Theoretical Foundations and Analysis of the Practice of Decision-Making on the Formation of a Project Financing System

T R Gambarov¹, R R Bashirzade², U S-E Khakhanaev³, A V Pahomova⁴

¹Povolzhsky Institute of Management named after P.A. Stolypin – Branch of The Russian Presidential Academy of National Economy and Public Administration, 410012, 164 Moskovskaya Street, Russian Federation
²Yuri Gagarin State Technical University of Saratov named after Yu.A. Gagarin, 410054, 77 Politechnicheskaya Street, Russian Federation
³Chechen State University, 364024, 32 A. Sheripov’s Street, Russian Federation
⁴Yuri Gagarin State Technical University of Saratov named after Yu.A. Gagarin, 410054, 77 Politechnicheskaya Street, Russian Federation

E-mail: ramila_b@mail.ru

Abstract. The article reviews the theoretical foundations and analyzes the practice of the project approach and its financial support in the context of structuring the management decision-making process based on the basic theoretical and methodological principles of management and finance. Attention is focused on the methods of selection and evaluation of projects for non-production and production areas, in particular, such as simple accounting (accounting) rate of return (ARR); payback period (PP); net present (current) value (value); internal rate of return (IRR). It has been determined that the initial premise for structuring the decision-making process is a specific investment situation, consisting in management-oriented decision-making stages of the process of forming and evaluating investment projects. The author’s classification of investment projects has been formed as a basis for setting goals and evaluating projects, taking into account the results obtained in the implementation of measures to achieve them, in particular, profits. Attention is paid to the specifics of projects in the non-production sphere, which bring indirect income by gaining stability. Practical recommendations are proposed for the step-by-step calculation of discounted flows, taking into account the discount factor. The use of recommendations allows you to make informed management decisions on the financing of projects both in terms of the amount of investments and in terms of investment time.

1. Introduction
Investing in real assets is one of the most important aspects of the activities of any dynamically developing commercial organization, whose management gives priority to profitability from a position of a long-term rather than a short-term perspective. A company usually develops a tree of complementary, hierarchically ordered goals. The larger the company, the more diversified its activities, the more complex the structure of the target tree. In this hierarchy, as a rule, the target for
scaling up is not the last. It is about increasing the indicators characterizing the company's resource potential, production and sales volumes.

Project finance is a funding technique that looks to the cash flows generated by a project to provide investor returns and lenders’ debt service [15]. The effectiveness of project financing also includes the timeliness and reasonable quality of the required fixed assets. To a certain extent, this is achieved by developing a detailed schedule for the investment phase. Making decisions of an investment nature, like any other type of management, is based on the use of formalized and non-formalized methods and criteria [20]. Their combination is determined by different circumstances, including how much the manager is familiar with the apparatus, applicable in a particular case. In domestic and foreign practice, a number of formalized methods are known; The results of calculations obtained with their help can serve as a basis for making decisions in the field of investment policy. There is no universal method suitable for all occasions. However, with some estimates obtained by formal methods, even if conditional, it is easier to make decisions. Reviews the basic features of project finance, the factors behind its development and the «building blocks» of a project-finance structure, with examples [16].

2. Relevance, the scientific importance of issues with a brief review of the literature

The relevance of the article is as follows. Making decisions about financing projects has a significant property - time. This is reflected in the fact that the investment of funds includes the expenditure of resources having an economic value (cash) at one point in time and an investor gaining economic benefits at some other point in time. In other words, costs precede the receipt of benefits. In addition, the manifestation of the time factor is that the costs are one-time in nature, while the benefit is obtained in the form of a stream of smaller amounts over a long period.

The focus remains on generic project finance concepts [17]. The scientific importance of the issues is determined by the economic role of decisions on the financing of projects by investors. Firstly, a significant amount of resources that, in the case of financing from own sources, influence the activity of an enterprise, especially in cases of wrong investment decisions, secondly, it is often difficult or impossible to «play back» the investment, and the enterprise will suffer losses. Hence the need to harmonize funding decisions with the objectives of the enterprise, because investments should reflect the specifics of the object of investment of financial resources. The existing significant differences between the theoretical attractiveness of specific decision-making technologies and evaluation criteria and their popularity in practice give rise to a problem in the field of management, namely, the choice of method for evaluating investments in capital projects and the formation of a process by which managers can monitor projects and monitor the implementation process throughout the life of the project [1].

It is also necessary to note the relevance of the study of the problem of financing infrastructure projects related to production and non-production areas. This is confirmed by statistics on the expenditures of the consolidated budget system for infrastructure. They remained at the same level (2 trillion rubles) in nominal terms in 2018, but decreased in real terms, and their share in GDP decreased by 1 percentage point to 2.1% of GDP.

3. Formulation of the problem

All commercial organizations are to some extent related to investment activities. Making such decisions is complicated by various factors: the type of investment; investment project cost; the multiplicity of available projects; limited financial resources available for investment; the risk associated with the adoption of a decision.

The reasons for the need for real investment can be divided into three types: updating the existing material and technical base, increasing the volume of production activities, the development of new activities. The degree of responsibility for the adoption of an investment project in one direction or another varies. So, when replacing the existing production capacity, the decision can be taken without serious consequences, since management clearly understands to itself how much and with what characteristics new fixed assets are needed. The task is complicated when it comes to investments
related to the expansion of core activities. In this case, it is necessary to take into account the possibility of changing the position of the company in the market for goods and services, the availability of additional volumes of material, labor and financial resources, the possibility of developing new markets, etc.

Obviously, the question of the size of the estimated investment is very important. Thus, the level of responsibility associated with the adoption of the project with an investment volume of 100 thousand rubles, respectively, or 100 million rubles. is different. Therefore, the depth of the analytical study of the economic side of the project, which precedes the decision making, must be different. In addition, in many firms, it becomes common practice to differentiate investment decision-making rights, i.e. The maximum amount of investment within which a manager can make independent decisions is limited. This can be achieved by introducing appropriate restrictions in statutory documents or by creating a hierarchically ordered network of responsibility centers. Decision-making styles mediate the influence of personality on investments [4].

Decisions should be made in the conditions when there are a number of alternative or mutually independent projects, i.e. there is a need to make a choice of one or several projects based on some formalized criteria. It is obvious that there may be several such criteria, and the likelihood that a project will be preferable to others by all criteria is usually much less than one. In this case, one has to give priority to one criterion, establish their hierarchy, or use additional non-formalized assessment methods.

In a market economy, there are quite a few opportunities to invest [18]. At the same time, any commercial organization has a limited amount of free financial resources available for investment. Therefore, the task of optimizing the investment portfolio is always relevant. As already mentioned, a very significant risk factor. Investment activity, firstly, is always associated with the immobilization of the company's financial resources and, secondly, usually takes place under conditions of uncertainty, the degree of which can vary considerably. So, at the time of acquisition of fixed assets it is never possible to accurately predict the economic effect of this operation. Therefore, decisions are often made intuitively. An erroneous forecast regarding the acquisition of a given volume of assets can have unpleasant consequences of two types: an error in investing in the direction of understating will lead to the non-receipt of possible income; excessive investment will lead to incomplete capacity utilization.

The scientific task is to explore the theoretical foundations and peculiarities of the practice of making managerial decisions on the financing of projects in the material and non-material areas. The more specific an underlying possibility and a corresponding possibility distribution are, the narrower (more specific) a set of the optimal decisions is (a decision is optimal if it minimizes the possibility of error) [5].

Decisions for others are a little more risky than decisions for the self [6]. The purpose of the work is to examine the theoretical foundations and analyze the practice of the project approach and its financial support in the context of structuring the management decision-making process. It is based on the basic theoretical and methodological provisions of the management decision-making process for financing a project based on an analysis of decision-making methods for investment projects. Efficient decision-making for multiagent target searching and occupancy in an unknown environment. Target searching in an unknown environment is a traditional research issue in the multiagent area [7]. The mediating role of career decision self-efficacy. High emotional intelligence leads to reduced career decision-making difficulties [8].

4. Theoretical part
The reasons for the expansion of the scope of the company's activities are both social and economic in nature. First, this process has a beneficial effect on the company's image, which contributes to strengthening and expanding its position in the market for goods and services. Larger firms are more likely to attract experienced management personnel. Secondly, the increase in production volumes is often associated with the effect, called «expanding returns to scale». The latter concept has the following interpretation.
If in a certain company, after a number of years of its operation, an efficient production method has developed, from the position of the equipment and technology used, the increase in output is possible due to a proportional increase in production resources. Of course, the pace of increasing the resource potential of the company and its production may not be the same, that is, returns to scale may be decreasing, constant or increasing. The situation when the increase in production volumes is carried out at a faster rate than the increase in the volume of resources involved in the production activity, and there is an expanding return on scale.

From the position of the company's management personnel, investment projects can be classified for various reasons (Fig. 1). Of course, the characteristics are not absolute. In particular, the division by volume of investment required most often depends on the size of the company, since it is obvious that in a solid financial and industrial group and a small furniture factory, the criteria used to classify the analyzed project as large or small differ significantly.

![Figure 1. Classification of investment projects.](image)

The goals that are set when evaluating projects may be different, and the results obtained when implementing measures to achieve them do not necessarily have the character of an obvious profit. There may be projects that are in themselves unprofitable (in the economic sense), but bring indirect income by gaining stability in providing raw materials and semi-finished products, entering new markets for raw materials and marketing products, achieving some social effect, reducing costs for other projects and industries. Thus, in many economically developed countries, the question of protecting the environment and ensuring the safety of company products for users and nature is acutely raised; Often, large companies include in the analytical sections of their annual reports relevant information on capital and operating costs in this direction [2]. In this case, the traditional criteria for project evaluation, based on formalized algorithms, may give way to some unformalized criteria.

Very important in the analysis of investment projects is the allocation of relationships of interdependence. Two analyzed projects are called independent if the decision to accept one of them does not affect the decision to accept the other. If two or more analyzed projects cannot be implemented simultaneously, i.e. the acceptance of one of them automatically means that the remaining projects must be rejected, then such projects are called alternative or mutually exclusive. The division of projects for independent and alternative is of particular importance when recruiting an
investment portfolio in the conditions of restrictions on the volume of capital investments. The value of the upper limit of the amount of funds allocated may be uncertain at the time of planning, depending on various factors, for example, current and future profit. In this case, you usually have to rank independent projects according to their priority.

Projects are considered to be interconnected by complementarity if the adoption of a new project contributes to the growth of revenues for one or several other projects. The identification of the complementarity relationship implies the priority consideration of projects in the complex, and not in isolation. This is of particular importance when the adoption of a project on a selected main criterion is not obvious; in this case, additional criteria should be used, including the presence and degree of complementarity. Projects are interconnected by substitution relationships, if the adoption of a new project results in some decrease in revenues for one or more active projects. As an example, we can cite a project involving the opening of tire repair production at a tire manufacturing plant. It is possible that the adoption of the project will reduce the demand for new products. A significant role in investment analysis has the characteristics of the type of cash flow inherent in the estimated project. A flow is called ordinary if it consists of an initial investment made at the same time or for several consecutive base periods, and subsequent cash inflows. If cash inflows alternate in any sequence with their outflows, the flow is called extraordinary. The selection of ordinary and extraordinary flows is extremely important when choosing an evaluation criterion, since not all the criteria cope with the situation when you have to analyze projects with extraordinary cash flows.

Investment projects vary in risk. It is believed that the least risky projects carried out under the state order (the state will almost certainly provide the necessary funding, and the corresponding consumption of products produced during the launch of the project) and the most risky projects associated with the creation of new industries and technologies. As a rule, an investment project rarely occurs spontaneously. It is an integral part of the investment policy of the company, the development of which involves the formulation of long-term furnaces of its activities, the search for promising areas of application of free capital, the development of engineering-technological, marketing and financial forecasts, the compilation of a portfolio of promising projects, the preparation of an appropriate capital investment budget, the evaluation of alternative projects and consequences implementation of previous projects.

Administration of investment activities in the context of real investment includes four stages: research, project planning and development, project implementation, monitoring and regulation during the project implementation, evaluation and analysis of achieved results upon completion of the project. The main procedures at the planning stage are the formulation of goals and sub-goals of investment activities, market research and identification of possible projects, economic evaluation, selection of options under various constraints (time, resource, having an economic and social nature), formation of an investment portfolio. The project implementation stage is usually divided into three phases: investment, project execution (production, sales, current financing costs), liquidation of its consequences. At each of the phases are monitored and regulated. Assessment of compliance with the goals set and achieved should be an integral part of the work of the financial manager and be carried out, as a rule, upon completion of the next project. The financing cost can be minimized if the financing decision considers different financing alternatives such as short-term and long-term loans and lines of credit. Financing optimization should be integrated into time-cost tradeoff analysis to minimize total cost and maximize profit [10].

It is customary to single out three blocks (groups) of decisions of an investment nature: selection and ranking, optimization of the operation of the project, the formation of an investment program (Fig. 2). The above classification is not the only possible one. Project finance is the financing of a single, high capital intensive, and long lasting industrial initiative [11].
The first situation occurs if the projects available for implementation are alternative, that is, the implementation of one of them automatically means giving up on others. For example, the question of the organization of accounting in the enterprise. There are two possible solutions to the problem: a) the organization of its own accounting service; b) the involvement of a third-party specialized company. A more preferred project is selected using some evaluation criterion, for example, by the maximum net present value (NPV).

The second situation appears when projects are not alternative, but the company cannot implement them immediately, for example, due to limited funding sources; therefore, as soon as the source becomes available, the next project can be accepted for implementation. In this case, using the criteria of quantitative evaluation, projects are ranked according to their degree of preference. The tasks of this block are obvious in their logic:
- a) select the evaluation criterion;
- b) its value is calculated for each project;
- c) a project is selected with a maximum (minimum) criterion value or a value satisfying its boundary value set in the firm; or projects are ranked in ascending (descending) criterion values.

The main difficulty is that there are many evaluation criteria and they are not «unanimous» in determining the preference of a project. In other words, the subjective factor plays a decisive role in this case. Research progress in project finance draws from interdisciplinary perspectives, leading to relevant research insights being spread out over a high number of publications [12].

To make a decision on financing a project, it is necessary to evaluate its effectiveness. In world practice, the following methods are used:
- simple accounting (accounting) rate of return (ARR);
- payback period (PP);
- net present (current) value (value);
- Internal Rate of Return (IRR);
- variations of these four methods.

The starting point for making a decision is a specific investment situation.

Simple accounting (accounting) rate of return (accounting rate of return (ARR)). Based on the average annual profit margin, which is provided by the investment, expressed as a percentage of the average investment during the life of the project. To calculate the accounting rate of return it is required to obtain an additional two estimates information:
- on average annual profit;
- about the average investment in a specific project.

The payback period (PP) is the length of time required for the initial investment to be offset by net cash flows from the project. The method is based on the calculation of the time interval. The method
of PP offers a way to overcome the problem of the distribution of cash flows over time, inherent in the method of the accounting rate of return.

Net present value. To facilitate management decisions on investment, we need an evaluation method that takes into account all the costs and benefits of each investment. Opportunities and also logically takes into account the time distribution of these costs and benefits. The net present value NPV method has all these qualities.

The internal rate of return (IRR) of a specific investment proposal is the discount rate, which, when applied to future project cash flows, makes their amount equal to the initial investment. In essence, it represents the rate of return of an investment project.

In 2018, the Supervisory Board of the Industry Development Fund of Russia approved the Standard of the Fund Terms and conditions for selecting projects for financing under the Development Projects program (Revision 3.1 No. SF-I-51 Moscow 2019 Development Projects) [3].

The Standard defines:
- directions of use of the loan;
- the size and grounds for liability for failure to perform or improper performance of the obligations specified in the contract.

Selecting projects for making investment decisions is key to project implementation.

Consider the novelty of the approach to the procedure for evaluating the project according to the Standard. First of all, let us pay attention to the conceptual apparatus, a single application of which is mandatory for all project participants.

The main participants of the project are persons whose participation in the project under consideration is critical for its successful implementation. Includes key performers with the competencies necessary to carry out certain activities; persons providing financing and provision for the project (financial institutions, investors, guarantors, guarantors, mortgagors); persons providing access to key project assets (e.g., patent, technology / know-how, land); leasing companies; banks. Loans or guarantees may also be provided by public-sector or multilateral development or infrastructure banks, usually in markets where private-sector debt is not so easily available [13].

Loan repayment collateral - types of collateral accepted by the Fund and stipulated by the Fund Standard No. SF-I-82 «Procedure for securing the repayment of loans granted as project financing» (hereinafter referred to as Fund Standard No. SF-82).

The total project budget is the sum of all project costs (not including interest on a loan agreement between the Applicant and the Fund, as well as on fundraising agreements): the total amount of previously made and planned investments in the project (incurred not earlier than two years before the application date), including the costs of project preparation and pre-design work (preparation of design estimates, obtaining the necessary approvals and permits, design and survey work, etc.), design work (construction, installation, commissioning, etc.), capital investments (acquisition of buildings, structures and equipment, etc.), recruitment and training of personnel, investments and working capital, and other costs [19]. Planned investments in the project are indicated in nominal prices (taking into account the projected inflation of the relevant costs). Previously implemented investments in the project are indicated separately by the actual amount of costs incurred and documented.

Syndicated loans are essentially loans made by coalitions of lenders, who share in the risks and rewards of the (large) loan [14]. The minimum and maximum loan size is determined by the decision of the Supervisory Board of the Foundation dated February 17, 2017 (Minutes No. 15). The minimum and maximum loan size is determined by a separate decision of the Supervisory Board of the Fund. When making a decision on financing a project, the Expert Council of the Fund determines the amount and term of the loan, based on the project’s characteristics and the applicant’s financial condition, but not more than the amount requested by the Applicant.

When calculating the amount of co-financing of the project by the Applicant, private investors or through bank loans:
- investments made in the project not earlier than two years preceding the date of the Application submission may be taken into account, subject to documentary evidence of the costs incurred prior to submission of the project to the Expert Council of the Fund;
- does not take into account investments made (carried out) at the expense of funds allocated directly to support projects from the budget (subsidies, etc.);
- does not take into account income in the form of cash flow generated by the project.

Co-financing from the Applicant’s own funds (and / or affiliates, the Applicant’s beneficiaries) in the amount of not less than 15% of the loan amount must be made in the following period: no earlier than 2 years before the application date and no later than 6 months from the date of the loan agreement.

In order to assess the compliance of a project with the criterion «Production feasibility of a project and the company's strategic interest in its implementation», the following parameters are examined, in particular:
• availability of production assets in Russia for the implementation of the results or the availability of appropriate measures to create assets and budget in the business plan;
• lack of critical dependence of the project on imported raw materials or components;
• compliance of the project with the company's main activity and its business strategy, the strategic importance of the project for the company, the company's interest in its implementation;
• availability of material and technical base for the development of the Applicant;
• the validity of the schedule and timing of new product development activities;
• The reasonableness of the budget for the development of a new product;
• availability of the necessary competencies for the development, professional reputation of the Applicant’s project team;
• availability of the export potential of the products produced, providing access to the world market and expanding its presence on the following parameters:
  - competitiveness of products in foreign markets;
  - high-tech products.

5. Practical relevance, suggestions and results of implementations, the results of experimental studies

We note, first of all, that the practical significance of the proposals relate to real investment, however, the provisions under consideration can be extended to financial investments. The practical significance of the proposals according to the results of the study will show on the example of consideration of a conditional project and its cash flows. The cycle duration is one year. Cash inflows with a plus sign, outflows with a minus sign. The discount rate \( r \) is 10\%. Net income (NI) in the last column (\( m = 8 \)) is row 6 and is 43.6 million rubles. this line shows that the need for additional funding (NF) is 88 million rubles. (in step 1) (\( n = 1 \)). Cash flows for the investment project are presented in Table 1.

| Table 1. Cash flows on the investment project, billion rubles. |
|---|---|---|---|---|---|---|---|---|
| Indicators | Line number | Calculation step number | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Cash flow from current activities (\( \text{Cf}_{\text{int}} \)) | 1 | 0 | 13 | 29,6 | 29,8 | 20,6 | 48,4 | 48,8 | 39,0 | 0 |
| Investment | | | | | | | | | | | |
| activities: | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | +6, 0 |
|------------|---|---|---|---|---|---|---|---|--------|
| Tributarie s | 3 | 0 | 0 | 0 | - | 0 | 0 | 0 | - |
| Outflows | 60, 41, | 36, 54, | 0 | 0 | 0 | 0 |
| Cash flows | 4 | - | 0 | 0 | - | 0 | 0 | 0 | - |
| balance | 60, 41, | 36, 48, | 0 | 0 | 0 |
| (Cf_m1) (investment) activities | | | | | |
| Balance | 5 | - | - | 29,6 | 29, - | 48, 48, 39, - | |
| of total cash flow | 60, 28, | 8, 16, 4, 8, 6, 48, 0 | 0 |
| (Cf= Cf_m1+Cf_m2) | | | | |
| Balance | 6 | - | - | -58,4 | - | 3,2 | 52, 91, 43, |
| of accumulated flow | 60, 88, | 28, 45, 0 | 6, 6 |
| Discount coefficient at the rate 10% (αm) | 7 | 1,0 | 0,9 | 0,83 | 0,7 | 0,6 | 0,6 | 0,5 | 0,5 | 0,4 |
| Discounted balance of total cash flow (line 5 x line 7) | 8 | - | - | - | 22, - | 30, 27, 20, - | |
| of total cash flow | 60, 25, | 24,5 | 35, 11, 0 | 33 | 19, 22, 56 |
| Discounted investment (line 4 x line 7) | 9 | - | - | 0 | - | 0 | 0 | 0 | - |
| 60, 37, | 24, | 22, | 0 | 31, 48 | 56 |

The proposal to summarize the results of the calculation is the presented management decision-making process on the financing of the project. So far, we have dealt with methods for evaluating alternative investments that have already been identified. This topic has received much attention in the literature on investment appraisal. The novelty of the approach to financing projects is as follows. We must remember that this is only part of the investment decision making process. There are other important aspects that managers also need to consider.

The process of financing projects is proposed to be considered as a sequence of six main stages (Fig. 3). Managers should pay due attention to each of these stages. This is especially true of funds available for investment. The starting point is the determination of how much you can invest in projects during the period. Sometimes top-managers set limits on the amount of funds allocated, even
if the funds are sufficient. This internal limit is a soft limit (limiting) of the amount of financial capital for investment (soft capital rationing). However, in other cases, investors may refuse to provide the funds necessary for investment projects. These external restrictions imposed (limits) are a hard option to limit financial resources for investment (hard capital rationing). In practice, the former seem to have the greatest impact on the amounts available for investment.

Thus, for the practical application of the proposals, we take into account the following provision. If for any reason there is a shortage of funds, managers must ensure that the available funds are used with maximum efficiency. In order to ensure that the priority of competing projects is established correctly, it is necessary to make certain amendments to the rule for deciding on the net present value method.

Definition of profitable financing opportunities for projects. A vital part of the investment management process is finding profitable investment opportunities. Companies must act proactively and use a systematic approach to identifying new opportunities. To remain competitive, the search for new investment opportunities must be viewed by the business as an integral part of the planning process. The list of investment opportunities will likely include the development of new products or services, the improvement of existing goods and services, access to new markets and investment in capacity expansion, as well as efficiency gains. Searching for new investment opportunities often forces you to look beyond existing business, explore technological innovations, changes in customer demand, market conditions, etc. Information needs to be gathered and this can take some time, especially in the case of unusual or unconventional investment opportunities.

6. Conclusion
1. The search for new funding opportunities for projects relates to project management. Decision making in this area of activity is based on the theoretical foundations and analysis of the practice of management decisions in the material and non-material areas. The adopted project will be more successful if there is a corporate culture that encourages employees at all levels to submit proposals for consideration. Certain corporate initiatives may contribute to the development of such a culture. For example, some companies stimulate the presentation of «raw» project ideas for consideration and then invest resources in developing useful ideas until the moment when they can be submitted for formal consideration. Some companies promote such offers by a reward and evaluation system developed for employees.

2. Transforming promising ideas about financing projects into mature proposals requires the classification of projects.

Figure 3. Stages of the project financing process.
The purpose of this stage of the process is to position the project in the developed classification for the formation of investment decisions. Further information will be required, much of which should be detailed. However, gathering information can be time consuming and expensive, so often the process is organized as consisting of two stages. The first stage involves the collection of information sufficient for its preliminary study. Many proposals stumble over this first obstacle, as it soon becomes clear that they are unprofitable or unacceptable for other reasons. Proposals that are deemed worthy of further study, proceed to the next stage, which includes the further development of ideas so that you can perform a more thorough selection. It is often useful to classify the identified investment opportunities. The following broad classification of these opportunities for making investment management decisions is proposed.

Development of new products. If enterprises operate in rapidly changing markets (for example, computer manufacturers), there should be a regular flow of new product development.

Increase sales of existing products. To maintain or improve a competitive position, a company can constantly strive to improve the quality or design of existing products.

Cost reduction. New investments can lead to significant savings over a long period. For example, the purchase of new equipment can reduce the costs associated with waste, waste, forced processing, labor costs of production workers and to check the quality of products.

Replacing equipment. If the equipment has developed a service life, it may be necessary to replace it in order to maintain the existing level of production.

Convenience and safety. An enterprise may strive to achieve certain standards, or it may be required to comply with new rules in areas such as safety of workers, pollution of the environment, recycling of waste, etc.

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