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## Digitalization of financial sphere: challenger banks efficiency estimation

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# Digitalization of financial sphere: challenger banks efficiency estimation

Vladimir Schepinin<sup>1</sup>, Alexey Bataev<sup>1\*</sup>

<sup>1</sup> Peter the Great St. Petersburg Polytechnic University, Politechnicheskaya st., 29, St. Petersburg, 195251, Russia

\* E-mail: [bat\\_a68@mail.ru](mailto:bat_a68@mail.ru)

**Abstract.** In the last few years digital transformation affects entire sectors of the world economic system. One of the main drivers of digital economy development is the financial sector which takes the second place after telecommunication companies by investments into innovative informational and communicational technologies. An innovative form of the financial institution is analyzed in the article – challenger bank, which presupposes doing bank business only in the form of remote approach, with the help of mobile communication channels. This form of the financial institution has appeared not long ago and, therefore, it is insufficiently investigated, for which reason the analysis of a corresponding credit organization is of vital importance. One of the main tasks, when exploring innovation projects, is presented by evaluation of economic efficiency of their activity. As a challenger bank is, in fact, a financial institution which can be presented in the form of an information-communication system, that's why methods of estimating IT-projects can be applied to it which will make it possible to evaluate its efficiency from the point of view of making investments into information system. On the basis of this supposition, a model of estimating efficiency of this form of a credit organization as an IT-project has been suggested, where dependency of the net present value on the number of clients growth of the digital financial institution and the number of operations performed by them has been explored. Simulation has demonstrated that it will be efficient for a challenger bank if the number of its clients in the first year of its existence will exceed two hundred thousand people.

## 1. Introduction

The modern stage of development of the world economic system is characterized by digital transformation of all economic sectors. New innovative forms of doing business, based on introducing new information-communication technologies, appear in different economical spheres.

One of such directions is Fintech in the financial sphere which is a synthesis of financial and advanced digital technologies. Fintech is a direction in the financial sphere which consists of credit organizations which use information-communication technologies and innovations to compete with classical financial institutions presented by credit organizations and intermediate parties in the financial sphere. Currently, various startups and large successful financial institutions, which do their best to improve and optimize financial services provided to them, are related to Fintech [1–3].

Within Fintech frameworks there appear new innovative forms of financial institutions. One of such forms is a credit organization – challenger bank, which functions completely in the Internet space providing cooperation with clients by means of exclusively remote access channels, mostly mobile ones.



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The history of a challenger bank development comprises only about five years, the first financial institution of this type appeared in Great Britain in 2014. The distinguishing feature of this form of bank organizations is that its structure is formed from ground zero without reference to traditional forms and structures of financial institutions [4–6].

When introducing innovative forms of business development, the main task is estimating economical efficiency of its functioning, therefore, the main aim of the study will consist in revealing parameters with which efficient development of challenger banks is possible.

A challenger bank is, by its nature, an information-communication system where the basis of development is the IT-department which occupies up to 80% of the entire institution, and therefore, introducing and developing this form of a credit organization can be presented as an IT-project [3], [7–9].

The aim of the study is evaluating economic efficiency of a challenger bank as an information-communication system.

## 2. Main approaches to estimating economic efficiency of IT-projects

Estimating the efficiency of an investment project, connected with introducing information-communication technologies, always has certain difficulties related to the fact that it's necessary to calculate material effect of implementation which is very often not obvious. Currently, there is a sufficiently large range of methods and models which allow to somehow provide economic evaluation of an informational investment project efficiency [10–12].

Very often evaluation of economic efficiency of information projects is based on comparing expenses on the system implementation and results of its functioning. For estimating economic efficiency of an investment project two groups of parameters, static and dynamic, are used. Static parameters don't take into account the influence of temporal indicators on expenses, which determine creation of an information-communication system and the results of its usage, and are applied to short terms of creating the system (within one year). Dynamic parameters take into account distribution of expenses and results in time span, based on the existing conception of the time value of money. Using these parameters is applied to sufficiently long terms of creating an innovation system [13–15].

Three main groups of methods are used in practice; they allow estimating the economic effect of implementing any information project [16–18]:

- quantitative – these are methods, based on the analysis of financial indicators of an investment project the main problem of which is the necessity to provide a sufficiently exact forecast of future earnings after implementing an IT-project.
- qualitative – these are methods, based on building a system of aggregate data on different directions which describe the system, on the basis of which the best project is being chosen; the main difficulty of this method is the necessity to bring the whole system of qualitative indicators to a common standard;
- probabilistic – these methods are based on determining the degree of probability of quantitative improvements of these or those indicators from implementing an investment project; their distinctive feature is complexity of building calculation models.

## 3. Method

For considering economic efficiency of challenger banks we will use the model of net present value, related to the group of financial models, as a calculation model.

Let's consider an investment project on implementing and operating a challenger bank. Implementation of this financial institution may be related to introducing and information system because, by its nature, a challenger bank is an IT-project.

The main indicator of efficiency of the information investment project is NPV – net present value of the project which is calculated by means of the following equation [6], [8], [19–21]:

$$NPV = \sum_{t=0}^T \frac{CF_t}{\prod_{i=0}^t (1+r_i)} - \sum_{t=0}^t \frac{I_t}{\prod_{i=0}^t (1+r_i)} \quad (1)$$

where

$T$  – the number of planning time periods for implementing the information project.

$CF_t$  – money flow in the time period  $t$ ,

$I_t$  – investments in the project at the time moment  $t$ ,

$r$  – discounting rate.

The equation (1) can be written as the following one with the use of net cash flow:

$$NPV = \sum_{t=0}^T \frac{NCF_{tcb}}{\prod_{i=0}^t (1+r_i)} \quad (2)$$

where

$NCF_{tcb}$  – net cash flow from implementing and operating the IT-project at the time moment  $t$ .

Then, NPV of the investment project on implementation of a challenger bank can be defined by means of the following equation:

$$NPV = \sum_{t=0}^T \frac{(C_{opcb}) \cdot N_{opt}}{\prod_{i=0}^t (1+r_i)} \quad (3)$$

where

$C_{opcb}$  – the cost of one operation performed in the challenger bank,

$N_{opt}$  – the number of operations performed in the planning period.

In this case, the financial institution income depends on the cost of each operation which is performed there.

To estimate the number of operations performed in this financial institution, the following equation can be used:

$$N_{opt} = n_{opqut} \cdot P_{bcb} \quad (4)$$

where

$n_{opqut}$  – the number of operations executed by a client during the planning period;

$P_{bcb}$  – the size of a challenger bank client base.

The parameter of the number of operations executed by the client of the given financial institution depends on time. According to the statistics, the longer the client is in the client base of the bank, the more often he executes corresponding operations selecting the necessary functionality.

As statistical data demonstrate, dependence of the number of operations performed by one client with time can be presented in the following form:

$$k_t = a_1 e^{-a_5 t^3} + a_2 t^2 - a_3 t + a_4 \quad (5)$$

where

$a_1, a_2, a_3, a_4, a_5$  – coefficients of the polynomial function determining changing of the number of operations depending on time.

The client base growth can be presented in short form as follows:

$$P_{bcb} = b_1 \cdot t^{b_2} \quad (6)$$

where

$b_1, b_2$  – coefficients of the exponential function, determining the client base growth.

Then, the equation (4) can be presented as follows:

$$N_{opt} = \sum_{t=1}^T [(n_{opqt} * k_t) * b_1 * t_1^{b_2}] + \sum_{t=2}^T (n_{opqt} * k_{t-1}) * [(b_1 * t_2^{b_2}) - (b_1 * t_1^{b_2})] + \dots + \sum_{t=T-1}^T (n_{opqt} * k_{t-1}) * [(b_1 * t_{T-1}^{b_2}) - (b_1 * t_{T-2}^{b_2})] \quad (7)$$

As a result the equation (3) can be written as follows:

$$NPV = \sum_{t=0}^T \frac{C_{opcb} * \sum_{t=1}^T [(n_{opqt} * k_t) * b_1 * t_1^{b_2}] + \sum_{t=2}^T (n_{opqt} * k_{t-1}) * [(b_1 * t_2^{b_2}) - (b_1 * t_1^{b_2})] + \dots + \sum_{t=T-1}^T (n_{opqt} * k_{t-1}) * [(b_1 * t_{T-1}^{b_2}) - (b_1 * t_{T-2}^{b_2})]}{\prod_{i=0}^t (1 + r_i)} \quad (8)$$

#### 4. Results and discussion

So far, the main problem of creating a challenger bank is obtaining a significant quantity of clients for doing the business. Consequently, there are three main approaches to creating such a financial institution.

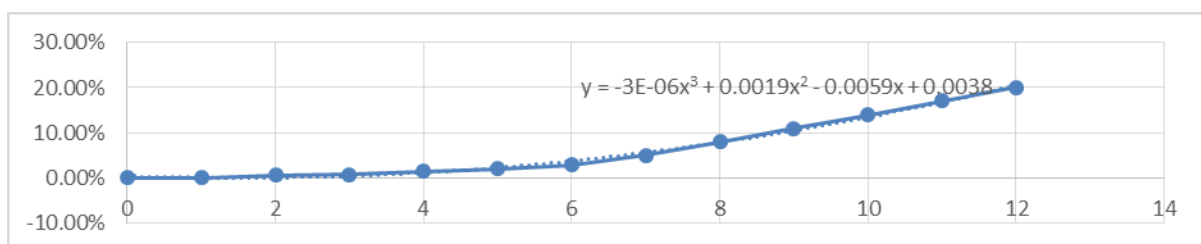
The first approach may be called a traditional one. Such financial institutions as AtomBank, StarlingBank and TandemBank can be related to it; they paid primary attention to the presence of authorized capital stock before the beginning of its functioning and suggested a corresponding set of services which requires a certain amount of monetary means in order to provide reliability of functioning of the financial institution.

Another approach to forming a challenger bank is the approach which has been called a semi-traditional bank. Such financial institutions as Monzo and N26 can be related to it: in order to develop a client base they provided an incomplete bank functionality which allowed them to provide fast entrance to the market which did not require sufficiency of capital of the financial institution.

The third approach in creating a challenger bank is the fast-lane model: its essence is penetrating the market and involving clients not by means of bank products but by means of products related to the financial sphere but that don't require a banking license.

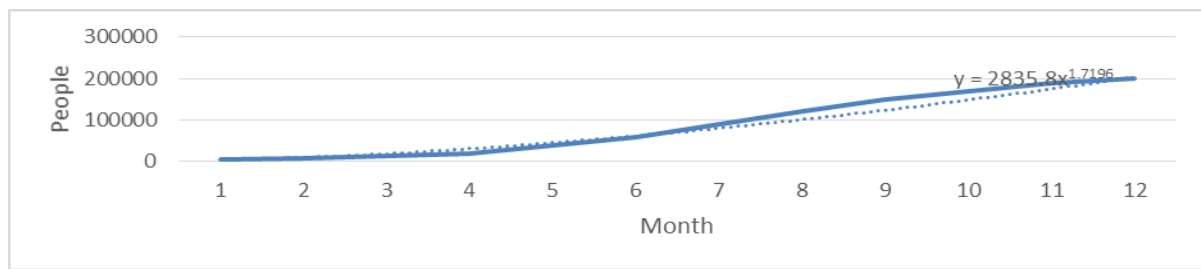
Let's consider the dependence of the challenger bank profit on the growth of its client base in the suggested model and determine the parameters necessary for its stable development.

We will consider the following dependence in the capacity of variation of the number of operations executed by one client (figure 1).



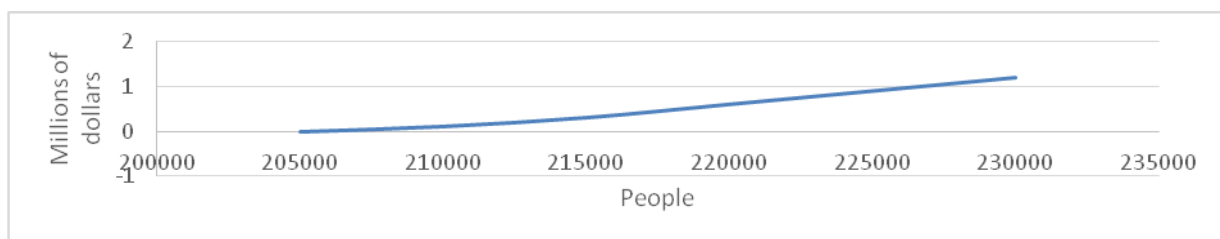
**Figure 1.** Dynamics of time-dependent variation of the number of clients of the challenger bank, in percentage terms.

We represent the growth of the client base of the challenger bank as follows (figure 2).



**Figure 2.** The growth of the client base of the challenger bank throughout the year, people.

It was understood on the basis of the obtained model that the financial institutions being considered will be efficient if during 12 months the number of the client base will amount to 210000 people. In this case the challenger bank has steady profit, provided that the cost of the investment project being implemented, in conjunction with the first year of functioning, will be equal to around 6 million dollars per year (figure 3).



**Figure 3.** A graph of dependency of net present value on the size of a challenger bank client base, people.

## 5. Conclusions

Over recent years, a fast growth of implementing information-communication technologies into all spheres of economic development has been observed, implementation of innovative digital technologies contributed to transition to a new stage of economic development – digital economy: its basis consists of branches which actively implement digital technologies. One of the drivers of the digital economy is innovation course in the financial sphere, Fintech, which represents a synthesis of financial and information-communication technologies; within the framework of this course, advanced forms of doing business are being formed, which allow for providing competitive advantages over traditional financial institutions. One of such innovative forms is challenger banks which represent a credit organization which performs its activity completely in the Internet and provides cooperation with clients by means of remote communication channels, first of all, mobile ones. A challenger banks' distinguishing feature is the fact that their structure is formed on the basis of new approaches without copying traditional finance institutions. The basis of any challenger bank is an IT-department which occupies up to 80% of the total personnel of the financial institution that's why such credit organization during its implementation can be viewed as an IT-project. The main problem when implementing innovation projects is evaluating their economic efficiency; therefore, a model has been suggested which allows to determine basic parameters of efficiency of challenger banks during their implementation and operation. As a result of modeling it has been understood that development of such a financial institution will be economically efficient if during the first year of its functioning a challenger bank is able to increase its client base up to 210 thousand people. In this case development of this business will enter a rather successful path.

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