

IDENTIFICATION OF THE STATE OF A COMPLEX SYSTEM IN UNCERTAINTY CONDITIONS

Goloskokov O.E., Tkachenko D.V.

National Technical University "Kharkiv Polytechnic Institute", Kharkiv

Both the company and its financial and economic services, as well as shareholders, investors, the tax service, and suppliers are interested in determining the financial position of an enterprise. There are external and internal financial analyses. Internal financial analysis is based on open and closed financial statements, its results are confidential. External financial analysis is based on data from external annual reports of enterprises. The results of this analysis are as open as possible. Assessment of the financial status of the company can be objectively determined only by using a complex of indicators. The modern system of indicators of the organization has several hundred indices and coefficients. There is an increase in the complexity of the internal and external conditions of the enterprise activity. The financial indicators are divided into two categories: volumetric (balance sheet, equity capital, net assets of the company, sales for the period, profit for the period, cash flow for the period, structure of cash flow for all activities) and relative (financial ratios). The last are divided into the next groups of indicators: liquidity, financial stability, business activity, profitability. Sources of information for recognition of financial status are Form No. 1 "Accounting Balance" and Form No. 2 "Report on Financial Results". Thus, nowadays the task of identifying the financial position of an enterprise as a complex system is relevant. The initial information for solving the problem of identification is the description of the enterprise in the form of a vector of financial indicators $X = (x_1, x_2, \dots, x_n)$. All possible classes of states of a complex system $S_1, S_2, \dots, S_m$ are defined, described by signs: $\{X_{1r}, X_{2r}, \dots, X_{nr}\} \subset S_r; r = \overline{1, m}$. A characteristic feature of the studied problem is the presence of an element of chance in the source statistical data, as well as the fuzziness of expert knowledge. According to the possible values of the introduced indicators, as a result of identification, the financial position of an enterprise can belong to one of five classes: absolute success, normally stable condition, satisfactory condition, unstable condition, bankruptcy. Based on the obtained results about the determination of the financial status, the subjects of market relations can draw conclusions about the enterprise's position. These data contribute to the evaluation of the enterprise, preparing decisions on the adjustment of the company financial policy or decision on the implementation of plans for the enterprise. For solving the problem of recognizing the financial condition of an enterprise, it is proposed to use the next approaches in our work: a stochastic theory of pattern recognition; neural network information processing technology; an approach based on the application of the theory of fuzzy sets. It has been established that the use of modern approaches allows us to more reliably identify the state of the system than the using of classical financial analysis. In addition, the used approaches make it possible to formalize the fuzzy knowledge of an expert. The results provide an increase in the efficiency of the management process of a complex system.