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METHODS REVIEW FOR ASSESSING THE INVESTMENT ATTRACTIVENESS OF INNOVATIVE BANK TECHNOLOGIES

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The use of information and communication technologies significantly changes the modern business space. Today banks are actively applying approaches to customer service, based on the use of innovative information technologies. These technologies provide a competitive advantage for a bank and contribute to growing its profitability [1, p. 134, 2, 3]. At the same time, it is risky to invest in innovations, since new technology implementation may not bring the desired effect. Therefore, the investment attractiveness assessment of innovative banking technologies is actual for banks, and the use of assessment will avoid inefficient and risky investment decisions.

The investment attractiveness of states, regions, and enterprises has been studied in great detail and many scientific papers have been devoted to its consideration. At the same time, the issue of investment attractiveness of innovative projects is paid much less attention and there are no uniform universal approaches to calculating the indicators of investment attractiveness of innovative projects.

The study's purpose is to review methods for assessing the investment attractiveness of projects related to the implementation of innovative technologies in the banking sector.

Innovation is impossible without investment, and investment makes sense only for the realization of something new. Mostly the innovation efficiency is viewed through investment activity. For example, the identity of methods for evaluating the effectiveness of innovative projects and investment projects are noted in [4, p.80]. To assess the investment attractiveness of innovative projects, mostly use two groups of methods: static and dynamic. Static methods are based on the economic evaluation of the project and don't take into account the project duration and the inequality of cash flows during its life cycle. The main advantages of these methods are their simplicity for understanding and calculating. Also, these methods allow ranking projects [5, p.150]. Dynamic methods are based on the principles of economic theory and apply the concept of "cash flow" and the concept of "discounting". These methods allow us to take into account the change in the value of money during the project lifecycle, the required rate of return, and project risk [4, p.75; 6].

Indicators of static methods:

1. The payback period *PP* is the minimal value of the period required to recover the investment cost *IC* by the net cash flows *CF* generated by the project. [5, p.150].

Another definition:

The payback period *PP* is the ratio between the required investment *IC* (or sometimes the average investment) to the average annual net income $\underline{P}$ [7; 8, p. 127].

Formula: $PP = min\ n$, when $\sum_{k=1}^{n} CF_k \geq IC$, *where k* – period. $PP = \frac{IC}{\underline{P}}$

Decision Rule: Choose the project with the shortest payback period.

The payback period for single project must be economically reasonable.

2. Single rate of return *SRR* - the ratio of net income *P* to the value of the required investment [5, p.150; 8, p. 127].

Formula: $SRR = \frac{P}{IC}$

Decision Rule: The project can be accepted if the SRR value exceeds the normative (desired) level of profitability. The project with a higher SRR value is more preferable.

3. Average rate of return *ARR* - the ratio of average annual income $\underline{P}$ to the value of the required investment *IC* [8, p. 128].

Formula: $ARR = \frac{\underline{P}}{IC}$

Decision Rule: The project can be accepted if the ARR value exceeds the normative (desired) level of profitability. The project with a higher ARR value is more preferable.

4. Accounting rate of return *ARR* is the ratio of average annual income to the average value of the investment. If the residual or liquid value RV is forecasted, its estimate should be taken into calculations [5, c.150].

Formula: $ARR = \frac{\frac{P}{N}}{\frac{(IC+RV)}{2}} = \frac{2P}{N \cdot (IC+RV)}$, *where N – the number of periods.*

Decision Rule: The project can be accepted if the ARR value exceeds the normative (desired) level of profitability. The project with a higher ARR value is more preferable.

5. The ratio of income and expenses *R* - the ratio of net income *P* to the sum of required investment *IC* and operating (current) costs *E* [8, p.128].

Formula: $R = \frac{P}{IC+E}$

Decision Rule: The project can be accepted if $R > 1$.

Indicators of dynamic methods:

1. Net present value *NPV* is the excess of the total amount of discounted net

cash flows generated by the project CF_k over the amount of investment costs IC [5, c.151; 7; 8].

Formula: $NPV = \sum_{k=1}^{N} \frac{CF_k}{(1+r)^k} - IC$, *where r - project discount rate.*

Decision Rule: If $NPV > 0$ the project can be accepted. Otherwise, it must be rejected.

2. Discounted payback period DPP is the minimal value of the period required to recover the investment costs IC by the discount net cash flows generated by the project [5, c.152].

Formula: $DPP = n$, when $\sum_{k=1}^{n} \frac{CF_k}{(1+r)^k} \geq IC$

Decision Rule: The project can be accepted if the project implementation period exceeds the *DPP* value.

3. Profitability index *PI* - the ratio of the total amount of discounted net cash flows generated by the project to the investment costs *IC* [5; 8].

Formula: $PI = \frac{\sum_{k=1}^{n} \frac{CF_k}{(1+r)^k}}{IC}$

Decision Rule: If $PI > 1$ the project can be accepted. Otherwise, it must be rejected.

4. The internal rate of return *IRR* is the interest rate at which $NPV = 0$ [5, c. 152; 7].

Formula: $IRR = r_1 + \frac{NPV(r_1)\cdot(r_2-r_1)}{NPV(r_1)-NPV(r_2)}$, where r_1 - the interest rate at which $NPV > 0$ ($NPV < 0$); r_2 - the interest rate at which $NPV < 0$ ($NPV > 0$).

Decision Rule: The project can be accepted if the IRR value exceeds the cost of capital.

5. Modified internal rate of return MIRR is the discount rate at which the present value of the investment costs is equal to the future value of the cash flows [5, p. 153].

Formula: MIRR value is determined from the equation:

$$\sum_{j=1}^{m} \frac{IC_j}{(1+r)^j} = \frac{\sum_{k=1}^{n} CF_k \cdot (1+r)^{n-k}}{(1+MIRR)^{\mathrm{T}} IC}$$

Decision Rule: The project can be accepted if the MIRR value exceeds the cost of capital.

These groups of methods can be extended by risk methods that take into account the risks of investing. There are method of equivalent certainty [6; 9; 10]; method of adjusting the risk of the discount rate [9]; sensitivity analysis [6; 10].

The first method divides cash flow into two parts - definite and risky. Discounting cash flows occur at a safe rate after converting them to safe (certain) cash flows. For example, the rate of government bonds may be a safe rate [10]. The second method is based on adding the risk premium to the safe discount rate [9]. The third method allows establishing the change in the net present value of the project when changing various factors such as the discount rate, material costs, labor costs, etc. This method allow determining the riskiness of the project [10].

Assessing the investment attractiveness of customer service bank technologies is relevant for banking institutions. Static and dynamic methods, as well as risk methods, are used to assess the investment attractiveness of innovative projects. Static methods are based on the economic evaluation of the project and don't take into account the project duration and the inequality of cash flows during its life cycle. Dynamic methods are based on the principles of economic theory and allow us to take into account the change in the value of money during the project lifecycle, the required rate of return, and project risk. Risk-methods allow determining the riskiness of the project.

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