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CHALLENGES OF AN EFFECTIVE STRATEGY FORMATION FOR THE INVESTMENT CLIMATE IN MOLDOVA

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Abstract: *In the context of European Union integration, Moldova needs to record economic performance. This is not possible without forming a proper investment climate, in order to attract effective investments.*
Investment plays an extraordinary and growing role at the level of macroeconomics and for business development as well. This is why, a careful analysis of theoretical aspects related to investment solutions, which form the basis for the development of methodological management instrumentation of the investment process, should be carried out. In our view, a contradictory understanding of the investment process at the microeconomic and the macro level has its origin in a lack of theoretical development of the very nature of the investment process.
Like any other process, the investment process needs to be managed. This investment process is based on the corporation investment strategy, developed with various financial and economic methods, which together make scientific funding methodology for the formation of investment decisions of the enterprise. Typically, when making investment decisions take into account the risk projects associated with the volatility of cash generated flows. Financing of investment projects at risk and uncertainty requires science-based approach to investment decisions. In the scientific literature, the basics of decision-making under uncertainty is described, but economic instruments of practical application not completely take into account the categories of "risk" and "return" that does not provide the possibility of adopting science-based solutions and reduces the reliability to estimate the investment project. This connection, the practice of investment planning needs adequate economic tools to more effective use of scientific potential.
Keywords: *Investment climate, efficiency, risk assessment*

Introduction

Every investment represents a series of management decisions which must be based on analytical calculations. In the Republic of Moldova, the problem of investment decision-making has been the center of attention, as for academics, as for business practitioners. And this is understandable: Investment plays a key role in the fundamental economic processes occurring at both the macro and micro levels. In this regard, from the qualitative and quantitative characteristics of the investment process depends on the country's productive capacity and efficiency of its operation, the reproductive structure of social production, as well as tackling problems such as unemployment, conditions of living.

The **scope and objectives of this article**: a complex analysis investment decision, the development of the scientific, theoretical-applied mechanisms that can serve as a basis for the increased economic effectiveness of the production assets, the industrial potential of the sustainable development of the Moldovan economy; the development of economic-mathematical mechanisms for optimal distribution of investments to sectors, to territories, block-schemes to optimize foreign investments in the context of Moldovan economic policy.

In our view, a contradictory understanding of the investment process at the level of economic activity of enterprises and at the macro level has its origin in a lack of theoretical developed of the very nature of the investment process. Therefore, it should: consider the investment costs as spending of various economic agents in the acquisition of material factors of production and the hiring of workers involved in the production process; conduct theoretical differences notions of "investment expenses, and investment demand. Investment demand, in our opinion - is the potential need for

entrepreneurs, expressed in monetary terms, the acquisition of investment goods to generate income; Investment demand can not be equated with "planned" or "expects," costs, since the basis of the demand is the availability of real, rather than the expected cash flows, emerging from different sources; Investment demand - an independent economic category, does not agree with the notion of temporarily idle funds.

There are various alternatives for the utilization of available funds, one of which is investment; conditions for the formation of investment demand vary depending on whether temporarily free funds own or borrowed; each of the alternative uses of available funds are objective conditions of tools and effects; The presence of only investment demand if they wish to take a decision on the acquisition of material and material factors of production is not a yardstick of real investment.

In addition to the demand for investment goods should take into account their availability, on the formation of the real volume of investment is influenced not only demand, but also the volume of supply of investment goods in the relevant markets.

Financing of investment projects in terms of risk and uncertainty, requires science-based approach to investment decisions. Currently, investment planning, taking into account uncertainties, has following features. First, the conditions for their implementation and the results are nondeterministic, forcing to take into account the full range of possible values of key parameters, the probability of each possible option, as well as the distribution of this probability. Second, risk factors and uncertainties leads to a significant change in the content of project materials, which necessitates the use of new methods and tools for investment planning.

One of the conditions that determine the importance of developing an investment strategy of the organization is its forthcoming stage life cycle. Each of the stages of the life cycle of the organization inherent characteristic of her level of investment activity, trends and forms of investment activity, particularly of investment resources. Investment strategies for early investment are developed to adapt the organization's activities for the upcoming opportunities for radical changes in its economic development.

In our view, an essential condition for determining the importance of developing an investment strategy is a radical change in the operating goals of the organization associated with opening new business opportunities. Realization of these goals requires a change in product range, introducing new production technologies, developing new markets, etc. In these conditions, a significant increase in investment activity organization and diversification of its investment activities should be predictable nature, for the development of a well-defined investment strategy.

1. Theoretical aspects of investment decisions

In the Republic of Moldova, the problem of investment decision-making has been the center of attention, as for academics, as for business practitioners. And this is understandable: Investment plays a key role in the fundamental economic processes occurring at both the macro and micro levels. In this regard, from the qualitative and quantitative characteristics of the investment process depends on the country's productive capacity and efficiency of its operation, the reproductive structure of social production, as well as tackling problems such as unemployment, conditions of living.

From the theoretical point of view, is very important to define what is meant by investment in the economic literature. It should be noted a significant difference in the interpretation of the definition of investment expenditures at the level of the industry economy and at the level of macroeconomics. Thus, at the micro level the concept is treated as investment funds, special bank deposits, shares and other securities, technology, equipment, licenses, loans, any other forms or property rights, intellectual values invested in the business facilities and other activities for profit and achievement of positive economic and social effect. In macroeconomics, investments include the costs of acquiring the means of production and purchase of housing. At the same time it should be noted that also uniquely determined by the content of investment activity. At the enterprise level it refers to any activity that brings some form of income. At the macro level, investment activity is associated with the development of the real sector, which includes both manufacturing and non-productive sphere. And, at the macro level, the size of investment is the criterion of economic development.

Based on the differences in the treatment of investment, its forms and results for different levels of the economy led to the conclusion that they are fundamental. So, macroeconomics, designing regulations of the national economy, uses one interpretation of the nature of investment, and for businesses there is a different interpretation, according to which, they set up their investment policies.

This contradiction is, in our opinion, one of the major causes of lack of communication between the theoretical models and practical results, which has adverse implications for both the science and practice.

Theoretical postulates of investment were laid by mercantilists and further developed in the teachings of various schools, each of them reflecting the appropriate level of development of society. In this context, to identify the causes of these contradictions evolution of theories of investing and basic theories of leading economic schools about the essence of investing must be analyzed.

The earliest scientific direction which considers issues of investment is mercantilism. Representatives of this school identified the wealth of the nation with money, and money with precious metals. The source of wealth according to the theory is foreign trade, providing the influx of gold and silver money by maintaining a trade surplus with the representatives of the early school believed that the multiplication of the nation's wealth can be achieved using the money for the organization of social production. In essence, mercantilists considered money as a fixed form of capital, which should turn first to the performance, and then in the commodity form, thus ensuring continuity of production and employment for farmers and artisans. They found that the accumulation of treasure is not an end to the nation, and represents only one element of social reproduction, Representatives of the school noticed the need for productive investment in order to overcome the negative phenomena in the economy and wealth creation of the nation.

Mercantilist ideas were expanded by Physiocrats. Thus, F. Kene, first identified natural-material structure of investment, dividing them into "avances primities" and "avances annuelles", He stressed that the distinction between them arises only when the advance money transformed into elements of productive capital. In Physiocrats theory only form of productive capital is capital used in agriculture and therefore, applies only to investments productive form of capital used in agriculture. At the same time, they are to the initial or annual advances, absented money and goods on the market In the later period of "advances" such called capital. At the same time, making no distinction between the essence of investment at the level of individual farms or social production in general, the Physiocrats have identified a direct relationship between the amount of productive capital and wealth of the nation, introducing economic theory in the name of the material and material factors – capital. As you can see, the investment appears as a process aimed at renewing and increasing use of capital, with which the production process in agriculture and increases the wealth of the nation. The distinctive feature of investment at different levels of economy is to introduce a farmer's cost of acquisition costs of production and hiring of agricultural workers, while at the national level to the capital attributed only to the material factors of production.

Further on, the theoretical aspects of the investment process have been reviewed by founder of the classical theory Adam Smith, who, like the Physiocrats, singled out the objectivity of the process of capital formation. In his opinion the result of the annual labor of any nation can be increased in two ways: either by increasing the number of productive workers, or increase the productive power of workers hired before. In both cases, the need to increase capital, or to create jobs for new workers or improvement of machinery and tools that enhance the productivity of labor is already employed in social production. Thus, the process of raising capital at the national level A. Smith connects with the increase of wealth.

Based on its research Smith points out in what ways the use of capital can achieve a capital increase, as well as displays wealth among people - the number of productive workers - the productive power of labor - the amount of capital embodied in the means of production. As used in similar ways, in addition to augmenting the capital of national wealth generates income in the form of profits to its owner, and economic actors, whose capitals are used by one of the following methods, are productive workers. Their work increases the cost of manufactured product and the profit they receive is part of this cost.

Thus, investment multiplies the social wealth, while makes profitable entities engaged in these forms of activity. However, Smith points out that if a commodity is used to generate income, it is capital for its owner, but is not a capital in a public sense, the basis on which we can speak of dual interpretation of the capital. This ambivalence not always can be attributed as social capital for the individual. The principal difference lies in the ability of capital to be used to increase national wealth. In this case, the labor of workers is productive, and income received by them, shall be paid from the value created.

Theory of the scientists it concludes that in the social scale, to include investment costs, to redress and to increase capital, existing in these forms, resulting in multiplied national wealth and the

owner of the capital derives income from its created value. Another form of investment represents the cost of purchasing the property, which brings profit to the owner of income, without increasing the national wealth. Consequently, we can conclude that the dual interpretation of the essence of the investment process appeared more in the teachings of Adam Smith and it consists of uneven understanding of the object of investment - capital. On the one hand, the classic attributes to him the property and money of an individual, can bring him income, on the other - factors of production, can in addition increase the wealth of society.

A different approach to the study of the investment process is found in **Alfred Marshall theory,** founder of the neoclassical school. Scientist analyzes the investment process as part of the functioning of the capital market. The capital market is foreseen as interaction of supply and demand, and the subjects of supply and demand of capital market are different individuals with different motivations of its activities. From these positions the formation of the supply of capital is determined by the savings of private individuals. The subjects of the savings, in his opinion, may become all members of society, although most of the savings are made by owners of capital is regulated by the accumulation of a diverse array of reasons, among them - bank interest rate, serving as a regulator of savings. The level of interest rate A. Marshall sees the reward loss, associated with the expectation of future satisfaction of material resources, explaining that an increase in savings with an increase in interest rates. Moreover, the interest rate depends on whether the employer uses its own funds or borrowed funds. Marshall, the first time in economic theory emphasized the impact of savings by the amount of bank interest rates, which serves as the offer price in the capital market. The second element of the capital market - demand - is regulated rate of return on invested capital, and A. Marshall, focused on the cost structure of the entrepreneur, the issue of discounting, time to balance investments and their impact, and also gives the definition of investment conditions, consisting in comparing the costs and benefits. Investments will be made if in addition to cost an entrepreneur gets an extra profit.

At the societal level, Marshall gives the concept of capital and hence investment, more narrowly. Like A. Smith, he does not relate to the social capital of its monetary form, but on the other hand, makes no distinction between capital goods and consumer durables, including in the composition of social capital. The scientist, more specifically, than its predecessors, defines the mechanism of formation of investment decisions.

Further study of the principles of the investment process was undertaken **by J. M. Keynes.** A distinctive feature of this research scientist is to postpone the analysis of the investment process at the level of macroeconomics. In his studies, Keynes criticized the postulates of the classical school that was established in the work of Ricardo, Pigou, Edgeworth and his teacher - Marshall. Their main mistake he had seen in ignoring the factors that have independently from the proposal, the impact on demand, which, in turn, inhibits the production and leads to unemployment.

In his study Keynes came with the following argument: for a given state of the art, the amount of resources used and the level of domestic production costs depend on the level of employment, the ratio between output and the expected value of consumption expenditure depends on the psychological characteristics of the society, called the propensity to consume, the amount labor costs, which entrepreneurs present a demand depends on the expected costs to society of consumption and of the expected costs to society for new investments. Consequently, the equilibrium level of employment depends on: the function of aggregate supply; of propensity to consume and the amount of investment.

Thus, in the arguments of Keynes's investment demand appears as an element of aggregate demand and as a factor influencing employment. Its value is determined, on the one hand, the so-called "expected" costs to society for investment goods, on the other - the investment costs are defined as the difference between the amount of aggregate supply and expected expenditures on consumer goods. In their model, the scientist identifies conditions for the formation of expected investment costs "as part of aggregate demand. Originally Keynes decide on their size, placing a reliance on consumption expenditure. Expenditure on consumption are determined as a function of employment and the marginal propensity to consume. Introduction to the analysis of this indicator is due to the action highlighted by Keynes fundamental psychological law behavior of the population, according to which people are inclined to increase their consumption to income growth, but not to such an extent that increases income.

At the same time, Keynes does not distinguish between two separate processes: the first - is the formation of investment demand and the second - to provide business revenue for manufactured products.

Expected costs - it costs next planning period, and they can not influence the formation of demand in the current time interval. Demand depends on consumer spending for the purchase of goods manufactured in the preceding time interval. It is from these costs depends on size of business receipts and, consequently, profit margins, personal income and business deductions to the sinking fund. Therefore, we believe the use of Keynes's rate of expected costs as a factor in creating demand logical error. The current investment demand is a function of consumer spending the previous interim period. But to make available funds received for the realization of output, the investment demand, need certain conditions.

Consider the problem of making investment decisions in the event of their own funds. This problem consists in comparing the benefits that can be obtained on the two alternative options for their use. The first option - it is investment and profit from productive activities, the second option - making available funds in the capital, and getting on him for income from bank interest. Selecting determined by the ratio of income derived from investments and bank interest rate. Investment decisions are made if the marginal efficiency of capital above the rate of bank interest.

In our opinion, the bank interest rate and the marginal efficiency of capital do not determine the actual amount of investment, and allow evaluating the profitability of the two alternatives available funds. It should be noted another factor affecting the evaluation of these two options in the case when entrepreneurs do not have the money and they turn to borrowing. It seems that this variant form of investment demand should be considered separately from the case using their own funds, because the borrower must take into account the higher rate of bank interest. These two rates of bank interest were named A. Marshall 'gross interest "and" net interest ".

In accordance with the foregoing, we believe it necessary in the analysis of investment demand into account the ratio of own funds and debt businesses. Naturally, with a high specific weight of own funds impact on them will have a "net interest". With an increase in borrowing to investment demand growing influence will have a gross interest rate, causing its decline.

In our view, a contradictory understanding of the investment process at the level of economic activity of enterprises and at the macro level has its origin in a lack of theoretical developed of the very nature of the investment process. Therefore, it should:

1) Consider the investment costs as spending of various economic agents in the acquisition of material factors of production and the hiring of workers involved in the production process.
2) Conduct theoretical differences notions of "investment expenses, and investment demand. "Investment demand, in our opinion - is the potential need for entrepreneurs, expressed in monetary terms, the acquisition of investment goods to generate income.
3) Investment demand can not be equated with "planned" or "expects," costs, since the basis of the demand is the availability of real, rather than the expected cash flows, emerging from different sources.
4) Investment demand - an independent economic category, does not agree with the notion of temporarily idle funds.
   There are various alternatives for the utilization of available funds, one of which is investment.
5) Conditions for the formation of investment demand vary depending on whether temporarily free funds own or borrowed.
6) Each of the alternative uses of available funds are objective conditions of tools and effects.
7) The presence of only investment demand if they wish to take a decision on the acquisition of material and material factors of production is not a yardstick of real investment.

In addition to the demand for investment goods should take into account their availability, ie on the formation of the real volume of investment is influenced not only demand, but also the volume of supply of investment goods in the relevant markets.

2. Methodological aspects of investment decisions based on stochastic models

Any business structure, as a result of the operation, was faced with the need to invest in the development of their infrastructure. In this context, it becomes relevant management investment process. Like any other process, subordinate achieve a certain goal, the investment process needs to be managed. This investment process is based on the Corporation's investment strategy, developed

with the use of various financial and economic methods, which together constitute the scientific methodology of formation of financial investment solutions company.

Typically, when making investment decisions take into account the risk of projects associated with the volatility of cash flows generated. Taken into account by the method of RADR (Risk-Adjusted Discount Rate): the discount rate used in calculating the NPV of each project, increasing the prize for the specific risk of the project. The obvious drawback of this approach is that there is no unambiguous and mathematically sound approach to correcting the discount rate risk; and risk taking in the value of NPV for each project individually, does not allow explicitly take into account the interdependence of the projects which had manifested itself through the correlation of cash flows generated by them, and, in general, which may significantly affect the volatility of the NPV of the total possible combinations of projects. At the same time, restrictions on funding levels in most cases accounted for a further stage investment opportunities from which management would have to choose, and by changing the magnitude of projects that may lead to an unjustified rejection of lucrative opportunities. A typical formulation of the constraints in the form of simple terms such as "total net investments during the first year must not exceed this amount," also has significant drawbacks: first, it completely ignores the volatility of the company's cash flow and its distribution by period, and not take into account the correlation cash flows on the draft and gross cash flow of the company.

In this regard, typical approaches to formulating and solving the problem of making investment decisions deliberately simplified and do not account for a significant piece of information that can be utilized when making decisions that might lead to unnecessary rejection of profitable investment opportunities. Thus, a number of simplifications are unjustified and can be waived, thus significantly improving the quality of the solutions. To address these shortcomings, it is advisable to use a mathematical model of investment decisions, allowing explicitly take into account the volatility of each individual project and the correlation between the projects themselves, reflect the attitude of the investor to risk and to trace its influence on the resulting solution with maximum flexibility to use funds for companies financing of projects under consideration.
In this model should be based on an optimization problem, in which the main parameter used criterion MVC (Mean Variance Criterion):

$$f = m(NPV) - \lambda \times \sigma^2(NPV), \quad (2.1)$$

(Further, instead of symbols m, σ2, and σ will use E, V and S respectively

As the volatility of NPV of possible combinations of projects considered in the criteria for calculating the NPV of each project using the same not be adjusted to a specific project risk discount rate that reflects the price of capital. NPV of each project is calculated by the limit AP generated by the project for a fixed number of periods since the start, the same for all projects. To be able to add NPV of all projects presented to the same period.
In this case, the possibility of financing projects must be in a position considered to ensure the solvency of the company, namely: the total amount of money in the future with a high probability to exceed a certain critical value, which requires the establishment of a reserve currency in the form of insurance available at the company in any If the unlikely event happens. Price insurance is that the reserve can be invested only in a totally risk-free liquid assets, which leads to a loss in profitability.

Such an approach to solvency is the most flexible because it allows to decide on an acceptable level of risk of insolvency and the value of the insurance reserve. With his use of restrictions on financing of projects expressed as follows: for each possible combination of the projects total amount of money a company formed by the implementation of this combination on a set date of the investment horizon with a given probability P exceeds a predetermined insurance reserve, optimization problem is as follows:

$$\begin{gathered} \max_x f(x) = \mathrm{m}\left(NPV_x\right) - \lambda \times \sigma^2\left(NPV_x\right) \to \max \\ \forall m \in M : \text{квантиль}\left(1\text{-}P, CE_m(x)\right) \geq D \end{gathered} \quad (2.2)$$

where,
X - number of possible combinations of projects;
M - the set of periods;
CEm (x) - the total amount of DS at the date of m in the case of implementation of a combination of x;

P - selected confidence level;
D - required insurance reserve.

Obviously, the use of the model parameters of distributions of random variables (expectation, variance, quintiles) requires some initial assumptions about the distribution of components of cash flows, since it affects the accuracy of the model, and its advantage disappears. However, the optimization model for investment decisions can be built based on solid theoretical and statistical assumptions.

To this end, for each segment of the mathematical model of marginal income, in which the sale of the segment as a whole (SS), for each of the months simulated normally distributed random variable (s). They are based on sales forecast by segment and forecast the dynamics of sales in the segment, with sales of own brand simulated normal random variable with E (OS), equal to E (SS), multiplied by the forecast of the share of own brands in sales for the segment in a given month . This oss calculated based on estimates of initial and maximum proportion of own brand sales in the segment.

It should be noted that sales of existing brands (BS) are divided into two components. First, the constant part (K), are considered for each month as a constant and is calculated as a percentage of E (SS). For each segment of the marketing department was used to estimate the proportion of permanent part of the sales of existing brands in sales in the segment as a whole (obozn. bsps). Second - the random part (B), negatively correlated with sales of own brands in this segment in a given month (due to displacement). It is modeled by a normal random variable and is calculated by the formula

$$E(B) = E(SS) \times (100\% - oss - bsps). \quad (2.3)$$

Introduction of sales of existing brands as a sum of constant and random components can reflect the impossibility of complete replacement of existing brands of its own, keeping a negative correlation between their sales in the month. Marginal income (MD) on a permanent part of sales of existing brands is calculated as the product of the appropriate level of margin on the value of the constant part of sales and, thus, is constant as the product of two constants. In the random part of the MD of sales is calculated as the product of the appropriate level of margin on sales. This MD, as the product of a constant and normal random variable is normally distributed with the MoD, equal to the product of the appropriate level of margin on the relevant MoD sales. Based on statistics for each of the segments are estimated coefficients of variation of the MD of sales of own brands and MD sales of existing brands, so the standard deviations are calculated as the product of the Defense Ministry and the coefficient of variation.

Thus, if the SCM (Segment Contribution Margin) - MD of the segment in general, less costs to promote its own brand; K - MD on a permanent part of sales of existing brands, B - MD of the random part of sales of existing brands, O - MD of sales of own brands , M - the planned costs of promoting its own brand, the SCM = KBO - M. In situations. When K and M - constant, B and O are normally distributed, therefore, SCM is normally distributed with the following parameters:

$$E(SCM) = E(B) + E(O) + K - M,$$
$$V(SCM) = V(B + O) = V(B) + V(O) + 2 \times \mathrm{cov}(B,O), \quad (2.4)$$
$$\mathrm{cov}(B,O) = S(B) \times S(O) \times R(B,O),$$

where R (B, O) - the correlation coefficient of MD on sales of own brands and MD of the random part of the sales of existing brands (sales in the same month). R (B, O) in each of the segments is assumed the same for all considered months. For each of the segments are estimates R (B, O).

Detailing the model is based on the assumption of normality of distribution of sales by segment and reporting of sales of existing brands as the sum of constants and the normal component.Then the MD for each of the segments, excluding the cost of promoting its own brand, is normally distributed with the calculated above parameters.
Further, the mathematical model of the marginal income units. For this purpose, in each month of the MD unit, minus the cost of promoting their own brands (obozn. CM - Contribution Margin), formed as the sum of the MD for each structure: $CM \sum_{S=1}^{5} SCM_S$ (Hereinafter the index s indicates the number of segments).
CM as the sum of normal random variables is normally distributed with parameters:

$$E(CM) = \sum_{S=1}^{5} E(SCM_S), \; V(CM) = V\left(\sum_{S=1}^{5} SCM_S\right) = \sum_{S1=1}^{5} \sum_{S2=1}^{5} \mathrm{cov}(SCM_{S1}, SCM_{S2}),$$
$$\mathrm{cov}(SCM_{S1}, SCM_{S2}) = \mathrm{cov}(K_{S1} + B_{S1} + O_{S1} - M_{S1}, K_{S2} + B_{S2} + O_{S2} - M_{S2}) = \quad (2.5)$$

$$= \mathrm{cov}\left(B_{S1} + O_{S1}, B_{S2} + O_{S2}\right) = \mathrm{cov}\left(B_{S1}, B_{S2}\right) + \mathrm{cov}\left(B_{S1}, O_{S2}\right) + \mathrm{cov}\left(O_{S1}, B_{S2}\right) + \mathrm{cov}\left(O_{S1}, O_{S2}\right).$$

The latter covariance is calculated as the product of standard deviations, multiplied by the corresponding correlation coefficient. Evaluation of correlation coefficients as follows: a score that the values of MD of sales in various departments within the network belonging to the same month, are correlated with each other with an average correlation coefficient of RCM = 0,3 .Statistics show that the correlation coefficient RCM reflects well the correlation between the different price segments of juice, between segments of juices and milk division, between the segments of milk production. It is estimated that all other factors not related to membership segments to the same network, balance each other.

It does not distinguish between correlation marginal income on sales of existing brands in two different segments of the available marks in one segment and its own brand to another, our own brands in two different segments. Thus, for s1 s2 R (Bs1, Bs2) = R (Bs1, Os2) = R (Os1, Os2), and for s1 = s2 R (Bs1, Bs2) = R (Os1, Os2) = 1; R (Bs1, Os2) = R (B, O).

The next stage, the mathematical model of the cash flow network works as a whole. In constructing this model, the DP network balance in each of the months in the light of this simplification is presented as follows: CF = CM OCM - OC - CC, where CF (Cash Flow) - DP network balance, CM - MD for two be separated, OCM (Other departments "Contribution Margin) - MD in other sections of the network, CC (Capital Costs) - Costs for the payment of loans and interest thereon, OC (Other Costs) - all other costs. OCM is modeled by a normal random variable. SS are set separately for each of months in accordance with the schedule of repayment of loans and interest thereon. The amount of money the network at the end of the month m (obozn. CEm - Cash & its Equivalents) calculated as follows:

$$CE_m = CE_0 + \sum_{i=1}^{m} CF_i = CE_0 + \sum_{i=1}^{m} (CM_i + OCM_i - OC_i - CC_i) \qquad (2.6)$$

where,

i - index of the month;

CE0 - the value of the DC network at home - is considered as a constant with a given estimate.

According to the approach to ensure the solvency of the companies used in the model, an amount equal quintiles CEm level (1P), where P - the chosen confidence level, are free to invest in a totally risk-free liquid (or close to risk-free) assets at least 1 month. The maximum accuracy of the model would be obtained by taking into account of CEm revenue opportunities from these sums. However, for the purposes of this paper this possibility is not essential for the sake of simplicity will not be considered.

CEm normally distributed as the sum of normal variables and constants. Consider the parameters of the distribution

$$E(CE_m) = CE_0 + \sum_{i=1}^{m} (E(CM_i) + E(OCM_i) - OC_i - CC_i),$$

$$V(CE_m) = V\sum_{i=1}^{m} (CM_i + OCM_i - OC_i - CC_i) = \qquad (2.7)$$

$$\sum_{i=1}^{m}\sum_{j=1}^{m} \mathrm{cov}\left(CM_i + OCM_i - OC_i - CC_i, CM_j + OCM_j - OC_j - CC_j\right) =$$

Consider each of the components of this sum of covariance:

$$\mathrm{cov}\left(CM_i,\ CM_j\right) = \mathrm{cov}\left(\sum_{s=1}^{5} SCM_{s,i}, \sum_{s=1}^{5} SCM_{s,j}\right) = \sum_{s1=1}^{5}\sum_{s2=1}^{5} \mathrm{cov}\left(SCM_{s1,i},\ SCM_{s2,j}\right)$$

$$\mathrm{cov}\left(SCM_{s1,i},\ SCM_{s2,j}\right) = \mathrm{cov}\left(K_{s1,i} + B_{s1,i} + O_{s1,i} - M_{s1,i},\ K_{s2,j} + B_{s2,j} + O_{s2,j} - M_{s2,j}\right) =$$

$$= \mathrm{cov}\left(B_{s1,i} + O_{s1,i},\ B_{s2,j} + O_{s2,j}\right) = \mathrm{cov}\left(B_{s1,i}, B_{s2,j}\right) + \mathrm{cov}\left(B_{s1,i}, O_{s2,j}\right) +$$

$$+ \mathrm{cov}\left(O_{s1,i}, B_{s2,j}\right) + \mathrm{cov}\left(O_{s1,i}, O_{s2,j}\right) \qquad (2.8)$$

Covariance forming this sum are different from the covariance calculated by the calculation is the fact that the values of CBMs belong to different months. Each of the data covariance is calculated as the product of standard deviations, multiplied by the corresponding correlation coefficient. For CBM belonging to the same month, the correlation coefficients are estimated by the above method. Based on statistics developed following the model of correlation weakening MD in time: when you remove the MD from each other on a monthly correlation coefficient retains its sign with a

gradual (linear) decrease in absolute value, with distances of 6 months or more this way,

$$\left|R(B_{s1,i}B_{s2,j})\right| = \begin{cases} \left|R(B_{s1},B_{s2})\right|, \text{ при } i=j \\ \left|R(B_{s1},B_{s2})\right| \times (1-|i-j|/6), \text{ при } i-j<6 \\ 0, \text{при } i-j \geq 6 \end{cases} \quad (2.9)$$

Similarly calculated

$\left|R\left(B_{s1,i}\,O_{s2,j}\right)\right|$ и $\left|R\left(O_{s1,i}\,O_{s2,j}\right)\right|$.

$$\operatorname{cov}\left(CM_i\,OCM_j\right) = S\left(CM_i\right) \times S\left(OCM_j\right) \times R\left(CM_i\,OCM_j\right). \quad (2.10)$$

CM and OCM, relating to the same month, correlate with the average correlation coefficient of sales of various departments within the network (RCM). To reflect the correlation of CM and OCM, belonging to different months, using a model of correlation weakening MD time.

Similarly, paragraph 2.

$$\operatorname{cov}\left(OCM_i\,OCM_j\right) = S\left(OCM_i\right) \times S\left(OCM_j\right) \times R\left(OCM_i\,OCM_j\right) \quad (2.11)$$

Use the above model of correlation weakening over time. $V(CE_m)$. Thus, all components are designed.

Thus, the volume of the DC network in the end each month is normally distributed with the calculated above parameters. Based on the model used in the approach to the solvency of the company are set limits on financing by month

$$\forall m = \overline{1,16}: \text{ quantile}\left(1-P, CE_m(x)\right) \geq D \quad (2.12)$$

In the last stage the mathematical model of NPV launch his own brand on the segment. To be able to add NPV of all projects presented to the same period (discounting at once made to the beginning of this month). Discounting factor for the i-th month will be denoted $k(i) = \frac{1}{(1+d)^i}$, where d - the discount rate used for the month.

We introduce the following notation:

NPV-NPV launch own brand in the segment s;

NPV-total NPV of any possible combination of projects launched his own brand across all segments structured units;

Ss-month number starting his own brand in the segment s; if the segment s own brand does not start, Ss = 0;

Es - number of the last month, the limit AP takes into account when calculating the NPVs. Es = Ss 11.

The combination of projects and months of launch will be denoted by a combination of numbers s1, s2, s3, s4, s5. A variable symbol which stands for the digit "0" refers to the case of refusal to run his own brand in all segments be separated (a combination of 00000).

For the combination 00000: E (NPV) = V (NPV) = 0.

For all other combinations:

$$NPV = \sum_{s=1}^{5} NPV_s = \sum_{s=1}^{5}\sum_{i=Ss}^{Es} k(i)*\left(SCM_{s,i} - SCMO_{s,i}\right) \quad (2.13)$$

Here and below summation is over those s (segments), which runs its own brand). NPV is normally distributed as the sum of normal St. Calculate the distribution parameters:

$$E(NPV) = \sum_{s=1}^{5}\sum_{i=Ss}^{Es} k(i)*\left(E\left(SCM_{s,i}\right) - E\left(SCMO_{s,i}\right)\right)$$

$$V(NPV) = V\left(\sum_{s=1}^{5}\sum_{i=Ss}^{Es} k(i)*\left(E\left(SCM_{s,i}\right) - E\left(SCMO_{s,i}\right)\right)\right) =$$

$$\sum_{s=1}^{5}\sum_{i=Ss}^{Es} \operatorname{cov}\left(\sum_{i=Ss1}^{Es1} k(i)*\left(SCM_{s1,i} - SCMO_{s1,i}\right), \sum_{j=Ss2}^{Es2} k(j)*\left(SCM_{s2,j} - SCMO_{s2,j}\right)\right) =$$

$$\sum_{s=1}^{5}\sum_{i=Ss}^{Es} \sum_{i=Ss1}^{Es,1}\sum_{j=Ss2}^{Es2} k(i)*k(j)*\operatorname{cov}\left(SCM_{s1,i} - SCMO_{s1,i}, SCM_{s2,j} - SCMO_{s2,j}\right),$$

$$\operatorname{cov}\left(SCM_{s1,i} - SCMO_{s1,i}\, SCM_{s2,j} - SCMO_{s2,j}\right) = \operatorname{cov}\left(SCM_{s1,i} - SCMO_{s2,j}\right) -$$
$$-\operatorname{cov}\left(SCMO_{s1,i} - SCM_{s2,j}\right) - \operatorname{cov}\left(SCM_{s1,i}, SCMO_{s2,j}\right) + \operatorname{cov}\left(SCMO_{s1,i},\, SCMO_{s2,j}\right) \quad (2.14)$$

In this case, the calculation of covariance, forming this sum is similar to the calculation of covariance, executed in the previous section. Thus, the total NPV of any possible combination of projects launched his own brand across all segments of the two divisions is normally distributed with calculated above parameters.

Thus, production optimization problem into a mathematical model of the proposed investment decision-making looks like: $\max_x f(x) = m(NPV_x) - \lambda \times \sigma^2(NPV_x)$, $\forall m \in M : \text{quantile}\left(1\text{-}P,\, CE_m(x)\right) \geq D$.

Thus, the approach used in the model of investment decisions reveals that the distribution of NPV projects and the amount of cash the company, but also calculated the parameters of these distributions can be made on the basis of a small number of theoretically and statistically based assumptions about the distribution of cash flows, which means practical applicability of the model in a wide class of problems. The model allows full and mathematically reasonably take into account in decision-making volatility of cash flows generated by each project, other cash flows that adequately reflects the correlation between different projects.

The analyst has the opportunity to reflect management's attitude to the degree of volatility of cash flows generated by such a project, by changing a single parameter -. The model allows to refuse a substantial part of the simplifications used in typical approaches, and use a larger amount of information, thereby significantly improving the quality of solutions obtained analyst. Used in the model approach to ensure the solvency of the company allows you to explicitly decide on an acceptable level of risk of insolvency and the amount of the insurance reserve and track their impact on the range of acceptable in terms of combinations of projects and funding for the optimal solution.

3. Economic methods for designing investment risk assessment

Financing of investment projects in terms of risk and uncertainty, requires science-based approach to investment decisions. In the scientific literature, the basics of decision making under uncertainty, but the practical application of economic instruments do not fully take into account the categories of "risk" and "yield", that does not provide the possibility of adopting science-based solutions and reduces the reliability of estimates of the investment project. In this regard, the practice of investment planning needs adequate economic tools to make better use of scientific potential.

The first theoretical development of risk management and uncertainty arose in the early XX century. Thus, in FH Knight was submitted to qualitative analysis of risks in the context of the theory of finance. Practical interest, and the first practical development of forecasting and risk assessment, there were abroad in connection with the global economic crisis. For example, Charles Dow developed the theory of cyclical movements in the market value of securities, I. Fisher initiated the investment designing its basic design modern theory of money, but also identified the impact of inflation on interest rates. J. Keynes in their theories also focus on risk assessment.

A new surge of research on this topic occurred in 1952, when H. Markowitz and J. Danzig suggested that scientific method to account for risk in choosing investment strategies. In the early 60's work of Johnson and D. Stein expanded portfolio theory, expanding its hedging. In the 60-ies W. Sharp formulated the basic concepts of risk, types, ways of its hedging and proposed an evaluation model of capital assets - Capital Assets Pricing Model - CAPM. Significantly increased the influence of "portfolio theory" J. Tobin, who proposed to include in the analysis of the risk-free assets, thereby suggesting a macroeconomic approach, in contrast to the microeconomic approach H. Markowitz.

By the mid 60-ies of William Sharpe, John Lintner and J. Mossina summed up this phase of development of modern investment theory, formulated the MSAR as macroeconomic generalization of the theory of Markowitz. All subsequent decade CAPM been criticized, and in 1977 Richard Roll suggested reject CAPM, as it in principle not allow an empirical test. At the same time, Steve Ross proposed an alternative model of capital asset pricing-Arbitrage Pricing Model.

A cornerstone of the problem formalized approach to the choice of strategy under uncertainty laid J. von Neumann and O. Morgenstern.

In parallel with the development of investment theory is widely developed in other parts of the financial science. In 50-60-ies of F. Modigliani and M. Miller dedicated their work analyzing the

capital structure of corporations and accounting for risk assessment of the investment project, which even today are considered classics of financial science. In general terms, at the risk of understanding the possibility of occurrence of some adverse events, entailing different kinds of losses. From this it follows that the risk exists only in relation to the future, it is associated with forecasting and planning, as categories of "risk" and "uncertainty" are closely linked. Because uncertainty is a source of risk, it should be minimized, which is practically very difficult to do. Therefore, when making decisions under uncertainty, the need to formalize and evaluate the risks arising due to this uncertainty. The risk exists in virtually all spheres of life, so when considering the investment planning in addition to assessing the possible damage, weighted according to their likelihood, the opportunity costs, loss of profits, etc., the risk should be considered as a possibility of loss arising from the need to make investment decisions conditions of uncertainty. The extent of this possibility can be characterized by such criteria as: the probability of an event, the deviation from the predicted value (the intensity variation); dispersion, the expectation, standard deviation, etc.

Because uncertainty can be given a probability distribution, the interval uncertainty, subjective probabilities, etc., and the manifestations of risk are extremely varied, it is advisable to use the most appropriate criteria such as: the expectation and standard deviation. In addition, the risk assessment should take into account individual risk tolerance, which is described by the indifference curves or utility, as follows: Risk = (P; L; Y).
It should be noted that in theory and practice in addition to statistical criteria used indicators: the value of lost profits, lost income and other, calculated in monetary units. However, to adequately describe the risks they must take into account its probabilistic characterization. In this regard, more reasonable is use of generalized complex criterion - "the price of risk" (C risk), which characterizes the magnitude of losses possible with conventional realization of the investment decision: C risk = (P; L), where L - is defined as exposure to direct losses from investment decision. In determining the price of risk is necessary to use only the indicators that take into account the possibility of occurrence of adverse events and the magnitude of the damage from it, namely: variance, standard deviation (RMS) and coefficient of variation (CV), the value of which should be reflected in currency format.

Typically, investors' attitude to risk is subjective, so with equal probabilities of unfavorable outcome of the decisions would be opposite, which proves the need to calculate the "price risk", as well as the investor's tolerance for risk. Individual investor attitude to risk can be determined by the degree of steepness of the indifference curve. However, investors' attitude to risk can be described not only the curves of indifference, but also in terms of utility theory, ie through the utility function. The main advantages of this feature lies in the fact that the utility curve, as the expression of individual preferences of the investor, being built once, in the future can make investment decisions based on their preferences, and this function may change over time. At the same time, it should be borne in mind that utility theory can be formalized approach to risk and thus scientifically justified decisions under uncertainty.

Currently, investment planning, taking into account uncertainties, has following features. First, the conditions for their implementation and the results are nondeterministic, forcing to take into account the full range of possible values of key parameters, the probability of each possible option, as well as the distribution of this probability. Second, risk factors and uncertainties leads to a significant change in the content of project materials, which necessitates the use of new methods and tools for investment planning.
To measure the effectiveness of the project requires a quantitative analysis and accounting-based risk models "yield - risk" when discounting cash flows, and regard for the individual investor's tolerance for risk. Thus, in deciding on the effectiveness of the investment project in conditions of uncertainty, the investor decides to at least becriteria problem, since he must find the optimal mix of risk-return. As these goals are conflicting, the final investment decision is a compromise in which risk and return must be balanced in the optimum proportions for the investor. However, to find the ideal "maximum yield - minimal risk" is possible only in very rare cases.

Therefore, the solution of this optimization problem should take into account the following items: the maximum payoff, minimum risk optimal probability, and the combination, in practice, approach the optimal probability with optimal variability. Fluctuation indices are expressing their variance, standard deviation and coefficient of variation. The essence of strategy for the optimal oscillation result is that the possible solutions is chosen then, in which the probability of winning and losing for the same venture capital investments have a small gap, t. e. the smallest value of variance, standard deviation, variation..

In addition to the presented models in the scientific literature, known model alternative CAPM, among them: Arbitral pricing theory (Arbitrage Pricing Theory-APT); theory of option pricing (Option Pricing Theory - OPT); theory of preferences under uncertainty states (State - Preference Theory -SPT) and others. Thus, the theory of arbitration pricing (Arbitrage Pricing Theory-APT), based on the idea that the yield of any asset consists of two parts: a risk-free and risky. Risk part in this case is determined by many financial and economic factors. The advantage of this model should recognize its multifactor and the lack of stringent assumptions, which are typical of CAPM. However, the practical realization of this model requires a fairly complex apparatus of mathematical statistics and a large amount of statistical data, so the model is sufficiently theorize character. The investment project involves the planning time the three major cash flows: the flow of investment, the flow of current payments and income flow. The flow of current income payments can not be planned completely accurate, since there is no complete certainty about the future of the market, and therefore, information uncertainty entails irremovable risk of making investment decisions. The investor will never have a comprehensive risk assessment, since the number of varieties of the external environment is always superior management capabilities, but must make efforts to enhance their awareness and attempt to measure the riskiness of their investment decisions as the design development phase, and during the investment process.

This problem can be solved using the principle of diversification project, not only in relation to securities, but also to the various assets, including those for investment projects, which from a financial point of view represents a set of cash flows. In this case, must proceed from the assumption that if each of the asset portfolio is characterized by some dispersion of income, the variance of the portfolio will be determined by its composition, thus altering the composition of the portfolio can minimize the variance and hence the risk. If the various indicators of income assets are statistically independent (not correlated), then the portfolio variance Dn are as follows: $D_n = \sum a_i^2 D_i$ (3.1)

where:

ai - the share of the project i;

Di - the dispersion of income from the project i.

For the dependent in the statistical sense projects:

$$D_n = \sum a_i D_i + 2\sum a_i a_j r_{ij} \sigma_i \sigma_j \qquad (3.2)$$

where:

rij - correlation coefficient of income projects i and j;

σ_i, σ_j **– standard deviation of income from projects i and j.**

The greatest effect of diversification is achieved at the maximum negative correlation. However, to reduce portfolio risk can be even positive correlation by increasing the scale of the portfolio that can be represented graphically by the formula: $\sigma_{norm} = \sqrt{1/n}\ \sigma_{gkjtrnf}$ (3.3)

So for two types of assets will be 0.71 standard deviation $\sigma_{proekta}$, the three already 0,58 $\sigma_{proekta}$, and for ten 0,31 $\sigma_{proekta}$. Zoom in on the diversification of the project consisting of a sufficiently large number of assets gives very little effect, for example, increasing the number of projects in the portfolio with 20 to 30 gives the effect of only 0,04 $\sigma_{proekta}$.

Significant effect on the risk of the portfolio has changed the structure of the portfolio. In this regard, it is recommended to use methods of diversification to optimize the structure of the project, which involves the implementation of several products with different profitability. This problem, formulate a problem to compile a portfolio with minimal risk. As the risk profile are encouraged to use the variance of sales of products using the following algorithm for solving the problem:

- determined by the risk profile of this product, ie– variance of sales;
- estimated share of each product in the project, at which the risk of the project (portfolio variance) will be minimal.

Thus, for a portfolio of three products

$$a_x = \frac{D_{y/z}}{D_{x/z}D_{y/z} + D_{x/z} + D_{y/z}}. \qquad (3.4)$$

$$a_x = \frac{D_{x/z}}{D_{x/z}D_{y/z} + D_{x/z} + D_{y/z}} \quad (3.5)$$

$$a_z = 1 - (a_x + a_y) \quad (3.6)$$

where:
oh, ay, az - the proportion of products X, Y and Z respectively in the portfolio;
DN / z - ratio of the variances in sales of products Y and Z;
Dx / z, - ratio of the variances in sales of products X and Z.
- estimated share of each product in the project, at which the risk of the project (portfolio variance) will be minimal.– Thus, for a portfolio of three products

$$\mathbf{D_n = a2_x D_x + a2_y D_y + [1- (a_x + a_y)]D_z} \quad (3.7)$$

Moreover, the profitability of the project with minimal risk is defined by the weighted average, where weights are the share of the product in the project.

The analysis and management of system risk of the investment project investor should use an algorithm of risk management. The main items of the process are as follows: by the identification of risks, their description and formulation of initial assumptions, a quantitative risk analysis, which aims at measuring risk, which leads to the solution of such problems as the formalization of the uncertainty calculation, valuation and risk, the risk of transforming analysis of a priori judgments into practical action for its management, and monitoring the risk of the investment project.

The most difficult is the process of quantitative analysis of the investment project. Involving the presence of such components as: the sensitivity of net present value (NPV) to changes in values of key indicators and the value of the range of possible changes in the key indicators, defined by their probability distributions. Both - based on the concept of temporary value of money and probabilistic approaches. At the same time, it should be noted that in international practice for risk analysis of investment projects using a wide range of methods. The most common are: the method of adjusting discount rate, the method reliable equivalents (coefficient of reliability); sensitivity analysis of performance criteria (NPV, IRR, etc.), the method of scenarios, and analysis of probability distributions of payment flows, decision trees, Monte Carlo (simulation) etc. All of them have certain advantages and disadvantages of their practical application.

In practical way to assess the investment risk associated with the method of describing information uncertainty of initial data of the project. If the original parameters are probabilistic, then the performance of investments also has the form of random variables with their implicative probability distribution. Moreover, the less statistically caused by those or other options, the more distorted is the information about the state of the market environment and, consequently, lower the validity of the use of any type of probability in investment analysis.

In this regard, an alternative way to deal with uncertainty is the so-called minimax approach of the wording of the expected scenarios in the investment process, from which selected two scenarios where it reaches its maximum and minimum efficiency. Then the expected effect is estimated by Hurwitz with the consent of the parameter L. When L = 0 (point Wald). It decides the basis, the most pessimistic assessment of the effectiveness of the project. Using this approach minimizes the risk of the investor, however, most projects, even those with a very decent chance of success, will be rejected.

In this regard, one of the tools designed to measure the capabilities (standby), is the theory of fuzzy sets. In accordance with this theory to calculate the complex index of risk assessment is carried out multivariate assessment of the investment project on further value of the index of net present value of investments: NPVmin - the minimum value of the index, NPVmax - the maximum value of the index, NPVexp - meaning the average projections. Under the effective investments we understand a set of states of the investment process, where the real value of the project purely modern more than zero. Assume that the equality NPVmin <0 <NPVexp. Then the degree of risk of V & M inefficient investments is estimated by the following formula:

$$V_{R\&M} = R \times \left(1 + \frac{1-\alpha}{\alpha} \times \ln(1-\alpha)\right),$$

where:

$$\alpha = -\frac{NPV_{min}}{NPV_{exp} - NPV_{min}}, \quad (3.8)$$

$$R = -\frac{NPV_{\min}}{NPV_{\max} - NPV_{\min}}$$

The degree of risk of V & M takes values from 0 to 1.

Each investor, based on their investment preferences, may classify the values of V & M, for selecting a segment of unacceptable risk values. It is also possible for more gradation levels of risk. For example, if you enter the linguistic variable "Risk" with its term-set of values (Negligible, Low, Medium, relatively high, unacceptable), then every investor can make an independent description of the corresponding fuzzy subsets by setting five membership functions m (V & M). In this situation, the net value of the modern project can be estimated following formulas:

$$NPV_{\min} = -I + \frac{CF_{\min}}{(1 + RD_{\max})^1} + \frac{CF_{\min}}{(1 + RD_{\max})^2} = -1{,}0$$
$$NPV_{\max} = -I + \frac{CF_{\max}}{(1 + RD_{\min})^1} + \frac{CF_{\max}}{(1 + RD_{\min})^2} = 2{,}5 \qquad (3.9)$$
$$NPV_{avg} = -I + \frac{CF_{avg}}{(1 + RD_{avg})^1} + \frac{CF_{avg}}{(1 + RD_{avg})^2} = 0{,}5$$

where CFavg = (CFmax-CFmin) / 2 = 1 million rubles., RDavg = (RDmax - RDmin) / 2 = 20% per annum.

Thus, fuzzy sets are a tool for calculating the capacity. in which the description of fuzzy initial data allows to proceed to fuzziness of the resulting indicators. Moreover, assessment of investment risk - this score measures the possibility of adverse developments in the investment process, which are expected events given by the membership function of the fuzzy numbers, known or determined by special methods. An approach based on ambiguity, overcomes the disadvantages of probabilistic and minimal approach of taking into account the uncertainty as: consider a full range of scenarios, investment process and decision is not based on two assessments of the effectiveness of the project, and the entire set of estimates; the expected efficiency of the project is not the point indicator, but a field interval of values with their expectations of distribution, characterized by the membership function of the fuzzy numbers. While the weighted complete set of expectations allows us to estimate the integral measure of expectations of negative results of the investment process, ie degree of investment risk.

4. Methodology to assess the efficiency of investment projects at the Present Stage

Enhancing the investment process is currently the most urgent and very painful problem at the macro and microeconomic level. Growth of investment and economic growth of Moldova as a whole was expected and predicted, yet since 1993, but the exit status of a cyclical downturn has not happened so far. At the same time, the reality is that without the merger of production and financial capital, enterprises find it increasingly difficult to withstand the requirements of ever-increasing competition. Therefore, objectively, has tended to search for effective sources of investment, as well as the formation of methodological tools of evaluation of investment decisions. Evaluating the effectiveness of investment projects is the main tool of the right choice most efficient investment projects, improving the investment programs and minimizes risks. Not in all cases methods for evaluation of investment projects may be the same, because they vary substantially in size costs, useful lives, as well as useful results.

In European countries and the U.S. in present there are several methods for evaluating the effectiveness of investments. They can be divided into two main groups: methods of evaluating the effectiveness of investment projects that do not include discounting and methods which include discounting. The methods, which do not include discounting, are indicators: payback period, rate of return on capital; Cash-flow or the accumulated balance of cash flow; the comparative effectiveness of reduced production costs, the method of comparing profits. These methods do not fully take into account the aspect value of money in time, factors associated with inflation and risk, as well as the complicated process of conducting a comparative analysis of design and the actual data by year of the investment project, and therefore, their most rational use in cases when the costs and benefits are evenly distributed by years for a investment projects and a payback period covers a short period of time. The main objectives of the investment planning in the traditional approach consisted in determining the break-even point, calculating the integral performance criteria and other parameters. Accordingly, the content of the investment planning reduced to the projection of cash flows in the future on the value of the investment horizon.

Justification of investment projects carried out in accordance with the theory of the time value of money. Thus, the classical approach to assess the effectiveness of investment projects foresees measures such as: discounted payback period (Pay-Back Period, PBP); net present value (Net Present Value, NPV); internal rate of return (Internal Rate of Return, IRR); profitability index, the method of annuity. The basis of these methods is the discounting of projected cash flows, include the selection of the discount rate, which allows the calculations to reflect the impact of the value of money. However, when the capital invested is taken from various sources, the calculation of the discount rate is complicated, as instead of interest on loans, to calculate it we use the concept of average cost of capital (Weighted Average Cost of Capital, WACC). This is calculated as follows:

$$WACC = k_{кр} \times r_{кр} + k_{ск} \times r_{ск} \quad (4.1)$$

where:
kkr - the share of credit funds in the sources of funding;
ksk - share of equity;
rkr - rate of interest on the loan;
rkr - return on equity required by the shareholder.

It turns out that each component of the capital lays in the cost of money of the project share proportionate to his share in the source of capital. In fact, through this mechanism for calculating the discount rate is taken into account the requirement of each of the investors in its earnings on invested funds.

The main criterion for the effectiveness of the investment project has always been considered the value of NPV, because it is easier to calculate and interpret, in comparison with other indicators. But in practice often turns out that to calculate the NPV will not always be easy, and correct conclusions, having its value, even more difficult. The main reason for difficulties is that almost every real project, we are confronted with two shortcomings NPV, namely: to build a detailed forecast for the entire period during which the work made by the investment is not always justified, so every project is a significant piece of unreported income but NPV does not complete withdrawal of how profitable an investment decision is.

The above indicators of efficiency of the investment project are closely linked. This is explained by the fact that they are based on the discounted stream of payments. But it is not always an investment project, the preferred one indicator will also be the preferred and other indicators as well as the background and characteristics of each indicator vary. Due to differences in the evaluation of investment projects that can be monitored using various performance indicators, the question arises about the preference of certain indicators measuring effectiveness.

The effectiveness of investment characterized by a system of indicators reflects the balance of costs and outcomes for the interests of its members. Evaluation of the upcoming costs and benefits in determining the effectiveness of investments made within the billing period, which duration is usually limited to a period of investment.

Payment rates can be expressed in lei or stable currency (USD, EUR, etc.).

In assessing the effectiveness of the comparison of different periods of investment performance is done by discounting of their values in the initial period. To approximate costs occurring in different periods of time, results, effects, is used discount rate (E), equal to an acceptable rate of return for investors on capital.

Technically, the reduction to the reference point in time cost, the results and effects occurring on the t-th step of calculation of the project, it is convenient to produce by multiplying them by a discount rate αt, defined for the constant discount rate E as:

$$\alpha_t = \frac{1}{(1+E)^t} \quad ,(4.2)$$

where,
t - step number calculation (t = 0, 1, 2, ... T),
T - calculation horizon.

To evaluate the effectiveness of investments, there are several different indicators, which include:

- ✓ profitability index (IP) element;
- ✓ net present value (NPV) or the integral effect of the use of a particular element of the investment portfolio;

- internal rate of return (IRRs) of the element;
- payback time for real investment and the repayment term for financial investments;
- other indicators that investors needed to assess the effectiveness of investments and reflect the specifics of a particular element of the portfolio.

Net present value (NPV) is defined as the sum of current effects for the entire period of the investment portfolio, reduced to the initial step, or as the excess of the integral results of the integral costs.

If during the billing period, there is no inflationary price changes or the calculation is made at constant prices, the value of NPV for the constant discount rate is calculated by the formula:

$$= \sum_{t=0}^{T} (R_t - ,_t) * \frac{1}{(1+E)^t} \quad \text{NPV} \qquad (4.3)$$

where: Rt - results achieved in the t-th step of calculation,

3t - costs carried on the same step,

T - calculation horizon (equal number of the step of calculation, which is the elimination of the object).

Et = (Rt - 3t) - an effect achieved in the t-th step.

If the NPV of a particular object of investment is positive, investment is efficient (at a given discount rate) and may be considered for adoption. The greater the NPV, the more efficient is investment using this investment tool. If the investment will be implemented with a negative NPV, the investor will suffer losses, the tool is inefficient.

Profitability index (TAI) is the ratio of the sum given to the effects of the initial investment in tools – ID is equal to:

$$\frac{1}{K} * \sum_{t=0}^{T} (R_t - 3_t^+) * \frac{1}{(1+E)^t} \qquad (4.4)$$

.

Profitability index is closely related to NPV. It is constructed of the same elements and its value is associated with the value NPV: if the NPV is positive, then the ID> 1 and vice versa. If ID> 1, the project is effective, if ID <1 - inefficient.

Internal rate of return (IRRs) represents that the discount rate (EVN), in which the value of the above effects is equal to investment costs.

In other words EVN (GNI) is a solution:

$$\sum_{t=0}^{T} \frac{R_t - 3_t^+}{(1+E_{вн})^t} = \sum_{t=0}^{T} \frac{K_t}{(1+E_{вн})^t}. \qquad (4.5)$$

If the calculation of the NPV of the investment project provides an answer to a question, is it effective or not at some specified rate of discount (E), the GNI of the project is determined during the calculation and then compared with the required rate of return to invest.

Analysis of the current state corporations shows that the most frequently used measure of investment efficiency is the internal rate of return, and the second frequency of use - net present value. All other indicators of investment are used much less frequently. It should be noted that both of the above figure is advisable to apply at the same time, as the internal rate of return can be considered as a qualitative measure of the profitability of a unit of invested capital and net present value is an absolute indicator of the extent of the investment project and the resulting income.

In addition to the formal evaluation criteria when deciding whether to finance an investment project are taken into account the various constraints and informal criteria. As the restrictions may make the deadline ROI requirements for environmental protection, safety personnel and others informal criteria may be: a promising entry into the market of products, removal from the market of competing companies, political motivation, etc.

It is this set of indicators contained in the summary of the business plan of the investment project and is used to assess the commercial attractiveness of investment ideas. The basis for calculating performance indicators are the so-called net cash flow (Net Cash-Flow, NCF), which include revenues from sales, operating and investment costs, increase working capital requirements and tax payments.

However, the so-called net flows do not take into account the types of sources. At the same time, you should take into account that the investor is interested in multiple meanings. First, it is payback period. This period is determined by the time required to aggregate net proceeds of the draft caught up with its expenses. But no investor would agree to part with today's money in favor of the

future, far enough revenues if those revenues will only cover the investment. Therefore, in assessing the effectiveness of the project always uses discounted cash flows.

Payback period - the minimum time interval (from the beginning of the project), beyond which the effect becomes an integral and in the future remains nonnegative. In other words, for a real project - this time (measured in months, quarters or years), from which the initial investment and other costs associated with the investment project shall be borne by the combined effect of its implementation and for the security - it is maturity, after which the financial tool does not work.

Results and costs associated with making investments, we can calculate with discounting or without him. Accordingly, you get two different payback period.

Payback period (payback method) - this is one of the most frequently used indicators, especially for preliminary evaluation of the effectiveness of investments. It is defined as the period of time during which the investment will be returned at the expense of the proceeds from the sale of an investment project. More precisely, under a payback period means the duration of the period during which the sum of net revenues, discounted at the time of completion of investment, equal to the amount of investment.

To determine the payback period you can use a formula, which assumes that all investments made at the time of completion. The equation for determining the payback period can be written as:

$$\sum_{t=0}^{T} \frac{P(t)}{(1+d^*)^t} = KV \quad , \qquad (4.6)$$

where

KV - total investment costs in the investment project.

Note that in this equation, t = 0 corresponds to the time of completion. The magnitude of the interval payback period is determined by the successive summation of the discounted income until the pending receipt of an amount equal to or greater than the investment.

Denote the aggregate income at time m through Sm, then

$$S_m = \sum_{t=0}^{m} \frac{P(t)}{(1+d)} , \qquad (4.7)$$

and, at time m is chosen so that

$$S_m < KV < S_{m+1} \qquad (4.7)$$

Then the payback period is approximately equal to

$$h = m + \frac{KV - S_m}{P(m)+1} * (1+d)^{m+1} \qquad (4.8)$$

Obviously, the value of the payback period, in addition to the intensity of revenue generation, is significantly affected by discount rate used by revenue. Naturally, the lowest payback period corresponds to the absence of discounting proceeds monotonically increasing with the increase in interest rates. In practice, there might be cases when the payback period does not exist (or is equal to infinity). In the absence of discounting, this situation occurs only if the payback period is longer than the income from production activities. Discounting revenue payback period may simply not exist (tends to infinity) for certain relations between investment, income and discount rate.

The main disadvantage of the payback period as an indicator of the effectiveness of capital investments is that it does not account for the entire period of operation of production and, consequently, it will not affect revenues to be received outside the payback period. Such a measure, as the payback period should not be used as a criterion for choosing an investment project, but only in the form of restrictions on the decision. This means that if the payback period is greater than some limiting value received, the investment project is excluded from consideration.

Calculation NPV, usually is enough to make decisions on the project. But its importance does not look very revealing, it may be clear that the project is profitable and attractive, but difficult to assess - how attractive. Therefore, NPV is used to help the third standard indicator - the internal rate of return, a value of the discount rate d, in which the NPV becomes equal to 0. Thus, IRR shows a maximum requirement for annual returns on invested money an investor can base their calculations so that the project still looks attractive. Profitability index (benefit-cost ratio), or profitability index (profitability index) investment project, is the ratio of reduced revenues to the directions on the same date, investment costs. Formula of Profitability (R) should be represented as follows:

$$R = \frac{\sum_{t=t_n}^{T} \frac{P(t)}{(1+d)^t}}{\sum_{t=0}^{t_c} \frac{KV(t)}{(1+d)^t}} . \quad (4.9)$$

As can be seen from this formula, it compares the two parts of adjusted net income - the income and investment. If at a certain rate of discount d profitability of the project is equal to unity, this means that these profits are given investment costs and net present value is zero. Consequently, d- an internal rate of return of the project, at a rate of discount is less than IRR, profitability is greater than 1. Thus, the excess over the unit cost of the project means some of his extra yield at the considered rate of interest. The case when the profitability of the project is less than unity, means its inefficiency at a given rate of interest.

So, in terms of classical ideas on the evaluation of investment projects, it is necessary to calculate the three indicators: NPV, PBP, and IRR. In this case the investor must arrange the values of payback and IRR, NPV and the value must be greater than zero. To a large extent, these problems are solved if we switch from the traditional performance to one of the methods used in valuing companies.

As is known, the company's value can be determined either by studying its assets, or by comparing it with other similar companies, either directly by analyzing its income. And the latter approach will be of interest to us as an alternative to NPV of the project. In order to understand the mechanisms for evaluating the company based on revenue, we must imagine that we have launched an investment project which lasts forever, has no time limitations.

Although it seems that the value of an infinite income may also be infinite, in reality it is not. NPV Formula with infinite horizon projection takes the following form:

$$NPV = \sum_{i=1}^{\infty} \frac{NCF}{(1=d)^i} = \frac{NCF}{d} \quad (4.10)$$

The calculation was not only possible, but also significantly. However, here we have one simplification: Assume that the NCF project will be unchanged from year to year. But in reality it will constantly change, at least, due to inflation, and sometimes and faster, due to gradual expansion activities. Therefore, this simplification would be excessive and need to add a record annual revenue growth. And our formula becomes:

$$NPV = \frac{NCF}{d - g} , \quad (4.11)$$

where

g - annual growth rate of revenues.

And, finally, the last amendment, as can be easily verified, clean NCF project cash flow is operating profit plus depreciation. Depreciation is not considered a cost of investment projects, since it is not directly related to monetary costs, but reflects the depreciation of property. In short investment projects that were true, but if predict the development of the company on an infinite term, it would be correct, though not in the first year, to take into account regular investment of money in the gradual replacement and maintenance equipment. This means that the amount is close to the depreciation must be taken into account as the cost of the project.

Development of an investment strategy takes into account the possible variation in advance of uncontrollable external factors, the organization of the investment environment and to minimize their negative consequences for the organization. It reflects the comparative advantages of organizations in the investment activity in relation to its competitors.

Availability of investment strategy provides a clear linkage of strategic, operational, and the current investment management organization. It provides a program of organizational behavior in the framework of the most important strategic investment decisions.

The system's investment strategy is formed of core selection criterion estimates of real investment projects and financial investment instruments.

The urgency of developing an investment strategy of the organization by a number of conditions is relevant. Foremost among these conditions is the intensity of external factors change the

investment environment. The high dynamics of basic macroeconomic indicators related to investment activities of organizations, the pace of scientific and technological progress, frequent fluctuations in investment market conditions, the volatility of public investment policies and forms of regulation of investment activities do not allow companies to effectively manage their investments based solely on past experience and traditional methods of financial management .Under these conditions, the lack of developed investment strategies, adapted to possible changes in factors of the investment environment, can lead to the fact that investment decisions of individual structural units of the organization will be multidirectional in nature, lead to tensions and reduce the efficiency of investment activity in general.

One of the conditions that determine the importance of developing an investment strategy of the organization is its forthcoming stage life cycle. Each of the stages of the life cycle of the organization inherent characteristic of her level of investment activity, trends and forms of investment activity, particularly of investment resources. Investment strategies for early investment are developed to adapt the organization's activities for the upcoming opportunities for radical changes in its economic development.

In our view, an essential condition for determining the importance of developing an investment strategy is a radical change in the operating goals of the organization associated with opening new business opportunities. Realization of these goals requires a change in product range, introducing new production technologies, developing new markets, etc. In these conditions, a significant increase in investment activity organization and diversification of its investment activities should be predictable nature, for the development of a well-defined investment strategy.

Thus, the investment attractiveness of the business entity - a set of characteristics that allow investors to assess how a particular object of investment more attractive than others. The result is a challenge to improve the investment attractiveness of the corporation in both the short and long term. In this regard, it is necessary to form a credit strategy, whose main task would be to optimize the investment attractiveness, on the other - a problem of distribution of the resources (investment). In order to assess investment opportunities necessary to investigate creditworthiness, this is a set of characteristics for assessing the investment potential of the corporation. Investment attractiveness and trustworthiness enterprise corporations can be represented as the main components of its financial capacity. Since the volume of investment resources of the subject is restricted, and the potential investment objects have different investment attractiveness, society should optimally allocate their investment resources. This raises the need for an investment strategy of the enterprise. Thus, in aggregate investment strategy and credit strategies constitute the financial strategy of economic agents. In the financial activities of the enterprise, certainly, there are two of the same importance tasks: the task of attracting resources for economic activity and task allocation of the resources (investment). Investment attractiveness and solvency of enterprises can be represented as the main components of financial capacity.

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