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Sustainable Development Assessment of Commercial Banks Based on the Analytic Hierarchy Process

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ABSTRACT

In the present context, the issues of sustainable development of commercial banks are becoming particularly relevant, since they largely determine the state of the country's economy as a whole. At the same time, commercial banks operate under the influence of various factors of the internal and external environment, digital transformation and the transition to the fourth industrial revolution, which significantly changes the conditions of their functioning. The time lag in which a credit institution can be in a relatively static, stable state is reduced. In this regard, there is a need to develop a methodology for assessing the sustainable development of commercial banks. This paper **aims** to develop theoretical provisions and methods for assessing the sustainable development of commercial banks using the **analytic hierarchy process**. As a result of the research, theoretical approaches to the disclosure of the economic content of the sustainable development of commercial banks, as well as existing A methodological approach to assessing the sustainability of the bank's development is justified, considering five components: economic, social, environmental, institutional and technological. Within the framework of this approach, criteria for their assessment are proposed for each of the components of the sustainability of the development of commercial banks, a scale of their relative importance is constructed and vectors are determined based on expert assessments. The authors make a **conclusion** that it is necessary to distinguish four types of stability of the bank's development: absolute stability, normal stability, unstable state, crisis state. This approach can be used by commercial banks when developing a strategy for the sustainable development of financial and credit organizations. **Prospects** for further research may be associated with the development of alternative methods for assessing the sustainable development of commercial banks.

Keywords: commercial bank; sustainable development; sustainability assessment; analytic hierarchy process; modeling

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INTRODUCTION

The state of the banking system is the most important indicator of the economic security of any country, region, and the banking sector is a factor in ensuring sustainable development and decarbonization of the economy [1, 2]. At the same time, many factors of the internal and external environment have a significant impact on the state of the banking sector (including commercial banks): macroeconomic policy; market conditions for goods and services; changes in the financial system; uneven economic development of certain regions; the growth of social tension; changing customer preferences; resource base; customer confidence; bank reputation and others [3–5].

According to the calculations of foreign scientists who assessed the impact of endogenous and exogenous factors on the stability of Latvian banks in 2003–2016, credit risk and the level of efficiency negatively affect the stability of banks, while the size of the bank, liquidity, profitability, inflation, and GDP growth have a positive impact [6].

N. Karim, S. M. Al-Habshi, M. Abduh, conducting a comparative analysis of the impact of macroeconomic indicators (GDP, interest rate, inflation) on the activities of Islamic banks and the banking sector in Indonesia for the period 1999–2013, concluded that these factors have a significant influence on the banking sector in Indonesia, but not on Islamic banks [7].

In the modern world, banks perform many functions: attracting temporarily free funds from legal entities and individuals and their placement on terms of payment, urgency, repayment, intermediation in payments, operations in the stock and foreign exchange markets, settlement and cash services, acquiring, online service, notional cash pooling, etc. Banks do not just accumulate financial resources, carrying out the internal accumulation of funds, they ensure their continuous movement for sustainable economic development, solving environmental and social problems [8, 9].

In particular, foreign scientists S.C. Obiora, O. Bamisile, E. Opoku-Mensah, A.N.K. Frimpong, examining the banking and financial systems of 45 countries, conclude that an increase in lending contributes to an increase in emissions of harmful substances by business entities into the atmosphere, as well as to an increase in interest rates on loans and deposits leads to a decrease in these emissions [10].

Performing the function of redistributing savings into investments, commercial banks face various risks that can lead to bankruptcy and loss of stability. In this regard, the problems of assessing and ensuring the sustainable development of commercial banks are very relevant.

CONTENT OF THE DEFINITION "SUSTAINABLE DEVELOPMENT OF A BANK"

During the period of the second industrial revolution, an objective need arose to expand the range of research on the problem of stability and sustainable development. This was due to the fact that along with rapid economic growth, the introduction of innovations and new technologies, the growth of industrial production, an increase in the standard of living of the population, there was a high degree of exploitation of natural resources and an increase in social inequality. Environmentalists have begun to pay attention to the limits of world population growth and the depletion of natural resources [11, 12].

In particular, following the report "Our Common Future" prepared in 1987 by the International Commission on Environment and Development, the term "sustainable development" became widespread. This has been interpreted as "such development that satisfies the needs of the present, but does not compromise the ability of future

generations to meet their own needs".[1] In 2015, the UN adopted the document "Transforming Our World: The 2030 Agenda for Sustainable Development", which reflects the Sustainable Development Goals (SDGs) and the main indicators, the achievement of which will save the planet's resources and ensure decent living conditions for all. This document takes into account three pillars of sustainable development: economic growth, social inclusion, and environmental protection.

Currently, the three-pillar concept of sustainable development, along with the economic, social, and environmental components, are supplemented by a number of scientists with a fourth subsystem — the institutional one [13, 14]. The inclusion of the institutional subsystem in the concept of sustainable development is due to the need to create a regulatory framework, a modern information system, and other institutions whose activities are aimed at ensuring the sustainable development of countries, regions, organizations.

As for the banking sector, we note that today categories such as "sustainability", "stability", "reliability" of a bank are widely used.

Note that the first mention of sustainability in banking was found in the World Bank's Sustainable Banking with the Poor: A Worldwide Inventory of Microfinance Institutions. This report notes that microfinance institutions represent a new socially oriented business model for organizing financial activities.[2] This finding is based on an analysis of basic social services provided by financial institutions to low-income populations. In the monograph "Sustainable Banking: Greening Finance", J. J. Bauma, M. Jauken, LJ Klinkers note that banks have a role to play in ensuring environmental sustainability [15].

The study of scientific views on the sustainability of a commercial bank made it possible to identify three main approaches to this problem. The first approach followed by L. P. Belykh and O. B. Nesterenko is based on considering the sustainability of a commercial bank from the point of view of the state of equilibrium [16, 17]. At the same time, there are three types of equilibrium: stable, unstable and indifferent. A stable equilibrium is characterized by the ability of an object to return to a state of equilibrium, determined by various factors, while an unstable equilibrium is the inability of an object to return to its original state. Indifferent equilibrium is a state in which any point of the system is a point of equilibrium, and the deviation of the system from the initial point of rest does not change anything in the alignment of forces within it.

According to Yu. N. Bulanov, the main characteristics of the bank's sustainable development are balance, stability and development [18].

The most popular in the scientific community is the second approach to considering the sustainability of a bank, which is followed by G. G. Fetisov, O. I. Lavrushin,[3] A. O. Shenaev [19, 20]. It is based on the definition of a bank as an object that performs its inherent functions, and stability is viewed as the bank's ability to continuously perform these functions in a changing environment. This approach to the functioning of a bank is often identified with the concept of "reliability" since it is "reliability" that is characterized as the ability of an object to perform certain functions. So, A. V. Buzdalin characterizes the bank's

[1] Our Common Future. New York: UN, 1987. URL: https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf (accessed on 12.07.2021).

[2] The World Bank. Sustainable Banking with the Poor: A Worldwide Inventory of Microfinance Institutions. Washington, DC, 1997. URL: http://wwwwds.worldbank.org/servlet/WDSContentServer/IW3P/IB/2006/04/12/000160016_20060412172642/Rendered/PDF/354680paper.pdf. (accessed on 12.07.2021).

[3] Lavrushin O.I., ed. Banking in the modern economy. Textbook. Moscow: KNORUS; 2016. 671 p.

reliability as the ability to fulfill obligations within a certain period of time [21].

The third approach to considering the concept of "sustainability of a commercial bank" is based on the idea of goal-oriented development. So, Yu. S. Maslenchenkov examines the economic stability of the bank from the point of view of the sustainability of its activities in the medium and long term. "Stability is the state of a commercial bank in a changing market environment, which ensures the purposefulness of its movement now and in the foreseeable future" [22].

It should be noted that today the term "bank stability" is often used in the context of its financial stability. At the same time, the financial stability of the bank is determined by the state and structure of assets, efficiency of activities, and capital adequacy [23, 24].

The generalization of the existing approaches to disclosing the content of the bank's sustainability made it possible to formulate the following definition of the considered category. Sustainability is a qualitative characteristic of the state of the bank throughout the entire interval of its development, which allows it to remain in an equilibrium state and continuously perform its functions when the factors of the external and internal environment change. Moreover, the sustainable development of the bank should be balanced, considering the economic, social, institutional and technological components.

METHODOLOGY FOR ASSESSING THE SUSTAINABLE DEVELOPMENT OF A COMMERCIAL BANK

In world practice, there are a significant number of methods for assessing the financial position and sustainability of a commercial bank. These methods can be divided into two groups: 1) methods used by central banks, supervisory authorities; 2) bank ratings used by independent news agencies.

Table 1 presents a comparative analysis of existing methods for assessing the sustainability of a commercial bank.

It should be emphasized that each of these methods is based on the analysis of quantitative indicators, while qualitative ones are not present in all, which reduces the quality of a full assessment of the bank's overall condition. All considered methods, as a rule, are based on the analysis of capital, liquidity, quality of liabilities and assets, profitability. Each method has both advantages and disadvantages. The main disadvantage of the considered methods is that almost all of them are based on information that is not publicly available, which significantly narrows the circle of their users. Only supervisory authorities can use these methods.

The study aims to develop a methodological approach to assessing the sustainability of a commercial bank based on the method of analytic hierarchy process (AHP). The main argument in favor of using this method is its versatility, which allows it to be used for solving a variety of problems.[4] This method involves the collection, processing, and interpretation of large amounts of data based on expert judgment [25].

Implementation of AHP is based on expert assessments and includes the following stages:

1. Target analysis:

- tree-like detailing of approaches (local criteria) P_i (i = 1, 2, ..., n) and alternatives for achieving the goal R_j (j = 1, 2, ..., m);
- identification of ranges (confidence intervals) of possible values for quantitative indicators of target components of the management system by the method of expert assessments;

[4] The World Bank. Sustainable Banking with the Poor: A Worldwide Inventory of Microfinance Institutions. Washington, DC, 1997. URL: http://wwwwds.worldbank.org/servlet/ WDS Content Server/IW3P/IB/2006/04/12/000160016_20060412172642/Rendered/PDF/354680paper.pdf. (accessed on 12.07.2021).

Table 1

Comparative analysis of methods for determining the stability of a commercial bank

Method	Quantitative indicators	Qualitative indicators	Expert assessment	Integral result indicator	Standard (recommended) values	Ranking of banks by group	An analysis rating
Russian methods							
Methodology of the Central Bank of the Russian Federation, assessing the financial condition of a bank	+	–	+	+	+	+	–
Methodology of the Central Bank of the Russian Federation for the inclusion of a bank in the deposit insurance system	+	+	+	+	–	–	–
Expert RA methodology	+	–	–	+	–	+	–
Methodology "Kommersant"	+	–	–	+	–	–	+
Foreign methods							
CAMELS (USA)	+	+	+	+	–	+	–
BAKIS (Germany)	+	–	–	–	+	+	–
PATROL (Italy)	+	–	–	–	+	+	–

Source: compiled by the authors.

• construction of algorithms for the relationship of individual target indicators.

2. Comparative analysis: construction of a set of matrices of pairwise comparisons for each of the lower levels of the hierarchy according to the principle: "one matrix for each controlled element (adjacent to the top level)", while the elements of any level are compared with each other with respect to their impact on controlled elements.

3. Hierarchical synthesis for weighing your own weights.

4. Assessment of the consistency of the entire hierarchy (acceptable consistency ratio — up to 10%).

As noted above, the assessment of the sustainable development of a commercial bank provides, in our opinion, the allocation of five components (local criteria):

- economic sustainability (P_1);
- social sustainability (P_2);
- environmental sustainability (P_3);
- institutional sustainability (P_4);
- technological sustainability (P_5).

As part of the study, a survey was conducted of several dozen experts — professionals in the field of banking. The experts were asked to evaluate the criteria (K_1-K_{40}) and the above-presented main components of the bank's sustainability

Table 2

Rating of fundamental components designed to assess the sustainable development of a commercial bank

Components of sustainable development of a commercial bank	Rank
Economic sustainability (P_1)	10
Social sustainability (P_2)	7
Environmental sustainability (P_3)	3
Institutional sustainability (P_4)	7
Technological sustainability (P_5)	8

Source: compiled by the authors.

on a 10-point scale. Further, the obtained results were processed using the methods of mathematical statistics.

The rating of the components of the sustainable development of a commercial bank, considering expert assessments, is presented in *Table 2*.

For each of the proposed components of the sustainable development of a commercial bank, by constructing a scale of their relative importance and determining the priority vector based on expert assessments, they are established on a 10-point scale of importance weight criteria for each component. *Table 3* presents the criteria for the economic, environmental, social, institutional and technological components of the sustainable development of a commercial bank.

Assessment of the level of digitalization of the bank and its internal divisions includes, inter alia, an analysis of the development of business process automation; self-service channels (services and functions available in digital channels); the speed of operations (offline, online, in real-time); development of data management systems, including machine learning; availability of services 24/7; rate of change, time to market.

Analysis of the security level of a bank and banking operations includes an assessment of the security of the main structural elements (owners, top managers, social relations, physical communications, personnel, equipment, facilities).

Analysis of the level of development of the bank's offline infrastructure implies an analysis of the presence or absence of a "single window" system, electronic queue, call-center, equipment of waiting rooms, etc.

Assessment of the level of development of the bank's online infrastructure includes an analysis of the official website, mobile applications for individuals and legal entities and individual entrepreneurs, Internet banking, Internet trading, etc.

Assessment of the level of information security of a bank involves an analysis of the sufficiency, relevance and speed of information updating.

Analysis of the degree of development of the infrastructure of the banking sector in the region involves the analysis of the presence/absence and development of audit and consulting companies, credit bureaus, insurance companies, appraisal organizations, collection agencies, credit brokers, IT companies, law firms, etc.

Assessment of the fairness of tariffs for banking services, dividends, wages, bonuses involves an analysis of the presence/absence of hidden commissions in banking products, a significant gap in the wages of staff and top managers, the formation of dividends on ordinary and preferred shares.

Table 3

Criteria for the components of sustainable development of a commercial bank

Designation	Criteria	Rank
Economic sustainability		
K_1	Return on equity (ROE)	8
K_2	Return on assets (ROA)	9
K_3	Capital adequacy level	10
K_4	Capital adequacy ratio	8
K_5	Capital quality assessment	8
K_6	Current liquidity ratio	9
K_7	Earning assets level	8
K_8	Net interest margin ratio	8
K_9	Resource base stability coefficient	8
K_{10}	Share of overdue loans	8
K_{11}	Maximum exposure to one borrower or a group of related borrowers (N 6)	8
K_{12}	Customer base ratio	8
K_{13}	Consumer loyalty index	8
K_{14}	Share of the regional deposit market	6
K_{15}	Market share of loans to non-financial organizations	6
K_{16}	Market share of loans to individuals	6
K_{17}	Gross regional product per capita	7
K_{18}	Inflation rate in the region	6
K_{19}	Business cycle stage	7
Social sustainability		
K_{20}	Share of the bank's investments in social projects	6
K_{21}	Fair formation of tariffs for banking services, dividends, wages, bonuses	8
K_{22}	Salary level of bank employees	6
K_{23}	Employee satisfaction with working conditions and wages	7
K_{24}	The level of the bank's expenses for staff development	7
K_{25}	Bank transparency level	7
K_{26}	Charity spending level	5
K_{27}	The level of per capita household income of the region	6
Environmental sustainability		
K_{28}	Share of expenditures on natural resources, including energy, in the expenditures associated with supporting the activities of a credit institution	5
K_{29}	Share of investments in projects related to environmental protection, rational use of natural resources	4
Institutional sustainability		
K_{30}	The level of information security of a bank	8
K_{31}	The level of regulation of the internal processes of a bank	8
K_{32}	Branch network development level	7
K_{33}	The level of cooperation and integration of a bank with partners	7
K_{34}	The degree of development of the infrastructure of the banking sector in the region	8
K_{35}	Banking legislation level	9
Technological sustainability		
K_{36}	The level of digitalization of the bank and its internal divisions	9
K_{37}	The share of modern technologies in the organization and management of the bank	8
K_{38}	Bank and banking security level	10
K_{39}	The level of development of the bank's offline infrastructure	8
K_{40}	The level of development of the bank's online infrastructure	8

Source: compiled by the authors.

Table 4

Determination of the vector of priorities (weights) of criteria for assessing the economic stability of a bank

Indicator	K_1	K_2	K_3	K_4	K_5	K_6	K_7	K_8	K_9	K_{10}	K_{11}	K_{12}	K_{13}	K_{14}	K_{15}	K_{16}	K_{17}	K_{18}	K_{19}	Weight
K_1	1.00	0.89	0.80	1.00	1.00	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.14	1.33	1.14	**19.984**
K_2	1.13	1.00	0.90	1.13	1.13	1.00	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.50	1.50	1.50	1.29	1.50	1.29	**22.482**
K_3	1.25	1.11	1.00	1.25	1.25	1.11	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.67	1.67	1.67	1.43	1.67	1.43	**24.980**
K_4	1.00	0.89	0.80	1.00	1.00	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.14	1.33	1.14	**19.984**
K_5	1.00	0.89	0.80	1.00	1.00	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.14	1.33	1.14	**19.984**
K_6	1.13	1.00	0.90	1.13	1.13	1.00	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.50	1.50	1.50	1.29	1.50	1.29	**22.482**
K_7	1.00	0.89	0.80	1.00	1.00	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.14	1.33	1.14	**19.984**
K_8	1.00	0.89	0.80	1.00	1.00	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.14	1.33	1.14	**19.984**
K_9	1.00	0.89	0.80	1.00	1.00	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.14	1.33	1.14	**19.984**
K_{10}	1.00	0.89	0.80	1.00	1.00	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.14	1.33	1.14	**19.984**
K_{11}	1.00	0.89	0.80	1.00	1.00	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.14	1.33	1.14	**19.984**
K_{12}	1.00	0.89	0.80	1.00	1.00	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.14	1.33	1.14	**19.984**
K_{13}	1.00	0.89	0.80	1.00	1.00	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.14	1.33	1.14	**19.984**
K_{14}	0.75	0.67	0.60	0.75	0.75	0.67	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1.00	1.00	1.00	0.86	1.00	0.86	**14.988**
K_{15}	0.75	0.67	0.60	0.75	0.75	0.67	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1.00	1.00	1.00	0.86	1.00	0.86	**14.988**
K_{16}	0.75	0.67	0.60	0.75	0.75	0.67	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1.00	1.00	1.00	0.86	1.00	0.86	**14.988**
K_{17}	0.88	0.78	0.70	0.88	0.88	0.78	0.88	0.88	0.88	0.88	0.88	0.88	0.88	1.17	1.17	1.17	1.00	1.17	1.00	**17.486**
K_{18}	0.75	0.67	0.60	0.75	0.75	0.67	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1.00	1.00	1.00	0.86	1.00	0.86	**14.988**
K_{19}	0.88	0.78	0.70	0.88	0.88	0.78	0.88	0.88	0.88	0.88	0.88	0.88	0.88	1.17	1.17	1.17	1.00	1.17	1.00	**17.486**

Source: compiled by the authors.

Table 5

Determination of the vector of priorities (weights) of criteria for assessing the social stability of a bank

Indicator	K_{20}	K_{21}	K_{22}	K_{23}	K_{24}	K_{25}	K_{26}	K_{27}	Weight
K_{20}	1.00	0.75	1.00	0.86	0.86	0.86	1.20	1.00	**7.452**
K_{21}	1.33	1.00	1.33	1.14	1.14	1.14	1.60	1.33	**9.936**
K_{22}	1.00	0.75	1.00	0.86	0.86	0.86	1.20	1.00	**7.452**
K_{23}	1.17	0.88	1.17	1.00	1.00	1.00	1.40	1.17	**8.694**
K_{24}	1.17	0.88	1.17	1.00	1.00	1.00	1.40	1.17	**8.694**
K_{25}	1.17	0.88	1.17	1.00	1.00	1.00	1.40	1.17	**8.694**
K_{26}	0.83	0.63	0.83	0.71	0.71	0.71	1.00	0.83	**6.210**
K_{27}	1.00	0.75	1.00	0.86	0.86	0.86	1.20	1.00	**7.452**

Source: compiled by the authors.

Таблица 6 / Table 6

Determination of the vector of priorities (weights) of criteria for assessing the environmental sustainability of a bank

Indicator	K_{28}	K_{29}	Weight
K_{28}	1.00	1.25	**2.236**
K_{29}	0.80	1.00	**1.789**

Source: compiled by the authors.

Table 7

Determination of the vector of priorities (weights) of criteria for assessing the institutional stability of a bank

Indicator	K_{30}	K_{31}	K_{32}	K_{33}	K_{34}	K_{35}	Weight
K_{30}	1.00	1.00	1.14	1.14	1.00	0.89	**6.151**
K_{31}	1.00	1.00	1.14	1.14	1.00	0.89	**6.151**
K_{32}	0.88	0.88	1.00	1.00	0.88	0.78	**5.382**
K_{33}	0.88	0.88	1.00	1.00	0.88	0.78	**5.382**
K_{34}	1.00	1.00	1.14	1.14	1.00	0.89	**6.151**
K_{35}	1.13	1.13	1.29	1.29	1.13	1.00	**6.920**

Source: compiled by the authors.

Table 8

Determination of the vector of priorities (weights) of criteria for assessing the technological stability of a bank

Indicator	K_{36}	K_{37}	K_{38}	K_{39}	K_{40}	Weight
K_{36}	1.00	1.13	0.90	1.13	1.13	**5.254**
K_{37}	0.89	1.00	0.80	1.00	1.00	**4.670**
K_{38}	1.11	1.25	1.00	1.25	1.25	**5.838**
K_{39}	0.89	1.00	0.80	1.00	1.00	**4.670**
K_{40}	0.89	1.00	0.80	1.00	1.00	**4.670**

Source: compiled by the authors.

Table 9

Intervals of changes and expert assessments of criteria for the degree of sustainable development of a commercial bank

	Indicator	Evaluation of criteria		
		0	1	2
Economic sustainability				
K_1	Return on equity (ROE)	Below 4	4–10	Above 10
K_2	Return on assets (ROA)	Below 0.5	0.5–1.5	Above 1.5
K_3	Capital adequacy level	Below 8	13 and higher	8–13
K_4	Capital adequacy ratio	Below 10	10–15	Above 15
K_5	Capital quality assessment	Above 80	30–80	Below 30
K_6	Current liquidity ratio	Below 50	50–70	Above 70
K_7	Net interest margin ratio	Below 5	5–8	Above 8
K_8	Earning assets level	Below 50	50–85	Above 85
K_9	Resource base stability coefficient	Below 50	50–70	Above 70
K_{10}	Share of overdue loans	Above 4	2–4	Below 2
K_{11}	Maximum exposure to one borrower	Above 25	25–20	Below 20
K_{12}	Customer base ratio	Below 70	70–80	80–100
K_{13}	Consumer loyalty index	Below 30	30–50	Above 50
K_{14}	Share of the regional deposit market	Below 5	5–15	Above 15
K_{15}	Market share of loans to non-financial organizations	Below 5	5–15	Above 15
K_{16}	Market share of loans to individuals	Below 5	5–15	Above 15
K_{17}	Gross regional product per capita	Below the all-Russian level	At the all-Russian level	Above the all-Russian level
K_{18}	Inflation rate in the region	Above the all-Russian level	At the all-Russian level	Below the all-Russian level
K_{19}	Business cycle stage	Bottom, decline	Rise	Peak
Social sustainability				
K_{20}	Share of the bank's investments in social projects	Below 2%	2–5%	Above 5%
K_{21}	Fair formation of tariffs for banking services, dividends, wages, bonuses	0–3%	4–6%	7–10%
K_{22}	Salary level of bank employees	At the level	Exceeds 1.2–1.5 times	Exceeds more than 1.5 times
K_{23}	Employee satisfaction with working conditions and wages	Below 30%	30–70%	Above 70%

Table 9 (continued)

	Indicator	Evaluation of criteria		
		0	1	2
K_{24}	The level of the bank's expenses (share of the wage fund) for staff development	Below 0.5%	0.5–5.0%	Above 5.0%
K_{25}	Charity spending level	No costs	Irregular costs	Fixed costs
K_{26}	The level of per capita income of households in the region in comparison with the average per capita money income of the population in the country as a whole	Below the national average per capita income of households	At the level of the national average per capita income of households	Above the all-Russian level of average per capita income of households
K_{27}	Share of the bank's investments in social projects	Below 2%	2–5%	Above 5%
Environmental sustainability				
K_{28}	Share of expenditures on natural resources, including energy, in the expenditures associated with supporting the activities of a credit institution	Above 4%	2–4%	Below 2%
K_{29}	Share of investments in projects related to environmental protection, rational use of natural resources	Below 0.1%	0.1–1.0%	More than 1.0% of investments
Institutional sustainability				
K_{30}	The level of information security of a bank	Low	Medium	High
K_{31}	The level of regulation of the internal processes of the bank	No	Partial	All internal processes are regulated
K_{32}	The level of development of the branch network (availability in the administrative centers of the region)	In one	In several	In most
K_{33}	The level of cooperation and integration of the bank with partners	Lack of cooperation	The presence of several projects in cooperation with partners	Developed level of cooperation with the bank's partners
K_{34}	The degree of development of the infrastructure of the banking sector in the region	Low	Medium	High
K_{35}	Banking legislation level	Low	Medium	High
Technological sustainability				
K_{36}	The level of digitalization of the bank and its internal divisions	0–2	3–6	7–10
K_{37}	The share of modern technologies in the organization and management of the bank	Below 0.1	0.1–1	Above 1
K_{38}	Bank and banking security level	0–2	3–6	7–10
K_{39}	The level of development of the bank's offline infrastructure	0–1	2	3–4
K_{40}	The level of development of the bank's online infrastructure	0–2	3–4	Above 4

Source: compiled by the authors.

Table 10

Types of sustainable development of commercial banks

Type	Value I_{sus}	Characteristics of a bank
Absolute stability	201–350	The Bank is characterized by a high level of profitability and capital adequacy, return on assets, liquidity of capital, availability of a sufficient resource base and flexible management system, and the use of modern banking digital technologies. The Bank has a fairly effective security system and developed infrastructure, has stable cooperative and integration partnerships, is distinguished by an open system for setting tariffs for banking services, dividends, and a fair system for assessing employees' work. The Bank participates in green financing and social projects
Normal stability	101–200	The Bank successfully develops, implements its strategy, and meets the expectations of business entities concerning the future profitability (return) of its capital while maintaining an acceptable level of risks for it. The Bank is characterized by the adequacy of its equity capital and a good ratio of the growth rates of the resource and client base, the ability, by regulating the growth rates of equity capital, liabilities and assets, to ensure a given return on equity with an acceptable level of risk and sufficient liquidity of operations. The Bank participates in social projects and/or projects aimed at reducing the environmental pollution
Unstable state	51–100	There are no violations of stability standards, but their values do not ensure the efficient operation of the bank. The average degree of development of the banking infrastructure, the irregularity of social projects and charitable activities, and the average level of profitability are characteristic
Crisis state	0–50	Regulatory violations are possible. The main indicators of the bank's activity are showing negative dynamics. The financial result of the credit institution is negative. The bank has a poor quality of capital and loan portfolio. Signs of legal and/or economic affiliation. The Bank does not participate in social and charitable projects

Source: compiled by the authors.

Thus, we have built a matrix of pairwise comparisons of five components (economic, social, environmental, institutional, and technological) to assess the sustainability of the development of a financial and credit institution (1):

$$\begin{pmatrix} & P_1 & P_2 & P_3 & P_4 & P_5 \\ P_1 & 1.00 & 1.43 & 3.33 & 1.43 & 1.25 \\ P_2 & 0.70 & 1.00 & 2.33 & 1.00 & 0.88 \\ P_3 & 0.30 & 0.43 & 1.00 & 0.43 & 0.38 \\ P_4 & 0.70 & 1.00 & 2.33 & 1.00 & 0,88 \\ P_5 & 0.80 & 1.14 & 2.67 & 1.14 & 1.00 \end{pmatrix}. \quad (1)$$

We also constructed matrices of pairwise comparisons and vectors of priorities (weights) of individual criteria for each component (*Tables 4–8*).

Based on the matrices of pairwise comparisons, we obtain estimates of local priorities for each considered component of the bank's sustainable development (P_1, P_2, P_3, P_4, P_5) using the convolution of each matrix into a vector and its normalization (2)—(7).

$$\begin{aligned} P_1 = {} & 19.984 \cdot K_1 + 22.482 \cdot K_2 + 24.980 \cdot K_3 + \\ & + 19.984 \cdot K_4 + 19.984 \cdot K_5 + 22.482 \cdot K_6 + 19.984 \cdot K_7 + \\ & + 19.984 \cdot K_8 + 19.984 \cdot K_9 + 19.984 \cdot K_{10} + + 19.984 \cdot K_{11} + \\ & + 19.984 \cdot K_{12} + 19.984 \cdot K_{13} + 14.988 \cdot K_{14} + 14.988 \cdot K_{15} + \\ & + 14.988 \cdot K_{16} + 17.486 \cdot K_{17} + 14.988 \cdot K_{18} + 17.486 \cdot K_{19}. \end{aligned} \quad (2)$$

$$P_2 = 7.452 \cdot K_{20} + 9.936 \cdot K_{21} + 7.452 \cdot K_{22} + \\ + 8.694 \cdot K_{23} + 8.694 \cdot K_{24} + \\ + 8.694 \cdot K_{25} + 6.210 \cdot K_{26} + 7.452 \cdot K_{27}. \quad (3)$$

$$P_3 = 2.236 \cdot K_{28} + 1.789 \cdot K_{29}. \quad (4)$$

$$P_4 = 6.151 \cdot K_{30} + 6.151 \cdot K_{31} + 5.382 \cdot K_{32} + \\ + 5.382 \cdot K_{33} + 6.151 \cdot K_{34} + + 6.920 \cdot K_{35}. \quad (5)$$

$$P_5 = 5.254 \cdot K_{36} + 4.670 \cdot K_{37} + \\ + 5.838 \cdot K_{38} + 4.670 \cdot K_{39} + 4.670 \cdot K_{40}. \quad (6)$$

The integral indicator for assessing the sustainable development of a regional commercial bank (I_{sus}), calculated on the scale of relative importance (*Table 1*) of each individual local criterion, has the form (11):

$$I_{sus} = 0.370 \cdot P_1 + 0.259 \cdot P_2 + 0.111 \cdot P_3 + \\ + 0.259 \cdot P_4 + 0.296 \cdot P_5. \quad (7)$$

For each component (local criterion), intervals of changes and corresponding assessments of the criteria for the degree of sustainable development of a commercial bank were constructed (*Table 9*).

We believe that based on the calculation of the integral indicator (7), four types of sustainable development of commercial banks can be distinguished: absolute stability, normal stability, unstable state, crisis state (*Table 10*).

CONCLUSIONS

The research allows us to draw the following conclusions. Currently, the definition of "sustainable development of commercial banks" is considered from the standpoint of three approaches: 1) as a state of equilibrium; 2) the ability to continuously perform functions under the influence of various factors; 3) the stability of its activities in the medium and long term. In our opinion, stability is a qualitative characteristic of the state of a bank throughout the entire interval of its development, allowing it to remain in an equilibrium state and continuously perform its functions when the external and internal factors change. The bank's sustainable development should be balanced, considering the economic, social, institutional and technological components.

As a result of the study, a method was developed for assessing the sustainability of a commercial bank's development, based on the use of the method of analytic hierarchy process. The methodology proposed by the authors provides for the calculation of an integral indicator considering five components: economic, social, environmental, institutional, and technological. This approach can be used by commercial banks when developing a strategy for the sustainable development of a financial and credit institution. The proposed methodology can be used by banks with both universal and basic licenses.

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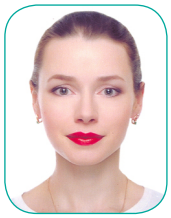

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Semenova N.N. — defined the problem, developed a conceptual framework of the article, developed a methodological approach to assessing sustainable development of banks, described the results and wrote the conclusions of the study.
Ivanova I.A. — designed tabular and graphical representations of the results, constructed an economic and statistical model.
Vasil'kina A.A. — collected research material, performed a critical literature analysis.

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