# Methods and instruments of credit risk management in banks

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***Abstract***
In the article the actuality of the methods of credit risk management system was grounded. The essence of the credit risk was specified, the methods and instruments of management of credit risks were considered as at the level of a separate loan so at the level of created by a bank credit portfolio.

***Key words:*** credit risk, banking system, banks, credit activity, risk indicators, financial market.

## *Introduction*

Bank lending remains a source of financial resources for economic entities, despite the worsening crisis in the real economy of Ukraine. The problem of the essence of credit risk and its management is currently the most relevant for creditors of various levels, and especially for banking institutions. When determining the terms of a loan agreement, and then directly during its validity period, the question arises of the choice of methods of risk mitigation, including credit risk. Effective risk management should include a number of stages, starting with the identification of factors and ending with continuous risk monitoring. This is not a one-time issue, as risk monitoring should be carried out regularly, continuously, and constantly refining the level of risk.

## *Analysis of recent research and publications*

Theoretical aspects of the study of minimization of credit risks of banks were covered by L. Prymostka, I. Voloshyn, O. Dziublyuk, V. Kovalenko, O. Zveriakov, D. Haidukovych, O. Malakhova, V. Mishchenko, S. Mishchenko.

## *Results*

The success of a bank's overall operations largely depends on the risk management strategy chosen. Lending operations are a priority for modern Ukrainian banks, as they are the basis for generating profit for the banking institution. In accordance with the NBU Regulation "On Determination of Credit Risk by Banks of Ukraine for Active Banking Operations" adopted on 30.06.2016 No. 351, credit risk is the amount of expected losses (damages) as a result of an active default of a debtor/counterparty (Bovalenko, V., Nenad, D., 2017). It is clear that the presented regulatory definition of credit risk is quite narrow, but it is formed in accordance with the requirements of Basel III. We agree with the opinion of the authors' the article (Radova, N., Garkusha, Y., p. 84-85) that the formation of approaches to credit risk management in banks is determined by certain postulates, namely: credit risk is an actual or potential risk to receipts and capital arising from the insolvency of a party, that has assumed the obligation to fulfill the terms of any financial agreement with the bank or otherwise fulfill its obligations; the amount of credit risk is measured by the amount that may be lost in case of non-payment or delay in payment of the debt; credit risk management is closely related to the lending strategy of the financial institution and its compliance by the employees involved in this process; the system for assessing the credit risk inherent in the loan portfolio should include an assessment of the quality of loans (Radova, N., Garkusha, Y., p. 84-85).

The unstable financial and economic environment in the financial and banking services markets, reduced solvency of borrowers, and incorrectly formed strategies of banks are constant threats to the normal functioning of banking institutions, which cause them to gradually lose their financial stability. Banks are trying to minimize their risks, which is necessary to reduce losses and further development of the financial institution. Risk minimization takes into account the following components of anticipating risks and losses that may result from the risk: capital levels, consequences for the banking institution, and measures to prevent, minimize, or eliminate losses. The need to comply with the NBU's rules, requirements and regulations on credit risks is the basis for the full, uninterrupted and efficient operation of a commercial bank. Negative deviations from the established standards pose a threat not only to the bank, but also to its customers and the stability of the banking system as a whole. Therefore, compliance with credit risk standards is the first stage of a comprehensive assessment of a bank's credit risk. A widespread problem in the Ukrainian banking system is a significant amount of non-performing loans (Figure 1), which directly affects the level of credit risk – the result of the credit expansion of the past years, when the standards for assessing borrowers' solvency were low and the rights of creditors were not sufficiently protected. A large share of them is a burden for the banking sector, especially for state-owned banks. The NBU emphasizes that banks should clean up their balance sheets more intensively: non-performing loans should be restructured, sold, or written off (Kharchenko, A., 2020; Whiting, J.F. (Jim)).

We distinguish three main systems that are used both in the case of enterprises and in other cases. Each of these systems is aimed at achieving different results, namely, achieving a balance of profitability and risk, maximizing profitability, and ensuring minimum regulatory capital (Table 1).

Methods and approaches of credit risk management are applied not only at the stage of direct loan disbursement to an enterprise, but also before signing the relevant agreement, as well as afterwards (Fig. 1).

**Table 1 – Key global standards for credit risk management of banks in customer financing**

| Features | COSO-ERM | RMS | Basel III |
|---|---|---|---|
| Full name of the standard and developer organization | Integrated risk management model adopted by the Committee of Sponsoring Organizations of the Treadway Commission | A risk management standard developed jointly by the Institute of Risk Management (IRM), the Association of Risk Management and Insurance (AIRMIC), with the participation of the National Forum for Risk Management in the Public Sector in the UK | International convergence of capital adequacy measurement and capital standards adopted by the Bank for International Settlements |
| The purpose of credit risk management | Balance of profitability and risk | Maximizing profitability | Ensuring minimum regulatory capital |

| Features | COSO-ERM | RMS | Basel III |
|---|---|---|---|
| Methods of credit risk management within the approach | Preventing risks by improving the efficiency of internal control and independent monitoring of risky processes | Risk minimization and methods of compensation for losses by transferring risk to a third party (insurance and hedging) | Minimizing risks by limiting and using market-based financial technologies (credit derivatives, securitization) |

*Source: compiled by the authors based on (Bodnar, O., 2019).*

Diversification is a key approach to managing a bank's credit risks. This may include diversification by time and geography. For example, to diversify by time, the bank provides loans to customers for different terms and throughout the financial year. Accordingly, if there is a surge in non-payments in one of the months, this will not have a devastating impact on the financial position of the credit institution. As a result, the consequences of a risk event are obviously reduced. In turn, diversification by geography is associated with the provision of loans to companies from different regions of Ukraine. Thus, a crisis in one of them, for example, due to the closure of key enterprises, will not lead to a complete loss of stability of the credit institution. Diversification can also take place in other areas: by industry, depending on the size of the enterprise, etc.

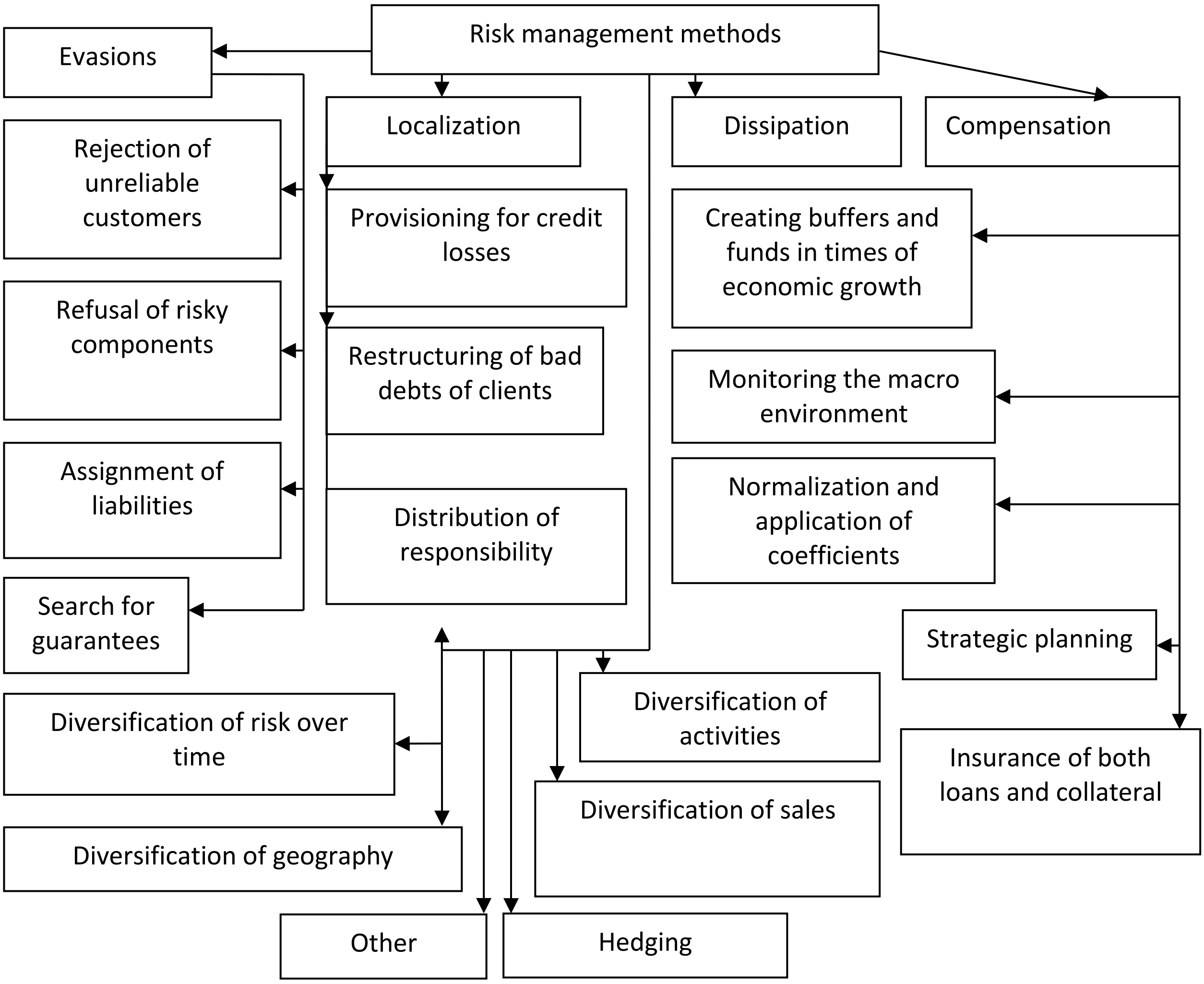


Figure 1 – Methods of bank credit risk management
*Source: compiled by the authors on the basis of (Bodnar, O., 2019).*

In the context of managing a bank's credit risk, provisioning is of great importance. The process of provisioning means that Ukrainian banks create a certain reserve of liquid funds for each credit transaction. This way, untimely payment of liabilities and writing off the corresponding debt will ensure that the bank can maintain a stable position. At the level of a credit institution, various buffers are formed, for example, countercyclical buffers. For example, during periods of economic growth, when the level of credit risks is lower, banks accumulate capital, which in the event of a crisis can be used to respond more adequately to the increased level of credit risk. This protects against the destructive impact of credit risk on the credit institution's position.

Insurance is another method of managing credit risk, and it should be noted that this method is not often used by Ukrainian banks. This insurance product allows to receive payments in case the client fails to repay its obligations.

The pledge of company assets should be recognized as an extremely important method for managing credit risk. Collateral may include production facilities, land, other movable and immovable property, company deposits in a bank account, and securities. Such an asset remains under the control of the bank until the obligations under the loan agreement are fully fulfilled. If there is a deviation from the obligations, the bank has the option to sell the pledged property to fully or partially compensate for losses due to late or incomplete fulfillment of the client's obligations.

Rejection of unreliable clients involves the formation of criteria for clients with whom the company will not cooperate in terms of providing credit products as part of the credit policy. If the creditworthiness assessment falls below a certain level, the bank will automatically send a response denying access to bank financial resources. Refusal from risky components means not using credit transactions characterized by increased risk.

Localization of credit risk means limiting it within certain limits. For example, if a credit institution is testing a new lending opportunity, for example, using a mobile application, it is not known in advance what the level of defaults will be and how the new direction will affect the stability of the financial institution. In such circumstances, the bank may create a new legal entity that will be engaged in the new business line. Thus, the credit risk is localized in a separate legal entity, and its bankruptcy will not lead to a sharp increase in the bank's liabilities.

The hedging method involves the purchase of securities that allow fixing a specific parameter of the financial environment. For example, if a company is actively lending to a certain industry, the corresponding result will depend on an external parameter. In this case, it is rational for the bank to buy options or other derivatives that fix the price of the resource on which the company depends. Accordingly, if there is a decline in this parameter, which, in turn, reduces the creditworthiness of client companies and, therefore, increases the level of credit risk, the bank will receive compensation from the transactions concluded under the relevant options. Thus, the stock market is able to offer a large number of instruments that help reduce the riskiness of banking operations. Options, futures, and other derivatives may be based on asset prices, exchange rates, and other parameters.

Assignment of a liability means transfer of credit risk to third parties. The Bank may simply sell a portion of its loan portfolio, which will not only ensure the loss of the potential to generate certain profits from lending operations, but also reduce the level of credit risk within the sold loan products.

The activities of every bank are closely related to the human factor. An employee may make a lending decision based on his or her acquaintances and other factors not directly related to the bank's interests. In this context, an important method of managing credit risk is to delineate the powers of employees and allocate their responsibilities, which minimizes the potentially destructive impact of rash, overly optimistic decisions by an individual employee.

To minimize credit risk, efforts should be made to improve, among other things, the methodology for assessing the creditworthiness of a particular client. The example of JSCCB

PrivatBank can be used to substantiate potential areas of improvement in this area to enhance the efficiency of a credit institution.

Several directions for supplementing the methodology for assessing the creditworthiness of corporate clients are proposed (Fig. 2).

1. Use big data to systematize customer feedback about the company and analyze the tone of such messages
2. Comparing the values of the indicators with the median values typical for the industry, which will allow to draw a conclusion about the quality of management
3. Using artificial intelligence to identify non-obvious dependencies of businesses on certain trends and events

Figure 2 – Ways to improve the effectiveness of the methodology for assessing the creditworthiness of companies-clients of JSCCB Privatbank

*Source: compiled by the authors*

The first proposal is to accumulate reviews of a wide variety of business entities from the most popular platforms. For example, for hotels and restaurants, it will be TripAdvisor, for companies supplying various goods – Prom and similar platforms. After accumulating a huge amount of data, using Big Data tools, it is possible to determine both the current attitude of customers to the company, the current tone of their feedback, and to identify the dynamics of such feedback.

The logic behind such a proposal is that even if the company was stable and held a stable market position, consumer tastes could change, which means that sales would fall, which would negatively affect creditworthiness in the short or medium term. In such circumstances, management may try to use the previously established brand by producing inherently cheaper products. This will lead to a deterioration of the brand's perception, as well as the prospects for the long-term development of the company. Using conventional financial ratios, it is impossible to detect such a situation in advance, although it poses a threat to the company's future creditworthiness.

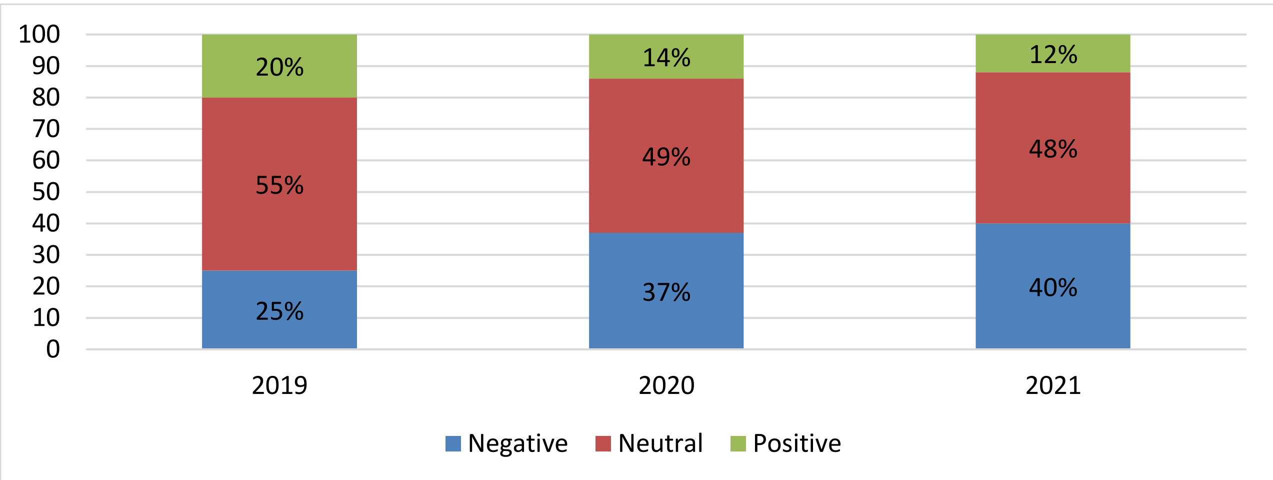


Figure 3 – An example of tracking the dynamics of feedback about a client-enterprise to identify changes in customer attitudes towards its goods and services, %.

*Source: compiled by the authors*

As shown in Fig. 3, the measure will make it possible to identify in advance the share of positive and neutral reviews in the total number, as well as the reduction in the share of favorable reviews over time. Consequently, the company should receive fewer points in the creditworthiness assessment, which will help to formulate a more adequate commercial offer in the form of an interest rate for the use of credit funds.

The essence of the second addition to the methodology for assessing the creditworthiness of a bank's client company is to take into account not only the financial ratios themselves, but also to compare them with the average or median values in the industry. The fact is that each industry is characterized by its own peculiarities. For example, you can expect further growth in the return on investment in digital technologies that can create significant added value per employee. Conversely, there are areas and niches that are in a state of decline. Print publishers are expected to face significant difficulties as, on the one hand, demand for online media is growing, and, on the other hand, the cost of printing is rising due to rising prices for the necessary imported materials.

This means that the competence of management, their experience and skills can only be assessed by comparing the company's actual financial ratios with those typical for a particular industry. Obviously, the better the performance compared to direct competitors, the more likely it is that management competence played a key role. And it is the management that affects the company's ability to meet its credit obligations even in situations where there are cash gaps, when the stability of cash flows is disrupted due to any unforeseen external and internal shocks.

By comparing the relevant financial ratios, it is possible to understand how competent the company's management is in its ability to generate sufficient profit to cover credit obligations, or to balance cash inflows and outflows, and to generate sufficient liquid current assets to achieve the same goals.

The third addition to the methodology is to apply artificial intelligence to identify non-obvious dependencies of the client's business on certain trends and events. For example, the success of crop production companies will depend on the weather forecast for the next year. Demand for gifts will be higher during the holidays. Such statements are quite obvious to an analyst. In practice, however, there are a huge number of different dependencies that are not only difficult to predict, but also financially inexpedient to identify using conventional technologies.

However, modern technologies make it possible to solve this problem, making the analysis of a wide variety of trends and events very cheap relative to the potential effect achieved. A written artificial intelligence model could compare the data already available to the bank with the financial indicators of companies, thereby identifying key dependencies that affect profitability, liquidity, and the ability to meet credit obligations.

In this context, it should be mentioned that PrivatBank is already accumulating a huge amount of information on the development of various sectors of the economy. The essence of the proposal is only to compare the information characterizing the performance of corporate clients. Accordingly, the formation of a new trend, identified in advance, can affect the assessment of the development prospects of a particular enterprise in the near future.

Thus, it is advisable to supplement the methodology for assessing the creditworthiness of a client company with such elements as the current attitude of customers, the dynamics of feedback, the experience and competence of management, as well as the factor of the dynamics of trends that are not obvious in terms of their connection with the company. Such a proposal can have a significant impact on the effective assessment of the company's creditworthiness.

Thus, the absence of reviews will indicate that the company is unknown in the market, and therefore, its position may be unstable at the moment. If the number of negative reviews exceeds 50%, this also negatively affects the creditworthiness level, as there is a high risk of losing customers and, consequently, reducing revenue. Conversely, a high share of positive reviews will lead to an increase in creditworthiness. Under such conditions, the company can attract a bank loan to intensify its production and sales activities, which will lead to higher net profit. It is easier for such a company to meet its obligations to the bank (Table 2).

**Table 2 – Proposed additional elements of the methodology for assessing the creditworthiness of a client-enterprise, points**

| Name of the indicator | Normative value |
|---|---|
| 1. Quality of reviews about the company as of the last known date | No reviews = -100 points;<br>Share of negative reviews above 50% = -100 points;<br>The share of positive reviews is more than 50% = 100 points;<br>Other – 0 points. |
| 2. Evaluating the dynamics of feedback quality | Deterioration in the quality of reviews (increased share of negative reviews) = -50 points;<br>Improving the quality of reviews = 50 points<br>Maintaining the quality of reviews = 0 points |
| 3. Management experience and competence | Profitability (return on sales) and liquidity (current ratio) are higher than the industry as a whole = 50 points;<br>Profitability or liquidity ratios are higher than the industry as a whole = 25 points;<br>Profitability and liquidity ratios are lower than the industry as a whole = 0 points; |
| 4. Factor in the dynamics of non-obvious trends | Stimulate the company’s development = 100 points;<br>Neutral impact = 50 points;<br>Hinder the company's development = -100 points |

Thus, we propose three additions to the current methodology for assessing the creditworthiness of bank clients, which will contribute to a more adequate assessment of the company’s ability to meet its obligations under the loan agreement. First of all, it is necessary to systematize the data sets available on the Internet on how customers of companies respond to their goods, services, and the companies themselves. This information will help both to identify the share of positive and neutral reviews in the total number and to track the dynamics of changes in the tone of the review. It will be possible to understand whether the company is using its brand to maximize its current profits and then announce the start of bankruptcy proceedings. It is advisable to supplement the methodology by comparing the median values of return on sales and current liquidity with those that are typical for the industry on average. This will make it possible to assess the quality of management. It is proposed to use artificial intelligence to identify non-obvious patterns between the development of clients’ business and certain events in the economic and social space.

## *Conclusions*

According to the study, effective methods include using big data to systematize customer feedback about the company and analyze the tone of such messages, comparing the values of indicators with median values typical for the industry, which will allow to draw a conclusion about the quality of management, and using artificial intelligence to identify non-obvious dependencies of businesses on certain trends and events.

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