase products of each bank on DBRIP.

3.2 System Architecture of DBRIP
As shown in Figure 4, the components of the DBRIP contains three modules: data layer, function layer and service layer. In the following, we will introduce each of these modules in detail.

![Figure 4. The architecture of DBRIP](image)

Data layer
The multiple data resources are integrated in this module. These resources mainly consist of financial products, bank resources and user resources. That is clear these resources will produce a vast amounts of data. In order to offer better service to users, cloud computing is a good solution to storage and computing problem of big data. In the numerous cloud computing and storage research, a famous distributed file system HDFS (Hadoop Distributed File System) [11] is a standard model. HDFS provides high fault tolerance and high performance which ensure file access efficiently and securely.

The architecture of HDFS cluster consist of two parts: a single master node called Namenode that maintains and manages all files and a plurality nodes called Datanodes. The function of HDFS cluster is data storing, this is a critical part of the whole system, and it provides reliable and persistent storage capabilities. As illustrated in Figure 5. the function of Client is the entry of the system which provides the interface to upload, down load, and browse file. HDFS client is mainly responsible for data processing, the file system is accessed through HDFS clients, which first contact the Namenode for data location, and the second, that transfer data from the specified Datanode to another Datanode.
Figure 5. The architecture of HDFS system

Function layer

This module contains a series of public functions that ensure the comfortable services for Direct Banks and customers. (1) Complete management function and nice operation interface, which enable users to have a good user experience and increase customer stickiness. (2) User and product segmentation, the customers should be classified according to income, age and education. Many results shows the customer who prefer Internet bank tend to be younger, wealthier and high education than traditional customers [12]. Products also need to be segmented in capital preservation and venture investment. NB (Naïve Bayes) [13] is a classical probabilistic classifier in machine learning, and it can predict class membership probabilities. (3) A criteria for star rating and growth factor ranking, the evaluation indicator of Direct Banks include: the background, operation situation, trading volume, earning rate and social influence. These evaluation results will help banks develop products as well as users select purchase products. (4) Multi-source semantic fusion, this function can process the complex and changeable multi-dimensional data, which is helpful to take advantage of the data and produce more reliable data analysis results. (5) Unified data access standards can utilize data resources efficiently. (6) Data security and privacy protection, the aim of this function is protects the information security of users and Direct Banks on the information sharing platform. Compare to traditional data, big data faces higher risk due to multiple sources and a large amount of data. In order to solve this problem effectively, there are some techniques might be useful, such as, k-anonymity, l-diversity and t-closeness [14]. These approach can withstand probabilistic inference attacks mistake identify and mistake attributes. These functions together guarantee the safe and effective operation of resource integration platform.

Service layer

The module provides a series of services for Direct Banks and users. (1) Secure account opening service, this function enable users transaction with an easy mind on the platform. (2) Intelligent recommendation of financial products, that recommend products through user history data and prediction with the similarity between user profiles. Collaborative filtering (CF) [15] is the one of the most popular recommendation algorithm, which recommend products to customers that other customers with similar tastes have liked in the past. The aim of which is reduce the time cost for user selecting products, and help banks deeply understanding user’ preferences. (3) The star rating and the growth factor ranking of Direct Banks, this function reflects the overall strength of Direct Banks and the prosperity degree of industry. The ranking result will help user conduct a comprehensive risk assessment, reduce investment risk and develop an effective operational strategies for Direct Banks.

4. CONCLUSION

We conclude that DBRIP is the result of two interactive developments, the concept of sharing economy and application of Internet technological in financial filed. The incentive to propose this platform depends on the expectation of cost reduction and the expectation of handling the problem of resource underutilized. That is under the market competition premise, a large number of banks have more advantages than one. Nevertheless, there is an incentive for Direct Banks to establish DBRIP in order to attract more customers and reap long run profits through information sharing. But it does not imply that traditional bank is obsolete. DBRIP is not comfortable for uninformed customers and a customer who prefer manual services of traditional banks.
Overall speaking, the main motive to use DBRIP is lower time costs and browse or purchase anytime. Direct Bank is a booming industry that needs to be improved continuously and it also need to strengthen the cooperation with information platform. In our future studies, further efforts will be requested to functions and enhancing the performance of DBRIP.

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