V.A. PODSORIN
E.N. OVSYANNIKOVA
P.A. BULAKHOVA

Economic evaluation of investments

TEXTBOOK

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«RUSSIAN UNIVERSITY OF TRANSPORT»

Institute of Economics and Finance
Department of Economics and Transport Management

V.A. PODSORIN
E.N. OVSYANNIKOVA
P.A. BULAKHOVA

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Textbook
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The textbook considers the basic concepts of investment management, the basic provisions of the project-oriented approach to investment management, different approaches to the investments classification, the methodological approaches to determining indicators of investment projects, the basic indicators of economic efficiency used in the feasibility study of investment projects, highlighted indicators of general and comparative efficiency, analyzed features of evaluation of investment

CONTENTS

1. INVESTMENT ACTIVITY IN THE MARKET ECONOMY

1.1. ECONOMIC ESSENCE AND TYPES OF INVESTMENTS

Investment (from latin - *invest* - to invest) is defined as the investment of capital for the purpose of its subsequent increase in the broadest definition. In the market economy the increase of capital is due to profits.

In the economics, the term "investment" is associated with the abandonment of the current consumption of a good by investing it in the objects of entrepreneurial activity for the sake of more complete satisfaction of needs in the future. In this regard, *investment* is a flow of expenditures intended for the production of goods, and not for direct consumption.

According to the Federal Law № 39-FL "On investment activities in the Russian Federation carried out in the form of capital investments" dated 25.02.1999, *investments* are monetary funds, securities, other property, including property rights, other rights, having monetary value, invested in business and (or) other activities in order to make profit and (or) achieve another useful effect.

Foreign investment is a separate concept in domestic law. *Foreign investment* is the investment of foreign capital in the object of entrepreneurial activity in the Russian Federation in the form of objects of civil rights owned by a foreign investor, if such objects of civil rights are not withdrawn from circulation or are not limited in circulation in the Russian Federation by federal laws, including money, securities (in foreign currency and currency of the Russian Federation), other property, property rights with the monetary value of the exclusive rights to intellectual results.

Investments include:

– cash, earmarked bank deposits;

– movable and immovable property (buildings and structures, machinery and equipment, vehicles, computers, etc.);

– securities (shares, bonds, etc.);

– intellectual property (property rights arising from copyrights, licenses, patents, know-how, etc.);

– rights to use land, subsoil and other natural resources.

Signs of investment:

–   the potential ability to generate income;

–   conversion of part of the accumulated capital into alternative types of assets;

–   the purposeful nature of capital investment;

–   the time frame of the investment process;

–   the investment activity risk.

A general definition of «investment»: *Investments* are various forms of capital invested by an investor in the objects of entrepreneurial or other activities in order to obtain a useful result.

Investments *can be classified* by the following attributes: form and type of investment, industry, investor level, source of funding, scope of investment, reproductive and technological structure, and type of investment object.

According to the type of investment, investments are divided into real, financial and intellectual property investments.

The real investments are the capital directly invested in realization of the long-term project, as a rule, connected with creation of industrial potential of the enterprises of real economic sector. Real investments increase in means of production, tangible assets, intangible assets and stocks. According to the economic content, they are divided into two groups: investments in fixed capital (capital expenditures) and investments in working capital. Capital investment is the most important driver of economic development. **Capital investments** are investments in fixed assets, including costs of new construction, expansion, reconstruction, and technical re-equipment of existing enterprises, purchase of machinery, equipment, tools, inventories; design and survey work, and other costs.

Financial investments are investments in stocks, bonds and other security papers, as well as bank deposits. Among financial investments, there are **portfolio investments**. They are a set of securities (a portfolio of security papers). They allow the achievement of specific deterministic in-time investment goals (e.g., risk

minimization). Nowadays, portfolio investments are becoming broader, associated with the scale of investment activity and the set of investment projects targeted.

Investments in intellectual property are the costs of acquiring property rights, licenses, patents, etc.

Depending on the *nature and material composition*, investments in fixed assets are divided into the following groups: buildings; structures; measuring instruments and devices; computers; machinery and equipment; vehicles; industrial and household equipment; working and productive livestock; perennial plantations; other fixed assets, depending on the purpose of use and the functions performed.

By the sectoral affiliation, investments are divided into investments in industry, investments in agriculture, investments in transport, etc.

Depending on the level of the investor and the form of ownership, investments are divided:

−   Russian investments (federal and regional budgets; funds allocated by the local administration; funds of enterprises and organizations; private investments; mixed investments);

−   Foreign investments;

−   Joint Russian and foreign investments.

Depending on the source of funding, a distinction is made between own, attracted, and borrowed investments. As their own investment funds enterprises can, for example, use part of the profits, as borrowed - funds from the sale of shares, subsidies, guarantees from budgets, as borrowed - bank loans.

By the *nature of investor participation* in investment projects, a distinction is made between direct and indirect investments. **Direct investments** imply the direct participation of the investor in the investment process. They act as investments in the authorized capital of enterprises to establish direct control and management of the object of investment, aimed at expanding the sphere of influence, ensuring future financial interests, and not just generating income. **Indirect investments** are the investments of funds by investors in securities issued by financial intermediaries,

which place funds invested by investors in the implementation of investment projects under their criteria for the efficient use of capital.

According to the reproduction structure of investment objects are distributed as follows:

investments in new construction are the costs for the construction of new railroads, stations, separate points, depots; construction of track machine stations (PMS), sleeper, crushed stone, and other plants, link assembly bases, rail-welding plants; construction of bridges instead of crossings, creation of new computing centers;

investments in expansion are the costs of building additional main tracks, expanding stations, constructing or expanding technical buildings on existing railroads; expanding depots, expanding and building individual PMS shops and repairing track machines, expanding existing road computing centers, building new shops at various plants and factories;

investments in reconstruction are the costs for strengthening or re-equipment of railroads, including the removal of certain sections; electrification of existing railway lines, construction of high platforms, lengthening or widening passenger platforms; electrical centralization of points and signals, reconstruction of hump necks and station tracks, equipment of railroads with automatic blocking and dispatcher centralization, conversion of locomotive depots for other types of traction, construction of overpasses, track fencing;

investments in technical re-equipment are the costs for automation and mechanization of marshaling yards, modernization of heating and ventilation systems, implementation of environmental protection measures, the introduction of automated information processing systems, purchase and installation of equipment not included in construction budgets, modernization of rolling stock.

Depending on the macroeconomic approach, the sources of investment formation include:

– **depreciation** is the resource investment to compensate for the depreciation of fixed capital and restore it to its original level.

–   **net investment** is the investment of capital to increase, increase fixed assets through the construction of buildings and structures, installation of new equipment, modernization of existing production facilities.

Gross investment is the sum of depreciation and net investment, it is the investment resources used to maintain and increase fixed capital and reserves. If the gross investment exceeds depreciation, there is economic growth and expanded reproduction of a country's fixed capital. If the gross investment is equal to depreciation, the economy is static. If gross investment is less than depreciation, the economy regresses.

1.2. INVESTMENT ACTIVITY

Investment activity is the investment and implementation of practical actions in order to make a profit or achieve another useful effect.

Investment activity is a necessary condition for the capital cycle of the economic entity. *Investment cycle* is the period in which investments consistently pass all the investment phases and core activities of the business entity: from the formation of investment resources to obtaining the effect and reimbursement of funds invested. Investment in business objects at the expense of revenues or profits of the investor received from the sale of investments is called *reinvestment*.

The subjects of investment activities carried out in the form of capital investments are investors, customers, contractors, users of capital investments and other people.

An Investor is a subject of investment activity that makes capital investments on the territory of the Russian Federation using its own and (or) borrowed funds by the legislation of the Russian Federation. Investors may be individuals and legal entities established based on the agreement on joint activities and not having the status of legal entity associations of legal entities, state bodies, local authorities, as well as foreign investors.

The (a) Customer is an individual or legal entity authorized by the investor who implements investment projects. At the same time, it does not interfere in the

entrepreneurial and (or) other activities of other subjects of investment activity, unless otherwise provided by the agreement between them. The customer, who is not an investor, is granted the rights to own, use, and dispose the capital investments for the period and within the limits of the powers established by the contract and (or) the state contract by the legislation of the Russian Federation.

The (a) Contractor is a natural or legal person who performs work under a contract and (or) a state or municipal contract concluded with customers by the Civil Code of the Russian Federation. Contractors are required to have a license to carry out those types of activities that are subject to licensing by federal law.

Users of capital investment objects are individuals and legal entities, including foreign ones, as well as state bodies, local self-government bodies, foreign states, international associations, and organizations for which the specified objects are created.

The subject of investment activity has the right to combine the functions of two or more subjects unless otherwise stipulated by the agreement and (or) the state contract concluded between them.

At the macro level, investments should provide:

   –   Expanded reproduction of fixed capital;

   –   Acceleration of scientific and technological progress and implementation of innovations;

   –   Balanced development of economic activities;

   –   Solving social and environmental problems;

   –   Improvement of national defense capability;

   –   Increasing the competitiveness of domestic producers on world markets.

At the micro level, investments should provide:

- Creation, expansion, reconstruction, modernization, technical re-equipment of enterprises;

- Prevention of moral and physical deterioration of fixed assets, as well as increasing the armory of labor;

- Improvement of the quality of products of the enterprise;

- Implementation of measures to protect the environment;

- Achievement of social and other goals of the enterprise.

The major task of investment activity is the development of the productive capacity of enterprises, industries, the economy as a whole. In this regard, the book focuses on the issues of the organization, and evaluation of the effectiveness of forms of financial support for investment activities carried out in the form of capital investment.

1.3. FINANCIAL SUPPORT OF INVESTMENT ACTIVITIES

The main sources of funds used to finance investment activities are:

- Budget allocations given at the federal and regional levels;

- Own funds of enterprises (investments from profits and amortization and R&D costs as a part of production costs);

- Funds of special extrabudgetary funds of financing of investment and innovation projects, which are formed by ministries, federal and regional authorities;

- Funds of various types of commercial, financial structures (investment companies, commercial banks, insurance companies, FIGs, etc.);

- Credit resources of specially authorized by the government investment banks;

- Foreign investments;

- Funds of national and foreign funds;

- Private savings of individuals.

The peculiarity of investment activities carried out in capital investment is a long-life cycle, which determines the long-term diversion of investment resources.

Other characteristics of financial support of the investment activity, in the form of capital investments, can be following: high capital intensity; diversification of activities; investment program scale; short investment and long operational phases of projects; branch orientation. These peculiarities determine the necessity of the company's investment resources concentration and their management centralization to provide the target character of their use.

In the modern economy investment activity is impossible without the constant attraction of borrowed funds. The use of borrowed capital allows companies to expand the scale of economic activity significantly, ensure more efficient use of equity capital, accelerate the formation of various targeted financial funds, and intensify investment and innovation activities.

The use of borrowed capital has both positive and negative sides (Table 1.1).

Table 1.1. - Positive and negative sides of attraction of debt capital in the financial support of innovation activities

Positive sides	Negative sides
1. Diversification of the company's activities	1. Increase of risks (credit, interest, loss of liquidity)
2. The effect of a "tax shield": i.e., the interest for the loan is attributed to operating expenses	2. Additional debt service costs and, consequently, lower return on capital
3. Growth of financial potential	3. High dependence of the cost of borrowed capital on fluctuations in the financial market
4. Increase in return on equity due to the effect of financial leverage	4. The complexity of the procedure of borrowing, especially in large amounts and for a long period of time
5. Extensive engagement opportunities	5. Underdevelopment of the domestic capital market

The current state of the transport infrastructure requires radical modernization, reconstruction, and renewal. The solution to this problem in a midterm is impossible without the broad involvement of private capital in solving the investment problems of rail transport.

The general forms of support for private investors are:

– Direct budget financing;

– State earmarked loans and bonded loans;

– Budget subsidies and loans (on a repayable and non-repayable, reimbursable or non-repayable basis);

– Subsidizing interest rates on commercial credits;

– Granting of investment tax credits and tax exemptions;

– Provision of sovereign state guarantees;

– State insurance of investments;

– Inclusion in the federal targeted investment program;

– Introduction to the federal target program.

The comparative characteristic of forms of financial support for investment activities is in Table 1.2.

Table 1.2. - Comparative characteristics of the general forms of financial support of investment activity

Form of financial support	Advantages	Disadvantages
1. Profit	the universality of use; availability for use for investment purposes; traditional use as an investment; high liquidity	relative cost; risk of non-profit
2. Amortization	the cheapest source of investment; stability of receipts; the flexibility of calculation using modern methods and methods of depreciation	the possibility of "eating out"; insufficiency for expanded reproduction; a larger value increases costs and, consequently, the price
3. Share capital	the availability for large companies; limited liability to investors; possibility of attracting a wide range of investors; absence of regulated payments; increased investment attractiveness	risk of capital dissipation; the possibility of capital appreciation; risk of loss of management; the necessity of payment of dividends
4. Credit	the absence of a first payment; possibility to revise the interest rate in connection with changes in the macroeconomic situation; possibility of inclusion of expenses on interest repayment into the cost price; formation of a credit rating	fixed terms of payments with a fairly high frequency (monthly); possibility of untargeted use of resources; relatively high-interest rate

Form of financial support	Advantages	Disadvantages
5. Venture capital	high profitability; satisfaction of a new need; intensification of production; creation of new advanced technology	long-term diversion of funds; high-level risk; initial illiquidity of capital
6. Leasing	the possibility of a flexible schedule of lease payments; reduction of taxable profit; property tax reduction due to accelerated depreciation: targeted nature of the use of resources; possibility not to increase the lessee's accounts payable	availability of initial payment (down payment); no possibility to revise the cost of financing
7. Bonds	comparatively low cost of attracting resources; possibility of reviewing the cost of resources depending on market conditions; possibility to attract a considerable amount of funds; low periodicity of payments (as a rule, once in half a year or year); image of a financial market player market player; formation of credit rating	the presence of overhead costs associated with the registration and placement of the loan; the possibility of misuse of resources; presence of risk of non-deployment of the loan
8. Government investment	availability of guarantees and sureties; low cost or gratuitous provision; the possibility of implementing major infrastructure projects; long-term granting period; implementation of target programs and national projects	risk of misuse; bureaucratic management structure; low profitability;

Thus, the evaluation of the final results of the use of internal and external sources of financial support for investment activities provides for both an assessment of the effectiveness of the implementation of goals and the impact on the structure of the economic results.

Control questions:

1. Investment as an economic category.
2. Types of investments.
3. The main features of investments.
4. Investment activities.

5. The role of investment in the economy of the country.

6. Forms of financial support of investment activity.

7. Own resources of realization of investment activity.

8. The borrowed resources for the investment activity.

9. Positive and negative sides of attraction of the borrowed capital at the investment activity.

10. Comparative characteristic of forms of financial maintenance of investment activity.

2. PROJECT INVESTMENT MANAGEMENT

Investment project is a justification of economic feasibility, volume, and timing of capital investments, including the necessary design and estimate documentation developed by the Russian legislation and duly approved standards (norms and rules), and a description of the practical steps to implement the investment (business plan).

In international practice, within project management theory, the general concept of "project" is given. According to the Project Management Code of Knowledge Handbook (PMBOK Handbook, American National Standard ANSI/PMI 99-001-2004), a project is a temporary venture designed to create unique products, services, or deliverables. The term "temporary" means that any project has a clear beginning and a clear end. Completion occurs when the project goals have been achieved. Or it is realized that the project goals will not or cannot be achieved. Or the project is no longer needed and is discontinued. Uniqueness is a general characteristic of project delivery results. The presence of repetitive elements does not violate the fundamental uniqueness of each project. Consistent development is a property of projects, on a par with the concepts of temporality and uniqueness. Sequential development means developing in stages and flowing through the steps.

The characteristic features of an investment project are:

- time-determined goals;

- purposeful change of the system from the existing state to the desired one;

- coordinated execution of numerous, interrelated works with a level-by-level detailing of activities, responsibilities, volumes, and resources;

- limited duration in time, with a definite beginning and end;

- limited resources;

- formation of a special project management structure for the project team;

- implementation of one-time costs in the initial phase of project realization.

A set of interrelated projects and various activities, united by a common goal and the conditions of their implementation, is called a ***program***. As opposed to a single project, a program requires special methods of coordination and multi-project management to ensure that the overall goal of the program is achieved while meeting the given constraints and conditions of its implementation. A separate project implementation within the program may not give tangible results, while the entire program implementation ensures maximum efficiency

It is necessary to distinguish "project program" from "project portfolio". ***The portfolio of projects*** is a set of various, usually not interrelated, projects carried out in the interests of the company and, as a rule, having common restrictions on resources. Based on the known resource limitations, the targets for project implementation are set (ensuring profitability, safety, etc.).

The following classification attributes are distinguished:

1. By composition and structure:

Mono-project is a separate project of any type, type, and scale. In its essence, it can be separate technical, organizational, economic or social projects or their various combinations.

Multi-project is a complex project or program that consists of a number of mono-projects and requires multi-project management.

Megaproject is a targeted program for the development of regions, industries, and other entities, which includes some mono projects and multi-projects.

2. According to the main areas of activity in which the project is carried out: **social, economic, organizational, and technical projects.**

3. Depending on public importance: **global; socially significant; large-scale; local.**

4. By functional orientation:

- renovation projects,

- development projects,

- remediation projects.

5. According to the purpose of investment:

- projects that meet the need for additional transportation volumes,

- projects that ensure improvement of the quality of transport products,

- projects ensuring the solution of social, environmental, and other problems.

6. According to the compatibility of implementation:

- projects independent of the implementation of other projects of the enterprise,

- projects, dependent on the implementation of other projects of the enterprise,

- projects that exclude the implementation of other projects.

7. According to the expected sources of funding:

- projects financed by domestic sources,

- projects financed at the expense of attracted capital,

- projects financed at the expense of borrowed funds,

- projects with mixed norms of financing.

Nowadays, project management has become a recognized methodology for managing investment projects in all developed countries.

Project management is a methodology of organization, planning, management, and coordination of human and material resources throughout the project life cycle (project cycle). It must achieve its goals by applying the system of modern management methods, techniques, and technologies to obtain project-specific results on the composition and scope of work, cost, time, and quality.

Project-oriented management (Management by Projects) is the management approach, in which separate orders and tasks that are solved within the framework of the organization are considered as separate projects, to which the principles and methods of project management are applied.

The concept of the life cycle is one of the central concepts used in project management methodology. It is based on:

- The project structure is formed, and the composition of the project work is determined;

- The need for raw materials, materials, equipment, and other technical systems is estimated;

- The cost dynamics and employment level of the personnel engaged in the project implementation are assessed;

- The system of financial support for the investment project implementation is formed;

- Economic and organizational mechanism of project management, adequate to the various stages of the life cycle is built.

From the point of view of project management, the following main phases of the project life cycle are distinguished.

Conceptual phase. The main task in this phase is to develop a project concept, including:

- collecting baseline data and analyzing the existing condition (preliminary survey);

- identification of the need for the project;

- formation of the investment concept;

- preparation of the declaration of intent;

- assessment of the viability of the project and the financial feasibility of the project;

- definition and comparative evaluation of alternatives;

- conceptual proposals submission, appraisal, and expert evaluation;

- approval of the concept and obtaining approval to begin work on the next phase.

Development phase. The main content of this phase is the development of design and estimate documentation:

- design assignment;

- development of the feasibility study;

- expert examination of the feasibility study;

- approval of the feasibility study;

- development of design estimates and project documentation;

- expert examination of design estimates and project documentation;

- approval of design and estimate documentation.

Project Implementation Phase. The main content of the phase follows from its name - the implementation of the main works of the project, necessary to achieve the goal of the project. The main works in this phase are:

- detailed design and technical specifications;

- material and technical support of the project work;

- execution of the works stipulated by the project;

- confirmation of work completion and obtaining approval for the works of the next phase.

The final phase or the end of the project. In this phase, the project achieves its final goals, the results are summarized, conflicts are resolved, and the project is completed. The main content of works in this phase usually consists of the following:

- project acceptance work;

- operational testing of the final project product;

- training of staff to operate the facility being created;

- preparation of documentation and commissioning of the facility;

- project completion.

The life cycle of an investment project is a set of phases sequential in time from the moment of investment in its development to the moment of its completion. In this case, as a rule, there are three phases of the investment project: pre-investment, investment and post-investment.

The pre-investment phase determines the approximate cost of the investment project and the structure of investment costs of implementation. At the *investment phase* of the investment project the main volume of investments in the project is formed. These costs must be repaid *at the phase of project implementation (operational or post-investment).* Otherwise, the implementation of the investment project is not effective.

General composition of project participants and their functions.

Initiator is the side that is the author of the general idea of the project, it`s preliminary justification and proposals for the implementation of the project. Practically any future project participants can act as the initiator, but, ultimately, the business initiative to implement the project must come from the customer found by the project.

Customer is the main person interested in the implementation of the project and the achievement of its results, the future owner and user of the project results. The customer determines the basic requirements and scope of the project, provides funding for the project from its funds or from the funds of investors attracted by it, concludes contracts with the main performers of the project, is responsible for these contracts, manages the process of interaction between all participants of the project. Is responsible for the project as a whole before the society and the law.

Investor is a party that invests in a project, for example, through loans. The investor's goal is to maximize the return on his investment from the project. If the investor and the customer are not the same people, the investors are usually banks, investment funds, and other organizations. Investors enter into a contractual relationship with the customer, oversee the execution of contracts, and settle accounts with other parties as the project progresses. Investors are full partners in the project and own all property is acquired through their investment until all funds are paid under the contract with the customer or loan agreement.

Project Manager (project manager) is a person to whom the customer and the investor delegate the authority to manage project implementation activities: planning, control and coordination of the work of all project participants. The project manager's functions and powers are defined in the contract with the customer. However, the project manager and his team are usually tasked with the comprehensive management and coordination of work throughout the project life cycle, until the goals and results defined in the project are achieved while meeting the established deadlines, budget, and quality requirements. The project manager is

responsible for achieving the project objectives within budget, in accordance with the project schedule, and with the specified level of quality.

The project team is a specific organizational structure, headed by the project manager and created for the duration of the project. The task of the project team is to effectively achieve the project goals. The composition and functions of the project team depend on the scope, complexity, and other characteristics of the project, but in all cases the team's composition must ensure a high professional level of all assigned responsibilities. The project team is formed depending on the needs of the project, considering the experience and qualifications of the personnel, as well as depending on the conditions and organization of the project implementation, is created in a targeted way for the project implementation period, also includes all external performers and consultants.

Contractor (general contractor) is a part of the project that enters into a relationship with the customer and assumes responsibility for the performance of work and services under the contract. It may be the entire project or part of it. The functions of the general contractor include the conclusion of a contract with the customer (investor), selection and signing agreements with subcontractors, ensuring coordination of their work, acceptance and payment of the work of co-contractors. The contractor may be a general contracting, engineering, consulting firms and professional project management organizations.

Subcontractor enters into a contractual relationship with the contractor or higher-level subcontractor. Is responsible for the performance of works and services by the contract.

Designer is a legal entity that performs design and survey work under the contract under the project. enters into a contractual relationship with the general contractor of the project or directly with the customer.

The general contractor is a contractor (subcontractor) who performs work under the contract, has the right to select and enter into contracts with subcontractors to perform certain works and services. In construction projects, the role of the

general contractor is usually performed by construction or design-build organizations.

Suppliers are subcontractors performing various types of deliveries on a contractual basis: materials, equipment, vehicles, etc.

Licensors are organizations that issue licenses for the right to own a land plot, to conduct tenders, to perform certain types of work and services, etc.

Government is a party that satisfies its interests by obtaining taxes from the project participants, putting forward and supporting environmental, social and other public and governmental requirements associated with the implementation of the project.

Landowner is a legal or natural person who is the owner of the land involved in the project. Enters into a relationship with the customer and transfers the right to use or own this plot of land.

The producer of the final product of the project operates the created fixed assets and produces the final product. The main goal is to profit from the finished products sale to consumers. Takes part in the phases of the project life cycle and interacts with the general participants of the project. His role and functions depend on the share of ownership in the final results of the project. In many cases, it is the customer and investor of the project.

Consumers of final products are legal entities and individuals who are buyers and users of final products, determining the requirements for the products and services provided, forming the demand for them. At the expense of consumers are reimbursed the costs of the project and the profit of all participants of the project.

Other project participants. Other parties from the project environment also influence project implementation. They can also be classified as project participants: competitors of the general project participants; community groups and the public, whose economic and non-economic interests are affected by project implementation; project sponsors; various consulting, engineering, legal organizations involved in the project implementation process, etc.

It should be noted that in the practice of project management there is such a notion as "stakeholders", i.e. individuals and organizations that are directly involved in the project or whose interests may be affected by the implementation of the project. In most cases, it coincides with the project participants, but can consider a much broader range of people than the project participants themselves.

To detail the management functions, differentiation of participants and other stakeholders of the project within the project management, the following subsystems of management are distinguished:

- subject area management subsystem;

- subsystem of time management;

- cost management subsystem;

- quality management subsystem;

- human resources management subsystem;

- communications management subsystem;

- risk management subsystem;

- supply chain management subsystem;

- change management subsystem.

The subsystem of the subject area management determines the content of the project, the basic project solutions, the system of control and evaluation of the project implementation results.

In the subsystem of time management, the activities are defined, their structural decomposition is performed, their duration is estimated, the schedule of project implementation is developed, and the mechanism for controlling the duration of project implementation is formed.

In the subsystem of cost management, the needs in resources necessary for the effective implementation of the project are determined in cost terms, the project budget is formed, as well as the mechanism of controlling its implementation.

In the subsystem of quality management, the requirements and standards for the quality of products and technology are formed, as well as documentation of the

quality system, the policy, goals, objectives and procedures for quality assurance are determined.

In the subsystem of human resource management, the following is defined: the project organizational structure, the role and status of the project team, the need for human resources, an analysis of the possibility of providing the project with specialists, the mechanism for conflict resolution is formed.

In the subsystem of communications management, the scheme of informational interaction of participants is reflected, the system of management and reporting information necessary for informed decision-making, documentation of the project progress is performed.

The subsystem of risk management determines the possible risks and forms a set of measures to respond to them during the implementation of the project, develops procedures to mitigate the negative consequences of risk events.

In the subsystem of supply management, the issues of timely and effective provision of the project with resources are considered.

In a subsystem of change management the processes of change, relevant to all internal and external factors of project implementation, the system of registration of all potential changes in other subsystems for detailed study, assessment of consequences, approval or rejection, as well as the organization of monitoring and coordination of executors who implement changes in the project are formed.

Project-oriented management increases the flexibility and dynamism of the company, decentralizes the responsibility of functional managers, and ensures that the company is ready for organizational, functional, technical, and economic changes adequate to the market economy.

Control questions:
1. The concept of the investment project.
2. The life cycle of the investment project.
3. The main phases and stages of the investment project and their features.
4. Signs of the investment project.
5. Types of investment projects.

6.   Characteristics of the project as an object of management.

7.   Portfolio and program of projects.

8.   The composition of project participants and their functions.

9.   Project management subsystems.

10.   Characteristics of the project management subsystems.

3. METHODOLOGICAL APPROACHES TO ASSESSING THE EFFECTIVENESS OF INVESTMENTS

3.1. FORMATION OF INDICATORS OF EFFICIENCY OF INVESTMENT PROJECTS AND THEIR CLASSIFICATION

The efficiency of investment is determined by comparing the useful result obtained during the implementation of an investment project, and *the investment costs that led to it.*

The useful result concerning to the interests of the investor is an increase in national income, reduction of current costs of production or services, increase in income or profit of the enterprise, reducing the energy and resource intensity of production, etc.

Investment costs include the costs of technical and economic research of investment opportunities, development of a feasibility study, a business plan for the implementation of the investment project; for research work, development of design and estimate documentation, design and survey work; for the purchase of rolling stock and equipment; for construction and installation work, etc.

Indicators of investment efficiency *can be classified* according to the following characteristics.

Depending on investor goals, investment performance indicators are divided into indicators of public efficiency, commercial efficiency, budgetary efficiency. Indicators of *public efficiency* consider the results and costs that go beyond the direct economic interests of the participants of investment projects. The indicators of *budgetary efficiency* reflect the economic consequences of the implementation of investment projects for the federal, regional or local budgets. Indicators of *commercial efficiency* consider the economic consequences of the implementation of investment projects for its direct participants.

Depending on *the form of accounting costs* and results of investment performance indicators can be expressed in *kind and value (money) form.*

Depending on the factors considered in determining the effectiveness indicators performance indicators are divided into indicators of general (absolute) efficiency and indicators of comparative (relative) efficiency. Indicators of *overall (absolute) efficiency* allows you to evaluate the effectiveness of invested capital for the selected investment project. In determining the indicators of overall cost-effectiveness consider all costs and the full extent of the result due to these costs. Indicators of *comparative (relative) efficiency* are used to select the most effective project out of several. In determining the indicators of comparative cost-effectiveness is sufficient to take into account only varying with projects part of the costs and the result. *Indicators of overall effectiveness characterize the measure of rationality of the total amount of resources spent, indicators of comparative effectiveness - the measure of rationality of the use of additional, but not all costs - for one project compared to another.*

Depending on the consideration of the time factor, the indicators of the choice of investment options can be divided into static and dynamic. *Dynamic indicators* are calculated by considering the change in operating conditions of objects during the estimated period of comparison of options, the impact of changes in inflation factors on capital and current costs, and the inequality of costs in time. It should be noted that the degree of accuracy of the initial information in the perspective periods used to calculate the dynamic indicators causes the presence of different degrees of uncertainty. On the contrary, the determination of *static indicators* does not consider the change over time of the factors that determine them.

Currently, following international approaches to assessing the effectiveness of investment projects, the formation of indicators of the effectiveness of investment projects is based on the cash flows associated with the project for the years of the calculation period. For each year of the calculation period, the cash flow is determined as the difference between cash inflows and outflows.

Cash inflows include the following receipts directly related to the implementation of investment projects:

- revenue, net of indirect taxes;

- income from the use and sale of assets related to the project;

- income in the form of reduction (savings) of current (operating) costs, prevention of damages.

Cash outflows include investment and current (operating) costs of the implementation of investment projects.

The investment costs of projects consist of the costs:

- for research and development work, the results of which were used in the performance of experimental design and technological work;

- for experimental design and technological work;

- acquisition of new equipment, including the cost of delivery, loading, unloading, forwarding, installation, adjustment;

- acquisition of equipment necessary for the use of new equipment and technology, including the cost of delivery, loading, unloading, forwarding, installation, adjustment of equipment;

- reconstruction (construction) of production buildings, facilities associated with the placement of new equipment, the use of new technologies;

- upgrading existing equipment necessary for the operation of new equipment and introduction of new technologies;

- the purchase of tools and equipment associated with the replacement of existing equipment, the purchase of new equipment, the introduction of new technologies.

Investment costs for the replacement of equipment to be used in the future are recognized as costs:

- for dismantling, disassembly;

- for packing, loading, unloading, transportation to the new place of use;

- for installation, assembly, adjustment;

- for reconstruction of production premises necessary for accommodation and use of the replaced equipment.

The investment costs of replacing equipment that will not be used in the future are:

- residual value (under-depreciated value) of fixed assets;

-costs of dismantling and disassembly;

- costs of packaging, loading, unloading, transportation to the place of disposal;

- costs of packing, loading, unloading, transportation performed at the sale of the replaced equipment or useful remains;

- costs of storage of the replaced equipment until its sale or disposal;

- costs of disposal of the replaced equipment and residues that cannot be used or sold.

In the case of replacement of equipment, which will not be used in the future, should be considered and the corresponding income in the total amount of income from the project, namely: the cost of sold equipment, useful residues; the price of the possible use of useful residues.

Current (operating) costs for the implementation of the investment project include:

- labor costs of employees, fully (partially) attributable to work with new equipment, technology;

- social deductions;

- costs of obligatory pension insurance;

-costs of materials, fuel, electricity and heat;

- expenditures for capital repairs of new equipment and equipment purchased to use new technology, technologies and other results of the project;

- costs of maintenance and current repairs of new machinery and equipment purchased for the use of new equipment, technologies and other results of the project;

- property tax - new machinery and other fixed assets acquired as part of the project;

- cost of maintenance and repair of production buildings and structures used to accommodate new machinery and equipment acquired for the project;

- cost of periodic advanced training of employees;

- other current expenses related to the implementation of the project.

3.2. PRINCIPLES FOR EVALUATING THE EFFECTIVENESS OF INVESTMENT PROJECTS

The general principles of assessing the effectiveness of investment projects, considered in the methodological literature, are the following:

- system approach. This principle takes into account the relationship of the evaluated project with both external and internal environment. In determining the effectiveness of an investment project, all the consequences of its implementation, both directly economic and non-economic, should be considered;

- comparability of conditions of comparison of various projects (project variants). This principle provides comparability of indicators as it is possible to compare only qualitatively homogeneous values. For this purpose, it is used unified informational base when defining indicators of efficiency, unified methodical approaches to forming of criteria of efficiency evaluation, unified time period etc.;

- calculation period. This principle assumes consideration of the project during all its life cycle - from the moment of carrying out pre-investment research up to the termination of the project;

- cash flow modeling. This principle takes into account all cash receipts and expenses related to the implementation of the project over the accounting period, taking into account the possibility of using different currencies;

of positivity and maximum effect. This principle implies the following. For an investment project to be recognized as effective, the effect of its generating project must be positive, and when comparing alternatives, preference must be given to the project with the highest effect value;

- consideration of the time factor. This principle takes into account various aspects of the time factor, including the dynamics (change over time) of the project parameters and its economic environment, gaps in time (lags) between the production of products or the receipt of resources and their payment, the unequal value of different costs and/or results (preference of earlier results and later costs);

- consideration of investor's interests. This principle implies the presence of different participants in the project, the mismatch of their interests and different assessments of the cost of capital, expressed in individual values of the discount rate;

- multistage appraisal. This principle implies a different depth of elaboration of project efficiency indicators at different stages of its development and implementation (justification of investments, feasibility study, choice of financing scheme, economic monitoring, project completion);

- accounting for the impact of uncertainties and risks accompanying the implementation of the project. This principle involves taking into account the impact of changes in the conditions of the project due to the impact of unfavorable factors (e.g., a reduction in demand for the products produced, an increase in the price of the consumed resources, changes in working conditions with suppliers, etc.).

3.3. DISCOUNTING CASH FLOWS FOR ASSESSING THE EFFECTIVENESS OF INVESTMENT PROJECTS

The main reason for applying the procedure of discounting cash flows in economic calculations of the effectiveness of investment projects is their unequal value in different periods. The unequal value of cash flows in different periods is determined by the action of objective economic laws (supply and demand, competition, etc.).

Discounting of cash flows is a procedure of bringing their different (related to different calculation steps) values to their value at a certain point in time. Cash flow discounting is carried out by multiplying its current value by the discount factor in the current period. In general, the discount factor is determined by the formula:

$$\eta_t = (1+d)^{t_{pr}-t},$$

where d - is the discount rate;

t_{pr} – is the moment of the induction;

t – is the current period.

In practice, the base torque is usually taken as a leading moment (however, this is an optional condition, and the leading moment may not coincide with the base torque), i.e. tpr = 0. Thus, the formula takes the most commonly used form:

$$\eta_t = \frac{1}{(1+d)^t}.$$

Tables 3.1-3.2 show the values of the discount coefficient by calculation steps at different discount rates respectively to bring the values of cash flows to their value in the zero year (Table 3.1) and the tenth year (Table 3.2).

Table 3.1. - Discounting coefficient to reduce the values of cash flows to their value in zero (base) year

Calculation step	Discount rate									
	0,05	0,10	0,15	0,20	0,25	0,30	0,35	0,40	0,45	0,50
0	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
1	0,952	0,909	0,870	0,833	0,800	0,769	0,741	0,714	0,690	0,667
2	0,907	0,826	0,756	0,694	0,640	0,592	0,549	0,510	0,476	0,444
3	0,864	0,751	0,658	0,579	0,512	0,455	0,406	0,364	0,328	0,296
4	0,823	0,683	0,572	0,482	0,410	0,350	0,301	0,260	0,226	0,198
5	0,784	0,621	0,497	0,402	0,328	0,269	0,223	0,186	0,156	0,132
6	0,746	0,564	0,432	0,335	0,262	0,207	0,165	0,133	0,108	0,088
7	0,711	0,513	0,376	0,279	0,210	0,159	0,122	0,095	0,074	0,059
8	0,677	0,467	0,327	0,233	0,168	0,123	0,091	0,068	0,051	0,039
9	0,645	0,424	0,284	0,194	0,134	0,094	0,067	0,048	0,035	0,026
10	0,614	0,386	0,247	0,162	0,107	0,073	0,050	0,035	0,024	0,017

Table 3.2. - Discounting coefficients to bring the values of cash flows to their value in the tenth (last) year

Calculation step	Discount rate									
	0,05	0,10	0,15	0,20	0,25	0,30	0,35	0,40	0,45	0,50

0	1,629	2,594	4,046	6,192	9,313	13,786	20,107	28,925	41,085	57,665
1	1,551	2,358	3,518	5,160	7,451	10,604	14,894	20,661	28,334	38,443
2	1,477	2,144	3,059	4,300	5,960	8,157	11,032	14,758	19,541	25,629
3	1,407	1,949	2,660	3,583	4,768	6,275	8,172	10,541	13,476	17,086
4	1,340	1,772	2,313	2,986	3,815	4,827	6,053	7,530	9,294	11,391
5	1,276	1,611	2,011	2,488	3,052	3,713	4,484	5,378	6,410	7,594
6	1,216	1,464	1,749	2,074	2,441	2,856	3,322	3,842	4,421	5,063
7	1,158	1,331	1,521	1,728	1,953	2,197	2,460	2,744	3,049	3,375
8	1,103	1,210	1,323	1,440	1,563	1,690	1,823	1,960	2,103	2,250
9	1,050	1,100	1,150	1,200	1,250	1,300	1,350	1,400	1,450	1,500
10	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

As we can see from Tables 3.1-3.2, the value of cash flows decreases over time.

An important economic standard used in discounting cash flows is the discount rate (d). It is expressed as a fraction of a unit or as a percentage per year. The discount rate is an exogenously set basic economic norm used in evaluating the effectiveness of projects.

Depending on the level of the investor, the following discount rates are distinguished:

- commercial discount rate - used in assessing the commercial efficiency of the project; it is determined considering the alternative (i.e., related to other projects) efficiency of the use of capital;

- social (public) discount rate is used when calculating the indicators of social efficiency and characterizes the minimum requirements of society to the social efficiency of projects;

- budgetary discount rate - used in calculating the indicators of budgetary efficiency and reflects the opportunity cost of budgetary funds.

The discount rate, reflecting the opportunity cost of capital, depends on the ability to use the capital. The most common methods of justifying the discount rate are as follows:

1. Weighted average cost of capital is the average interest that is paid for the use of capital (for example, equity and debt). In general terms, it is defined as:

$$d = \Sigma \gamma_i \cdot r_i$$

where γ_i - is the share of the i-th financing source in the total structure of the used capital;

r_i – is the cost of using capital from the i-th source of financing.

The advantages of this approach of determining the discount rate are as follows: simplicity (according to accounting data), the cost of capital from different sources (averaging of risks and the cost of capital used), and among the drawbacks: the correction for risk is considered in the calculation of compound interest (risk does not always accrue evenly), disproportionality of sources of financing of a particular investment project.

In international practice, this method is called WACC (Weighted Average Cost of Capital).

$$d = \frac{K_{br}}{K} \cdot r_{oc} + (1 - r_{pr}) \cdot \frac{K_{br}}{K} \cdot r_{br},$$

where K_{cob} - is the amount of equity capital to implement the project, rubles;

K_{br} - is the amount of borrowed capital to implement the project, rubles;

K – is the total amount of capital needed to implement the project, rubles;

R_{oc} – is the cost of using own capital, %;

r_{br} – is the cost of using borrowed capital, %;

r_{pr} – is the profit tax rate, %.

The economic sense of reducing the profitability of debt capital in (1- r_{pr}) times is that interest payments on the loan are expenditures, i.e. reduce the taxable base of income tax (the effect of «tax shield»). Consequently, to calculate the real rate of return, it is necessary to reduce the cost of borrowed capital by the amount of the tax shield. If interest payments are paid from profit, the previous formula is used to determine the discount rate.

2. Interest on borrowed capital – is the current effective interest rate on long-term debt. The effective interest rate on borrowed capital differs from the nominal

rate because it takes into account the period of interest capitalization. A disadvantage is the volatility of interest on debt over time.

3. The rate on safe investments is the interest rate on such investments, the risk of non-payment or non-receipt of monetary income on which is practically zero (there are certain types of risk that cannot be eliminated). In world practice, such a rate is the interest rate on government securities (usually bonds). The main disadvantage of this method of determining the discount rate is the lack of consideration of risk factors, which is not acceptable when assessing the commercial efficiency of investment projects.

4. Risk-adjusted safe investment rate is the rate of interest on safe investments adjusted for the risk factor. In its most common form, it is determined by the formula:

$$d = r_s + \beta \cdot (r_r - r_s)$$

where r_s – is the safe investment rate;

$\beta \cdot (r_r - r_s)$ – is the risk adjustment;

β – is a coefficient that considers the relationship between the average market return on risky investments and the return on a particular type of investment;

r_r –is the average rate for risky investments (e.g., stock returns).

The main disadvantages of this method of determining the discount rate are the difficulty of determining the «beta» coefficient and exposure to stock market fluctuations.

In international practice, this method is called the Capital Asset Pricing Model (CAPM). In economic literature, you can also meet the following name of this method: stock market model because risky assets - shares and risk-free assets - bonds are used as summands. At the same time, the number of summands can increase to consider the value of a particular group of assets.

5. Combination of risk-adjusted rate and weighted average cost of capital. This method implies discounting cash flows at discount rates that reflect the risk of a certain cash flow of the investment project. For example, cash flows associated

with investment activities are discounted at the discount rate determined by the «weighted average cost of capital» method. Cash flows associated with financial activities are discounted at the discount rate determined by the «interest on borrowed capital» method. Cash flows associated with production activities are discounted using the «risk-adjusted safe investment rate» method.

One of the disadvantages of this method is the need to determine the exact value of discount factors for different cash flows.

6. The method of cumulative construction (summation method) consists of substantiation of two general components of the discount rate: the rate of return of capital, i.e., the rate of repayment of the amount of initial investment; the rate of investment profit, i.e., the rate of compensation to the investor for changes in the value of the cash flow in time, risk factors, low liquidity of real estate and investment management:

$$d = r_{re} + r_{rr},$$

r_{re} – is the return on equity;

r_{rr} – is the investment rate of return.

The rate of return on investment can be justified as the value of the risk premium, and to determine the rate of return on invested capital in world practice the following methods are used:

- straight-line return of capital (Ring method);

- the return of capital according to the recovery fund and the rate of return on investment (Inwood method);

- the return of capital at the recovery fund and risk-free interest rate (Hoskold method).

The determination of the investment rate of return with a linear capital return assumes that the capital will be returned in equal installments over the life of the asset. In this case, the rate of return is the annual share of the initial capital allocated to the interest-free compensation fund, i.e. it is determined according to the formula:

$$r_{re} = \frac{1}{T}.$$

Return on invested capital (the Inwood method) is used when constant, equal income is expected to be generated throughout the forecast period. Moreover, part of the income stream will represent income on investments, and the other part provides a return of capital, which is re-invested at the rate of return on investment, i.e., calculated according to the formula:

$$r_{re} = \frac{r_{pr}}{(1 + r_{pr})^T - 1}$$

Hoskold`s method is used when the rate of return on the original investment is high enough, and there is usually no reinvestment and the recovery fund is formed at the safe investment rate:

$$r_{re} = \frac{r_b}{(1 + r_b)^T - 1}.$$

7. The method of market squeeze (extraction). This method analyzes the return on investment by object-analogues in order to obtain reasonable information on the behavior of the market for quantitative and qualitative characteristics:

$$d = \frac{NI_{ipa}}{C_{ipa}},$$

NI_{ipa} − is net income from the implementation of the investment project-analogues;

C_{ipa} − is the amount of investment under the peer investment project.

8. Expert methods of determining the discount rate are based on determining the internal rate of return of the marginal accepted or marginal unaccepted project, which is a reference point for the current calculations of performance indicators. The main disadvantage of these methods is the subjective opinion of an expert in the determination of discount rates.

9. The graphical method consists in determining the sensitivity of the integral effect to the change in the discount rate. This method does not determine the discount rate, acceptable for a particular investor, but shows the limits of profitability and unprofitability of investments.

The use of the discount rate in the economic calculations of the indicators of the effectiveness of investment projects allows considering the most important additional factor - the time factor. It should be noted that the substantiation of the discount rate is a key stage in assessing the effectiveness of an investment project, which determines the acceptance or rejection of proposals for the implementation of investment projects. Overestimation of the discount rate can lead to the recognition of ineffective projects that are necessary for the development of the company, and its underestimation - to complications of the procedure of optimization of the company's investment profile.

Control questions:

1. Classification of indicators of investment efficiency.

2. Depending on the level of investor goals performance indicators are divided:

3. Depending on the consideration of factors in determining the indicators of effectiveness they are subdivided:

4. Basic principles of assessing the effectiveness of investments.

5. The advantages of using discounted cash flows in determining the performance of investments.

6. Methods of substantiating the norm of discount.

7. Weighted average cost of capital (WACC-method) - method of determining the discount rate. 8.

8. Risk-adjusted safe investment rate (SARM method) - method for determining the discount rate

9. Discounting of cash flows. Types of discount rates.

10. The reasons for using discounted cash flows in economic calculations.

4. INDICATORS OF GENERAL AND COMPARATIVE ECONOMIC EFFICIENCY OF INVESTMENT PROJECTS

4.1. INDICATORS OF GENERAL ECONOMIC EFFICIENCY OF INVESTMENTS

Integral effect (**Net Present Value, (NPV)**) is the difference between the sum of the effects and investment costs for the calculation period, reduced to one (usually the base) year at a discount rate set by the investor:

$$NPV = \sum_{t=0}^{T_p} Ef_t \cdot \eta_t - \sum_{t=0}^{T_p} K_t \cdot \eta_t$$

where t – is current calculated step;

T_p – is the calculation period;

Ef_t – is the effect obtained during the implementation of the investment project;

η_t – is the discounting coefficient, which is determined by the formula:

$$\eta_t = \frac{1}{(1+d)^t}$$

d – is the discount rate;

K_t – is the investment costs to implement the project.

In other words, *the integral effect* is the accumulated discounted effect for the calculation period, reduced to one (usually the base) year at the discount rate set by the investor or the total balance of the net cash flow discounted at the discount rate set by the investor for the calculation period. This can be expressed as the following formula:

$$NPV = \sum_{t=0}^{T_p} CF_t \cdot \eta_t ,$$

where CF_t – is the cash flow from the implementation of the investment project.

A necessary and sufficient condition for the project to be effective is the non-negativity of the NPV. If the NPV is negative, the project is considered ineffective, i.e., there are opportunities for the investor to use the capital more profitably.

A variation of this indicator is net income (another name Net Value (NV)), which is defined as the accumulated effect (balance of cash flow) over the calculation period without discounting cash flows.

The difference between net income and discounted net income reflects the effect of the cash flow discounting procedure on the integral effect value. This indicator is referred to in the economic literature as the project discount. It reflects the net effect required by the investor for participation in the project and allows you to determine the financial stability of the project.

The necessity of additional financing (other names - project cost, risk capital) is the maximum value of the absolute value of the negative accumulated balance from investment and operating activities. This value shows the minimum amount of external financing for the project necessary to ensure its financial feasibility.

In general, the need for additional financing, considering the discounted cash flows, is determined by the formula:

$$PC = \Sigma K_t \cdot \eta_t - \Sigma Ef_t \cdot \eta_t.$$

The Internal Rate of Return (IRR) is the rate of discount at which the present value of the effect of realization of the investment over the calculation period equals the present value of the investment that led to it. The internal rate of return is determined based on the following expression:

$$\sum_{t=0}^{T_p} \frac{Ef_t}{(1 + IRR)^t} = \sum_{t=0}^{T_p} \frac{K_t}{(1 + IRR)^t}.$$

To assess the effectiveness of a project, the value of GNI must be compared with the rate of return required by the investor. Projects with a GNI greater than or equal to the required rate of return (as a rule, have a positive NPV) are effective. Projects whose GNI is less than the required rate of return (as a rule, have a negative NPV) are ineffective.

A modified internal rate of return is a modification that considers the impact of the capital market on its value. In determining the total discounted investment costs, the risk-free discount rate is used. In determining the total discounted effect - the discount rate, reflecting the required rate of return of the investor:

$$\text{MIRR=}\sqrt[T_p]{\dfrac{\Sigma\text{Ef}}{\Sigma\text{K}}}-1.$$

where ΣEf - is the total effect of the investment project, reduced to the last year of its realization by the discount rate, reflecting the required profit rate of the investor

ΣK – is the total investment costs, discounted at the discount rate, reflecting the risk-free liquidity rate.

The Payback Period is the period from the start of a project during which the total present value of the investment is recovered from the total present value of the investment. Payback Period:

$$\sum_{t=0}^{T_{pp}}\frac{\text{Ef}_t}{(1+d)^t}=\sum_{t=0}^{T_{pp}}\frac{\text{K}_t}{(1+d)^t}.$$

Another indicator of the overall cost-effectiveness of investments is *the profitability index (Profitability Index).*

In general, the return on investment index is determined by the formula:

$$I_K=\frac{\displaystyle\sum_{t=0}^{T_p}\text{Ef}_t\cdot\eta_t}{\displaystyle\sum_{t=0}^{T_p}\text{K}_t\cdot\eta_t}$$

Thus, the use of indicators of overall effectiveness in assessing the feasibility of an innovative project allows us to characterize the rationality of the use of resources and capital involved.

4.2. INDICATORS OF COMPARATIVE ECONOMIC EFFICIENCY OF INVESTMENTS

To determine the economic advantages of one project over others, indicators of comparative cost-effectiveness can be used.

Comparative value of integral effect characterizes the additional value of the integral effect obtained from the implementation of the project in comparison with

others. In contrast to the integral effect, this indicator takes into account only the components that change by options:

$$\Delta E_{int} = \sum_{t=0}^{T_p} \Delta P_t \cdot \eta_t - \sum_{t=0}^{T_p} \Delta Z_t \cdot \eta_t - \sum_{t=0}^{T_p} \Delta K_t \cdot \eta_t$$

where ΔP – is the difference in the results of the compared options for the implementation of investments;

ΔZ – is the difference of current costs on comparable variants of realization of investments;

ΔK – is the difference of investment costs on comparable variants of realization of investments.

The criterion for selecting a capital-intensive project is a positive value of the comparative integral effect.

Presented cost is the sum of all required investments and current costs. The most effective solution will correspond to a minimum of reduced costs. Presented costs are determined by the formula:

$$Z_{cca} = \sum_{t=0}^{T_p} 3_t \cdot \eta_t + \sum_{t=0}^{T_p} K_t \cdot \eta_t \text{,}$$

where Z – is current costs arising during the project implementation;

K – is investment costs to implement the project.

The payback period of additional investments is a time period during which additional investment costs for a more capital-intensive option are compensated due to the increase in economic results resulting from their implementation. In general, the payback period of additional investments is determined from the expression:

$$\sum_{t=0}^{T_{pp}^{ai}} \Delta Ef_t \cdot \eta_t = \sum_{t=0}^{T_{pp}^{ai}} \Delta K_t \cdot \eta_t$$

where ΔEf - is the increase in economic results from the implementation of a more capital-intensive option;

ΔK – is an additional investments for the implementation of a more capital-intensive option.

To select the option calculated value of the payback period of additional investment is compared with its normative value. The capital-intensive variant is accepted for realization in the case payback period of additional investments is lower than its normative value, otherwise more resource-intensive variant is chosen.

The coefficient of efficiency of additional investments shows what effect is formed by increasing investments by one and is determined by the formula:

$$E_{ai=} \frac{\Delta Ef}{\Delta K}.$$

The calculated value of the coefficient of comparative efficiency is compared with the normative value. If it exceeds the normative value the investment-intensive option is implemented, otherwise - resource-intensive.

Thus, the use of indicators of comparative efficiency in assessing the feasibility of investment allows justifying the choice of the project most rationally to use the involved resources of several, and indicators of the comparative efficiency - the most rational use of additional resources involved.

Control questions:

1. Criteria for evaluating the effectiveness of investment projects.

2. What characterize the indicators of absolute efficiency.

What characterize the indicators of comparative efficiency.

4. Advantages of indicators of absolute efficiency.

5. The advantages of comparative effectiveness indicators.

6. Integral effect. Advantages and disadvantages.

7. Internal rate of return. Advantages and disadvantages.

8. Comparative value of integral effect. Advantages and disadvantages.

9. Presented costs. Advantages and disadvantages.

10. The payback period of additional investments. Advantages and disadvantages.

5. FEATURES OF PERFORMANCE EVALUATION OF FINANCIAL INVESTMENTS

5.1. SECURITIES AND THEIR TYPES

Financial investments are investments of capital or other assets in securities (shares, bonds, etc.) of various issuers. *Security* is a document certifying, in compliance with the established form and mandatory details, property rights, the exercise or transfer of which is possible only by presenting it. With the transfer of a security, all of the rights certified by it are transferred as a whole.

Securities include government bonds, bonds, bills of exchange, checks, certificates of deposit and savings certificates, bank savings book to bearer, bills of lading, shares, privatization securities, and other documents that are classified as securities by the laws on securities or in the order established by them.

Securities can be classified according to various characteristics.

Depending on **the ownership of the rights certified by a security**, three types of securities can be distinguished:

- bearer securities,

- registered securities,

- order securities.

According to the term of circulation, securities are divided into *short-term, medium-term, long-term, indefinite, and maturity.*

Depending on **the terms of the issue**, securities are divided into *issuable and non-issue.*

Depending on **the form of issue**, securities are divided into *certificated and uncertificated.*

Depending on **the rights exercisable**, securities can be divided into primary, giving the right to income or a share in the capital, and secondary (derivative), giving the right to purchase or sell primary securities, such as options, privatized checks (vouchers).

Depending on the **sphere of circulation**, securities are divided into stock and commercial ones.

Depending on **the level of obligations of the issuer**, securities are divided into *debt securities*, which are the debt obligations of the issuer (bonds, bills, certificates of deposit and savings, etc.), and *non-debt securities* (shares, options).

The main types of securities and their characteristics are presented in Table 6.1.

Table 6.1. - Types of securities and their characteristics

Valuable paper	Definition and Characteristics
Bond	Issuance security secures the right of its holder to receive its nominal value or another property equivalent from the issuer of the bond within the period provided for in it. The bond may also provide for the right of its holder to receive the interest fixed in it on the nominal value of the bond or other property rights.
Share, including	Issuance security secures the rights of its owner (shareholder) to receive part of the profit of a joint stock company in the form of dividends, to participate in the management of the joint stock company and to part of the property that remains after its liquidation. The share is an inscribed security. The term of circulation of the share is not limited, this security can be redeemed only by the decision of the meeting of shareholders of the joint-stock company, or on its liquidation.
- ordinary share	Holders of the company's ordinary shares may participate in the general shareholders' meeting with the right to vote on all matters within its competence and are entitled to receive dividends and, in the event of liquidation of the company, the right to receive part of its assets. A common share entitles its holder to one vote at a shareholders' meeting.
- preference share	Owners of preference shares of the company do not have the right to vote at the general meeting of shareholders, unless otherwise established by the Federal Law "On Joint-Stock Companies", but guarantee income regardless of the financial results of the joint-stock company. The size of this income is specified at issue and can only be increased. The dividend on these shares cannot be less than that on ordinary shares.
Bill of sale	Security certifying the unconditioned obligation of the drawer (a promissory note) or another payer indicated in the bill (a bill of exchange) to pay the money amounts received on the date stipulated by the bill.
Option	Issuance security that secures the right of its holder to purchase on the date stipulated in it and/or upon the occurrence of the circumstances specified in it a certain number of shares of the issuer of such option at the price specified in the issuer's option.
Warrant	Security that gives the right to buy other securities at their initial offering at a certain price and sold by the issuer of these securities. A warrant is a type of option under the following conditions: 1) the issuer of warrant and the security the right to purchase is the same legal entity; 2) a warrant is always a call option; 3) a warrant gives the right to purchase securities at their primary offering.

Valuable paper	Definition and Characteristics
Check	Security that instructs the payer-checker to his bank to pay a specified amount to the check-keeper.
Certificates of deposit and savings certificates	Securities certifying the deposit of funds for a certain period of time at a fixed interest rate with the bank. In fact, savings certificates of deposit are a kind of fixed-term deposits of the bank that can be resold. The difference between certificates of deposit and savings certificates is only that savings certificates are issued to individuals (citizens), and certificates of deposit are issued to legal entities (organizations). Certificates of deposit and savings certificates can be bought at any time during their validity period and interest on them accrues from the moment of their purchase.
Bookmark	Registered security certifying the rights of its holder to receive performance under a monetary obligation secured by a mortgage of the real estate specified in the mortgage agreement. The mortgage certifies the following rights of its lawful holder: the right to receive performance under the monetary obligation secured by the mortgage of the property specified in the mortgage agreement, without providing other evidence of the existence of this obligation; the right to mortgage the property specified in the mortgage agreement.
Bill of Lading	A bill of lading is a security issued by the carrier of sea cargo to the owner of the cargo. A bill of lading is an unconditional obligation of the ocean carrier to deliver the cargo to its destination in accordance with the terms of the contract of carriage.

The diversity of securities allows the investor to form an optimal investment portfolio (for example, to ensure the safety of investments), and the issuer - to use available sources of funding for its development (for example, the implementation of a large-scale project, for the implementation of which its funds are not enough).

5.2. PRICE AND YIELD OF SECURITIES - CRITERIA OF EFFICIENCY OF FINANCIAL INVESTMENTS

The main characteristics of financial investments are their cost and yield. Investment differences in securities are related primarily to the type of income received: income in the form of fixed interest payments, floating rate of lending interest, interest on the loan, discount on the purchase of securities, dividend, the difference in the exchange value when selling, etc. The profitability of securities is determined by the profit and the growth of the exchange rate value compared to the invested funds.

The advantages and disadvantages of investing in some securities, characterizing their investment qualities, are presented in Table 6.2.

Table 6.2. - Comparative characteristics of the investment qualities of some types of securities

Type of security	Advantages	Disadvantages
Ordinary shares	The possibility of receiving high dividends; High liquidity; Participation in the management and development of the economic policy of the joint-stock company.	Stochastic nature of income; High level of risk; The last order of return of the capital at the liquidation of the joint stock company; Inability of minority shareholders to influence management decisions.
Preferred shares	Stable income level; Higher liquidity; Medium risk level.	Dividends may be lower than on common stock; Average liquidity on the stock market; The possibility of repurchase beyond the wishes of the shareholder; Limitation of the possibility to participate in the management of the joint-stock company.
Bonds	Stable income level; High liquidity; Low risk.	Low level of income; No right to participate in management.
Convertible bonds	Stable income level; Low level of risk; Possibility of conversion into other securities.	Low level of income; No right to participate in management.
Stock Options	Possibility to buy the asset at a fixed price; Simplification of price change forecasting procedure; Risk hedging.	Temporal limitation of action; Risk of non-receipt of the premium; Possible low level of liquidity.

One of the safe investments is bonds. The number of types of bonds that exist in world practice is enormous.

According to **the term of existence and the form** of its establishment bonds can be fixed-term or perpetual.

According to **the possibility of conversion** into other securities, bonds are divided into convertible and non-convertible.

According to **the form of income** bonds are divided into: coupon (interest) and discount bonds.

In general, any bond has the following *main characteristics*: nominal value, redemption value, market value, coupon rate, issue date, maturity date, redemption amount.

The par value of a bond is the value of the bond as printed on the letterhead:

$$P_v = \frac{C}{N} \, ,$$

C – is the loan amount, rubles.;

N – is the number of bonds to be issued, pcs.

The redemption value of a bond (value to maturity) is the value at which the issuer redeems the bond.

The market value of a bond is the value formed in the securities market and depends on supply and demand (market conditions).

In practice, to compare market prices of bonds with different denominations, an indicator called the exchange rate or rate of the security is used. *The exchange rate of a bond* is the current price of the bond per 100 denomination units and is determined by the formula:

$$R_b = \frac{P_m}{P_n} \cdot 100$$

P_m – is the market price of the bond, rubles.

The Current yield of a fixed-rate bond is defined as the ratio of the periodic payment to the purchase price:

$$Y_c = \frac{P_n \cdot k}{P_m} \cdot 100 = \frac{CP}{P_m} \cdot 100 = \frac{k}{V_n} \cdot 100 \, .$$

Yield to maturity is the internal rate of return on the cash flow of a bond when the buyer intends to hold that bond to maturity. For a bond redeemable at par with a fixed coupon payable once a year, it is determined from the equation:

$$P_s = \sum \frac{CP}{(1 + I_r)^t} + \frac{P_n}{(1 + I_r)^t}$$

P_s – is a sale price of the bond, rubles.

It should be noted that the calculation of the yield to maturity is similar in this case to the calculation of the internal rate of return, an indicator of the effectiveness of real investments.

The value of a bond with a fixed coupon rate is determined on the basis of the cash flow it generates:

$$V_r = \sum \frac{(P_n \cdot k)/m}{(1+r/m)^{mt}} + \frac{V_n}{(1+r/m)^{mT}},$$

where V_n – is the nominal value of the bond, rubles;

k – is an annual coupon rate, fractions of units;

r – is a market rate (discount rate), fractions of units;

т – is a number of coupon payments per year, times;

T – is a term of the bond, years;

t – is a current period for which the value of the bond is determined, years;

V_r – is a bond redemption value (as a rule, par value), rubles.

When investors justify the effectiveness of investment in shares, the profitability and share price indicators are also used. At the same time, it is necessary to consider the peculiarities of cash flow formation when acquiring ordinary and preferred shares. In the first case future cash flows are formed only at the expense of accrued dividends, in the second case future cash flows include sums of accrued dividends and growth of rate value.

In general, the following formula is used in determining the current yield on a stock:

$$I_c = \frac{d}{P_s},$$

where d – is the dividends, rubles;

P_s – is a stock price, rubles.

The total return on the stock is determined by the formula:

$$I_t = \frac{\sum d_i + P_{st} - P_{s0}}{P_{s0} \cdot T},$$

where $\sum d_i$ – is the number of dividends for the period of holding the shares, rubles;

P_{st} – is a market price of a share at the moment of estimation of share's profitability, rubles;

P_{s0} – is a market price of a share at the moment of acquisition, rubles;

T – is a period of shareholding, years.

The operating yield on a stock is determined by the formula:

$$I_{op} = \frac{P_{st} - P_{s0}}{P_{s0}}.$$

Operating profitability is used to evaluate the efficiency of speculative operations with shares.

When assessing *the value of shares*, the income approach to pricing is used. In this case, the price of a stock is determined based on the cash income it generates.

$$P_s = \sum \frac{I_s}{(1+r)^t},$$

where I_s – is the expected income per share (as a rule, dividends), rubles.

When estimating *the value of preferred shares with a fixed dividend value, the formula* can be simplified to the following form:

$$P_s = \frac{I_d}{r},$$

where I_d – is the expected income per share in the form of a dividend, rubles.

It should be noted that in the world practice of the stock market, the higher the number of dividends paid by a joint stock company, the higher the market value of the share.

The yield to maturity of certificates of deposit is determined by:

$$I_m = \frac{1}{\sqrt[T]{\dfrac{P_{sr}}{P_{ps}}}} - 1,$$

where P_{sr} – is the security's redemption price, rubles;

P_{ps} – is a purchase price of the security, rubles.

In practice, long-term certificates and similar securities may be sold on secondary markets at prices different from the face value. In the general case, the redemption yield is determined by:

$$I_m = \frac{1+r}{\sqrt[T]{\dfrac{P_n}{P_m}}} - 1 = \frac{1+r}{\sqrt[T]{\dfrac{K_d}{100}}} - 1 \text{ ,}$$

where K_d – is the deposit rate at the time of the transaction.

The current value of a bill of exchange is determined by:

$$P_m = P_n \cdot \left(\frac{1+r}{1+I_m}\right)^T \text{ ,}$$

$$K_d = 100 \cdot \left(\frac{1+r}{1+I_m}\right)^T \text{ .}$$

It follows from the above ratios that if $r < I_{пог}$, the price of the liability will be below par, i.e. it will be sold at a discount. Correspondingly, when $r > I_{пог}$, the price of the liability will be above par, i.e. it will be sold at a premium.

When assessing the effectiveness of the purchase of bills of exchange, it should be considered that a bill of exchange can be issued both with a discount and with the payment of a fixed interest to the par value at maturity.

In the first case, a promissory note is a discount security, the income on which is the difference between the purchase price and the par value. *The yield of such bill is determined as follows:*

$$I_c = \frac{Pn - P_b}{P_b} \cdot \frac{T}{t} = \frac{100 - R_e}{R_e} \cdot \frac{T}{t} \text{ ,}$$

where R_e – is the exchange rate value of the bill;

t – is a number of days to maturity, days;

T – is the time base used (360, 365 or 366), days;

P_n – is the face value of the bill, rubles;

P_b – is the bill's purchase price, rubles.

If a promissory note is placed at face value, its yield is determined by the announced interest rate. In this case, the bill is a security with fixed income payment at the moment of maturity, so the methods of yield evaluation discussed above can be applied.

Table 6.3 shows general characteristics of the indicators, considered in this section, which are used at estimation of financial investment efficiency.

When assessing the effectiveness of financial investments, in addition to the calculation of general performance indicators, research is carried out by methods of fundamental and technical analysis, adopted in financial practice.

Table 6.3. - Generalizing characteristics of indicators of effectiveness of financial investments

Indicator	Characteristic
Current yield	characterizes the number of interest payments on a security in relation to its price
Total return	besides the interest payments on the security it takes into account the exchange rate difference
Security price	is an aggregated evaluation of the value of a security of the seller and the buyer at a certain moment of time

THE GLOSSARY

Share is an issuance security that fixes the rights of its owner (shareholder) to receive part of the profit of a joint stock company in the form of dividends, to participate in the management of the joint stock company and to receive part of the property that remains after its liquidation. The share is an inscribed security.

Base prices are the prices included in the project without regard to inflation.

Gross investments are the sum of depreciation and net investments, i.e., they are the investment resources used to maintain and increase fixed capital and inventories.

Promissory note is a security certifying the unconditioned obligation of the drawer (a promissory note) or another payer indicated in the promissory note (a bill of exchange) to pay the loaned amounts of money at the date stipulated by the promissory note.

Deflated (estimated) prices are forecast prices reduced to the price level of a fixed point in time by dividing by the general basic inflation index.

Discounting of cash flows is a procedure of reducing their different (related to different calculation steps) values to their value at a certain point in time. Cash flow discounting is carried out by multiplying its current value by the discount factor in the current period.

The life cycle of an investment project is a set of phases sequential in time (including their constituent steps, stages, phases) from the moment of investing in its development to the moment of its completion.

Investment (from Latin invest - invest) is defined as the investment of capital for the purpose of its subsequent increase.

Investment activity is the investment and implementation of practical actions in order to make a profit and (or) to achieve another useful effect.

Investment project is a system of interrelated research, development, manufacturing, organizational, financial, commercial and other activities, appropriately organized and coordinated by resources, timing and performers,

formalized set of project documentation and ensuring effective achievement of investor's goals.

Integral effect is the difference between the sum of the effects and investment costs for the calculation period, reduced to one (as a rule, the base) year at the discount rate set by the investor.

Capital investments are investments in fixed capital (fixed assets), including costs of new construction, reconstruction and technical re-equipment of existing enterprises, purchase of machinery, equipment, tools, inventories, design and survey work, and other costs;

Project team is a specific organizational structure, headed by the project manager and created for the duration of the project. The task of the project team is the effective achievement of the project goals.

Bond is an issuance security that secures the right of its holder to receive its nominal value or another property equivalent from the issuer of the bond within the period specified in it.

Option is an issuance security that secures the right of its holder to purchase a certain number of shares of the issuer of such option at the date stipulated therein and/or upon the occurrence of the circumstances specified therein at the price specified in the issuer's option.

Portfolio investments are a set of securities (a portfolio of securities) to achieve certain time-deterministic investment objectives (e.g., risk minimization).

Forecast prices are the prices expected (taking into account inflation) at future settlement steps.

Project-oriented management (Management by Projects) is a management approach in which separate orders and tasks to be solved within the organization's activity are considered as separate projects to which project management principles and methods are applied.

Financial investments are investments in shares, bonds, and other securities, as well as bank deposits.

Security is a document certifying property rights in compliance with the established form and mandatory details, the exercise or transfer of which is possible only by presenting it. With the transfer of a security all rights are certified by it as a whole pass.

Economic efficiency of investments is a relative value, characterized by the ratio of the useful result (economic effect) to the investment costs that led to its receipt.

RECOMMENDED LITERATURE

1.   Askinadzi V. M. Investment analysis: a textbook for academic baccalaureate: for students of higher education institutions studying in economic fields / V. M. Askinadzi, V. F. Maximova. - Moscow: Yurite, 2019. - 422 p.

2.   Baldin K.V. Investments in innovation: Textbook. Moscow: Dashkov and K, - 2008. -238 p.

3.   Basovsky L.E., Basovskaya E.N. Economic Evaluation of Investments: Textbook. - MOSCOW: INFRA-M, 2007. - 241 p.

4.   Vilensky P.L., Livshits V.N., Smolyak S.A. Assessment of efficiency of investment projects. Theory and Practice: Textbook - 2nd ed. revised and extended - M.: Delo, 2002. - 888 p.

5.   Volkov B.A. Economic efficiency of investments in railway transport in market conditions. - Moscow: Transport, 1996.

6.   Volkov B.A., Shulga V.Ya. Economics of railway construction and track facilities: Textbook for universities / Edited by B.A. Volkov, V.Y. Shulga. - Moscow: Marshrug, 2003. - 632 p.

7.   Gitman L.J., Jonk M.D. Fundamentals of Investment. Translated from English: Delo, 1997. - 1008 p.

8.   Danilina M.G., Podsorin V.A., Tarakanova N.S. Innovation Management: textbook for students of economic specialties, directions and profiles of undergraduate programs. P. 1. - M.: MIT, 2011. - 104 p.

9.   Dikaya L.G., Basovskaya E.N. Economic Evaluation of Investments: Textbook. Moscow: Infra-M, - 2006. - 241 p.

10.   Zubchenko L.A. Foreign investments: Textbook. Moscow: Knigodel, - 2010. -184 p.

11.   Ivasenko A.G. Investments: sources and methods of financing / A.G. Ivasenko, Ya.I. Nikonova. 3rd ed. revised and enlarged - M.: Publishing house Omega-L, 2009. - 261 p.

12.   Investments. Organization, Management, Finance: Textbook for students studying in Economics and Management / N.V. Igoshina - 3rd ed. revised

and supplemented - M.: UNITI-DANA, 2005. – 448 p. Колмыкова Т.С. Инвестиционный анализ: Учебное пособие. М.: Инфра-М, – 2009. – 204 p.

13.   Krylov E.I., Vlasova V.M., Zhuravkova I.V. Analysis of Efficiency of Investment and Innovation Activity of the Enterprise: Textbook. 2nd edition revised and supplemented - M.: Finance and Statistics, 2003. - 608 p.

14.   Methodical Recommendations on Evaluating the Efficiency of Investment Projects / V.V. Kossov, V.N. Livshits, A.G. Shakhnazarov et al. - Moscow: Economics, 2000. - 421 p

15.   Neshitoy A.S. Investments: Textbook. M.: Dashkov and K, - 2009. - 373 p.

16.   Podsorin V.A. Economic evaluation of investments: methodological guidelines for the discipline "Economic evaluation of investments. - M.: MIIT, 2010. - 148 p.

17.   Podsorin V.A. Economic evaluation of investments: a textbook on the discipline «Economic evaluation of investment» for students of specialty 080502 «Economics and management at the enterprise (railway transport)». - MOSCOW: MIIT, 2011. - 116 p.

18.   Podsorin V.A., Ivanov K.N. Investment policy of a transport company: a textbook for students of economic specialties, bachelors and masters in «Economics» and «Management». - MOSCOW: M.: MIIT., 2011. - 108 p.

19.   Rimer M.I., Kasatov A.D., Matienko N.N. Economic evaluation of investments. 2nd ed. / Edited by M.I. Rimer. - SPb: Peter, 2008. - 480 p.

20.   Tereshina N.P., Podsorin V.A. Management of the life cycle of technical systems on the railway transport: a textbook for universities. - Moscow: Vega-Info, 2012. - 316 p.

21.   Tereshina N.P., Podsorin V.A. Management of innovation in the railway transport: a textbook for universities / Edited by N. P. Tereshina. - Moscow: Vega-Info, 2012. - 592 p.

22.   Investment Management (textbook) / Maltseva Y.N., Vorotilova N.N. et al. - Moscow: ITC Dashkov & K, 2008. - 188 p.

23. Sharpe W., Alexander G., Bailey J. Investments: Translated from English - M.: INFRA-M, 2001. - 1028 p.

24. Economics of rail transport: textbook / N.P. Tereshina, V.G. Galaburda, V.A. Tokarev et al. ed. by N.P. Tereshina, B.M. Lapidus. - Moscow: Federal State Educational Institution "Training and Methodical Center for Education on the Railway Transport, 2011. - 676 p.

25. Shapkin, A. S. Management of securities investment portfolio / A. S. Shapkin, V. A. Shapkin. - 6th ed. - Moscow: Dashkov & K, 2021. - 510 p

26. Kasyanenko T. G. Economic evaluation of investments : textbook and practical work / T. G. Kasyanenko, G. A. Makhovikova. - Moscow : Publishing house Yurait, 2022. - 559 p.

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