природой человек выступает в двух ипостасях: как существо биологическое, со своими утилитарными, прикладными интересами, и как социальный индивид, способный к природопреобразующей деятельности. Различия между ними обусловливают и форму взаимоотношений с окружающей средой, и, следовательно, значительно меняют функциональную определенность во взаимодействии.

В повседневной практике формы оценочного взаимодействия с природной средой, биологическая и социальная, не дифференцируются, но на уровне теоретического анализа подобное разделение необходимо в связи с тем, что они отличаются между собой по основным параметрам: целям, функциям, масштабам проявления.

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MONTE CARLO SIMULATION IN INVESTMENT PROJECTS

The Monte Carlo simulation is widely used in investment projects, primarily under conditions of uncertainty and risk.

It is convenient because it is successfully combined with other economic and statistical methods, game theory and other methods of operations research. But practice has shown that it often provides more optimistic results than other techniques such as scenario analysis. The reason is obviously due to the enumeration of intermediate options.

The Monte Carlo method is a method for assessing the influence of the system parameters uncertainty in a wide range of situations. It is commonly used to estimate the range of results and the relative frequency of values within this range for quantities such as cost, duration, productivity, demand, etc. The Monte Carlo simulation can be used for two different purposes:

– transformation of uncertainty for conventional analytical models;
– calculating probabilities if analytical methods cannot be used.

The input to a Monte Carlo simulation is a well-developed model of the system, information about the type of input, sources of uncertainty, and required output. The input data and their associated uncertainty are treated as random variables with appropriate distributions. Often uniform, triangular, normal, and log-normal distributions are used for these purposes.

The research process includes:

– model definition or an algorithm that most accurately describes the system's behavior.

– numerous model application by using a random number generator to obtain the output of the model (system simulation). If necessary the effects of uncertainty can be simulated. The model is written in the form of an equation expressing the relationship between input and output parameters. The values selected as inputs are received from appropriate probability distributions characterizing the uncertainties in the data.

Using a computer, the model is repeatedly used (often up to 10,000 times) with different inputs and after you can obtain an output. Inputs can be processed using statistical methods to obtain estimates of the mean deviation, standard deviation, confidence intervals.

Typically, the model can be extended in various ways, for example by:

– changes in the interaction elements of model in the system (for example, the second element is in reserve and is put into operation immediately after the failure of the first element);

– replacing a fixed probability of failure-free operation with a variable (for example, subordinated to a triangular distribution) when the probability of failure-free operation cannot be accurately determined;

– using a flow parameter or failure rate parameter in combination with a random number generator to generate time to failure or to failure (exponential distribution, Weibull distribution or other distribution) and recovery time.

The Monte Carlo method can be used to assess the uncertainty of financial forecasts, the results of investment projects, in case of predicting the cost and schedule of the project, business process violations and personnel replacement. This method is used in situations where the results cannot be obtained by analytical methods or there is a high uncertainty in the input or output data.

The output may be characteristic values, a probability or failure rate distribution, or the output may be an identification of the main model features that have a major impact on the output.

The Monte Carlo method is commonly used to estimate input or output distributions or characteristics of a distribution, including the estimation:

– probabilities of established states;

– values of output quantities for which boundaries are set corresponding to a certain level of confidence, which should not be violated.

An analysis of the relationship between input and output values can reveal the relative importance of system performance factors and identify ways to reduce the uncertainty of output values.

We introduce the advantages and disadvantages in next table.

Table – Advantages and disadvantages of Monte Carlo simulation (MCS) [1]

Advantages	Disadvantages
1	2
MCS can be adapted to any distribution of input data, including empirical distributions based on observations of relevant systems	The accuracy of the solutions depends on the number of iterations that can be performed (this shortcoming becomes less significant as the speed of the computer increases)
The models are relatively simple to work with and can be extended as needed	The method assumes that the uncertainty of the data can be described by a known distribution
The method allows taking into account any impacts and relationships, including such subtle ones as conditional dependencies	Large and complex models can be difficult for modelers and make it difficult to involve stakeholders
Sensitivity analysis can be applied to identify strong and weak influences	MCS cannot adequately model events with a very high or very low probability of occurrence, which limits its use in risk analysis
The models are clear and the relationship between inputs and outputs is transparent	
MCS allows the use of efficient models for the study of multicomponent systems, such as the Petri net	
MCS allows achieving the required accuracy of the results.	
Method software is available and relatively inexpensive (for example Excel program)	

As we can see The Monte Carlo simulation has more advantages that disadvantages, very useful for investment projects, not so difficult if you use the Excel program, but not widely used for risk analysis.

Lebanon has been in a deep financial and economic crisis for more than two years (2019-2021 years), accompanied by political and social tensions. Against the background of the crisis, the banking system was almost completely paralyzed, the national currency depreciated more than 20 times against the dollar. As a result, more than 70% of the population fell below the poverty line without being able to provide a daily ration of food.

Nowadays Lebanon has a few positive prospects against the background of Iranian influence, international misunderstanding, national divisions, confessional manipulation and humiliation of the state. The investment projects are not so available to get but time doest stop at a point.

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