

## **FORECASTING THE COMPETITIVENESS OF AN ENTERPRISE**

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### **Abstract**

The competitiveness of the industrial sector is based on the formation of related factors: the production sector of an industrial enterprise, human resources, financial and material resources, etc. The assessment of the competitiveness of industrial enterprises is based on a methodology that comprehensively takes into account the various activities of the industrial enterprise under study based on a comparative analysis with leading competitors in the context of two main areas: current competitiveness and competitive potential of the production complex. Of particular importance is the competitive intelligence toolkit, which helps to find the necessary approach in a difficult situation for the enterprise. In this paper, the author provides a theoretical analysis of the research of foreign and domestic authors of methodological tools for forecasting the competitiveness of enterprises, studied a large number of scientific articles and studies on this topic. The purpose of this work is the theoretical and practical substantiation of methodological tools for forecasting the competitiveness of an enterprise based on the Elliott wave principle, as well as developing a model for assessing the forecast of competitiveness of enterprises based on the Elliott wave principle and using the Fibonacci spiral.

**Keywords:** Elliott wave principle, Fibonacci spiral, financial and economic models, production, competitiveness of enterprises, models.

At present, the basis for the growth of the competitiveness of industrial enterprises is the development and implementation of competitive strategies that ensure their transition to a qualitatively new level of development of the industrial complex, corresponding to the world's leading counterparts in terms of competitiveness. The formation and development of competitive strategies should be based on a scientifically based approach that organically combines all kinds of directions and methods that determine the competitiveness of industrial enterprises in their constant comparison with the characteristics of the external environment (competitors). It should be noted that today in the scientific literature there is no single methodological approach to assessing and forecasting the competitiveness of industrial enterprises, existing methods allow us to evaluate only a limited number of areas of activity of industrial enterprises, while a number of indicators characterizing the efficiency of the functioning of industrial enterprises as a system with synergistic effect due to production and technological relations between enterprises within the enterprise, remain behind the scenes. In

this regard, the development of methodological tools for forecasting the competitiveness of an enterprise based on the Elliott wave principle becomes especially relevant.

The works of Russian and foreign scientists, authors, such as: Smirnova N.A., Suslova G.V. are devoted to the research of methodological tools for forecasting the competitiveness of an enterprise. Berezina A.A., Finogeeva A.G., Volkova S.N., Sivak E.E., Shleenko A.V., Kabitsky D.A., Myachkoav A.S., Kuts V.I., Tretyakova V. D., Matias Marañon, Mustafa Kumral., P. Arthuis, T. Duguet, A. Tichai, R.-D. Lasserri, J.-P. Ebran and others.

The technique of N.A. Smirnova and G.V. Suslov, based on the Elliott wave principle, which is expressed in three relative features: models (figures), time and relation. Moreover, all these features obey the Fibonacci summation series. "The task is to interpret the waves, to understand their nature and patterns" [10].

The model of A.A. Berezina, A.G. Finogeeva "Modeling methodology, competitiveness forecasting algorithm, scenario analysis methodology and criteria for evaluating the results of predictive modeling are components of the competitiveness management method" [1].

To assess competitiveness, the authors have developed a modified mathematical model associated with the Van der Pol equation with a delay, which is introduced for stabilization under random exposure to external and internal fluctuations. The model is based on the following terms of factors: "a set of mathematical models of competitive interaction adapted for enterprises of various types of activity; methodology for mathematical modeling of the benchmarking process; algorithm for predicting indicators of competitiveness and financial position of companies in a competitive environment; typical scenarios of enterprise behavior for market situations (optimistic, pessimistic, critical, optimal); scenario analysis methodology for modeling competitive interactions; criteria for evaluating simulation results for choosing a competitive strategy; recommendations for improving competitive advantages; procedures for monitoring the activities of the enterprise to assess the effectiveness of the implemented recommendations. This model is used in financial institutions.

A very interesting model is A.A. Voronov, N.A. Ovcharenko "... a mathematical model of competitive processes in the competitive environment of industrial enterprises." This model is based on the ratio of the net present value criteria proposed by H. Fashiev and O. Sitnikova in order to model the competitiveness of a car at the design stage. The developed model of the authors can be used not only in calculating the competitiveness of a car at the design stage, but also in "simulating the current market conditions for industrial products; situations of entering the market of a new enterprise; modeling the situation of bringing an innovative product to the market" [4].

Considering the analysis of the competitiveness of microeconomic systems by the authors Shuvalov I.A., Semenchin E.A., we see that the authors used the apparatus of the theory of discrete Markov processes when developing a competitiveness forecasting model, which also allows predicting the competitiveness of enterprises in the market. When developing the model,

the authors took into account the characteristic criteria of the market, namely the intensity of transitions from one state of market functioning to another, which is associated with the passage of time, when “analogues of products with new properties demanded by consumers always appear on the market, and, as a rule, they remain on the market competing with the company's products. But these intensities cannot be completely neglected, since there is always the possibility that the competitor’s products will not be in demand, and therefore he will have to leave the market.” The advantage of this model of the authors is its simplicity of calculation. The disadvantage is the low informative base, a number of factors for the development of the competitiveness of the enterprise are not taken into account, the mechanism of the functioning of the enterprise has not been identified [12].

Y. Kabitsky used certain groups of algorithms to develop a model of enterprise competitiveness: “The first group of heuristic algorithms uses some heuristic rules for the priority of operations in the event of a conflict situation associated with limited resources. The second group of heuristic algorithms uses the idea of local optimization, that is, the improvement of some initial solution. The second approach is based on the idea of aggregation, that is, reducing the number of project operations by replacing several operations (subprojects) with one operation. The resulting aggregated project, as a rule, allows more efficient solution methods (due to the smaller dimension). The resulting aggregated solution is then disaggregated into the original project schedule.” On the basis of the considered factors of the functioning of the enterprise and the methods of pricing using the econometric approach, he formulated a mathematical model for determining the price, which, after transforming the model, the author obtains a model for predicting the competitiveness of enterprises. The strength of the model is that it describes the proposed dependence; this model proposes a calculation using the regression analysis method, which allows “to establish a functional relationship between the dependent variable (response) and independent variables (factors) in each of the equations presented in the mathematical model. The resulting mathematical model can be used to determine the estimated price of the product based on domestic market factors.” The disadvantage of this model is that there is no testing of the model on the example of an enterprise [5].

You can also consider the developed model of "assessing the effectiveness and managing the competitiveness of the financial activity of an enterprise based on the formation of the optimal structure of its total capital, taking into account the market prices of its constituent elements." A.S. Myachkov. The author has developed an approach and a numerical procedure for managing the competitiveness of the production activities of an industrial enterprise based on the formation of an optimal variant of the production program according to the criterion of total marginal income, taking into account market restrictions on demand, sales costs and calculated levels of specific marginal income of individual products. The advantage of this

model is the consideration of all factors of production, their impact on the competitiveness of an industrial enterprise.

In the research work of V.I. Kuts, who, when developing a model for predicting the competitiveness of enterprises, took into account the national scale of industrial production. The author substantiated the developed model as follows: “The developed model for the implementation of competitiveness factors of the national industry as its sectoral structure is modernized in the context of structuring the basic conditions necessary for this, efficiency factors, innovation activity priorities at the micro level and taking into account the assessment of the contribution of each of these parameters to increasing the competitiveness of the real sector of the economy as a whole” [8].

A model for “evaluating the competitive advantages of Russian enterprises in the science-intensive sector of industry in the practice of realizing their scientific and technical potential depending on prices, product quality, organizational and commercial conditions, brand image, as well as economic, financial, scientific, technical and stock factors.”

In this paper, we will present some models for assessing the forecast of the competitiveness of an enterprise based on mathematical modeling by researchers and authors in the field of economic and mathematical sciences. Let us pay attention to the “development of a mechanism for searching for the zone of waiting for a bifurcation of the “rise-fall” type based on the Elliott wave principle. The presented analytical model is used to predict the Fibonacci spiral” presented by N.A. Smirnov and G.V. Suslov. This model is based on the dynamics of real economic processes, in which there are cycles, within which three phases can be distinguished: inception, saturation and decline. At the same time, the phase of origin is always accompanied by growth, and the decline is accompanied by the emergence of a new one, which provokes new demand. Such cycles are short in time and make it possible to predict the economic activity of enterprises [10].

According to the authors, “when interacting with the external environment of a large number of economic entities, the cyclic oscillatory regime of individual entities leads to the cyclicity of the system itself. Cycles add up and are accompanied by a synergy effect with possible resonances. Proceeding from this, the possibility of predicting the state of socio-economic systems can be based on the following provisions: the only form of existence of socio-economic systems is an oscillatory regime; socio-economic systems are hierarchical; the behavior of a socio-economic system of any level is determined by the impact of a system of a higher level”. In his developed model, N.A. Smirnov and G.V. Suslov uses the Elliott wave principle and Fibonacci trend channels. The authors take as a basis two groups into which, according to Elliott, the stock market is divided into “bull market” and “bear market”. "Bull market" according to Elliott "is a market that has a fairly stable growth dynamics, however, with partial failures, "bear market" - with similar features - on the contrary" [10].

Thus, the use of this model shows the application of competitive intelligence methods, that is, for the growth of the competitiveness of industrial enterprises, mutual exchange of information between them, both publicly available and confidential, is necessary. If the same initial conditions arise that interact (information-related), then industrial enterprises have a pronounced competitive advantage in terms of the possibility of obtaining the largest market share than single enterprises that operate without cooperation with other industrial enterprises. The advantage of the model is its relative stabilization of the dynamics of market shares for industrial enterprises while reducing the factor of irregular work. The disadvantage of the model is its low information content; the model does not take into account many factors of the work of industrial enterprises.

Above, we considered the opinions of authors, scientists who developed models for assessing the forecast of the competitiveness of enterprises using mathematical modeling. As we have already noted, the main criterion for increasing the competitiveness of industrial enterprises is its factor-forming terms, which show the level of financial and economic activity of enterprises, their level of competitiveness. It should be noted that the financial, economic, competitive criteria for the development of an enterprise are influenced by the macroeconomic level, which reflects all economic processes in the state. Taking into account this factor, we will develop an innovative method for forecasting the competitiveness of enterprises based on the Elliott wave principle and the use of the Fibonacci spiral [10].

Developing an innovative method for assessing the forecast of the competitiveness of an industrial enterprise based on the Elliott wave principle and the use of the Fibonacci spiral, we note the main criteria that are inherent in this principle. The Elliott wave principle shows its effectiveness for a general understanding of the market: the current trend point, momentum or rollback (correction) of the value. In our situation, it is necessary to correctly determine the momentum and correction on a certain timeframe - annual. Since this principle will be applied on the example of industrial enterprises, then we will build an annual forecast.

This paper provides a theoretical analysis of research by foreign and domestic authors of methodological tools for forecasting the competitiveness of enterprises. In the work, the main task was to develop a (new) method for forecasting the competitiveness of enterprises based on the Elliott wave principle and the use of the Fibonacci spiral, which as a result was fulfilled. We reviewed and studied a large number of scientific articles and studies on this topic, presented the opinions of many authors who have studied this area of science. We also present the developments of the authors in the paper: we considered the model of "development of a mechanism for searching for a waiting zone for a rise-fall bifurcation based on the Elliott wave principle. The presented analytical model is used to predict the Fibonacci spiral" presented by N.A. Smirnov and G.V. Suslov. The model of V.D. Tretyakova, which is based on R. Bellman's equation. This model shows "dynamic programming, which is a kind of methods for step-by-step optimization of the functionality (in our case, maximizing the competitiveness

index) by making optimal management decisions at each stage." As a methodological tool for assessing the forecast of the competitiveness of an enterprise, we considered the model of Berezin A.A., Finogeeva A.G. "Development of a model of competitiveness dynamics based on the Van Der Pol equation". The development of this model was based on the research of Van der Pol, who proposed a nonlinear model of two pairs of coupled equations. The model of V.I. Kuts was also considered. "Models for assessing the competitiveness of the national industry". The model shows the level of heterogeneity of the resources of industrial enterprises, which is not a deviation from the norm, but acts as a certain criterion for the transition to the new highest state of the technological paradigm. As a result, taking into account the research of many authors, we have developed an innovative method for forecasting the competitiveness of enterprises based on the Elliott wave principle and the use of the Fibonacci spiral. In this model, we presented our advantages and disadvantages. The disadvantage was that before making the calculation according to this model, it is necessary to calculate all the previous levels of the enterprise functioning. The advantage of the model is the high accuracy of the competitiveness forecast, the model shows an optimistic development forecast and a pessimistic forecast, such a forecast indicates that both under one scenario for the development of an enterprise, and under another, various measures can be implemented to optimize the functioning of the enterprise in the future.

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