ISSN 2224-5294

ҚАЗАҚСТАН РЕСПУБЛИКАСЫ
ҰЛТТЫҚ ҒЫЛЫМ АКАДЕМИЯСЫНЫҢ

Абай атындағы Қазақ ұлттық педагогикалық университетінің

Х А Б А Р Л А Р Ы

ИЗВЕСТИЯ

НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК
РЕСПУБЛИКИ КАЗАХСТАН
Казахский национальный
педагогический университет им. Абая

NEWS

OF THE NATIONAL ACADEMY OF CIENCES
OF THE REPUBLIC OF KAZAKHSTAN
Abay Kazakh National
Pedagogical University

SERIES
OF SOCIAL AND HUMAN SCIENCES

4 (332)

JULY – AUGUST 2020

PUBLISHED SINCE JANUARY 1962

PUBLISHED 6 TIMES A YEAR

ALMATY, NAS RK

«Қазақстан Республикасы Ұлттық ғылым академиясының Хабарлары. Қоғамдық және гуманитарлық ғылымдар сериясы».
ISSN 2224-5294
Меншіктенуші: «Қазақстан Республикасының Ұлттық ғылым академиясы» РҚБ (Алматы қ.).
Қазақстан республикасының Мәдениет пен ақпарат министрлігінің Ақпарат және мұрағат комитетінде 30.04.2010 ж. берілген **№ 10894-Ж** мерзімдік басылым тіркеуіне қойылу туралы куәлік.

Мерзімділігі: жылына 6 рет.
Тиражы: 500 дана.

Редакцияның мекенжайы: 050010, Алматы қ., Шевченко көш., 28; 219, 220 бөл.; тел.: 272-13-19, 272-13-18
http://soc-human.kz/index.php/en/arhiv

Типографияның мекенжайы: «NurNaz GRACE», Алматы қ., Рысқұлов көш., 103.

Известия Национальной академии наук Республики Казахстан. Серия общественных и гумани-тарных наук.
ISSN 2224-5294
Собственник: РОО «Национальная академия наук Республики Казахстан» (г. Алматы).
Свидетельство о постановке на учет периодического печатного издания в Комитете информации и архивов Министерства культуры и информации Республики Казахстан **№ 10894-Ж**, выданное 30.04.2010 г.

Периодичность 6 раз в год.
Тираж: 500 экземпляров.

Адрес редакции: 050010, г. Алматы, ул. Шевченко, 28; ком. 219, 220; тел. 272-13-19, 272-13-18
http://soc-human.kz/index.php/en/arhiv

Адрес типографии: «NurNaz GRACE», г. Алматы, ул. Рыскулова, 103.

News of the National Academy of Sciences of the Republic of Kazakhstan. Series of Social and Humanities.
ISSN 2224-5294
Owner: RPA "National Academy of Sciences of the Republic of Kazakhstan" (Almaty).
The certificate of registration of a periodic printed publication in the Committee of information and archives of the Ministry of culture and information of the Republic of Kazakhstan **N 10894-Ж**, issued 30.04.2010.

Periodicity: 6 times a year.
Circulation: 500 copies.

Editorial address: 28, Shevchenko str., of. 219, 220, Almaty, 050010, tel. 272-13-19, 272-13-18
http://soc-human.kz/index.php/en/arhiv

Address of printing house: «NurNaz GRACE», 103, Ryskulov str, Almaty.

N E W S
OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
SERIES OF SOCIAL AND HUMAN SCIENCES
ISSN 2224-5294 **https://doi.org/10.32014/2020.2224-5294.117**
Volume 4, Number 332 (2020), 171 – 181

IRSTI 06.52.01
UDC 330.361.3

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METHODS OF FORECASTING AND THEIR CLASSIFICATION

Abstract. The article discusses the classification and description of forecasting methods for various socio-economic objects. In the process of economic reform, there is an increasing demand for predictive research of socio-economic processes at various levels of management and decision-making. The correct choice of a solution depends directly on the quality of its justification. Forecasting is one of the management functions, along with analysis, organization, planning, motivation, etc.

To date, we have accumulated sufficient experience and a set of tools for both long-term and short-term forecasting. Forecasting is a science-based prediction of the most likely state, trends and features of development of a managed object in the long-term period based on the identification and correct assessment of stable relationships and dependencies between the past, present and future. A distinctive feature of forecasting is that it justifies the emergence of such processes and forms of material and spiritual life of society, which are currently inaccessible to direct perception, as well as verification in practice.

Forecasting allows you to reveal stable trends, or, conversely, significant changes in socio-economic processes, assess their probability for the future planning period, identify possible alternatives, and accumulate scientific and empirical material for a reasonable choice of a particular development concept or planning solution.

Consideration of predictive activity as a study of future events and phenomena in the development of the object requires the definition of methodological principles that form a constructive basis for the development and use of applied forecasting methods.

The most important principle that allows you to combine on a single methodological basis all the variety of forecasting methods in the study of processes of very different nature is the principle of consistency.

Formalized and intuitive methods of forecasting are described. Forecasting methods are in a certain sense an applied discipline, in the study of which the theory is supported by the collection of necessary information, calculations, calculations and evaluation of research results.

Econometric models are a forecasting tool that takes into account the requirements of a systematic approach to the object and its quantitative characteristics.

Keywords: forecasting methods, classification, intuitive and formalized, extrapolation, interpretation of methods used in economic, social, socio-political, scientific and technical.

Introduction. The authors used a combination of forecasting methods. Forecasting is one of the ways to solve the problem of verification of forecasts, considered as a generalized assessment of their reliability, accuracy and validity. The coincidence of prediction results obtained by different methods is one of the evidences of their reliability. The choice and use of the method are the main stage in the development of the forecast, and it does not guarantee final reliable results. The development procedure involves other stages of activity.

Main part. According to some scientists, there are more than 150 methods of forecasting. Basic methods are much less, many of the "methods" are more relevant to individual methods and procedures for forecasting, or they are a set of individual techniques that differ from the basic methods by the number of private techniques and the successive application of them.

By the *method of forecasting* we mean a set of methods and methods of thinking that allow, based on the analysis of historical data, exogenous (external) and endogenous (internal) links of the forecasting object, and also to measure them within the framework of the phenomenon or process, to deduce certain certainty about the future development of the object. A more concise definition was given by E. Yanch: "a way of investigating a prediction object, aimed at developing forecasts".

The meaningful interpretation of methods is determined by the nature, features and regularities of the processes being studied. The future states of processes and phenomena are evaluated on the basis of already accumulated knowledge of the essence, properties and patterns of existing or prospective trends in their development.

Thus, if the methodological basis for forecasting is the theory of the object that reveals the existing laws, the contents of the basic cause-and-effect relationships of the process, the forecasting methods enable us to find a measure of the influence of individual patterns and causes of development, submit the forecast object as a dynamic system measured with a certain degree of confidence Interactions of real phenomena, factors, forces of social activity and thereby to enable to reproduce With a certain degree of probability, the behavior of this system in the future [1 p.67].

The words of I. Siegel, the author of the classic work on technology forecasting "Technological changes and long-range forecasting", remain valid, that success in forecasting depends not so much on the application of certain methods as on the preservation of the correct "point of view".

In many cases, none of the methods alone can provide the required degree of reliability and accuracy of the forecast, but, when used in certain combinations with others, is very effective - the advantages of one method compensate for the shortcomings of the other, or they are used in development.

An objective need for combining different methods often arises when developing forecasts for the development of processes characterized by the presence of complex interrelationships. Using a combination of prediction methods is one of the ways in solving the problem of verification of forecasts, considered as a generalized assessment of their reliability, accuracy and validity. The coincidence of the results of forecasting, obtained by various methods, is one of the evidences of their reliability.

Although the choice and use of the method is the main stage in the development of the forecast, they do not guarantee final reliable results. The development procedure assumes also other stages of activity, among which one can single out the following:

1. Forecast justification, i.e. the formulation of goals, tasks, initial data on the structure of the object and the processes analyzed, the main factors, interconnections, the development of preliminary hypotheses about the laws of development, methods and organization of forecasting procedures.
2. Description of the external environment (the forecast background), the identification of external influences on the development of the facility and internal management, clarification of development criteria and management parameters.
3. Development of the forecast model, i.e. the definition of its structure and constituent elements, the establishment of interrelations between them, which will allow us to trace the patterns of change in the process.
4. Develop, if possible, an alternative forecast based on the use of suitable forecasting methods.
5. An estimation of reliability, accuracy and validity of the developed forecast, consequences of its realization. Comparison of forecast results with alternative forecast options.
6. Development of recommendations for managing the development of the process, taking into account the options for the impact of the external environment and the internal evolution of the object.
7. Formulation of the task of developing a new version of the forecast, taking into account the analysis of the results obtained and new information received.

A useful forecast is the result of making a decision from a set of alternatives that differ not only from formal criteria, but also from their validity and adequacy to the context of the development of events. Thus, the development of the forecast represents an iterative process, where the results of each stage can affect the problem statement and its implementation.

Therefore, in many cases of implementation of various projects and programs of a strategic nature, the task is to assess the state of the analyzed object and develop predictive directions for development, which represents an in-depth analysis of possible situations and consequences of decisions (scenario analysis or situational analysis).

Classification of prediction methods.

The authors of the "Working book on forecasting" give a three-level classification of methods, based on the following principles: sufficient coverage of methods, the unity of the classification feature at each level, the non-intersection of the classification sections, the openness of the classification scheme (the possibility of complementation by new methods). Each level in the scheme is determined by its classification criterion: the degree of formalization, the general principle of action, the way to obtain the forecast information [2, p. 132].

According to the degree of formalization, methods of forecasting are divided into *intuitive and formalized*. If the combination of causal links is projected into the future, the use of methods based on formalized thinking has advantages over intuitive methods.

The classification proposed by the authors is quite extensive, because Includes forecasting methods used in economic, social, socio-political, scientific and technical fields.

The ratio of the forecast horizon (the preemptive period) Δt and the evolutionary period (retrospective period) of the process development t_x:

$$\boldsymbol{\tau = \Delta t / t_x}.$$

If $\tau \ll 1$ (the forecasting horizon fits within the evolutionary cycle), then it is recommended to use formalized methods. At $\tau \approx 1$ and the possibility of sudden changes in development, intuitive methods are more effective. Formalized methods can be used before and after the turning events. If several evolutionary periods fit in the period of anticipation ($\tau \gg 1$), intuitive methods are used to develop forecasts.

In the training manual edited by A.E. Granberg presents a classification scheme in which methods are divided into four groups according to the method of obtaining predictive information: individual expert assessments, collective expert estimates, prognosis extrapolation methods, and modeling methods [3, p.174].

From the standpoint of a general approach, a set of prediction methods aimed at solving applied problems of analyzing the state of an object and forecasting its development in a modern dynamic world can be systematized in the following classification (table 1).

Table 1 – Classification of forecasting methods

<table>
<tr><td colspan="6">Forecasting methods</td></tr>
<tr><td colspan="2">Intuitive methods</td><td colspan="4">Formalized methods</td></tr>
<tr><td>Individual expert assessments</td><td>Collective expert assessments</td><td>Methods of predictive extrapolation</td><td>System-Structural methods and models</td><td>Associative methods</td><td>Methods of leading information</td></tr>
<tr><td>The "interview" method</td><td>Method of commissions</td><td>Simple extrapolation</td><td>Morphological analysis</td><td rowspan="2">Simulation modeling</td><td>Analysis of publication flows</td></tr>
<tr><td>Analytical method</td><td>Method "Delphi"</td><td rowspan="2">Moving Average Method</td><td>System analysis</td><td></td></tr>
<tr><td>Building a script</td><td rowspan="2">The method of collective generation of ideas ("brainstorm")</td><td>The matrix method</td><td rowspan="3">Historical and logical analysis</td><td></td></tr>
<tr><td>The method of psycho-intellectual generation of ideas</td><td rowspan="2">The method of guided ideas generation</td><td rowspan="2">The method of exponential smoothing</td><td>Regression models</td><td rowspan="2">Assessment of the importance of inventions</td></tr>
<tr><td></td><td></td><td>Econometric methods</td></tr>
<tr><td></td><td></td><td>Extrapolation of trends</td><td>Functional-hierarchical modeling</td><td rowspan="2">Patent Information Analysis</td></tr>
<tr><td></td><td>Synoptic method</td><td>Autoregressive models</td><td>Network Simulation</td></tr>
</table>

The most common and fundamental classification feature is the "method of obtaining predictive information". There are three main sources of forecast information [4, p.32]:

- human experience and intuition;
- extrapolation of known trends and patterns in the development of processes and phenomena;
- a model of the process under investigation that reflects the expected or desirable conditions for its development.

If the first two sources with some degree of convention can be considered as empirical, then the model uniquely represents a theoretical source. Adequate mathematical description of relationships and regularities, taking into account the time factor, makes it possible to carry out calculations for the future for various objects. Thus, the model is a tool for implementation.

A certain approach to the study of the object through a formalized (quantitative) expression of the patterns inherent in its development.

In connection with the above, it is necessary to highlight the role and importance of econometrics and econometric models have recently received by the right development and wide distribution. The computational capabilities of modern information technologies have opened access to the study and use of econometrics. It is worth noting that the achievements of researchers are in the field of econometrics awarded Nobel prizes: Ragnar Frisch and Jan Tinbergen (1969), Lourens Kleyn (1980), Trygve Haavelmo (1989), Dzheyms Hekman and Daniel McFadden (2000), Robert Engle and Klayv Grendzher (2003). Econometric models allow us to solve applied problems of socio-economic development, including a meaningful interpretation of the results of the analysis and prediction.

Intuitive methods are used when the object of forecasting is either too simple, or so complex and unpredictable, that it is practically impossible to take into account the influence of many factors analytically. The individual and collective peer evaluations obtained in such cases are used as final forecasts or as input data in complex prediction systems.

The "interview" method represents an individual expert assessment formulated by the impromptu without preliminary analysis of the questions and therefore excluding ambiguous interpretation. In this case, the researcher-forecaster contacts the expert directly in the "question-answer" mode according to a previously developed program aimed at identifying the prospects of the process under study. Success depends on the level of preparedness of the interviewer: the content and thoughtfulness of the questions, their uniqueness and logical interconnectedness.

The analytical method is connected with the expression of individual point of view of the expert in the research or analytical notes on the trends in the development of studied phenomena and processes. In the course of such work, expert can use all the needed information.

When constructing scenarios, a logical sequence of hypothetical events is established, connected with each other by cause-effect relationships; This is a model of the process, and not just the final result. The sequence of events or states is considered in the time coordinate system. The methodology for writing the scenario requires determining the necessary control actions and those turning points at which these impacts must be applied to achieve the development goals. Therefore, the scenario forecasting method can be used when forecasting partially or completely controlled processes. Attention is drawn to the relationship between phenomena that can be missed at the abstract level of analysis.

The method of *psycho-intellectual* generation of ideas should be based on motivational creative motives, but he, like all individual assessments, is subjective. The final version of the decision is determined through the analysis of expert data directly by the researcher.

The method of *commissions* is the unification of the work of experts in the development of documents on the prospects for the development of the forecasting facility. As an information base are sociological surveys.

The "Delphi" method represents a number of consistently implemented procedures aimed at preparing and substantiating the forecast. The method developed by O. Helmer and his colleagues, after the publication of the "Report on the study of long-range forecasting" by the American corporation "RAND" in 1964, became widely known [5]. The objects of research were: scientific breakthroughs, population growth, automation, space exploration, the emergence and prevention of wars, the future weapons systems. In a simplified form, the method can be viewed as a sequence of iterative analysis cycles, in which an attempt is made to avoid the intervention of psychological factors through the anonymity of the interview and at the same time the group nature of the response.

Since the method is based on the experience and intuition of specialists, O. Helmer discusses it in detail along with scripting and other techniques in the report "Social Technology", also published by RAND Corporation in 1965 [6].

The method of collective generation of ideas, called "brainstorming" or "brainstorming", differs from the "Delphi" method by the joint nature of obtaining a decision during a special meeting and the subsequent analysis of its results. The essence of the method is to solve two problems:

- generating new ideas on possible options for the development of the process;
- analysis and evaluation of ideas put forward.

The method of "brainstorming" is recommended to use in critical situations, characterized by the absence of real, fairly obvious options for the development of processes in the future. The method is applied at the level of regions, large firms, concerns for the forecast of development and placement, for example, of social infrastructure or analysis of the situation emerging in the market, to determine the system of measures to overcome the "barriers" to enter the markets, etc.

If the "brainstorm" is primarily aimed at collecting new ideas, then the method of guided idea generation is a method of exchange of opinions, as a result of which it is expected to reach agreement between experts. The group leader, who manages the generation of ideas and stimulates it, knows the true nature of the problem and organizes the discussion in such a way as to find the right solution.

The synoptic method presents a consolidated, overview approach to the analysis of the object and the writing of individual scenarios for different areas, followed by their integration by iteration.

Formalized methods are divided according to the general principle of action into four groups: extrapolation (statistical), system-structural, associative and methods of advanced information.

In the practice of forecasting economic processes, statistical methods are prevailing, at least until recently. This is mainly due to the fact that statistical methods rely on the analysis apparatus, the development and application of which have a fairly long history. The forecasting process, based on statistical methods, breaks down into two stages.

The first is to summarize the data collected over a certain period of time, and also to create a process model on the basis of this generalization. The model is described as an analytically expressed trend of development (*trend extrapolation*) or as a functional dependence on one or several factors - the arguments (*regression equations*). The construction of a process model for forecasting, whatever the form, necessarily includes the choice of the form of the equation describing the dynamics and interconnection of phenomena, and the estimation of its parameters by one or another method.

The second stage is the forecast itself. At this stage, based on the found patterns, the expected value of the predicted indicator, value or characteristic is determined. Of course, the results obtained can’t be regarded as something final, since in their evaluation and use factors, conditions and constraints that do not participate in the description and construction of the model should be taken into account. Their adjustment should be in accordance with the expected change in the circumstances of their formation.

It should also be noted that in some cases the actual statistical processing of economic information is not a forecast at all, but it appears as an important link in the overall system of its development. The world practice has extensive material in the field of prospective analysis, and it is already clear that the success of predictions obtained on the basis of statistical models depends significantly on the analysis of empirical data, on the extent to which such an analysis will be able to identify and generalize the patterns of behavior of the processes under study in time .

One of the most common prediction methods is *extrapolation*, i.e. the extension to the future of trends observed in the past (the extrapolation method is described in more detail in the next chapter). Extrapolation is based on the following assumptions [7, p.151]:

1) the development of the phenomenon can be reasonably characterized by a smooth trajectory-a trend;

2) the general conditions that determine the development trend in the past will not undergo significant changes in the future.

Extrapolation can be represented as the definition of the value of a function:

$$y_{t+l} = f(y_t^*, L), \tag{1.1}$$

where $\boldsymbol{y_{t+l}}$ is the extrapolated level value; $\boldsymbol{y_t^*}$ - the level adopted for the extrapolation base; $\boldsymbol{L}$ – Period of anticipation.

The simplest extrapolation can be carried out on the basis of the average characteristics of the series: *average, average absolute growth and average growth rate.*

If the *average level* of the series does not tend to change, or if this change is insignificant, then we can accept:

$$\boldsymbol{y_{t+l} = \overline{y}}.$$

If the *average absolute growth* remains unchanged, then the dynamics of the levels will correspond to the arithmetic progression:

$$\boldsymbol{y_{t+l} = y_t + \Delta y_t}$$

If the *average growth rate* does not tend to change, the forecast value can be calculated by the formula:

$$\boldsymbol{y_{t+l} = y_t^* \tau^L} \quad (1.2)$$

where $\boldsymbol{\tau}$ - average growth rate; $\boldsymbol{y_t^*}$ - The level adopted for the base for extrapolation.

In this case, it is supposed to develop according to a geometric progression or exponentially. In all cases, a confidence interval should be determined that takes into account the uncertainty and inaccuracy of the estimates used.

The simplest and best-known method is *the moving average method*, which performs mechanical alignment of the time series. The essence of the method is to replace the actual levels of the series with calculated averages, in which the oscillations are canceled. The method is considered in detail in the course of the theory of statistics.

For the purposes of short-term forecasting, the *method of exponential smoothing* can also be used. The average level of the series at time *t* is equal to the linear combination of the actual level for the same time $\boldsymbol{y_t}$ and the average level of past and current observations.

$$\boldsymbol{Q_t = \alpha y_t + (1 - \alpha) Q_{t-1}} \quad (1.3)$$

where $\mathbf{Q_t}$ - exponential mean (smoothed value of the row level) at the moment *t*; $\boldsymbol{\alpha}$ - coefficient characterizing the weight of the current observation when calculating the exponential average (the smoothing parameter), $\boldsymbol{0 < \alpha \leq 1}$.

If the forecast is one step ahead, then the forecast value $\boldsymbol{y_t = Q_t}$, Is a point estimate.

Trend extrapolation is possible if the dependence of the series levels on the time factor t is found, in which case the dependence has the form:

$$y_t = f(t) \quad (1.4)$$

The types of curves, the grounds for choosing the type of analytic dependence, and the calculation of the confidence interval are discussed in the next chapter.

For many stationary processes in the economy, there is a close relationship between levels over previous periods or moments and subsequent levels. In such cases, the dependence on time is manifested through the characteristics of the internal structure of the process over past periods. Having expressed in the analytical form the interrelation of the levels of the time series, one can use the obtained regularity for forecasting.

The stationary process model expressing the value of the indicator $\boldsymbol{y_t}$ in the form of a linear combination of a finite number of previous values of this index and an additive random component is called the autoregression model.

$$y_t = \alpha + \varphi y_{t-1} + \varepsilon_t \quad (1.5)$$

where $\boldsymbol{\alpha}$ - constant, $\boldsymbol{\varphi}$ – parameter of expression , $\boldsymbol{\varepsilon_t}$ - random component.

The methods considered above, with the exception of trend extrapolation, are *adaptive*, since The process of their implementation is to calculate the time-series values of the predicted indicator, taking into account the degree of influence of the previous levels.

The morphological method was developed by the famous Swiss astronomer F. Zwicky, who worked at observatories in the state of California until 1942. The morphological method was developed by the famous Swiss astronomer F. Zwicky, who worked at observatories in the state of California until 1942. Three types of problems that he believes morphological analysis can solve:

- how much information about a limited range of phenomena can be obtained with this class of receptions?
- what is the complete chain of consequences arising from a particular cause?
- what are all possible methods and techniques for solving this particular problem?

The answer to the second question is the construction of a goal tree based on graph theory. The answer to the third question is provided by prospecting forecasting.

The premature formulation of the question of value is detrimental to the study. The ordering of all decisions, including trivial solutions, allows you to get away from stereotypes, structure your thinking in such a way that new information is generated that escapes attention during non-systematic activities.

In morphological analysis, all combinations are systematically examined in the conduct of qualitative changes in the basic parameters of the concept, and through this, the possibilities of new combinations are revealed.

The most constructive of applied areas of systemic research is system analysis. "Total systems analyses" was first developed by the RAND Corporation in 1948 to optimize the complex tasks of military management. However, regardless of whether the term "system analysis" is applied only to defining the structure of the system's goals and functions, to planning, developing the main lines of development of the industry, enterprise, organization, or to researching the system as a whole, including goals and organizational structure, work on a systemic Analysis is different in that they always offer a methodology for conducting research, organizing the decision-making process, an attempt is made to identify the stages of research or decision-making and propose approaches to the implementation of these stages In specific conditions.

In addition, in these works, special attention is always paid to work with the objectives of the system: their origin, formulation, detailing (decomposition, structuring), analysis and other issues of transformation (goal-setting). Some authors, even in the definition of system analysis, emphasize that this is the methodology for investigating purposeful systems. At the same time, the development of the methodology and the choice of methods and techniques for performing its stages are based on systemic representations, on the use of regularities, classifications, and other results obtained by system theory.

The methods of normative technological forecasting include the *matrix approaches* used to verify alignment with various horizontally acting factors. Two-dimensional matrices provide a quick method for assessing the priority of one or another of the proposed options. This principle is consistent with the widespread in the management method of SWOT analysis, that is, taking into account the weak and strong sides of the object, threats and advantages in the external environment.

From the point of view of methodology, matrix methods are *methods and models of game theory*. They are used in forecasting socio-economic processes in the analysis of situations arising from certain relationships between the system under investigation and other opposing systems. An example is the consideration of an enterprise (one player) and nature (another player), i.e. Reaction and behavior of buyers.

Another example is connected with the activity of enterprises and the economic policy of the government. The distribution of income is a trade-off between the need to centralize revenues and ensure the economic independence of enterprises. The strategy of the enterprise is formed taking into account the total winnings that it receives from the remaining share of its income and from the additional opportunities provided to it by the center. The state's strategy is to determine the share of centralized incomes that do not undermine the economic possibilities of enterprise development and at the same time is sufficient for solving state-wide problems, which ultimately matter for the enterprises themselves [3, p. 188].

The main goal of the theory of games is to develop recommendations for choosing the most effective solutions for managing processes in the presence of uncertain factors. Uncertainties include factors about which the researcher does not have any information, they have an unknown nature.

The modern competitive world is characterized by strategic uncertainty due to the participation in it of a multitude of parties having their own different goals and not sufficiently representing the strategies of competitors. In strategic management, a competitive strategy must evolve in the direction from conflict situations to partnership. At the same time, each side should be ready to make certain losses and be sure that its competitor is also ready for losses [4, p.318].

The methods of statistical modeling include *regression equations* that describe the interrelationships of time series of independent features and performance indicators. The projected levels are calculated by substituting for the regression equation the projected values of the characteristic factors that can be obtained, for example, on the basis of extrapolation. Forecasting based on regression models can be performed only after evaluating the significance of regression coefficients and testing the model for adequacy. The forecasting tool, taking into account the requirements of the system approach to the object and its quantitative characteristics, is *the econometric models*. Their area of application are macroeconomic processes at the level of the national economy, its sectors and industries, and the economy of the territories.

Econometric studies originate from W. Petty, J. Graunt, A. Qetle and all statisticians who have made a significant contribution to the study of mass economic phenomena through quantitative measurements can be included in this list.

The development of some problems of econometric modeling is devoted to the work of many economists in the field of economic and mathematical modeling in the 1950s-1980s.

The logic of econometric monographs is primarily directed to various applications, rather than to solving problems arising in theory. This is how the monographs of G.Teil and E.Malenvo translated into Russian became available, which became accessible to a wide circle of readers in the 70s of the last century and played an important role in the solution of applied problems[8,9].

A systematic exposition of the methods of theoretical econometrics is devoted to the J. Johnston monograph "Econometric methods", published in 1980. The book contains numerous examples and results obtained until the end of the 1970s, after which a qualitatively new stage of development of the market economy began [10].

Functional-hierarchical modeling represents the coordination of a distant goal with actions (functions) that must be undertaken to achieve it in the present and future time. For the first time the idea of constructing a graph according to the principle of the target tree was proposed by a group of researchers in connection with the problems of decision making in industry [7]. Trees of goals with quantitative indicators are used as an aid in decision-making and in this case bear the name of decision trees.

The first major application of the methodology of the goal tree to quantitative calculations in the field of decision-making was carried out by the Department of Military and Space Sciences of Honiwell Company. The PATTERN scheme, originally used for aeronautics and space problems, was turned into a universal scheme covering all military and space spheres of activity.

Network modeling is widely used in normative technological forecasting. The most famous method was the critical path, based on the use of network graphs, reflecting the various stages of each part of the project, and analyzing them to select the optimal path between the initial and final stages. As a criterion, there are costs or deadlines. Network modeling uses the target tree as an auxiliary tool.

At the core of simulation modeling method has an idea of making maximum use of all available information about the system. The goal is to analyze and predict the behavior of a complex system with many functions, not all of which are quantified.

Simulation modeling has found wide application in forecasting processes, the analysis of which is impossible on the basis of direct experiment.

The possibility of a systematic use of similarity in the development of various objects underlies the method of historical analogies. As a comment by E. Yanchem [8, p.221], the historical analogy has always played a separate conscious or unconscious role in forecasting. For the first time, the results of the systematic use of the historical analogy to "the main social inventions of the 20th century, conducted

under the auspices of the American Academy of Arts and Sciences, were presented in the book" Railway and space programs - a study from the standpoint of a historical analogy. "

When using historical analogies, it is necessary to bear in mind:

- success depends on the correct selection of matching objects;
- there is a historical conditioning of processes and phenomena;

Innovations in socio-economic processes bear the imprint of the national "style."

In the past, O. Shpengler and later A. Toynbee sought to rethink the socio-historical development of mankind in the spirit of the theory of the cycle of local civilizations. The end of the 20th century, with its gigantic changes, led to a clash of civilizations and globalization [10].

The method of historical analogies can be fairly conditionally attributed to formalized methods, since At the stage of choice, it contains a sufficient share of subjectivism, characteristic of expert methods. Historical analogies allow solving the problems of scientific and technical forecasting. At the same time, quality indicators of the analogue, shifted relative to the object along the time axis, are used as a source of advanced information. The method is oriented to the prediction of the development of objects of the same nature, therefore classifications or methods of pattern recognition can be used [11].

The group of methods of *advanced information* refers to technological forecasting and is associated with monitoring of the latest research, results and breakthroughs in various fields of knowledge and evaluation of accumulated achievements. The methods are based on the property of scientific and technical information ahead of the implementation of achievements in production. To carry out such activities, there are great opportunities in connection with the high level of development of information technology [12].

The main source of information is patent and patent-associated information: patents, copyright certificates, licenses, catalogs, commercial information. The trend of the modern world is the reduction of the "life cycle" of innovations.

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БОЛЖАУ ӘДІСТЕРІ ЖӘНЕ ОЛАРДЫҢ ЖІКТЕЛУІ

Аннотация. Мақалада түрлі әлеуметтік-экономикалық нысанды болжау әдістерінің жіктелуі мен сипаттамасы қарастырылады. Экономиканы реформалау үдерісінде көбінесе басқару мен шешім қабылдаудың түрлі деңгейіндегі әлеуметтік-экономикалық үдерістерді болжаған зерттеулерге сұраныс артады.

Шешімді дұрыс таңдау оны негіздеу сапасына тікелей тәуелді. Болжау талдау, ұйымдастыру, жоспарлау, мотивация және т.б. басқару функцияларының бірі болып саналады. Болжамдық әзірлемелердің белсенді тұтынушылары – миллиондаған нарық агенттері, үй шаруашылықтары, мемлекеттік және аумақтық басқару органдары. Демократиялық ашық қоғамда қоғамды дамытудың балама нұсқаларын, нарықтық қатынастардың әрбір қатысушысында бар мүмкіндіктерді ұсыну қажет.

Қазіргі уақытта ұзақмерзімді және қысқамерзімді болжам үшін жеткілікті тәжірибе мен құралдар жинақталған. Болжамдау – өткен, қазіргі және болашақ арасындағы тұрақты байланыстар мен тәуелділікті анықтау және дұрыс бағалау негізінде болашақ кезеңде басқарылатын нысанның неғұрлым ықтимал жай-күйін, даму үрдістері мен ерекшеліктерін ғылыми негіздеген болжам.

Болжалдаудың ерекшелігі – қазіргі уақытта тікелей қабылдауға, сондай-ақ практикада тексеруге қол жетпейтін қоғамның материалдық және рухани өмірінің осындай үдерістері мен нысандарының туындауын негіздейді.

Болжам тұрақты үрдістерді немесе керісінше, әлеуметтік-экономикалық үдерістердегі елеулі өзгерістерді ашуға, олардың болашақ жоспарлы кезең үшін ықтималдығын бағалауға, ықтимал балама нұсқаларды анықтауға, дамудың қандай да бір тұжырымдамасын немесе жоспарлы шешімді негізделген таңдау үшін ғылыми және эмпирикалық материалды жинақтауға мүмкіндік береді.

Болжамды қызметті нысан дамуындағы болашақ оқиғалар мен құбылыстарды зерттеу ретінде қарау болжамның қолданбалы әдістерін әзірлеу және пайдалану үшін конструктивтік негізді құрайтын әдіснамалық қағидаттарды айқындауды талап етеді.

Әртүрлі табиғат үдерістерін зерттеуде болжаудың барлық алуан түрлілігін бірыңғай әдіснамалық базада біріктіруге мүмкіндік беретін аса маңызды қағидат жүйелілік принципі болып саналады.

Болжаудың формалды және интуитивті әдістері берілген. Болжамдау әдістері белгілі бір мағынада қолданбалы пәндерді көрсетеді, оны зерттеуде теория қажетті ақпарат жинаумен, жинақтаумен, есеп және зерттеу нәтижелерін бағалау арқылы бекітіледі. Нысанға және оның сандық сипаттамаларына жүйелілік тәсіл талаптарын ескеретін болжалдау құралы эконометриялық үлгілер болып есептеледі.

Түйін сөздер: болжау әдістері, жіктелу, интуитивті және формалды, экстраполяция, экономикалық, әлеуметтік, қоғамдық-саяси, ғылыми-техникалық әдістер, интерпретациялау.

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МЕТОДЫ ПРОГНОЗИРОВАНИЯ И ИХ КЛАССИФИКАЦИЯ

Аннотация. В статье рассматривается классификация и описание методов прогнозирования для различных социально-экономических объектов. В процессе реформирования экономики все в большей степени возрастает спрос на прогнозные исследования социально-экономических процессов на различных уровнях управления и принятия решений. Правильный выбор решения находится в прямой зависимости от качества его обоснования. Прогнозирование является одной из функций управления наряду с анализом, организацией, планированием, мотивацией и т.д. Активными потребителями прогнозных разработок являются миллионы агентов рынка, домашние хозяйства, органы государственного и территориального управления.

В открытом демократическом обществе необходимо представлять альтернативные варианты развития общества, возможности, существующие у каждого участника рыночных отношений.

К настоящему времени накоплен достаточный опыт и набор инструментов как для долгосрочного, так и краткосрочного прогнозирования.

Прогнозирование – это научно обоснованное предсказание наиболее вероятного состояния, тенденций и особенностей развития управляемого объекта в перспективном периоде на основе выявления и правильной оценки устойчивых связей и зависимостей между прошлым, настоящим и будущим. Отличительная особенность прогнозирования состоит в том, что оно обосновывает возникновение таких процессов и форм материальной и духовной жизни общества, которые в данный момент недоступны непосредственному восприятию, а также проверке на практике.

Прогнозирование позволяет раскрыть устойчивые тенденции или, наоборот, существенные изменения в социально-экономических процессах оценить их вероятность для будущего планового периода, выявить возможные альтернативные варианты, накопить научный и эмпирический материал для обоснованного выбора той или иной концепции развития или планового решения.

Рассмотрение прогнозной деятельности как исследования будущих событий и явлений в развитии объекта требует определения методологических принципов, составляющих конструктивную основу для разработки и использования прикладных методов прогнозирования.

Важнейшим принципом, позволяющим объединить на единой методологической базе все многообразие методов прогнозирования в исследовании процессов самой разной природы, является принцип системности.

Изложены формализованные и интуитивные методы прогнозирования. Методы прогнозирования представляют в определенном смысле прикладную дисциплину, при изучении которой теория подкрепляется сбором необходимой информации, выкладками, расчетами и оценкой результатов исследования.

Инструментом прогнозирования, учитывающим требования системного подхода к объекту и его количественным характеристикам, являются *эконометрические модели.*

Ключевые слова: методы прогнозирования, классификация, интуитивные и формализованные, экстраполяция, интерпретация методов, применяемые в экономические, социальные, общественно-политические, научно-технические.

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Редакторы: *М. С. Ахметова, Д. С. Аленов, А. Ахметова*
Верстка на компьютере *А. М. Кульгинбаевой*

Подписано в печать 11.08.2020
Формат 60x881/8. Бумага офсетная. Печать – ризограф.
21 п.л. Тираж 500. Заказ 4.

Национальная академия наук РК
050010, Алматы, ул. Шевченко, 28, т. 272-13-18, 272-13-19

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11. Астрономия.
12. Ионосфера.

Адрес сайта «**Известия НАН РК. Серия физико-математическая**» –
http://physics-mathematics.kz/index.php/en/archive

IV. Научный журнал **«Известия НАН РК. Серия химии и технологий»** посвящен исследованиям в области химии и технологий новых материалов.

Редакционная коллегия принимает статьи по следующим отраслям науки:

1. Органическая химия.
2. Неорганическая химия.
3. Высокомолекулярные соединения.
4. Физическая химия (катализ, электрохимия).
5. Технология новых материалов.
6. Технология органических веществ.
7. Технология неорганических веществ.
8. Технология химических удобрений.
9. Технология полимерных и строительных материалов и силикаты.
10. Технология пищевых продуктов.
11. Фармацевтическая химия.

Адрес сайта **«Известия НАН РК. Серия химии и технологии» –**

http://chemistry-technology.kz/index.php/en/arhiv

V. Научный журнал **«Известия НАН РК. Серия геологии и технических наук»** посвящен исследованиям в области геологии и технических наук:

Редакционная коллегия принимает статьи по следующим отраслям науки:

1. Геология.
2. Региональная геология.
3. Петрология.
4. Геология нефти и газа.
5. Геология и генезис рудных месторождений.
6. Гидрогеология.
7. Горное дело и геомеханика.
8. Фундаментальные проблемы обогащения минерального сырья.
9. Инженерная геология.
10. Геофизика и сейсмология.
11. География.

Адрес сайта **«Известия НАН РК. Серия геологии и технических наук» –**
http://www.geolog-technical.kz/index.php/en/archive