# Improving the Innovative Methods of managing active Operations of a Commercial Bank

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## ABSTRACT

The aim of this research article is to focus on the factors, which make an impact on the stability and liquidity of commercial banks, i.e. improve the methodology for managing assets and liabilities in commercial banks. In addition, this article is aimed at identifying current problems in the activities of commercial banks in the country in reliance upon statistical data, surveys and proposals obtained from customers and employees of the bank. Moreover, particular attention is paid to the policy of commercial banks to diversify the methods of managing active and passive operations by types of ownership. Furthermore, the article focuses on the innovative approach to the activities of the Committee for the Management of Assets and Liabilities of Commercial Banks. Scientifically grounded proposals and recommendations have been developed to achieve economic development and improve the banking system in Uzbekistan.

## CCS CONCEPTS

• **GDP**; • **econometric analysis**; • **innovative management**; • **management strategies**; • **classical methods**; • **economic-mathematical methods**; • ;

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## 1 INTRODUCTION

Global standards and global integration, although they facilitate the interaction of different banking systems, do not eliminate the deep differences between them, do not protect against the effects of negative exogenous impact and crisis events. The banking services market is not free from the influence of local government, local traditions and the local level of economic development, as well as the financial systems of different countries are divided into stocks, banking and mixing.


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The banking systems of all countries are forced to interact, despite the differences in their types. However, the performance of banks depends on the level of local economic development and the legal framework.

In the German banking system, state banks own 40 percent of all bank assets. Also, the total number of German banks is 24% of the banks in Europe. They own 18% of the assets of European banks [1].

At the same time, Germany has the highest 25% of private depositors 'income on deposit accounts in Europe. In other European countries, it does not exceed 18 percent. But state-owned savings banks are the weakest link in the country's banking system. According to Moody's rating agency, while the German banking business is overloaded, we can see that German state-owned banks, such as Deutsche Bank, are overloaded with loans.

At the same time, the German banking system is one of the most stable and organized in the world. The peculiarity of the German banking system is the high level of development of savings banks, the cooperative sector and their high importance in the banking sector and the country's economy as a whole. The most important tasks of banks are to ensure uninterrupted cash flow and capital turnover, the necessary financing of industrial enterprises, as well as the state budget and private farms.

Today, the stage of development of the banking system in the CIS countries is characterized by a strong competitive environment among credit institutions, resulting in a high saturation of the financial market with products and services. Therefore, it is necessary to develop and introduce new technologies in the system, modernize and diversify the product range, develop alternative ways of customer service. At the same time, credit institutions that are able to implement the innovative process will have a great competitive advantage. In this case, it is important to determine the reasons why the introduction of innovations in the banking system does not lead to the desired result, that is, to identify the main risk factors for banking innovations for the financial market.

Of course, it is important to improve the innovative management of the banking system, and their full application in the operational processes will have a positive effect. It is expedient to dwell on the processes of innovative management of assets and liabilities of the bank in the CIS countries.

According to a survey of German and Russian citizens, the most important factor in determining the social impact of finance is innovation, which means the level of financial literacy of the population.

The level of financial literacy in Russia is quite low. Only 27% of Russians are interested in innovation and changes in the banking sector, while in Germany the figure is 63%. However, approximately 52% use remote technologies in Russia and 88% actively. Internet banking, mobile banking, etc. In Russia, remote maintenance is

associated with frequent failures of the system - 47%, low level of protection of personal data - 32% and unreliability - 21% of the entire banking sector [2].

Of course, improving financial innovation will have a positive effect on the banking system, as in all areas. In today's period of rapid development, it is expedient to introduce innovations in the banking system of foreign countries to commercial banks in our country.

Currently commercial banks have a unique management strategy, their own client base and an efficient source of revenue. However, during the period of drastic economic changes, this does not always yield the expected outcome, since the assessment of existing or potential risks, analysis and management of their impact have not been fully worked out by commercial banks in our country yet. We will be able to resolve these issues by expanding the powers and improving the work of the Assets and Liabilities Management Committee. In the United States, despite limited data, systems and other resources, banks can use the functionality of "if" modeling tools to handle the impact of unfavorable economic scenarios on balance sheets in managing their assets and liabilities. This is a two-level process:
first, it is necessary to determine external macroeconomic conditions that directly or indirectly influence local economic indicators, such as the global economic crisis, geopolitical risks, conditions of the US economy, fiscal and monetary policy;
second, it describes how changes in the macroeconomic environment can impact regional or local economy in which a state-owned bank operates. In addition, it helps the Asset and Liabilities Management and Executive Board of the bank understand the assumptions and ensures that the entity possesses a realistic and comprehensive view of its potential risks.

Definitely, it is essential to develop the banking system through implementation of the experience of developed countries, as well as its subsequent adjustment in compliance with the economy of our country.

Another important aspect of the bank's assets is the structure of liabilities by maturity, as well as the fact that the bank is not completely released from the risk of market volatility, which causes a problem for the bank's management to ensure the profitability of banking transactions without liquidity. However, the liquidity limit and strict adherence to the maturity of assets and liabilities in some cases does not enable the bank to maximize its revenues as well. In current banking practice part of demand deposits is of a historical nature. That is, it is stored for a long time for no reason, thus, it is advisable to invest these long-term resources in highly profitable assets.

Concurrently, international experience demonstrates that the policy of asset diversification has been implemented, and the high share of not only lending operations, but also operations with securities, investments and non-traditional lending operations proves availability of problems in commercial banks and their significance.

The primary task of this research paper is to make the econometric analysis of the relationship between the management of assets and liabilities in commercial banks. Wherein to determine the dependence of one factor on another by the Granger causality test, there has been developed the model of the neural system of active and passive operations based on the correlation matrix and regression equations. To perform this task, preliminary data have been obtained from the State Committee of the Republic of Uzbekistan on on Statistics and the Central Bank of the Republic of Uzbekistan, and subsequently econometric analysis has been made.

During 2001-2020, the following factors are considered significant or insignificant. Scientifically grounded proposals and recommendations have been developed by means of comparative analysis and surveys of customers and employees of commercial banks.

## 2 LITERATURE REVIEW

Nowadays, banking is chosen as it represents an area in which digital innovation and data-intensive technologies are leading to both significant industry- wide change and societal impacts. These new technologies underpin digital services such as internet banking, mobile payments, crowdfunding, peer-to-peer lending, Robo-Advisory and online identification [3].

But AIR is constituted by different types of barriers. The functional barrier is constituted by perceived risk (Joachim et al., 2018), which is the belief or fear that an apparatus may fail the user due to a lack of sufficient testing or, more likely, the user's lack of familiarity with or confidence in a technology [4].

Shortcomings in the bank's innovative management of assets and liabilities in rural areas can be seen in the scientific work of Aaron van Klyton. This qualitative case study uses semi-structured interviews, participant observation, and semiotics to unpack the causes of resistance in a rural town and use this experience to elaborate on existing innovation theories [5].

From the above economic approaches, the scope of innovative management processes of active and passive operations shows that there are many problems that need to be addressed.

It should be noted, that the bank must undertake the measures to improve the quality of its assets and raise profitability. Since the value of a bank's capital depends not only on its cost-effectiveness (performance), but also on its exposure to risk, the issue of risk management is considered a crucially important objective. Having analyzed the views and approaches of economists-scholars towards this issue, we may state, that a foreign economist-scholar D. Hogan, applying various survey methods, has proven that there is a relationship between customers possessing long-term deposits, the volume and composition of their loan and bond portfolio, as well as acceptability of their capital and income. The main conclusion he made is that the cost for a bank loan is determined by the average amount of deposits and the time they are kept with the bank. According to the opinion of D. Hogan, banks should manage not only the composition of the asset portfolio, but also the deposit/loan ratio, wherein the management process should be of a dynamic nature, not static. The portfolio theory, which determines the basis for measuring portfolio risk has been revealed in the research papers of foreign economists-scholars J. Lintner [6], J. Mossin [7] and W. Sharpe [8], who have independently from one another developed the Capital Assent Pricing Model – CAPM. This model has clarified the relationship between risk level and return required.

In particular, W.Sharpe refers to research results by G. Markovits as a starting point for further research, in the course of which he revealed that the Markovits model makes an impact on the prices of financial assets. Assuming that the price of financial assets changes

at any time with the aim of balancing the supply and demand of each risky asset, he proved that the expected return on risky assets should have specific peculiarities [9].

The asset structure acquired from Sharpe's theoretical views is currently widely used as a basis for risk management in many areas of financial theory and practice. However, its development is still in progress as it requires consideration of many factors that make an impact these relationships in actual practice [10].

In 1980 G.P. Szego [11] further elaborated the portfolio theory and expanded its ability to be applied in practice to manage bank assets. In his research paper he demonstrates, that there is actually no single risk-free rate, but actually, first, the risk-free rate when borrowing is higher than the risk-free rate when lending for ordinary investors, second, as for banks the risk-free rate (deposit rate) is higher than the risk-free rate (loan rate) in lending, the risk-free rate for lending is much lower. Moreover, banks do not possess any ability to accumulate an unlimited amount of deposits and issue an unlimited amount of loans.

G.P. Szego proposes the new model, taking into consideration the limitations identified, and in this modified interpretation he demonstrates that CAPM (Capital Asset Pricing Model) remains a useful and convenient tool for managing bank assets.

According to the researches made by Western scholars, the composition of assets and liabilities was treated as a single management object. Herewith management responsibilities include maintaining liquidity and ensuring high return and cost-effectiveness, as well as minimizing risk.

In particular, the economist-scholar S.M. Ilyasov gives the following definition: "Asset and liability management process is aimed at attracting maximum amount of resources (equity and borrowings) to place them in the most profitable assets with a high level of liquidity and limited risk" [12].

A similar concept has been developed by Ye.V. Velik, who believes that "... the main aim of asset and liability management is to maximize short-term and long-term return on capital invested in ensuring solvency and liquidity of the lending institution" [13].

From the point of view of the economist V.Yu. Polushkin "Asset and liability management constitutes an integral part of financial management, minimizing the financial risks of banking institutions". This definition is close to the interpretation of foreign scholars, as the approach to asset and liability management is considered in terms of risk minimization. Further V.Yu. Polushkin expanded his idea stating that "Conducting efficient and balanced asset and liability management with the aim of ensuring a stable return on banking operations will raise final assessment of the bank's financial condition and creditworthiness" [14].

In the opinion of the economist I.V. Larionova, asset and liability management of the bank consists of a sufficient understanding of the relationship between risk and return and management of the bank's balance sheet; operational changes in the balance sheet structure depending on environmental parameters; maximizing profits within the risk values determined in the financial strategy [15].

Thus, it can be concluded, that management of assets and liabilities of the bank or the bank's portfolio is management of its composition, aimed at maximizing profits within the established risk values.

Currently, optimal management of assets and liabilities represents a set of measures aimed at achieving maximum return from banking operations, maintaining a certain level of liquidity and minimizing banking risks.

This fact demonstrates that the primary problem of portfolio management, which considers the problem of risk optimization inherent in the classical portfolio theory, is aimed at ensuring necessary balance of risk, liquidity and profitability within the framework of the bank's portfolio management.

Another economist-scholar R.V. Kapshitar supposes that "When implementing asset operations, in the process of formation of the asset portfolio, the bank must assess the asset portfolio in relation to and interdependence with sources of financing, which results in the accounting not only of assets but also liabilities" [16].

Therefore, there is a necessity to manage the bank's assets and liabilities on an aggregate basis or manage the balance sheet in general. From the point of view of R.V. Kapshitar "out of several financial options, focus should be made on selecting the option that enables to maximize incentives in the area of risk, return and liquidity. In general, the optimal choice option involves evaluating compromise between the average amount of risk and the required liquidity and a higher return" [17].

In reliance upon the statements specified above, the analysis of various management methods has resulted in the conclusion that risk, return and liquidity constitute the elements of management of assets and liabilities in a commercial bank.

## 3 RESEARCH METHODOLOGY

In this scientific article, we use Granger causality test. The specificity of this method is that a statistical hypothesis test for determining whether one-time series is useful in forecasting another, which is determined by a vector auto regression (VAR) model using an annual lag. The structured VAR model is then checked using the Fischer criteria to see if there is appropriate interrelation.

VAR (Vector Auto Regression) is the model of the dynamics of several time series, in which the current values of these series depend on the past values of the same time series. The model was proposed by Christopher Sims as an alternative to systems of simultaneous equations, which involve significant theoretical limitations. VAR models are free from the constraints of structural models. Nevertheless, the problem with VAR models is a sharp increase in the number of parameters with an increase in the number of analyzed time series and the number of lags.

## 4 ANALYSIS AND RESULTS

In particular, income-earning (performing) assets include bank loans, investments in securities, non-earning (non-performing) assets include cash on hand, balances on correspondent and reserve accounts with the central bank, investments in fixed assets of the bank.

Instead, it is recommended to manage income-earning and non-earning assets of commercial banks.

In the figure below, we can see the dynamics of growth in the volume of income-earning and non-earning assets in the period from 2020 to 2005. We see that the volume of income-earning assets

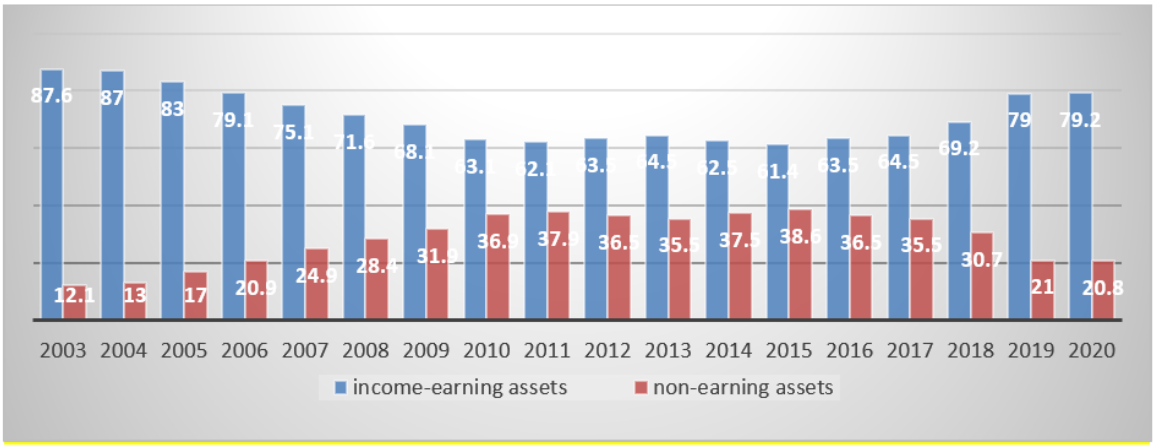


**Figure 1: Dynamics of changes in the volume of income earning and non-earning assets of commercial banks (in percent) [18]**

decreased by 3.8 percent, and the volume of non-earning assets increased by 3.8 percent.

Currently the difference between them constitutes 58.4. These indicators have made an influence on the the bank' revenue from the impact of the global financial and economic crisis on mortgage loans of our banks around the world. For many years we have been searching the ways to raise the share of profitable assets of commercial banks, and at present we see that these numbers are of a favorable nature. However, now one of the global concerns is that the Covid-19 pandemic is disrupting economies, affecting all countries. In our country, commercial banks have also provided their customers with credit holidays, which has resulted in the decrease in the share of income-earning assets. Therefore, commercial banks should be provided with cushions against such economic crises. This fact substantiates the necessity to focus on income-earning and non-earning assets in asset management

Asset quality is characterized by profitability and the level of risk. In the banking system the decrease in the share of income-earning in the structure of assets up to 60 percent should be considered as a critical threshold. Meanwhile, the dynamics of credit investments relative to GDP growth is assessed. If the credit growth rate increases by 5 percent compared to the previous GDP growth trend, this trend is considered as a crisis situation. Herewith, a critical level is established for credit investments and the dynamics of the banking system's own placements. A systematic increase in the growth rate of credit investments from the growth rate of capital in the banking system indicates an increase in risk and instability.

Loan to deposit ratio. This indicator reflects the degree of involvement of borrowings in active operations with a high level of risk. The value of the ratio exceeding 100% specifies that the banking system has immobilized its own funds in low-liquid assets, which indicates a crisis.

In our opinion, the management of operations with assets based on income is aimed at identifying the sources of raising the bank's income and making decisions on financing; developing the measures to reduce the share of non-earning assets in the total assets of the bank; determining the basic focus areas of diversification of the bank's assets. Herewith particular focus should be made on operations with securities and since these assets do not have their share in the bank's balance sheet, this fact enables to solve a number of issues in the republic, for example, achieving an accurate distribution of active operations with the account of territorial peculiarities.

The solution to these issues depends on the internal management system of the bank.

The purpose of the management system is to solve the problems of the banking system, which constitutes an integral part of the management of active bank operations.

If we explain the process of managing operations with bank assets, first of all, in reliance upon current theory in the management of entities demonstrated by the Figure above, the aims, strategies, plans are developed and the external environment and the state of active operations are investigated. The results are converted into wise-scheduled tasks, limits, and they are directly influenced by active operations through the management system. At the end of the management system, we will have the outcome of achieving the aims set for us in the management of active operations. Moreover, monitoring is used to identify and measure the achievement of the aim. If the aim is not achieved, information about this is forwarded to the management system, where additional methods of asset management are developed to adjust it in compliance with the status indicated there. New management processes start meanwhile. Within a more complicated system assets, the state of the external environment is investigated, aims are set, strategies are developed, and so on.

The oversight for active operations is implemented by the inspection system. The sources of the inspection system can be represented as a chain of relevant theoretical concepts. In practice, the emphasis is put on the last two elements of the chain of theoretical concepts in the management of operations with bank assets, namely, the methods and tools of management. In theoretical terms, the object of the research is usually the aims and principles of active management of operations. Recently scholars in our country have been investigating the issues of the management of loans, which constitute an integral part of active operations through the task of management. However, the issues of legislation applied

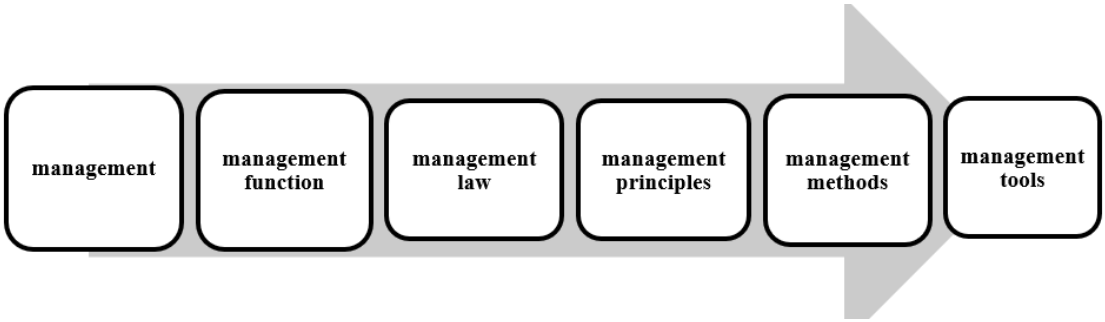


**Figure 2: The order of the banking management system [19]**

**Table 1: Dynamics of changes in the structure of assets of the banking system in 2010-2020, (in percent) [20]**

| № | Assets | 2010 | 2012 | 2014 | 2016 | 2018 | 2020 | Change in 2010 in relation to 2020 |
|---|---|---|---|---|---|---|---|---|
| 1. | Valuables at the cashier's desk | 2,3 | 2,9 | 3 | 1,9 | 2,9 | 2,4 | -0,1 |
| 2. | Funds available on the correspondent accounts with the Central Bank | 20,8 | 16,6 | 11,5 | 14,8 | 8,9 | 5,4 | -15,4 |
| 3. | Funds obtained from other banks | 13,8 | 17,9 | 13,4 | 11,5 | 15,0 | 9,4 | -4,4 |
| 5. | Investments and other securities* | 3,4 | 2,5 | 2,3 | 1,6 | 2,5 | 1,2 | -2,2 |
| 6. | Loans and leasing funds | 48,4 | 50,2 | 61,4 | 61,7 | 65,1 | 76,1 | 27,7 |
| 7. | Promissory noted purchased | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 8. | Other financial assets | 2,1 | 1 | 1,8 | 1,7 | 0,2 | 0,1 | -2 |
| 9. | Fixed assets | 3,2 | 3,2 | 3 | 2,5 | 1,4 | 2,1 | -1,1 |
| 10. | Accrued interest receivable | 0,6 | 0,6 | 0,6 | 0,7 | 0,8 | 1,2 | 0,6 |
| 11. | Other assets | 5 | 4,5 | 2,7 | 2,6 | 3,1 | 1,9 | -3,1 |
| Total assets | | 100 | 100 | 100 | 100 | 100 | 100 | |

in the banking system, including the management of bank assets, have not been researched at the adequate level. In managing the assets and liabilities of the bank, first of all, it is required to analyze the factors of attracting the bank's resources. The stability of the resources of commercial banks provides with an opportunity of risk-free management of active operations. Therefore, the formation of innovative strategies for managing active and passive operations of commercial banks is essential to achieve favorable outcomes. Herewith, if we analyze the composition and share of assets of commercial banks, it becomes apparent what type of operation should become the primary one in the strategy of innovative management of active operations (Table 1).

From the table above it is obvious, that the share of loans and leasing funds have increased by 27.7 percent in the structure of assets, which can definitely be considered a favorable situation as lending operations constitute the main type of income-earning assets. However, only decline has been observed in other income-earning assets, which include funds from purchase and sale transactions, i.e. securities and investments. This fact justifies the urgency of improving asset management strategies and proves the possibility of enhancing the quality of assets.

It is advisable to use statistical, expert and combined analysis in the research of problems related to commercial banks. First, we analyze the results of the survey conducted in the commercial bank. The results of the survey of customers and employees of National Bank for Foreign Economic Activity of the Republic of Uzbekistan JSC, Uzbekistan Industrial and Construction Bank JSCB, Trust bank PJSC with three forms of ownership are as follows:

One of our first questions is related to the bank's stability, which shows that the primary stability factor by commercial banks depends on customer confidence. According to the survey results the next factor is the fact that the bank's competitiveness and liquidity depend on the banks' potential, application of innovative ideas and definitely the bank's management.

The recommendations of the bank officers on attracting customers to the bank to enhance their confidence in the bank are as follows:

- raising the image of the bank, improving the quality of customer service;

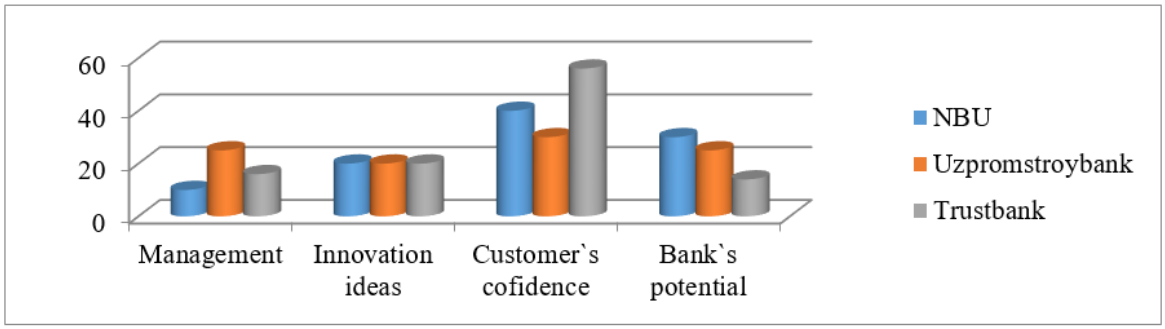


**Figure 3: Factors on which the bank's stability depend [21]**

- increasing advanced banking services, advertising campaign;
- creating innovations in getting loans, reducing tariff rates;
- investigating customer demands;
- increasing the types of deposits;
- providing customers with incentives.

Analyzing the recommendations, specified above, we can see that the primary factors in ensuring the confidence of customers in the banking system, stability of banks depends on the proper management of these active and passive operations. In addition, according to the responds, non-performing loans is one of the factors, which makes an impact on the stability of banks.

Analyzing the responds of the customers, it is possible to make a conclusion that in the National Bank for Foreign Economic Activity of the Republic of Uzbekistan the primary reason for non-performing loans is the lack of monitoring over lending, while the officers of Uzbekistan Industrial and Construction Bank have explained that management has not been properly in business processes, and in Trust bank the business plan plays a key role in lending operations. In addition, we have received the following answers to the question on the use of various types of banking operations.

From this figure it is obvious that the share of bank customers in the use of remote banking services, i.e. SMS-banking, internet banking, innovative services of bank customers, as well as lending operations is relatively high. However, it becomes clear from this bar-chart, that the level of application of deposits is not high, which many customers have commented that they do not have any confidence in the banking system, do not have extra money and bank interest rates are quite low.

After looking into the views specified above, we can conclude that the primary problem is the irresponsibility of bank officers, because the fact that a customer who comes to the bank loses control of his business plan, supplies, and activities, causes occurrence of non-performing loans. The customer should always be closely in touch with the bank so as not to find himself in the difficult situation. Only then in cooperation will they be able to find solutions to economic problems.

However, the management of passive operations, i.e. types of deposits, plays an essential role in improving the management mechanism of the bank's active operations. Here with it can be concluded that the balanced management of assets and liabilities is considered a factor of liquidity and sustainability. In this regard, we are performing econometric analyzes.

The development of the banking system in the national economy will result in the improvement and intensification of the business environment in the country. In this regard A. Smith noted that «... intensification of economic activity in Scotland in the 17th century occurred due to the development of the banking system and provision of a wide range of banking services by banks»[22].

From the point of view of A. Smith, the banking system is crucially important in the business environment in the country. Representatives of the A. Smith school (school of classic scholars) analyze the banking system through the impact of Gross Domestic Product on aggregate supply. That is, first of all, a developed banking system ensures that the inflation process in the country is kept within normal limits; second, within the framework of stable inflation, banks will promote aggregate supply in the country by attracting free funds at the disposal of economic agents and directing them to efficient projects.

Representatives of the Keynesian school have noted that the developed banking system promotes aggregate demand (i.e. loans extended to consumers), and as a result of increased demand, each producer raises its production in order to maximize market share in a free competitive environment.

As a result of the analyzed economic literary sources, we assume that the active operations of bank may impact the development of the national economy through the following system. We suppose that the country's gross production process may impact the growth process in the form of the following flow-chart.

To verify the hypothesis presented in we are using Granger causality test. The specificity of this method is that a statistical hypothesis test for determining whether one-time series is useful in forecasting another, which is determined by a vector auto regression (VAR) model using an annual lag (equation 1). The structured VAR model is then checked using the Fischer criteria to see if there is appropriate interrelation

$$x_2(t) = \sum_{j=1}^{p} a_{21}(j)\, x_1(t-j) + \sum_{j=1}^{p} a_{22}(j)\, x_2(t-j) + E_2(t)\, x_2$$

$$x_1(t) = \sum_{j=1}^{p} a_{11}(j)\, x_1(t-j) + \sum_{j=1}^{p} a_{12}(j)\, x_2(t-j) + E_1(t)$$

**Table 2: Granger causality test of gross demand and gross supply of banking active operations [23]**

| Null Hypothesis: | Obs | F-Statistic | Prob. |
|---|---|---|---|
| Credit does not Granger Cause Asset | 12 | 1.56848 | 0,2736 |
| Asset does not Granger Cause Deposit | 12 | 0.39376 | 0,6886 |
| Deposit does not Granger Cause Consumption | 12 | 0.86720 | 0,4608 |
| Consumption does not Granger Cause VA | 12 | 4.94723 | 0,1558 |
| VA does not Granger Cause Credit | 12 | 21.8222 | 0,241 |

**Table 3: Correlation matrix of relationship of active bank operations with gross demand and gross supply indicators [24]**

| № | Indicator | Ordinal number of indicator | | | | |
|---|---|---|---|---|---|---|
| | | 1. | 2. | 3. | 4. | 5. |
| 1 | Active bank operations | 1 | | | | |
| 2 | Lending operations of the bank | 0,98 | 1 | | | |
| 3 | Gross value added | 0,97 | 0,91 | 1 | | |
| 4 | Bank deposits | 0,94 | 0,86 | 0,98 | 1 | |
| 5 | Consumption | 0,99 | 0,95 | 0,99 | 0,96 | 1 |

Where, p – the number of previous values, $a_{ik}(j)$regression coefficient, $E_1(t), E_2(t)$,- forecasting errors.

The results of the research illustrate that the formation of deposits depends on lending operations. In addition, value added has relationship with loans, revenue of economic agents depends on value added, and income of the population depends on bank deposits (Table 2).

In reliance upon the results of Granger causality test, if we develop the regression models of the correlation in Figure 6, we will be able to assess how the change in factors affects the change in other factors in terms of quantity. For this aim we first need to create a correlation matrix between the indicators to assess the degree of linear correlation between the economic indicators.

As can be seen from the results of the developed correlation matrix, it is not possible to construct a multifactor regression equation with bank asset operations and aggregate demand and aggregate supply factors, because a multicollinearity state is observed in the regression model (the linear correlation between all factors is in the range [0.86; 0.99]), as well as results in the error in model results (Table 2). It is possible to create a double regression model to express the correlation shown in Figure 6. By means of developed regression matrix, it is possible to make a conclusion about how many units a factor can change in the future by changing a factor through a set of neurons. With this aim, it is required first of all to create regression models.

The results of Table 3 demonstrate that the regression equation compiled between bank lending operations and active operations demonstrate a stable trend. This conclusion can be made due to the fact that the coefficient of determination constitutes 0.95, the Fisher criterion accounts for 261.0, and the student coefficient amounts to 16.15 and -3.75, respectively. Meanwhile, according to the model results, a one percent change in active bank operations results in 0.68 percent change in bank loans, provided that all factors remain unchanged. Moreover, the regression model of the correlation of value added (to express aggregate supply) with bank loans shows that the change in bank loans affects the change in value added by percent, while the remaining 18 percent occur due to other factors. The high point of Fishsher criterion, which is one of the criteria used to express stability of this created regression model, indicates sustainability of created model. Herewith the student criterion, which represents the stability of the constant parameters of the model, indicates the accuracy of the calculated model parameters as well. At the same time, the results of the model demonstrate that a 1percent change in bank loans results in a 6.19 percent change in the aggregate supply. The results of the created model between consumption of economic agents and aggregate supply demonstrate that a one percent change in aggregate supply causes 0.4 percent change in aggregate demand. According to the results of econometric analysis, this model entirely meets the requirements. The analysis of the relationship between bank deposits and aggregate demand shows that a one percent change in consumption results in 0.38 percent change in bank deposits. Meanwhile a change in bank deposits by one percent causes a change in bank assets by 1.21 percent.

According to the results provided in Table 4, after a certain period of time after the established economic relations on changes of active bank operations it is recommended to apply the neuron model to analyze the degree of impact of changes in active bank operations on themselves. With this aim each economic relationship is determined using the regression coefficients of the regression equations compiled in Table 4

The results of the neuron model illustrate that if the national economy possesses this development trend, one percent increase in active bank operations will result in 0.77 percent increase in active bank operations during one year.

The goal of every research innovation is to ensure economic stability of the country, thereby improving the management strategies of economic systems. In reliance upon the econometric analysis, we have proven the degree of impact of improving the management strategy of the active bank operations on the economic growth

**Table 4: Regression equations between aggregate demand and aggregate supply of active bank operations [25]**

| Regression equation | R2 | F stat | t-student | |
|---|---|---|---|---|
| | | | t1 | t2 |
| credit=asset 0,68+401,5 | 0,95 | 261.0 | 16,15 | -3,75 |
| va=credit 6,19+8481,6 | 0,82 | 54,9 | 7,40 | 2,87 |
| consumption=va 0,4+1203,5 | 0,98 | 897,7 | 29,96 | 2,67 |
| deposit=consumption 0,38-1337,6 | 0,92 | 154,4 | 12,42 | -3,48 |
| asset=deposit 1,21+2325,2 | 0,88 | 88,7 | 9,42 | 5,05 |

of the country. This requires adequate management of the active bank operations through proposed innovative methods, as well as introduction of the assets securitization, which, in turn, will yield beneficial effect.

## 5 CONCLUSION AND RECOMMENDATIONS

It may be concluded, that in terms of improving financial services of commercial banks in the national banking system, identifying the problems available in the development of new types of financial services, finding relevant solutions, determining the prospects, as well as creating convenient and favourable conditions for users of banking services and further development of internet banking the following can be recommended:

- developing by a commercial bank of a specific action plan on innovation activity for itself;
- beneficiating the bank with the types of innovative services;
- improving the conduct of the research to ensure innovative activity;
- developing the ways to introduce new innovative ideas into banking practice;
- developing skills and abilities by organizing workshop trainings for bank officers;
- establishing special groups to solve the problems that arise in the process of providing innovative services in the bank;
- making the customers familiarized with the benefits of new innovative services through bank marketing strategy;
- introducing and improving the quality of efficient banking services used in the practice of foreign countries.

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