ATLANTIS PRESS

*Advances in Economics, Business and Management Research, volume 81*
1st International Scientific Conference "Modern Management Trends and the Digital Economy: from Regional Development to Global Economic Growth" (MTDE 2019)

# *Digitalization in remote banking service*

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***Abstract* — The subject of scientific research is the economic relations connected with the system of organization and functioning of remote banking services. It was hypothesized that the aggregate use of different methods by the bank to improve information resources for the promotion of remote banking services: Business Intelligence technology, the introduction of the complex Einvoicing electronic document circulation service and the ABS cloud system will allow any bank to reach a new level of digitalization and have certain competitive advantages. Thus, the consideration of remote banking services as a way of servicing a bank's clients using information and telecommunication technologies implies, that the bank interacts with clients without visiting the bank branch, i.e. through remote channels. The relevance and debatable nature of the theoretical and methodological basis of remote banking services with elements of digitalization of operations, constant innovations in the field of information services in the modern banking system predetermined the purpose and tasks, determined the choice of the object of study. Purpose of the study: to prove and calculate the expediency of the transition by the bank to new options of processing and transmitting information. The methodological basis of this research includes the methods of system structural, functional, factor and comparative analysis. The methodological tools of scientific research are graphic, analytical, statistical and economic-mathematical methods of information processing.**

***Keywords — remote banking services, electronic document circulation.***

## I. INTRODUCTION

Remote banking service (RBS) is a universal concept for the technologies of providing banking services as a result of creating orders that are transferred to a client remotely (that is, without his visit to the bank), in most cases using computer networks. In English, different types of relative terms are used to describe RBS technologies: on-linebanking, remotebanking, directbanking, homebanking, Internet-banking, PC-banking, phone-banking, mobilebanking, WAP-banking, SMS-banking, GSM-banking, TV-banking [5].

The main component of the RBS is the activity of exchanging information between the bank and the client, but this operation must comply with an important level of security and confidentiality.

Absolutely all components of the system are equal, and if new elements appear, they are also fully added to the system. For example, the creation of mobile banking entailed another alternative opportunity to use transaction information operations. Internet banking, like other components, prolonged its existence. The RBS system exists on certain beliefs:

- diligence and constancy;
- security;
- effectiveness;
- comfort of activity;
- work speed.

Methods of providing remote banking services can be divided into certain categories [3]:

- Internet bank;
- mobile bank;
- phone bank;
- external services;
- classic client bank.

Internet banking is a system for providing remote banking products and services using the Internet. When an additional communication channel (Internet channel) is formed, corporate clients have the opportunity to do the same operations as in the "client-bank" system, only in real time mode according to the "fat client" principle, i.e. using direct Internet connection to the web site of the bank and particularized software and information modules that are installed on personal computers of clients. Internet banking for individuals works on the "thin client" principle, while clients who have a bank account and a plastic card have the opportunity to conduct a huge list of non-cash transactions and receive various types of information immediately through the bank's website, where the account is opened, without installation of any special software [3].

Mobile Banking — this system of remote banking service is connected with the use of a mobile phone. This service can be provided by the bank's information customer service on all transactions performed on their accounts (passive SMS banking), and it can also include performing specific operations on accounts (for example, making payments on bank details known to the customer) by sending SMS messages (extended or active SMS-banking).

Phone banking is a system that provides remote banking products and services through a phone connection.

Terminal banking is a system for providing remote banking products and services through the use of self-service terminals.

PC banking system (from eng. Personal Computer — personal computer) - it is shown in many sources as a “home bank” (home banking). A particularly common example of this system is the usual “client-bank” system, which provides remote access for legal entities to manage their accounts by installing certain software (software and information modules) on a client’s computer. The channel of communication with the bank’s server is the phone network that transmits data via a modem. Such data transmission makes it possible to call this type of remote banking service phone banking [3].

Today, there is a policy of regular modernization, which is one of the main factors for successful banking. This interpretation is due to the prerequisites that characterize the position of RBS in the modern world.

Currently, the success of any bank in the remote banking technologies market is determined by how quickly the bank adapts various digital technologies and how it influences them to achieve the goal. Banks must assess risks, develop strategies, determine their resources, and so on, but, of course, information is a priority for making management decisions.

## II. Research Methodology

Business Intelligence (BI) is a method and tool for transference raw information into the most convenient form. Today, BI-systems are used in various large organizations, including credit ones. Business Intelligence is the main part for developing a viable bank strategy, because its development is not feasible without presenting the current situation in the business and the direction of its movement [6]. The world learned about Business Intelligence in the late 1980s. This concept was introduced by analysts at Gartner. It was used to denote the user process, which included the stages of access to data and their research, subsequent analysis, as well as the development of understanding and intuition, leading to informal and improved decision-making. This concept was somewhat clarified in 1996. Then it started to be talked about Business Intelligence, which is nothing more than a set of tools to analyze the data need to build queries and reports. The final result of the work done with the help of such technologies is necessary to isolate meaningful information from the huge flow of data. Today, the entire specified set of tools is included into the category, which is called "business intelligence", that is, Business Intelligence.

BI-systems are used for collecting information and its analysis. Since banks use a variety of information systems, the main task of BI is to convert the collected data into information for decision-making. As a rule, data storage is used for such purposes. A secondary task is the analysis of information. Each bank sets its own requirements for analytics. Positive results of the introduction and further operation of the system depend on professionally established criteria for the formation of the report.

The last few years on the market Internet banks have actively started working, which, using Business Intelligence technologies in their activities, primarily increase business profitability and capacity, as well as create conditions for accounting transparency. Through BI-decisions, it is possible to prepare target offers for the client, which provide an opportunity to increase the scale of application of banking products. This leads to an increase in bank income and allows it to take a leading position in the market.

The main task of BI-systems is to prepare the necessary amount of information in time, by means of which risks can be calculated and managed. In addition, BI-solutions allow to create a model of customers behavior who applied to the bank for a loan. Based on this, the bank decides to whom and in what volume to issue a loan.

In Table 1, there are presented the advantages for banks after the introduction and use of BI [8].

TABLE I. The advantages for banks after the introduction and use of BI

| Advantages | Description |
|---|---|
| Increase profitability.<br>Increase of the efficiency of the sales department | - optimization by comparative analysis of the profitability of the credit product;<br>- optimization of the products price in accordance with their cost;<br>- increase of sales by using customer analytics; |
| Understanding of customers.<br>Optimization of marketing strategies | - the possibility of attracting customers on a long-term basis;<br>- attracting and maintaining the right customers through target marketing;<br>- tracking and managing all aspects of attracting customers; |
| Quality service and customer retention | - reducing customer outflow by increasing their satisfaction and loyalty;<br>- operational solution of the problem of customer outflow using prime cause analysis; |
| Bank Finance Management | - on the basis of financial results, the ability to control the main efficiency indicators (KPI).<br>- quick response to changes by reducing planning, budgeting and consolidation cycles;<br>- accurate predicting for managing financial implications, opportunities and risks |
| Improving IT-sector efficiency | - a significant reduction of the costs on creating, developing and testing reports;<br>- reduction of time for reporting and improving the efficiency of query making. |

BI-systems are designed to improve the efficiency of bank management by helping to make correct and quick management decisions. This system is engaged in processing data collected by other IT systems, i.e. the bank should use any automated system to collect sufficiently large amounts of data necessary for analysis and decision-making on their basis. Moreover, the collected data should be presented in such data formats that can be used for processing using the BI system.

After analyzing the concept of Business Intelligence and the main directions of its development, it can be concluded that this direction of IT is now actively developing, and the main directions of development are associated with the intellectualization of BI and their globalization associated with an orientation to Internet technologies. Many BI applications become Web-oriented, they are presented to users as Web services, and access to them is provided through meta-data and ontologies.

The developed model of an information and analytical system based on the principles of building Business

Intelligence systems, which allows to analyze the use of remote banking services in various aspects, to decide on the effective introduction of such services, the requirements for its modules are formalized, the information environment and mechanisms for processing the source data models is described.

Thus, this model can be applied by banks to decide on the feasibility of introduction remote service.

It is advisable to use BI systems with the parallel introduction of an integrated electronic document circulation service. One of the most popular services is Einvoicing Using this service and adding new features to it, banks can attract new customers and keep old ones.

The main function of the electronic document circulation service is the exchange of legally relevant electronic documents between organizations. The service provides the ability to create, upload and process documents before sending.

Another technology in the field of digitalization is the introduction of a cloud-based ABS system, an object-oriented automation system for banking activities of a new generation, developed by experts of the Center for Financial Technologies, which costs 120 million rubles.

The calculated data are summarized in Table 2, where two options are presented, depending on the correction factors: the first for correction factors is 20%, the second option is for a value of 10% for the introduction of the traditional IB System Object.

TABLE II. THE COSTS ON INTRODUCTION AND OPERATION FOR THE YEAR

| Indicator | Option 1, million rubles | Option 2, million rubles |
|---|---|---|
| ABS cost | 120 | 120 |
| ABS introduction cost | 24 | 12 |
| ABS operating cost | 24 | 12 |

Of course, within the framework of the introduction, various factors should be taken into account, but the authors do not consider it expedient to describe them within the framework of this research.

## III. RESULTS OF THE RESEARCH

Calculate the total cost of ownership (TCO) by the formula (1) for equal to five years, the results are summarized in Table 3.

$$TSO = I_{abs} + K_{kor1} \cdot I_{abs} + (K_{kor2} \cdot I_{abs}) \cdot T_{plan}, \quad (1)$$

TABLE III. CALCULATION OF TCO FOR THE INTRODUCTION OF TRADITIONAL ABS BY THE BANK FOR 5 YEARS

| Options | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Option 1, million rubles | 144 | 168 | 192 | 216 | 240 | 264 |
| Option 2, million rubles | 132 | 144 | 156 | 168 | 180 | 192 |

The calculation of the TCO for the introduction of the cloud-based automated banking system can be calculated using the following approximate formula, which can be obtained from formula (1), adjusted for lower costs in operating the cloud-based ABS and increased latent costs during operation.

$$TCO = {}_{Iabs} + K_{kor1} \cdot I_{abs} + K^{i}_{kor\ 2\ obl} (K_{kor1obl} \cdot K_{kor2} \cdot I_{abs}) \cdot Tplan, \quad (2)$$

where $K_{kor1obl}$ — the correction factor the first reduction in the cost of operating the cloud-based ABS, which, according to statistical data, lies in the range from 30% to 80%;

$K^{i}_{kor2obl}$ - the correction factor the second determines the hidden costs for operating the cloud-based ABS, the value of which according to expert data is 1.2 [12], is determined by the increase in the cost of the cloud-based ABS in connection with the inefficient management of the automated banking system;

i = 0, n, where n is the year of the planning period.

The calculated data are summarized in Table 4, where two options are presented, depending on the correction factor: the first for correction factor is 30%, the second option is for 80% for the introduction of traditional ABS, considering that the introduction of the cloud-based ABS will be 10%, since the development of ABS is on third-party servers, which provides saving.

The value of 30% is considered for the first option of introduction the traditional ABS, as the most costly from the point of view of operation, to estimate the entire range of costs for the cloud-based ABS.

TABLE IV. THE COST OF INTRODUCTION AND OPERATION FOR THE YEAR CLOUD-BASED ABS

| Indicator | Option 1, million rubles | Option 2, million rubles |
|---|---|---|
| Cloud-based ABS cost | 120 | 120 |
| Cloud-based ABS introduction cost | 12 | 12 |
| Cloud-based ABS operating cost | 16.8 | 2.4 |

In Table 5 is presented the calculation of the project of the introduction of the cloud-based ABS system.

TABLE V. THE CALCULATION OF THE PROJECT OF INTRODUCTION OF THE CLOUD-BASED ABS SYSTEM.

| Expenses items | Costs, rub |
|---|---|
| Consumables | 74,874.0 |
| Developers base salary | 400,372.8 |
| Additional developers salary | 80,074.6 |
| Social Security Deductions | 101,854.8 |
| Other expenses | 14,511.9 |
| Total expenses | 671,688.1 |

Saving from the replacement of traditional ABS to cloud-based information processing is formed as a result of reducing the costs of information processing and will be determined by the formula 3, rub.:

$$E_y = C_p - C_a, \quad (3)$$

where: $C_p$ — the cost of traditional ABS, rub.;

$C_a$ — the cost of cloud-based ABS, rub.

$E_y$ = 814,350 – 2093.3 = 812,256.7 rub.

The cost of traditional ABS will be determined by the formula 4:

$$C_p = A_i * C * G_d / R_d, \quad (4)$$

where: $A_i$ — the amount of information processed manually, MB;

C — the cost of one hour of work, rubles/hour;

$G_d$ — factor taking into account the additional time spent on logical operations during manual processing of information (set experimentally $G_d$ = 2.5);

$R_d$ — the rate of development, MB/hour;

$C_p$= 89 * 14.64 * 2.5 / 0.004 = 814,350 rub.

The cost on cloud-based ABS is calculated using the following formula 5:

$$C_a = t_a*C_m + t_O * (C_m + C_O), \quad (5)$$

where: $t_a$ — the time of automatic processing, h;

$C_m$ — the cost of one hour of machine time, rubles/hour;

$t_O$ — the operator's work time, h;

$C_o$ — the cost of one hour of the operator work, rubles/hour.

$C_a$=15 * 4.88 + 95.16 * (4.88 + 16.3) = 2093.3 rub.

## IV. Discussion of Results

The economic effect of the use of cloud-based ABS for the year will be determined by the formula 6.

$$E_g = E_y - E_n * C_a, \quad (6)$$

$E_g$= 812,256.7 – 0.2 * 671,688.1 = 677,919.1 rub.

The effectiveness of the development can be estimated by the formula 7.

$$E_p = E_g * 0.4 / E_y, \quad (7)$$

$E_p$= 677,919.1 * 0.4 / 812,256.7= 0.33

If Ep > 0.20, then it can be concluded that the installation of cloud-based ABS is economically viable.

Net present value (NPV) is calculated as the difference between the accumulated discounted income from the project implementation and the discounted single costs of innovation introduction :

$$ЧДД_n = \sum_{i=1}^{n} ДД_i \ , \quad (8)$$

where: $PV_i$ — the discounted income of the i-th period of the project implementation;

n — the number of periods of the project.

Discounted income of a certain period is calculated by the formula 9:

$$ДД_i = (D_i * \frac{1}{(1+d)^i}) - (R_i * \frac{1}{(1+d_i)^i} = (D_i - R_i) * \frac{1}{(1+d_i)^i}, \quad (9)$$

where: $D_i$ — the income of the i-th period of the project implementation;

$R_i$ — costs of the i-th period of the project implementation;

d — the discount factor.

If the NPV for the entire period of the project implementation is positive, then this project is economically effective.

The main indicators for determining the effectiveness of an innovative project are shown in Table 6.

TABLE VI. The main indicators for determining the effectiveness of an innovative project

| Indicators | Unit of | Value |
|---|---|---|
| Single cost | RUB | 671,688.1 |
| Annual saving from the introduction of | RUB | 812,256.7 |
| The economic effect for the year | RUB | 677,919.1 |
| Discount factor | | 0.2 |
| Project working term | years | 5 |

When evaluating using the created model, the introduction of the cloud-based automated banking system, compared to the traditional ABS, reduces the costs of introduction and maintaining the system by at least 20% within five years.

The proposed measures will generally allow to improve the quality of remote services provided, to provide an opportunity to expand the customer base, as well as reduce operational risks and improve the financial performance of the bank.

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