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Features of Decision-Making in the Process of Lending to Small Businesses: The BDI Model and Trust Indices

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ABSTRACT

The aim of the study is to identify the problems hindering the effective interaction of banks with SMEs and to determine the role of trust and other institutional factors in decision-making. Despite the recovery in the SME lending sector in 2019–2020, the needs of small firms in loans are not fully satisfied. The task of enhancing interactions between banks and the sectors under study requires a fundamental approach and is **relevant**. The BDI (Belief-Desire-Intention) model developed by M. Bratman was used as a **method** for investigating the decision-making process in the subject area under consideration. The place of this tool in the system of methods of analysis and support of decision-making processes is shown; the universality of the BDI model is substantiated and the main areas of its application are indicated. **The scientific novelty** of the paper is the modification of the BDI model, which is carried out by taking into account the trust factor and increasing the number of decision-making phases. **The prospects** of using the modified BDI model as a methodological basis for the formation of the architecture of banking ecosystems are considered. On the example of the experience of a quantitative assessment of the trust factor between banks and small firms, the possibilities of using the index method to measure other institutional factors of the modified M. Bratman model and determine the level of feasibility of a transaction planned in the area of lending are investigated. The author **concluded** that a necessary condition for enhancing the lending activities of banks interacting with small firms is the formation of an adequate institutional environment in accordance with the methodological principles outlined in this article.

Keywords: lending to SMEs; models and methods of decision theory; BDI model; trust index

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INTRODUCTION

Interaction of banks with small and medium Russian entrepreneurship for many years was characterized by very low credit and investment activity and many serious problems [1]. Over the last ten years, the situation has gradually improved, but the dynamics of lending to small and medium enterprises (SMEs) are characterized by significant unevenness. Analysis of data conducted in the work [2] allows to allocate three periods in the evolution of the indicator of the share of SME entities that attract credit:

1) relatively small growth of this indicator (2012–2015);

2) moderate growth (2015–2019);

3) high growth in the share of lending firms (2019–2021).

Deserve special attention 2020–2021. During this period, despite the support of the SME through a national project "Small and medium enterprises and support individual entrepreneurial initiatives",[1] SMEs development indicators are deteriorated [3]. In 2020 turnover due to quarantine measures decreased by 2.8 trillion rubles, or 6.0%.[2] According to the FTS, the number of SMEs subjects decreased from 2.51 to 2.36 million units, i.e. by 6.3%. The small and micro business segments, which account for 8.1 and 91.2% of the total number of SME, respectively, were most affected; and to a lesser extent — medium enterprises (0.7%), whose turnover declined less significantly.[3]

Economic indicators of SMEs lending, by contrast, showed positive dynamics, while in some cases reaching record values. So, according to the information and analytical agency Frank RG, the share of companies attracting loans for their development has more than doubled compared to 2019 (from 3.3 to 8%) in micro business; from 10 to 14.8% — in small business and from 25.3 to 26.6% — in medium business. The actual weighted average lending rate (including benefits) was 6.29% for micro-firms; 6.4% — for small firms and 7.62% — for medium firms [2]. According to the company "Expert RA", for 2020 banks issued SME entities loans totaling 7.6 trillion rubles and about the same (7.1 trillion rubles) in 2021 [3]. Positive dynamics of crediting SMEs was carried out against the background of consolidated state support of small business, the volume of which amounted to 2021–88.9 billion rubles.

Despite the high performance in the sphere of SME bank lending in 2020 and 2021, analysis of the situation shows that the problems of effective interaction between banks and Russian small businesses have not been solved.

First, this situation is temporary, situational conditions and is caused by, on the one hand, unprecedented low refinancing rates sustained a long period; on the other hand — extraordinary public support measures in conditions of a coronavirus pandemic (lending at preferential interest rates, credit holidays, etc.). The current high demand for loans is therefore not sustainable. Currently (summer-autumn 2022) the key interest rate is in the range of 7–9.5%, which is significantly higher than the average level of profitability of SME subjects. And if it continues to rise, the demand for credit will fall to the extreme. The same will be facilitated by a reduction in the volume of state support (including concessional

[1] National project "Small and medium enterprises and support individual entrepreneurial initiatives", 2018. URL: https://www.economy.gov.ru/material/directions/nacionalnyy_proekt_maloe_i_srednee_predprinimatelstvo_i_podderzhka_individualnoy_predprinimatelskoy_iniciativy (accessed on 17.12.2021).

[2] Kolobova M. Turnover is not there: small enterprises in 2020 lost 2.8 trillion rubles. Izvestia. 2021. 21 January. URL: https://iz.ru/1113935/mariia-kolobova/oborot-ne-tuda-malye-predpriiatiia-za-2020-god-poteriali-28-trln-rublei (accessed on 17.12.2021).

[3] Segments of SMEs: microbusiness — companies with turnover to 120 million rubles per year and/or with a number of employees up to 15 people; small business— companies with turnover from 120 to 800 million rubles per year and with the number of employees from 16 to 100 people.; medium business— companies with turnover from 800 million rubles to 2 billion rubles per year and with the number of employees from 101 to 250 people.

lending), which should be expected due to the special military operation on the territory of Ukraine, the imposition of large-scale economic sanctions and the growth of inflationary processes.

Second, the demand for loans from SME entities was not fully satisfied. According to research conducted by NAFR (National Association of Financial Research), on average, one in four small enterprises required credit, 10% of small firms required long-term resources and 14% — medium, but in the short-term — 19% small and 25.4% medium enterprises.[4] For now, these targets have not been met.

Third, the banks' potential to lend to SMEs was far from exhausted. At present, the credit market for SMEs is a duopoly: high level players — Sberbank and VTB. For other banks, small businesses remain persona non grata.

Fourthly, in the short time of more intensive interaction between banks and small firms, it has not been possible to form a sustainable relationship and partnership model characteristic of foreign enterprises [1, 4, 5]. In this regard, it is not clear how loyal the attitude of banks to SME subjects in a crisis situation will be. According to the forecasts of the agency "Expert RA" the expected percentage of overdue debt will be significantly higher than 13% [3]. Banks may be reluctant to restructure debt and, in some cases, will exercise their flexibility to change credit rates unilaterally, thus putting small firms in a difficult position.[5]

Thus, the task of ensuring effective interaction of Russian banks with the small business sector requires not situational, a fundamental approach consisting in the complex analysis of problems, the use of a wide range of economic and mathematical methods and the formation of the most favorable infrastructure for lending to SMEs.

REVIEW OF MODELS AND METHODS FOR ANALYSING DECISION-MAKING PROCESSES

Decision-making processes occupy an important place in the theory of strategic planning and development of economic objects, including — SMEs sector. When the interaction of economic entities is characterized by a low level of activity (as it happens between Russian banks and small firms), it is necessary to identify the causes of the situation, in particular — the research of the factors and hypotheses, which are used decision maker (DM) in current of its transactions. From this perspective, the following groups of models are distinguished:

1) rational decision-making models based on quantitative indicators and criteria;[6]

2) heuristic-individualistic models based on the theory of bounded rationality, based on the experience and intuition of DM [6, 7];

3) socio-behavioral models, also based on the bounded rationality hypothesis, but using norms, traditions and other behavioral institutional settings that are used in society [8–10].

These models are within two main scientific approaches: neoclassical and neoinstitutional (*Fig. 1*).

The neoclassical approach (which is by far the most developed and based on the hypothesis of rational behavior of the DM) is represented by three main directions:

1) find a solution based on different types of optimization tasks (including single criteria and multi-criteria);

2) decision-making based on statistical relationships (trend forecasting, Altman

[4] Berezina E. The loan is out of reach. Russian Gazeta. 2016. No. 117 (6985). URL: https://rg.ru/2016/05/31/potrebnost-malogo-i-srednego-biznesa-v-kreditah-uvelichilas.html (accessed on 19.05.2020).

[5] Korolev S., Esmanskiy A. Bank's unilateral interest rate increase: how to dispute if such a possibility is provided for in the contract. EJ Lawyer. 2019;19(102).

[6] Chernyak V.Z. Methods of making management decisions. Textbook. Moscow: Academia; 2019. 296 p.; Golubkov E.P. Methods of managerial decision making. In two volumes. Moscow: Publishing in Yurayt; 2022. 183 p. URL: https://urait.ru/bcode/489387 (accessed on12.10.2022).

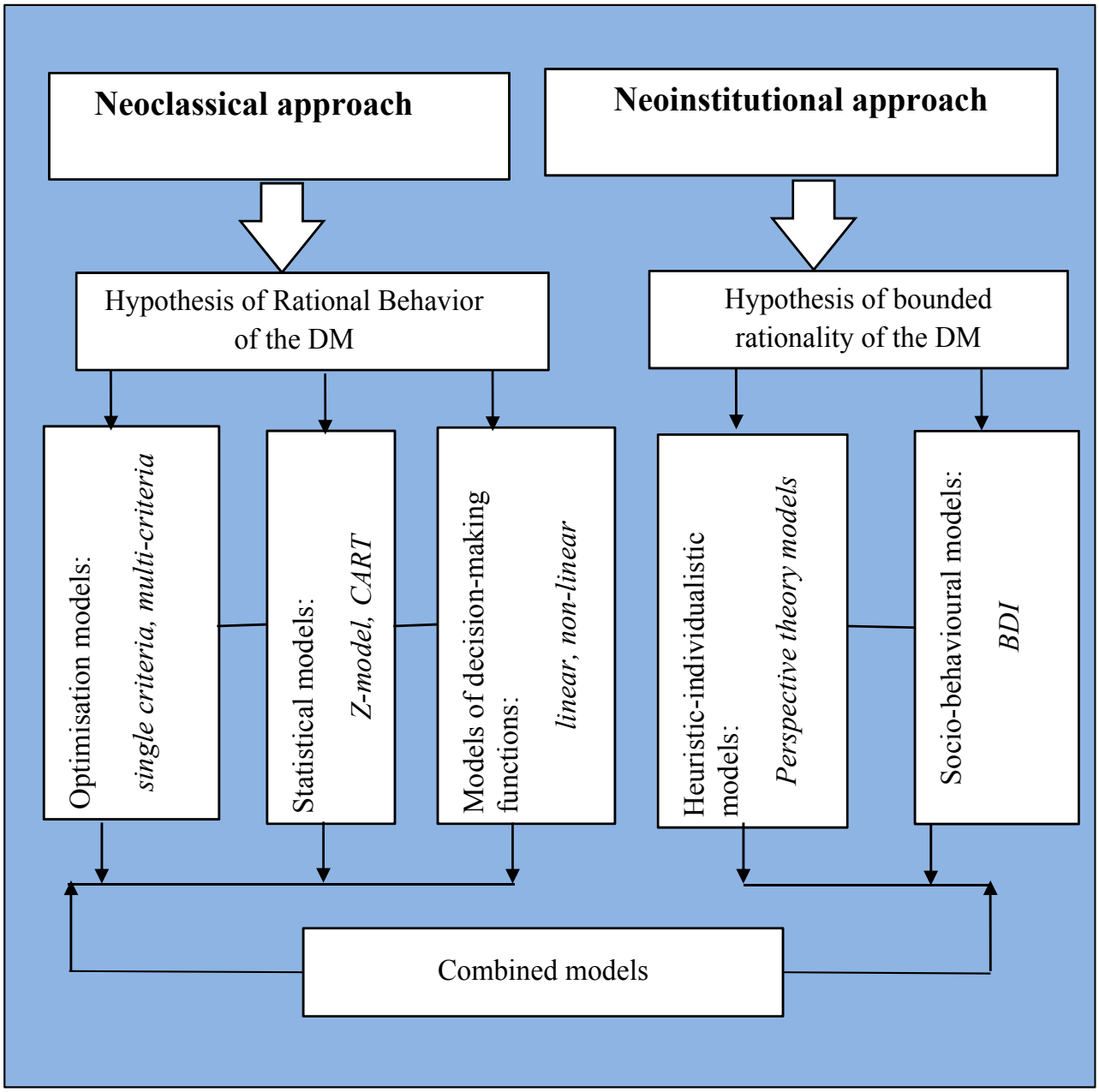

Fig. 1. **Classification of models and methods for analyzing the decision-making process**

Source: developed by the author.

Z-model for bankruptcy assessment, CART classification tree model (Classification Aggregation Regression Trees), etc.;

3) decision-making based on the determination of the utility function formed by algorithmic processing of decision archives, done previously by DM.

Methods for determining a utility function include — hierarchy methods (Saati), STEM etc., the most famous Zionts-Wallenius (ZW) method allows to determine weights of criteria used from formed inequality systems [11–13].

Thus, if it is known that previously considered options are preferable $i = \overline{1,n}$

$$W_1 \succ W_2 \succ \ldots \succ W_i \succ W_n, \qquad (1)$$

where W_i — utility function by i-option and criteria were used in decision-making $f_1, f_2, \ldots, f_m$, $j = \overline{1,m}$, weighting factors, reflecting the relevance of these criteria can

be found (under certain assumptions) by the following ratio system:

$$\begin{cases} \sum_{j}^{m} (\widehat{f_{1j}} - \widehat{j_{2j}})\xi_j \geq 0, \\ \ldots\ldots\ldots\ldots\ldots \\ \sum_{j}^{m} (\widehat{f_{ij}} - \widehat{f_{(i+1)j}})\xi_j \geq 0, \\ i = \overline{1, n-1}, \end{cases} \quad (2)$$

where $\widehat{f_{ij}}$ — numerical value of criterion j by i-option; m — number of criteria; n — number of options to consider; ξ_j — required value.

ZW method, along with other similar methods, served as a methodological basis for the future construction of more complex artificial intelligence systems, algorithmically providing decision-making processes for cases of linear utility function. In determining non-linear utility functions (which are most characteristic of economic realities), more complex mathematical constructs, such as neural network models, are used.

The models described above are applied to solve a variety of tasks of development SMEs. So, optimization models can be used when substantiating the most effective combinations of different investment resources for the development of small firms; CART models and Z-model — for express analysis of economic status of a small enterprise; utility functions — for select options for the development of subjects SMEs, etc.

The main disadvantage of the neoclassical approach is that the decision-making procedure itself is not disclosed and is considered as a whole, and an entity participating in this procedure (DM) is "charged" with some set of criteria and conditions under which it operates.

The neo-institutional approach uses heuristic institutional and socio-behavioral models of decision-making analysis and process description using categories of institutional economy and behavioral characteristics by DM. So, H. Simon thought that the choice of a person depends on stereotypes, habits, his simplified representation of reality, which allows him to cope with uncertainty. As a result, the DM is not making optimal, but satisfactory, decisions commensurate with its level of claim [6]. Models of perspective theory [7] apply to the analysis of situations with very high uncertainty (for example, in cases where there is no opportunity to take advantage of social experience stereotypes). In particular, according to these models, DM tends to underestimate high risks and overestimate low risks when solving tasks in these situations. Modern research conducted in 2020 on large and representative data sets confirmed the presence of 12 of the 13 behavioral effects discovered and proven earlier by Daniel Kahneman and Amos Tversky. The formalized representation of these effects, demonstrating the bounded rationality of the DM, allowed us to obtain a heuristic perspective theory model [14].

Socio-behavioral models (which include the BDI model below) take into account social experiences; they are used primarily for qualitative analysis of the specific decision-making process under consideration.

The current trend in economic research is a tendency convergence between the two approaches.

On the one hand, there is a departure from the "rigidity" of formal models and the introduction of the hypothesis of bounded rationality of DM behavior. For example, formal models are supplemented by heuristic processes [15]; they introduce unclear variables [16] etc.[7] In the same direction, simulation modeling are developed, suggesting that in key points of the model

[7] According to many researchers, this modification of models makes them more realistic. So, T. Peters, R. Waterman consider that "the quantitative approach is accurate enough to become dangerously erroneous and, in the opinion of some, has already led us to serious errors" [17].

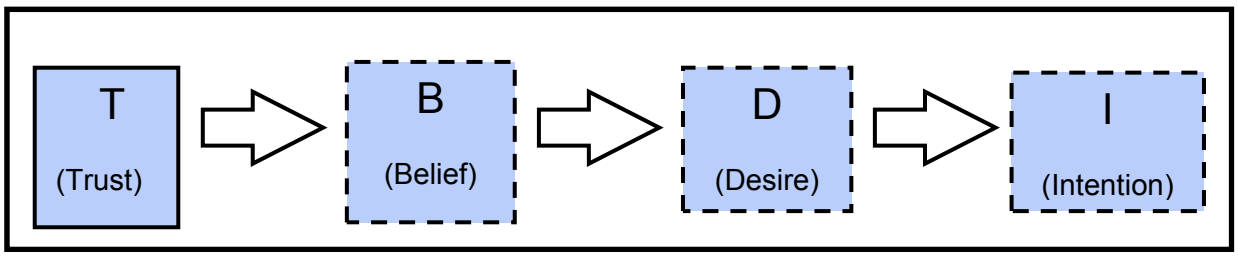

Fig. 2. **Scheme of the modified TBDI model**
Source: developed by the author.

the decision is made by the DM, using both formalized criteria and subjective preferences that difficult to formalize [18, 19].

On the other hand, the traditional qualitative analysis of decision-making processes through neo-institutional models is complemented by formal methods, the use of economic indicators, and the use of index methods and ordinal scales, etc.

The trend of convergence can be considered as one of the mainstream currents of modern economic science, which makes the issues of application and modification of models of decision-making processes, of course, relevant.

BDI MODEL AND ITS MODIFICATION

Among the models of decision-making processes known in the foreign literature is the three-phase mental model of M. Bratman, also called the BDI model [10]. It involves structuring decision-making according to three mental phases:

1) Belief;
2) Desire;
3) Intention.

According to M. Bratman, homo economicus is an "planning" economic agent whose activity involves the implementation of these phases [9, 20].

The theoretical significance of the BDI model is that it reflects, on the one hand, the main components of the decision-making process. These are, firstly, DM beliefs formed on the basis of knowledge (both true and false); as well as information from the external environment and his personal experience as presented in the first phase of the model. Second, the motivational aspect that determines DM's interest in carrying out the proposed transaction, which is contained in the second phase of the model. Third — intentions reflecting the target component of the solution already in the final phase of the BDI model.

On the other hand, the separation of the decision-making procedure into phases, by M. Bratman, allows the analysis of this process to be carried out in detail and more efficiently to find the reasons for failure in the implementation of potential transactions.

The practical value of the BDI model is to identify the weakest link in the decision-making process. If the first phase is the weak link, then in order to activate the planned transactions between economic agents, the main efforts should be directed to the development of the information base on which reliable knowledge and beliefs are formed. If the second phase is the bottleneck, the motivation of actors in decision-making should be strengthened. Implementation of the third phase requires the establishment of the necessary organizational infrastructure.

In this regard, the BDI model is as much a strategic analysis tool as the well-known matrix of the Boston Consulting Group (BCG), operating market share and growth rates and linking the development stage of the facility with investment policy. At the same time, similar to the BCG matrix, the BDI model allows us to assess investment policy priorities at a qualitative level, as well as to substantiate the need to concentrate not only

investment, but also other resources on the most promising growth points.

The scientific hypothesis further developed in the article is that the BDI model should be modified by adding another institutional factor — trust [21, 22]. The need for such a transformation of the M. Bratman model is due to the fact that the trust factor is, first, a prerequisite for any business transaction and, second, a significant impact on the realization of other mental phases of decision-making.

S. Kripke's research supports BDI model modification, in which the thesis that beliefs, desires and intentions are linked to their attainability, which depends to a large extent on the level of trust [23]. When introduced into the Trust Factor model, the modified M. Bratman model is presented in the *Fig. 2*.

Especially relevant is the consideration of a modified version of the TBDI model in the context of the Russian economy, since Russia is characterized by one of the lowest levels of public confidence, measured in accordance with international methodologies by two main indices: ETB index (Edelman Trust Barometer), and the WVS index (World Values Survey). Thus, the WVS index was 27.8% in Russia in 2011–2013, while China— 60.3%, Netherlands — 66.1%. Low levels of trust negatively affect all phases of decision-making: forming beliefs, motivations and intentions.

Application of the modified TBDI model is possible for a wide range of tasks arising in the Russian economy. However, it is most appropriate where trust factor plays a particularly important role. As shown in the works [1, 4], among these tasks is include enhancing interaction between the banking and small business sectors, which traditionally have a particularly low level of trust, while the scope of ongoing credit transactions requires increased mutual trust. The word "credit" comes from Latin credio — trust.

On *Fig. 3* shows the dynamics of the volume of loans issued to all enterprises and separately — SMEs (bottom curve), which indicates the predominance of bank lending to large companies. Even taking into account that large enterprises dominate the institutional structure of the Russian economy, the gap in the values of the economic indicators is obvious and too large.

The TBDI model is universal and can be used not only to analyze specific decision-making processes, but also to create a balanced architecture of different organizational systems. Currently, in the banking sector, there is an active process of creating banking ecosystems, including — in the segment of lending to SMEs, where the leaders are Sberbank and VTB. Common understanding of the banking ecosystem has not yet developed. Further, the ecosystem of the bank means such a subsystem, the purpose of which is the dynamic formation of its external environment on the basis of a powerful digital platform in order to solve the problems not only own, but also business partners interacting with it, ensuring coherence of socio-economic interests of all participants on the principles of Pareto-optimality.

The potential of banking ecosystems (BE) in lending to SMEs is as follows:

- scope of coverage of small businesses, speed, convenience and efficiency of business decisions, which is achieved by the use of modern digital technologies;
- expansion of the range of services provided by the bank due to the so-called non-core banking services (which are in the most demand among small businesses), which additionally increases the contingent of bank customers;
- forming long-term relationships based on increased trust; improving the investment climate at the bank level — small enterprises; ensuring a greater flow of funds to the SMEs sector, etc.

The analysis of BE objectives, functions and capabilities based on the TBDI model leads to the conclusion that its balanced architecture

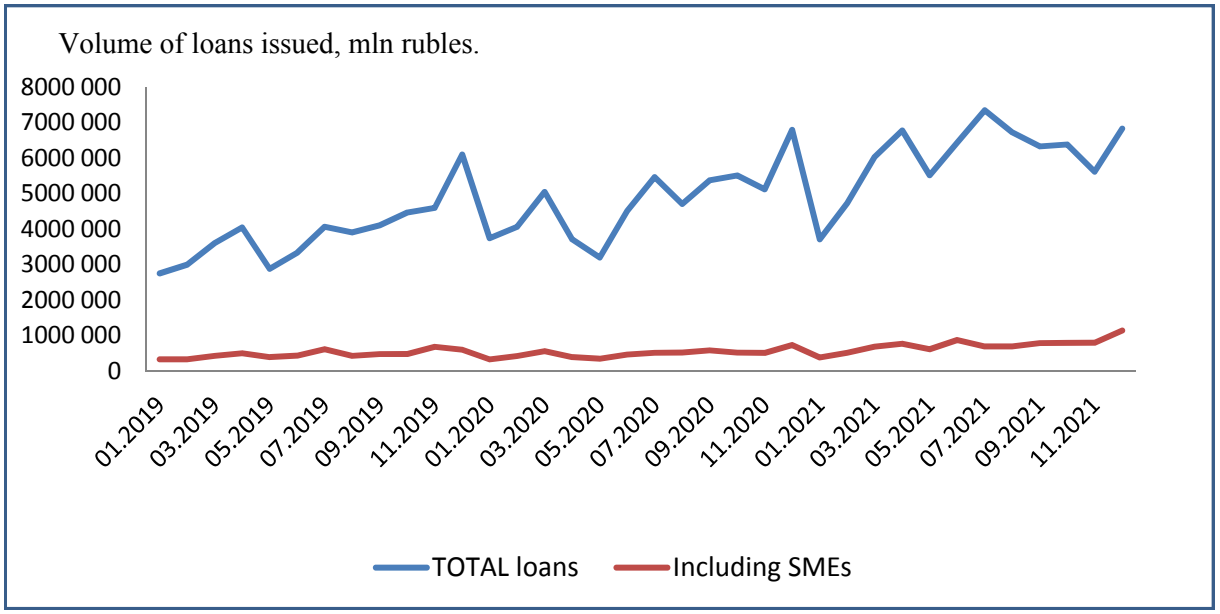

Fig. 3. **The volume of loans provided by the 30 largest banks in 2019–2021 to their borrowers**

Source: data of the Central Bank of the Russian Federation, [5].

should correspond to the four phases of the decision-making process.

That is, BE according to the phases of the model should provide:

Trust — maximum openness and transparency of information in order to build trust relationship between bank and small firm.

Belief — advising a small firm on its development and prospects for changing the external economic environment; development of reasonable recommendations for crediting the client not only on the basis of standard banking products, but also with the possibility of individualized approach, including on the basis of the application of economic and mathematical tools (*Fig. 2*).

Desire — consistency of interests on a sufficiently representative set of criteria, which in addition to the volume, timing and value of the loan rate may include a list of additional non-core banking services (information support, legal support, accounting, inventory accounting and logistics, etc.). The formation of such "complex packages" of offers is advantageous both for the bank (obtaining additional profit from non-core services, income from accounting and cash services of enterprises, etc.), and for small firms, who often have no business experience and are ready to transfer some of these managerial aspects to the bank on the principles of outsourcing.

Intention — the most favorable conditions for a small firm to implement a loan and repay debts. Including the possibility of credit holidays, debt restructuring to maintain and strengthen long-term relationships, etc.

Another important aspect of the analysis of the TBDI model is to investigate the possibilities of quantifying its mental phases using some parameter system, which will certainly widen the scope of its practical application. To this end, the model should be supplemented by some quantitative indicators reflecting the level of importance of institutional factors considered in the decision-making process. This can be achieved, for example, by using index methods. Synthetic indices characterizing the potential feasibility of the solutions in general may also be used.

So, if I^1, I^2, I^3 and I^4 — these are indices that reflect the level of trust in the relationship, as well as the level of information, motivation and organizational security of the potential contract,

Table 1

Results of decision evaluation based on the index approach and the TBDI model

Decision	Trust I^1	Desire I^2	Belief I^3	Intention I^4	Synthetic Index I^{int}
1	0.6	0.7	2	0.7	0.2351
2	0.6	0.5	0.4	0.5	0.06

Source: compiled by the author.

and if their values are high (on some selected scale), that their multiplication I^{int} will reflect the high degree of realization of the proposed transaction, where

$$I^{int} = I^1 \cdot I^2 \cdot I^3 \cdot I^4. \quad (3)$$

In the *Table 1* as an example the results of assessment of two different solutions using the index approach and the TDBI model are given.

It is obvious that the first solution is more balanced in the phases of the TDBI model and more feasible than the second solution (due to higher index I^{int} value). The second decision is characterized by a barrier to its implementation, as evidenced by the low value of the index $I^3 = 0.4$. At the same time, there is another barrier in the decision-making process according to the index $I^2 = 0.5$. Thus, the chances of a second decision being taken are small.

Analysis of condition, developed over the last 10–15 years in the SMEs lending market, conducted in the article [4], leads to the conclusion, that the most common situation when making a credit decision is the option, presented in *Table 1* at number two. The bottleneck in the decision-making process is, firstly, the lack of motivation (unfavorable ratio of interest rate for credit to average profitability of small firms) and insufficient information security of partners involved in credit transactions.

However, a more accurate assessment of the situation could be made if the actual values of the indices given in the *Table 1*. Currently there is no method for calculating indices I^2, I^3 and I^4. Their development is the subject of special researches. It may be useful for these studies to be carried out by specialized information and analytical agencies through questionnaires and interviews with a wide range of respondents. Significantly better developed methods of index assessment of the level of trust in relations, but they (as shown in the paper [4]) need to improve, as well as to adapt them to the task under consideration of interaction between banks and subjects of the Russian SMEs. The fundamental possibility of an index method to describe the institutional categories under consideration is illustrated below by the trust category.

TRUST CATEGORY: PROBLEMS AND METHODOLOGICAL PRINCIPLES FOR ITS QUANTITATIVE MEASUREMENT

The interest in the problem of trust began in the 1980s last century and is related to the development of the concept of social capital presented in the works J. Coleman [21] and F. Fukuyama [22], who considered that trust was a prerequisite for long-term business linkages. In essence, trust is the expectation of good-faith (neo-opportunist) behavior of one economic entity towards another in a situation where the first has voluntarily subordinated the achievement of its interests to the actions of the second. Trust cannot be

Table 2

The level of trust in the WVS index and the level of development of the SME sector for selected countries in 2011–2013

Country	Level of trust, %	GDP per capita, in US dollars	The share of SMEs in the country's GDP, %
Netherlands	66.1	49128	63.0
China	60.3	6093	60.0
Sweden	60.1	59593	58.0
Austria	51.4	48348	58.0
Germany	44.6	46269	53.9
Singapore	37.3	54007	51.0
Russia	27.8	13324	21.2

Source: compiled by the author according to the data of the Central Bank of the Russian Federation (the main economic indicators of SMEs) and [24] (values of the WVS trust index).

negotiated or reflected in the contract, it is an informal institution developing on the basis of the experience of interaction of agents. At the same time, it acts as a tool to compensate for uncertainty, reduce the complexity of the system.

The development and maintenance of successful long-term relationships based on the trust of the parties is a prerequisite for mutually beneficial inter-firm contacts, improving competitiveness, reducing the risk of opportunism, which is especially important in an increasingly dynamic and unpredictable business environment [24]. Trust helps DM to maintain cooperation with established partners and to keep it from entering into short-term alternative cooperative relationships. An analysis of the trust factor helps to understand why a relationship with similar economic data can be perceived by the parties as either successful or unpromising.

The level of trust has a significant impact on the economic growth of the entire national system and its individual sectors, including — small and medium enterprises. The analysis of statistical data makes it possible to establish an obvious link between the level of trust and the degree of development of the SMEs (*Table 2*). This trend continues in the subsequent period (2013–2020).

At the same time for the development of the SME sector is important not only the indicator of public confidence in general (indices *ETB, WVS*), but also the level of mutual trust between it and the banking sector as a driver of growth.

In comparison with the countries of the West, where banking has been formed for more than a century and where there is a "partner" model of interaction between banks and SME entities (based on the principle of tolerance and a high level of trust), in Russia, the situation is quite different, with a low level of trust between these sectors. Much of this is determined by the history of the relationship between them, which is enshrined in the relevant informal institutions. At the same time, small enterprises and banks explain the situation in different ways. There are two "truths".

From the point of view of small firms, Russian banks — are "financial egoists" and "business sharks", who are interested only in their own profit. Communication with them is dangerous and can be destructive for the enterprise. In case of overdue debt, debts can be transferred to collectors. At the same time,

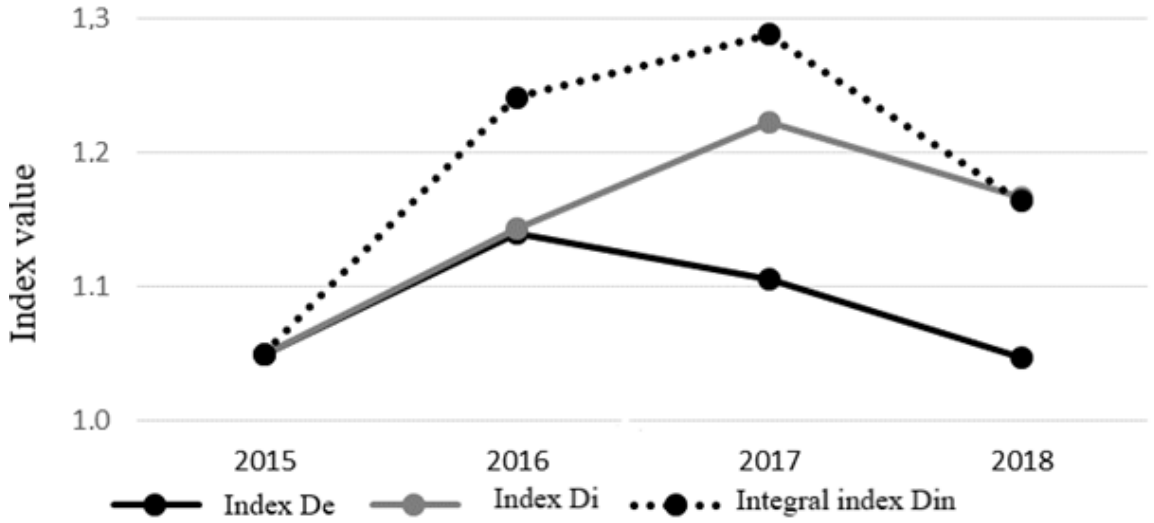

Fig. 4. ***De, Di* and *Din* Mutual Trust Indices in 2015–2018**

Source: Egorova N.E., Smulov A.M., Koroleva E.A. [4].

these are unstable financial structures: when the license is revoked and bankruptcy occurs, there is a freeze of the company's accounts, cash breaks, etc.

From the bank's point of view, SME subjects — are disadvantageous clients, as they are usually characterized by unstable financial position and low profitability, are often unscrupulous borrowers with a strong shadow component; the average amount of credit is low, and the labor intensity of the credit contract is high (including due to the low financial literacy of entrepreneurs), etc. Thus, according to the rating agency "Expert RA", the share of overdue debt of SME entities in 2015–2020 was on average 13–15% and was 3 times higher than that of large enterprises and 2 times higher than that of individuals [3]. It is for these reasons that small enterprises have for many years faced the refusal of Russian banks to issue credit.

Currently, there are a number of methodologies to measure the level of trust, including at the level of banks and SME entities. These include NAFR research (National Association of Financial Research), HSE, Levada-Center, Alfa Bank etc. They are usually based on survey data, less often economic indicators. In addition, unilateral trust is usually measured (one economic entity or sector of the economy against another). However, decision-making requires, firstly, mutual trust; secondly, trust of economic agents is formed on the basis of both statistical indicators and on the basis of the past experience of their relationships, routines available in society, etc.

In the series of works conducted under the guidance and with the personal participation of the author, issues of quantitative measurement of the level of trust between the banking sector and SME on the basis of the proposed synthetic index were comprehensively considered. This index implies a convergence of rational and institutional approaches and reflects the duality of the process of building mutual trust between the sectors under consideration, that consists of using both economic indicators and institutional characteristics of interaction experiences, transparency, etc. [1, 4].

This is reflected in the following basic formula:

$$I^1 = Din = De \cdot Di\,, \qquad (4)$$

where Din — integral mutual trust index; De — economic index (emerging from selected set of economic indicators); Di — institutional index (based on surveys).

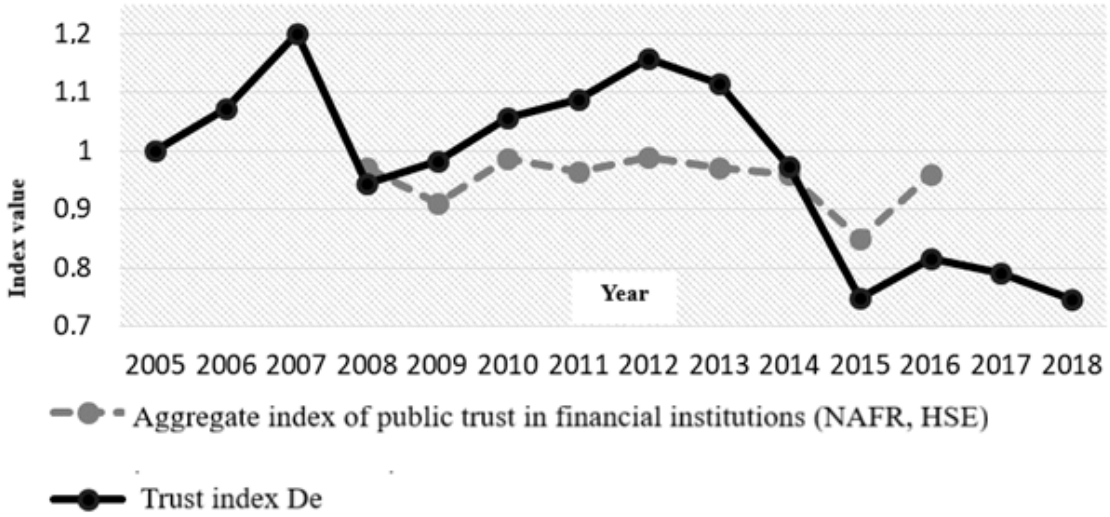

Fig. 5. **Trust indices (*D*e and the aggregate index of public confidence in financial institutions)**
Source: Egorova N.E., Smulov A.M., Koroleva E.A. [4].

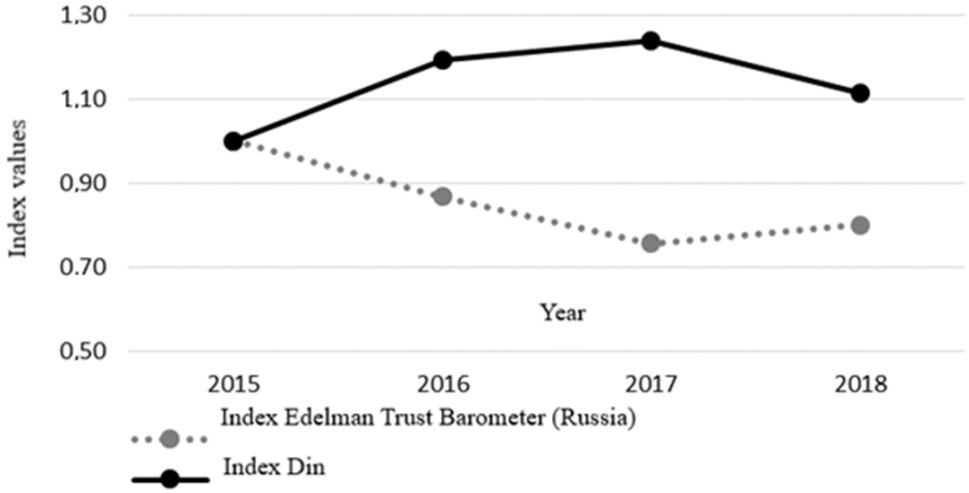

Fig 6. **Dynamics of the *D*in and Edelman Trust Barometer indices in 2015–2018**
Source: Egorova N.E., Smulov A.M., Koroleva E.A. [4].

The set of economic indicators used in the formation of the economic index *D*e, includes five indicators that describe both the ratio of banks to lending to SMEs and the ratio of small and medium firms to banks as borrowers of financial resources.

Economic indicators characterizing the position of banks include:

4) share of SME loans in bank assets (the bank's activity intensity in the SME lending sector and its inclination to work with small firms);

5) ratio of SME loans to small business sector turnover (reflects banks' trust in small and medium firms as it characterizes their growth potential through credit and investment);

6) average return on SME assets (key to the decision: the higher the profitability, the higher the trust of the bank to the SME subject).

Among the economic indicators characterizing the ratio of SME entities to banks are:

1) spread (difference) between the credit rate and the key rate of the Bank of Russia (the lower it is, the more favorable for small enterprises credit conditions and higher trust to the bank);

2) bank security of equity (the higher the security ratio, the more reliable the partner is and the higher the trust of SMEs).

The institutional component of the proposed mutual trust index is formed as a definite aggregate of results of surveys of high-rating agencies that have investigated the level of trust between the sectors under consideration.[8]

EXPERIENCE OF PRACTICAL CALCULATIONS OF MUTUAL TRUST INDEX BETWEEN THE BANKING SECTOR AND SMES

On the basis of available statistical information and survey data, calculations of the proposed integral index of mutual trust between the banking and business sectors were implemented and their verification was carried out on the basis of existing experience in computing similar indicators by other sectors highly rated analytical agencies. Verification was carried out both for the local components of this index (economic and institutional components) and for the integral index as a whole, which is presented at *Fig. 4–6*.

Verification of the developed index indicates about good interpretation of the results. In particular, this is confirmed by comparing the calculations with the results of similar studies on measuring trust, for example, with the aggregate index of public confidence in financial institutions (NAFR, HSE research). Since the index *D*i reflects general trends in trust due to its construction, the comparison was made for component *D*e, which is close in economic content to the total index of trust in financial institutions (*Fig. 5*). This comparison led to the conclusion that the results obtained from the above-mentioned tested methodology were very similar.

Uptrend and downward trends on charts generally match. Divergence of the curves on *Fig. 5* in 2008–2009 can be explained by the fact that the aggregate index of public confidence in financial institutions did not fully reflect the impact of the crisis in the banking sector on small business, when credit resources became completely inaccessible to SME, which affected the decline of the index *D*in.

The obtained dynamics of the integral index *D*in was compared with the dynamics of the international trust index ETB — index Edelman Trust Barometer (*Fig. 6*).

Figure 6 illustrates the divergence of trends in the ETB and *D*in indices, which can be explained by the following hypotheses about the reasons for their different dynamics. The aggregate ETB index provides an assessment of trust not only in business and banks, but also in the media, the State and non-governmental organizations. Apparently, in the period 2015–2017, trust in other institutions was much worse than in business and banks, which led to a downward trend, and in 2018 the opposite was true (trust in banks declined, while trust in other market players increased).

For more information on the calculation of mutual trust indices between banks and SMEs, contained in the works [1, 4].

CONCLUSION

Analysis of the problems of lending to SMEs has revealed a number of factors that hinder the active interaction of banks and small firms. These include: ratio between the level of profitability of small enterprises and the average interest rate, insufficient amount of state subsidy of this rate, absence or insufficient degree of other types of assistance to small business, etc. In addition to economic factors, there are institutional factors that also have a negative impact: absence of partnership model of relationships and stable relations between the economic agents under consideration, negative experience of their interaction in the past, established in "social memory", etc. The said features of the lending sector

[8] The method of index construction is more detailed in the work [4]. The assessment of the effects expected from the growth of the trust level is also considered there.

of small and medium enterprises allow to formulate a conclusion about the need to study the decision-making processes in the subject area under consideration on the basis of attracting a wide range of methods. The article provides a classification of the main methods of decision-making theory, including models and methods based on both the hypothesis of rational behavior of DM and the hypothesis of bounded rationality, as well as combined models. Special attention is paid to the M. Bratman model BDI (Belief, Desire, Intention), which is considered in the appendix to its lending to small and medium enterprises. It has been substantiated that in the conditions of the Russian economy (and in particular in the study of procedures of lending to SMEs) it is expedient to use an extended modification of this model with the inclusion of the trust factor. Methodical principles of using the modified model for assessing the feasibility of transactions implemented in the sphere of lending to small enterprises are developed, and to form an architecture of banking ecosystems focused on the small business segment. Prospects of using the index method for quantitative assessment of institutional factors included in the M. Bratman model have been formulated, which is confirmed by the experience of mutual trust indices between banks and small enterprises.

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