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ANALYSIS OF THE METHODS OF ASSESSMENT OF INVESTMENT APPEAL OF CONSTRUCTION OBJECTS IN TERM OF UNCERTAINTY AND RISK

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The work devoted to the analysis of risks in the construction sector was considered. The analysis of methods of determination of investment attractiveness of building objects is given. As a management object build projects are the difficult systems which function in the conditions of vagueness. In the process of estimation of investment attractiveness of such projects it is necessary to take into account both external and internal factors of origin of risk. Making decision in relation to investing in build projects requires the use of the scientifically grounded methods.
Keywords: risk, vagueness, investment attractiveness, building objects, analysis.

Problem statement. Market is based on the economic will of the subjects of business activity. Herewith, each participant of market relations primarily seeks for his own benefit and the benefit of one often leads to the loss of others, in addition, with the development of market relations competition increases. Therefore it is necessary to admit that one has to pay for the freedom of action in such way that while functioning in these conditions, entrepreneurs are forced to take risk, because they cannot predict the size of future profit and find out whether it will be at all.

The more complex and dynamic environment and the object of control are, the harder the management system has to be, the more urgent consideration of risk in making the decision is.

Factors that cause uncertainty can be conditionally divided into three groups [1]:

1) the lack of complete and reliable information about the environment (market situation, the political and economic situation in the country, etc.), which is associated with little knowledge about the environment;

2) the existence of contingency in development of events at the market;

3) the resistance from the market (e.g. defaults on contracts, conflicts between customers and suppliers, etc).

The intensification of risk is the reverse side of business freedom, so to survive in the conditions of market economy, courageous nontrivial solutions that increase the risk should be taken.

Orientation of Ukraine's economy to a market economy means the need of the accounting of different types of uncertainties and risks for all business entities.

Analysis of the latest research and publications. Economic risk is the objective-subjective category of business entities related to overcoming of uncertainty and conflict situations in the situation of inevitable choice. It reflects the extent (degree) of deviation from the goals, from the desired (expected) result, the measure of failure (losses), considering the effects of controlled and uncontrolled factors, direct links and feedbacks relating to the object of management.

This definition is based on a system approach to the category of economic risk and points to the need of analysis of the influence on the control objects of the set of internal and external factors, as well as attitude to risk entities (the subjects of risk) [1].

In any field of human activity risk management consists of three main stages: qualitative analysis of risk, its quantitative assessment and means of reducing risks level.

The qualitative risk analysis involves identifying all possible risks inherent in the project, classification and determination of the most important ones.

According to the field of appearance risks are divided into two groups: external and internal. According to this distribution while the analysis and assessment of risks of investment projects of builders industry both the construction project and the conditions in term of which its implementation is planned should be considered.

In the case of risk analysis of investment in construction projects it should be noted that any construction project is a complex socio-economic system, which has all the characteristics of complex systems: integrity, emergence, holism, spatial and temporal certainty and limited, dynamics, complexity, relative autonomy of the functioning, functional control, causality, uncertainty in the functioning, homeostatychnist, stability, inertia, adaptability [2]. Some of them promote the appearance of internal risk factors; others provide the ability to manage risks. The works are dedicated to the issue of analysis and risk assessment [3-11]. Methods of assessment of investment appeal are also considered in the works [12-15].

The purpose of the article. To analyze the investment objects in the construction sector, to identify the risks that arise while the investment process and consider methods of evaluating of investment construction projects, taking into account these risks.

Presentation the main material. In the process of analysis of external risk factors the construction site as a socio-economic system can be represented as the part or subsystem of several larger systems that graphically depicted in Figure 1.

The combination of environmental factors is characterized by:

– the complexity is the variety of factors affecting the system;

– the force of factors impact, among which more or less important are singled out;

– the dynamism is the speed of the changes occurring in the environment of the system;

– the uncertainty is the number of a prior information held by the system for a specific factor [2].

One of the classifier of risks characteristics of the construction objects is the area of manifestation according to which risks are divided into industrial, commercial, financial risk and insurance risk. The financial risk arises when making financial transactions, it includes: a currency risk, a credit risk, an investment risk. The main risks that belong to the group of investment are shown in the Table 1.

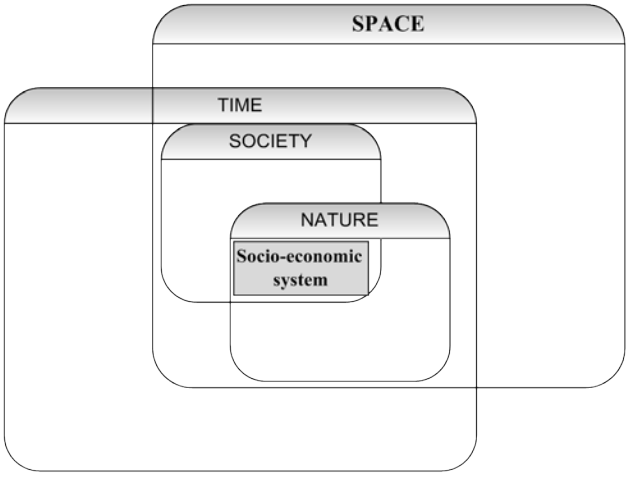

Fig. 1. Socio-economic system from a perspective of system approach

Source: [2]

Table 1

The main types of investment risk

Types of risks	Explanation
Capital	The risk is that investors will not be able to return the invested means without losses
Selective	The risk of directional selection of objects for investment compared to other options
Percentage	The risk of losses resulting from changes in the percentage rates at the market
Country	The risk of possible losses due to investments in enterprises under the jurisdiction of the countries with unstable social and economic situation
Operating	The risk of possible loss related to failures in the operation of the computer information systems
Temporal	The risk of investing in poorly selected time, which results in losses
Risk of legislative changes, instability of legislative framework	Possible losses caused by changes in legislative regulation
Liquidity risk	The risk caused by the sale of securities at the time of possible changes in the assessment of liquidity
Inflation risk	The risk is that the high inflation revenue that will come from the invested funds may depreciate in real terms

Source: [2]

In [16] to already known risks classifiers two more classifiers of risks that characteristic the investment process in the construction industry are proposed.

1 Depending on the participants of the investment process:

– Investor's risk related to the financial losses as a result of the bankruptcy of the construction company, the suspension of the construction work at the facility, etc.

– Builder'srisk associated with the lack of demand, decrease of prices for construction sites, a revocation of license;

– Customer's risk consists of all financial risks associated with the implementation of the project, the risk of default by the contractor liabilities, and in some cases also the risks of the builder;

– The risk of the contractor and general contractor related to the shortfall in incomes as a result of inability to perform their duties, or even a complete rejection of further participation in the project;

– Designer's risk associated with the financial and temporal loss as a result of rejection of the developed project, the need for significant changes or occurrence of essential errors;

– The risk of users of the construction occurs as a result of the lack of complete information about the process of building of a particular object, and thus the inability to assess its quality adequately.

2 Depending on the types of resources used in the development and implementation of investment projects of production:

– Financial resources meet the risk of insolvency of the customer, unpredictable expenses, inflation risk, etc.

– Labour risk is the risk of recruiting unqualified staff, shortage of labour, etc.

– Information risk is risk associated with the leakage of information and usage it by the competitors, ineffective marketing, etc

The result of the all above is the need to consider the characteristics of the construction object and the environment when selecting assessment methods of investment projects in the construction sector.

According to the objective-subjective nature of the risk methods for quantitative assessment of risks are divided into: objective and subjective. To the first group belong methods based on statistical information (for example, the implementation of similar construction projects). The second group is based on knowledge, experience and intuition regulator (investor) or involved experts.

The indicated complexity of the objects of construction as a socio-economic system provides a large number of heterogeneous elements and connections, multifunctional, multi-structuring, multi-objective, multi-variant development, etc. , so using objective methods of evaluating of investment projects a large number of performance indicators should be taken into account, among which the most frequently used are [4]:

– net cash flow;
– payback period;
– net present value;
– internal rate (norm) of income;
– index of profitability.

Taking into account the risks and uncertainties of the investment project, these figures get a stochastic nature. Then the assessment of appeal of investment objects can be made using the method-

ology and the tools of scenario analysis, using the subjective methods for building scenarios and determining corresponding probabilities or statistical methods based on objective information about the implementation of similar projects in the past or using the methods of simulation modelling in case of the uniqueness of the project.

While using the statistical methods for selecting investment projects when taking into account the risk, construction projects are represented as points in a coordinate effectiveness-riskiness. As the efficiency indicator mathematic expectation of the stochastic dimension of economic benefits is admitted (e.g. profit), as the indicator of riskiness standard deviation of this magnitude is accepted.

This method of evaluation and selection of projects is visible to a large number of projects and can be used for many efficiency indicator of projects.

Risk as the probability of occurrence of adverse events can be evaluated in terms of the size of potential losses and the dimension of the likelihood of adverse events [10]. In this case it is advisable to assess the risk of investment projects as the probability of exceeding of losses of the certain calculated designations. In practice, the following designations of losses are used: x_{ac} – loss in the amount of estimated profit on the project, x_{cr} – in the amount of the estimated designation of revenue x_{ct} – in the amount of property status (authorized capital). According to these designations the following areas are formed: risk-free (profit exceeds the calculation index, it is possible for the dynamic or speculative risks), acceptable risk (losses from zero to x_{ac}), a critical risk (losses from x_{ac} to x_{cr}) and catastrophic risk (losses are in the amount of x_{cr} to x_{ct}).

According to the risk areas three major basic indicators of risk are revealed:

– indicator of acceptable risk – a possibility that the losses will be greater than their maximum allowable level of x_{ac},

– indicator of critical risk – is the possibility that the losses will be greater than their maximum allowable critical level of x_{cr},

– Indicator of catastrophic risk – is the possibility that losses will be greater than their maximum allowable catastrophic level of x_{ct}.

Being aware of these metrics helps to decide about investing in a certain project, but the information on these important indicators are not enough for the final decision – their limitdimensions must be established (set or accept) not to fall into the zone of unacceptable risk. These dimensions are called the criteria acceptable according to the critical and the catastrophic risk.

So, with the three risk indicators and the criteria for critical risks we come to these most general conditions of admissibility of project for investment: the designation if the indicator for each of the risk areas should not exceed the designation of the criteria that is established by the investor.

To assess and select one of the mutually exclusive investment projects in construction site a game theoretic model cam be used, which takes into account the complexity and multidimensionality of both the object and investment environment in terms of which it will be realized [11].

The creative component of making the decision in term of risk by game-theoretic approach is crucial and consists of the following steps:

1) forming a plurality of solutions (strategies) of the subject of making the decision X;

2) forming a plurality of states (strategies) of the environment Θ;

3) defining and formalization of the key indicators of efficiency and utility, which are parts of functionality by which each of the alternative for each of the states of the environment are evaluated $F = \{f_{kj}\}$, defined on the set $X \times \Theta$, and one that takes the value of the space R1 (one-dimensional space), where the function $f(x, \theta)$ – the function of the winning of the subject of making the decision;

4) defining of the information situation that characterizes the strategy of handling the economic environment;

5) selection of the criteria of making the decision from the set of criteria that are specific for the selected (identified) information situation;

6) decision-making of the optimal solution for the selected criteria.

The formal part of the process of making the decision in term of the risk and uncertainty of using the models of game-theoretic approach is to hold payments for existing algorithms indicators of efficiency that is a part of the determination of functional evaluation $F = \{f_{kj}\}$ and the calculations associated with finding optimal solutions (or set of solutions), according to the selected criteria of making the decision.

The choice of a specific solution depends on the information situation on the set of the states of the economic environment and the chosen criteria of making the decision.

Using this approach a subjective component of risk is also taken into account because different criterials of making the decision correspond to different attitudes to risk of the subject that makes the decisions. The application of these criteria should be moderate and complex because the criteria of extreme optimism can lead to adopting the projects with too burdensome risks and extreme pessimism may lead to abandon the implementation of planned projects.

Conclusions. The object of building as a complex system and at the same time as an element of a higher level was examined. Characteristics of the environment of construction were adduced. Internal and external risks of the objects of a construction industry and some of their classification were analysed. A brief review of methods was made: the assessment of the investment attractiveness of construction, taking into account the risks, selecting one of alternative variants of investments and determining the appropriateness of investing money in a facility.

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АНАЛІЗ МЕТОДІВ ОЦІНОК ІНВЕСТИЦІЙНОЇ ПРИВАБЛИВОСТІ ОБ'ЄКТІВ БУДІВНИЦТВА В УМОВАХ НЕВИЗНАЧЕНОСТІ І РИЗИКУ

Анотація
Розглянуто роботи з аналізу ризиків у сфері будівництва. Надано аналіз методів визначення інвестиційної привабливості об'єктів будівництва. Як об'єкт управління будівничі проекти є складними системами, які функціонують в умовах невизначеності. В процесі оцінки інвестиційної привабливості таких проектів слід враховувати як зовнішні так і внутрішні чинники ризиків. Прийняття рішень щодо інвестування в проекти будівництва потребує використання науково обґрунтованих методів.
Ключові слова: ризик, невизначеність, інвестиційна привабливість, об'єкти будівництва, аналіз.

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АНАЛИЗ МЕТОДОВ ОЦЕНОК ИНВЕСТИЦИОННОЙ ПРИВЛЕКАТЕЛЬНОСТИ ОБЪЕКТОВ СТРОИТЕЛЬСТВА В УСЛОВИЯХ НЕОПРЕДЕЛЕННОСТИ И РИСКА

Аннотация
Рассмотрены работы посвященные анализу рисков в сфере строительства. Дан анализ методов определения инвестиционной привлекательности объектов строительства. Как объект управления строительные проекты являются сложными системами, которые функционируют в условиях неопределенности. В процессе оценки инвестиционной привлекательности таких проектов следует учитывать как внешние так и внутренние факторы возникновения риска. Принятие решений относительно инвестирования в строительные проекты требует использования научно обоснованных методов.
Ключевые слова: риск, неопределенность, инвестиционная привлекательность, объекты строительства, анализ.