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Price Competition: Method of Nonlinear Dynamics As a Tool For Managing Export Marketing at Mesoeconomic Level

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Keywords: marketing; price competition; time series; export; nonlinear dynamics method; double price maneuver; regional and sectoral economics.

Abstract: The problems of the development of the sectoral and regional economy are related to forecasting the average price of goods for the future period. Price competition is aimed at conquering the international export market in order to attract customers from a particular region and choose the time to enter the market. The author's approach is to use mathematical model methods.The nonlinear dynamics method is presented as a unified methodological approach in studying the behavior of two socio-economic systems at the meso-level: an industrial enterprise in the international export market. It is based on the example of the development of the Russian timber industry. The method of nonlinear dynamics is applied in the analysis of a time series of statistical data on the average price of exported timber based on the Hearst index. The Hurst indicator characterizes the ratio of trend strength (deterministic factor) to noise level (random factor). The study predicts the dynamics of changes in the average price in the short term. The postulates of fractal theory are used. Based on the values of indicators D (estimation of the fractured series) and A (dimension of the probability space), the possibility of sharp fluctuations in the average price within the range and a low probability of extreme events in the identified range are determined. A prescriptive business analysis revealed the problems of the timber industry. The comparison of industry plans for the formation of corporate financial policy with the state regulatory and legislative regulation is carried out. With the help of technical, trend (trading), fractal and economic analysis, a universal mathematical model of the trend is obtained. The above example of a marketing solution is applicable to price competition. The marketing solution is considered as a "rapid response tool" to changes in the external environment caused by the introduction of the fifth package of sanctions aimed at undermining the forestry industry, including the export of Russian products to friendly countries. The nonlinear dynamics method acts as an export marketing management tool. A double price maneuver involves a price adjustment. Choosing the moment of "sliding" is a strategy of flexible pricing policy, adapted to the conditions of a dynamically developing export market. The study uses a proven forecasting technique and an industry strategy of double price maneuver. The advantage of the research is the development of export marketing management principles based on the theory of price behavior in the Dow market, fractals, sets and the economic theory of choice to achieve the goal. The research is aimed at studying the economic development and growth of the industry.

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1 INTRODUCTION

Be advised that papers in a technically unsuitable form will be returned for retyping. After returned the manuscript must be appropriately modified. The timber industry in Russia, represented by a combination of timber harvesting and processing industries, is the oldest sector of the economy. The economic efficiency of forest management is measured by the ratio of costs and benefits from their use. According to Rosstat, in 2022, forest plantations died by 181% more than in the previous year. The causes are damage by harmful insects, wild animals, tree diseases, adverse weather conditions, fires, anthropogenic factors, and exposure to industrial waste. The timber industry is a key sector of the Russian economy, focused on the foreign market. Exports are associated with the attraction of foreign currency. Foreign countries pay for timber products in foreign currency. Monetary policy stimulates exports. The fifth package of sanctions is aimed at destabilizing the development of economic sectors and, first of all, the fuel and energy sector of the economy, the chemical industry, the forestry industry, etc. For Russia, the export of "unprocessed timber" is one of the sources of attracting currency. According to Decree of the President of the Russian Federation No. 771 dated 11.10.2023 on foreign exchange earnings and the sale of credited foreign currency for 43 groups of companies, the fuel and energy sector of the economy is in the first place, followed by the chemical and forestry industries, grain farming. All this suggests that the export of "unprocessed timber" has a significant impact on GDP and other economic indicators. Monetary policy stimulates exports and attracts foreign investment.

2 BUSINESS STRATEGY DESIGN METODOLOGY REGIONAL AND SECTORAL ECONOMICS

The research uses the methodology of business strategy design (Vasilyeva, 2021). Fractal theory and its financial applications for the study of statistical data on time series (Kratovich, 2010).The method of forecasting the average price of exported goods, tested by the author for a wide range of exported products, including "iron ores and concentrates", "passenger cars", "fresh and frozen fish", "oil and gas condensate" (Veretekhina, 2024). Classical methods of commodity price modeling such as the index method, the statistical modeling method, the statistical model construction method, the cost-based approach method, and others form pricing for the present (Tregub, 2020). Each of the listed methods in economic analysis has its advantages, but the disadvantage for all is the inability to model the price of goods for future periods. Statistical data from the Federal Customs Service (FCS) of Russia are used to model and predict the average price of exported "unprocessed timber". The data on the average export price of Russian products "Unprocessed Timber" was uploaded from the portal of the Federal Customs Service of Russia (Table. 1).

Table 1: The average price of exported "unprocessed timber".

year	value	year	value
1995	57,7	2012	86,7
1999	43,4	2013	86,1
2000	43,4	2014	84,9
2001	43,9	2015	69,1
2002	44,8	2016	67,4
2003	48,1	2017	75,5
2004	56,3	2018	77,0
2005	59,6	2019	70,3
2006	63,8	2020	66,3
2007	83,9	2021	73,9 (simulated)
2008	95,1	2022	79,0 (simulated)
2009	84,6	2023	79,0 (simulated)
2010	87,1	2024	65,0 (simulated)
2011	94,3	2025 2026-	42,0 (simulated) 55,0 forecast 42,0

Source: compiled by the author based on statistical data from the Federal Customs Service of Russia *https://rosstat.gov.ru/statistics/vneshnyaya_torgovlya*

Source: compiled by the authors

Monetary Forecasting is based on the theory of dynamic systems (time series analysis), Dow theory (the Dow Jones industrial Index acts as an indicator of price behavior in the market), fractal theory (properties of fractals for making forecasts), set theory (a set of elements with common properties) and the economic theory of choice to achieve a goal. The main practical marketing task is to predict the dynamics of changes in the average price of exported timber for the future period in the short term. The research uses: 1) technical analysis, represented by a set of forecasting tools for probable price changes based on patterns of price changes in the past under similar circumstances; 2) trading analysis, including a method of studying patterns; 3) fractal analysis, including the study of the dependence of future prices on their past changes.

2.1 Method of Nonlinear Dynamics. Modeling the Average Price of Exported Products

The problems of the development of the sectoral and regional economy are related to forecasting the average price of goods for the future period. Price competition is aimed at conquering the international export market in order to attract customers from a particular region and choose the time to enter the market. The author's approach is to use mathematical model methods. Nonlinear dynamics is the only methodological approach that allows analyzing the dynamics of changes. The study examines the behavior of socio-economic systems at the meso-level, namely, an industrial enterprise in the international export market. In the study, the nonlinear dynamics method acts as a tool for managing export marketing at the mesoeconomic level. Price competition in the international export market is a strategy for promoting goods for export at a convenient time for the manufacturer. Rosstat statistics on the average price of products are based on a historical period of more than 24 years, which makes it possible to predict the average price for the future in the short term. The study predicts the average price along a stable trend line, where the main criterion for the stability of the series is the coefficient of determination. Trend building is carried out using the Excel Data Analysis toolkit (Educational Resource, 2024). The fractuality of the series and the dimension of the probability space are checked by the Hurst coefficient. Verification of the accuracy of the calculations of the Hearst indicator was carried out according to Nyman's theory using the formula used in the processing of economic indicators (Nyman, 2024). Forecasting is carried out in stages. At the first stage, a trend line is constructed and the persistence of the time series is determined. Further, all types of approximation and smoothing are applied (linear, power, logarithmic, exponential, polynomial and linear filtering). If the trend has a coefficient of determination value of negative or less than 0.9, we consider that the formed trend is not reliable, therefore, it is subject to cancellation, i.e. it is not used in modeling for future periods. The coefficient of determination shows how high-quality the model is, and the higher its value, the more reliable the model of forecasting the average price for future periods is. In a comparative characteristic, statistical data were approximated and smoothed (Table 2).

Table 2: Approximation and smoothing of a time series of statistical data.

Function	equation	coefficient
exponential	$y = e^{0,2631x}$	$R^2 = -55,71$
logarithmic	$y = 13,276\ln(x) + 38,995$	$R^2 = 0,4315$
linear	$y = 4,5671x$	$R^2 = -2,015$
polynomial of the 6th degree	$y = -0,0001x^6 + 0,0078x^5 - 0,2265x^4 + 3,0407x^3 - 18,994x^2 + 51,916x$	$R^2 = 0,8257$
polynomial of the 5th degree	$y = 0,0006x^5 - 0,0326x^4 + 0,6775x^3 - 6,1903x^2 + 28,501x$	$R^2 = 0,6151$
polynomial of the 2th degree	$y = -0,3748x^2 + 11,451x$	$R^2 = 0,3691$
sedate	$y = 41,044x^{0,216}$	$R^2 = 0,4803$
linear filtering	the equation is missing	not defined

Source: compiled by the authors

Table 2 shows that the highest value of the coefficient of determination was found when approximating and smoothing with a polynomial of degree 6 (R2=0.8257) and a polynomial of degree 5 (R2=0.6151).

2.2 An Overview of Existing Methods for Evaluating the Time Series for the Persistence of the Hearst Index and Choosing a Method Based on the Criteria: Economic indicator (price), Length of a Series of Statistical Data, Fractal dimension

This section must be in one column. There are various methods for evaluating the time series for the persistence of the Hurst exponent. A group of methods for determining the fractal dimension of Richardson, Kolmogorov, Minkovsky (the curve is covered with circles and the dependence of the area of the resulting coverage on the radius of the circle is sought) is used for the case when it is necessary to measure the length of the curve with varying degrees of coarsening of its representation. The Korczak, Hurst, Race, RMS, and Ferrier group of methods are applied to single-digit (each value corresponds to a single point) curves, where a software calculation of fractal dimension is used for large data. In the Race method, the dependence is constructed on a double logarithmic scale and the tangent of the slope angle is found from the linear approximation, which gives the Hurst exponent. Fractal analysis is used to assess physical conditions (Siegert, 2023). The method of calculating the Hurst index on small samples was developed by a team of Russian scientists (Volchikhin, 2024). Non-trivial Hearst dependence on the length of the time series, namely: a) "complex non-monotonic dependence of the Hearst exponent on the length of the time series; b) the dependence of the Hearst index on the numerical value of the intervals between measurements of two consecutive values of the series" is presented in a study by a team of scientists (Loginov, 1996). In trendwatching, the Dubois variational method is used to calculate the Hurst index. Dubuc's method involves processing big data on the TradingView platform using the Hurst library (Dubuc's Method, 2025). In the author's study, a statistical series of historical data was formed for the period from 1999 to 2021. Using the E. Naiman method, it is possible to determine the value of the Hurst coefficient and the fractal dimension. Let's use the standard deviation calculator, enter time series data to get the value of the standard deviation, variance, mean, and sum of squares (standard deviation calculator, 2025):

Standard deviation	s = 16.79
Variance	s^2 = 281.74
Quantity	n = 26
Average	$\bar{x}$ = 69.3
Sum of squares	SS = 1663.2

Sample size: R=94.3-43.9=50.4 Standard deviation S=16.79. The formula is the calculation of the Hurst coefficient (formula 1). Nyman E. He improved the Hearst formula for sampling random variables (formula 2), designed to process data from a time series represented by a small number of observations (formula 5, formula 11: Nekrasova, 2015). In Neumann's theory, in a number of his experiments it was proved that a series of data should have at least 21 values in observation (Neumann, 2024):

$$H = \log \llbracket R/S \rrbracket / \log aN = \log \llbracket 50.4/16.79 \rrbracket / \log \llbracket 0,5 * 24 \rrbracket = 0,44 \quad (1)$$

$$H_T = \frac{}{\log\left(\pi * \frac{N}{2}\right)} (-0,0011 * \ln(N) + 1,0138) \quad (2)$$

S – standard deviation number of observations;
R – the extent of the accumulated deviation;
N – number of observation periods;
a – specified constant, positive number.

Hearst empirically calculated this constant for relatively short-term time series of natural phenomena as 0.5. The calculated value of the Hearst index according to E. Naiman is H=0.31. Thus, applying several approaches to determining the persistence of a series, we can say that the average Hurst value (0,31+0,44)/2=0,37≈0,4 it is in the range 0<퓛<0.5. This indicates that the row is anti-persistent, i.e. the row corresponds to the "return to average" type.

Mandelbrot showed that there are two ways to define the fractal dimension. B. Mandelbrot's postulate on the relationship between the Hurst coefficient and fractal dimension:

1. D=2–H=2-0.4=1.6 (estimation of the degree of fracturing of the row).
2. A=1/ H=1/0.4=2.5 (the dimension of the probability space).

The average calculated value of the Hurst coefficient is H=0.4. The estimate of the degree of fracture of the series is D=1.6. The dimension of the probability space is A=2.5. The series is anti-persistent (ergodic), which means that if there is a recession, then there will be a rise after it and vice versa. Fill in the missing values for 2022-2025 (Fig.1).

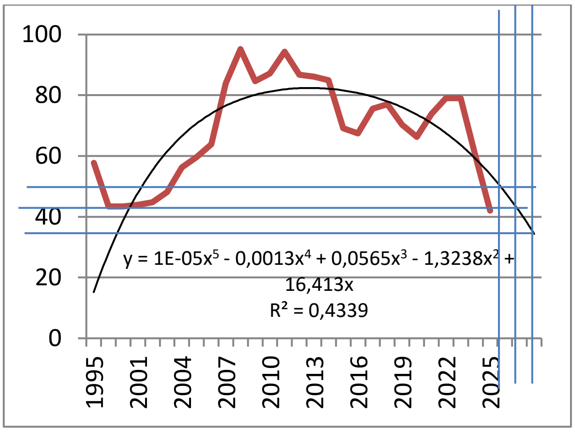

Figure 1: Forecast of the average price of exported goods "unprocessed timber" for 2026-2027. *Source:* compiled by the author

Adding the found values to the Table 1: 2022 (79); 2023 (79), 2024 (65), 2025(42). For forecasting, we will use the Excel Data Analysis tool, indicating the forecast for 2 years a head (2026-2027). The revealed trend is described by a universal mathematical equation (3):

$$y = 1E\text{-}05x^5 - 0{,}0013x^4 + 0{,}0565x^3 - 1{,}3238x^2 + 16{,}413x \qquad (3)$$
$$R^2 = 0{,}4339$$

The dynamics of the average price of exported timber for 2026-2027 has a downward trend. The dynamics of price changes in the short term is represented by the range from 55 to 42 $ per cubic meter (Fig.1).The revealed trend is described by the following parameters: 1) a deterministic dynamic model (change in parameters over time - change in the average price of exported products for the future in the short term) is represented by the universal equation (1) and represents the unambiguous behavior of the mesoeconomic system, where the variables are non-random variables - historical statistics; 2) the identified trend is downward; 3) the dynamics of changes in the average price of exported products until 2027 is in the range from $ 55 to $42 per 1 cubic meter with a probability of 0.4349 and shows a decrease; 4) the value of the Hearst indicator indicates the anti-persistence of a time series prone to changes after 2027; 5) the fractal dimension D=1.6 tends to 2, which, according to Minkowski, means strong tortuosity; 6) the dimension of the probability space A=2.5 (reduced dimension) suggests that the spectrum of Renyi fractal dimensions is an estimate of the "thickness of the tails".

2.2.1 Kurtosis Is Indicator

Kurtosis is an indicator that reflects the sharpness of the tip and the thickness of the tails of a one-dimensional distribution in a probability density function, where taking into account the leptoexcess (leptocurtic, mesocurtic, platycurtic) allows predicting how the system will behave in the event of a market collapse. The kurtosis coefficient is calculated using the Kurtosis method (a statistical measure that measures the degree of peak distribution compared to the normal distribution). Kurtosis is calculated using formula (4). Tail risk is the probability of loss due to a rare event predicted by probability distribution theory. A short-term movement of more than three standard deviations is considered a manifestation of extreme risk (Fig. 2).

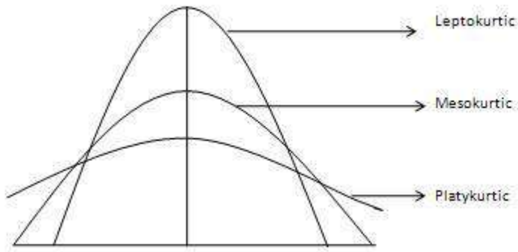

Fig. 2 Static distribution with kurtosis: exceeding 3 is a leptocurrent "thick tail" with a high probability of extreme events; mesocurrent – the shape of the tail, like in a normal distribution, is the initial one for leptocurrent and platycurrent; thin tail has a low probability of extreme events (described by the author: theory of technical analysis - https://www.investopedia.com/terms/p/platykurtic.asp)
Source: compiled by the author

$$\kappa=\sigma4\mu4=(Э[\sigma x-Э[x]])4Э[(\sigma x-Э[x])4], \quad (4)$$

$\sigma 4$ – the fourth central moment of the random variable x;
$\mu 4$ – fourth degree of standard deviation

In Figure 1, the kurtosis describes the different types of peaks that can have distributions in the probability density function. The leptocurtic distribution (a statistical distribution with a positive kurtosis greater than that of the normal distribution) or a distribution with a "heavy tail" indicates the presence of situations in which extreme values occurred more often than expected. Let's use the following postulates of fractal theory:

1. A random time series has a fractal dimension of D=1.5;
2. The curved line has a fractal dimension of D=1;
3. The geometric plane has a fractal dimension of D=2;
4. The fractal dimension of a random walk lies between a curve and a plane.;
5. if the value of the Hurst exponent is H=0.5, then the dimension of the probability space is D=1.5 – this dimension is characterized as an independent stochastic system;
6. If H=0, D=2, then the dimension of space probably tends to infinity and has values greater than 1 and further (A=2.5);
7. The persistent time series is a "black noise", it has a long-term correlation between current events and future events, where the persistence strength increases as it approaches 1 (100% correlation);

8. The anti-persistent "pink noise" time series tends to "return to the mean" and the closer the Hurst value is to 0, the more volatile (volatile) the series is, has a negative correlation and appears to be a recession-rise reversal;

9. With the value of the Hurst index H = 0.5, the series is "white noise", indicates Brownian motion and random walks, events are not correlated with each other, the present does not affect the future.

Using the theory of dynamical systems and the postulates of fractal analysis, we will interpret the results.

3 INTERPRETAITION OF RESULTAT

In the study of the time series of statistical data on the average price of "unprocessed timber", fractal analysis revealed that the average value of the Hurst index is H=0.4, therefore the series is anti-persistent. The values of the fractured series D=1.6 and the dimension of the probability space A=2.5 indicate the presence of a relatively "heavy tail", which means a relative negative correlation in price changes (Vlasov, Karaev et al., 2022). The largest value of the dimension of the probability space A=10 has the heaviest tail when the Hurst exponent H=0.1 (Roll, Fe, 2017). The antipersistent series has a fractured series D =1.7 of the maximum possible Minkowski 2 and A=2.5 of the maximum possible A=10. Consequently, in the probability density function, the value of A is just beginning to tend to the maximum possible, which indicates a low probability of extreme events in terms of changes in the average price of timber in the identified range. In other words, the downtrend is confirmed, and the dynamics of changes in the average price in the range from $ 55 to $42 may have sharp fluctuations within the range. The nonlinear dynamics method is used to analyze a time series of statistical data based on the Hearst exponent. The Hurst indicator characterizes the ratio of trend strength (deterministic factor) to noise level (random factor). The nonlinear dynamics method is applicable to the study of time series in economics. Using the immeasurable ratio of the normalized range, various phenomena can be compared. The Hurst score is a measure of correlation. The theory of price behavior in the Dow market suggests following the trend and knowing the time interval of the price reversal (Zinchenko, 2023). The Dow Jones Industrial Average (DJIA) is one of several stock indexes (Diamonds, 2024). The DJIA index was created to assess the development of the industrial component, including pricing. DJIA forecasting is a complex financial instrument, the mathematical tools of which are expensive and expensive, especially since the accuracy of calculations depends on historical time series data obtained from trading exchanges in real time, and only at the last second you can catch a signal indicating price changes.

3.1 Marketing Management

The strategy of the "double price maneuver" is related to the dynamics of changes. The average price of exported timber has a "sliding" moment. At the time of conclusion of the foreign trade contract, the price is set (estimated, final or contractual). The rules of foreign trade of INCOTERMS 2025 significantly affect pricing, therefore, depending on the date of conclusion of a foreign trade contract for the supply of products, compliance with the current requirements of the Rules and modern methods of payment for services is provided. The basic terms of delivery determine transportation services (sea and river modes of transport, rail and road) and its cost, as well as the cost of customs clearance, loading/unloading, risk insurance, and more. Pricing is influenced by the rules for issuing an invoice, a settlement document that determines the quantity and price of exported products, as well as payment methods. The basic terms of delivery include agreeing on a method of step-by-step payment for services. Step-by-step payment rules affect the promotion and subsequent shipment of products to a customer in a foreign country. The moment of price "sliding" is determined by economic indicators (profit, economic efficiency, profitability), which may not reach the required values. Choosing the moment of "sliding" is a strategy of flexible pricing policy related to price adjustment to the conditions of a dynamically developing export market (Veretekhina, 2023).

3.2 Prescriptive Business Analysis in Marketing

Prescriptive business analysis suggests specific actions and ready-made marketing solutions, identifies problems and offers innovative solutions. It should be noted that the forecasting results are confirmed by Roslesinform data: "The decline in logging volumes is slowing down in Russia. According to Roslesinforg, in January—August it decreased by 7% compared to the same period last year, to 112.9 million cubic meters. At the same time, production increased by 5% in August compared to July. The company attributes the gradual increase to increased activity in Siberia, the Northwest and the Volga region," according to KommersanT (https://www.kommersant.ru/doc/6266575, 2025). The interlocutors "KommersanT confirms that demand for raw materials from large holdings is growing, but problems with the Unified State Timber Turnover Accounting System (LesEGAIS) and rising cost of work against the background of slowly rising prices still show a negative impact on harvesting rates. The regulatory and legislative regulation "Peculiarities of licensing regimes in the field of forest relations" Appendix 10 to Decree of the Government of the Russian Federation dated March 12, 2022 No. 353 (as amended by Decree of the Government of the Russian Federation dated June 15, 2022 No. 1064) permits the extension of logging until May 1, 2024. The permit is valid for declarations submitted before 05/01/2022, and then it is indefinite. The dynamics of the decline can be explained by changes in regulatory and legislative regulation, low awareness of users (entrepreneurs) USAIS on the rules for providing data, the rising cost of logging operations, difficulties in settlements with foreign countries, including China, the Middle East, North Africa, and logistical difficulties in redirecting exports to Iran, Tunisia, Jordan, the United Arab Emirates, South and Southeast Asia. Roslesinforg calls the revealed trend negative. The crisis in the Russian timber industry continues (https://roslesinforg.ru/news/in-the-media/rossiya-v-2024-godu-prodolzhaet-snizhat-obemy-eksporta-drevesiny-/ , 2025)

4 RESULTS

Based on the fractal theory and the found values of the Hurst index, the ratio of trend strength (deterministic factor) to noise level (random factor) is determined. Using the postulates of fractal theory and the obtained values of indicator D (estimation of the fractured series) and A (dimension of the probability space), the possibility of sharp fluctuations in the average price within the range and a low probability of extreme events in the identified range were determined. A prescriptive business analysis compared industry plans for the formation of corporate financial policy with government regulatory and legislative regulation. A universal mathematical model of the trend has been obtained using technical, trade (trading), fractal and economic analysis. An example of a marketing solution applicable to price competition is given. The marketing solution is considered as a "rapid response tool" to changes in the external environment caused by the introduction of the fifth package of sanctions. The nonlinear dynamics method acts as an export marketing management tool. The "double price maneuver" involves a price adjustment. Choosing the moment of "sliding" is a strategy of flexible pricing policy, adapted to the conditions of a dynamically developing export market. Solving the main task of managing export layout, we have developed and applied:апробированная методика прогнозирования средней цены экспортируемой продукции на будущий период в краткосрочной перспективе;

1. The nonlinear dynamics method, which acts as an export marketing management tool;
2. The functional management structure is being improved by adding a new "modeling and forecasting" function to the five main management functions in the job description of the head of senior management, including a marketer; 3. The strategy of the "double price maneuver"
3. Is to apply "sliding" pricing by the time the trend reverses (from downward to upward).

Among the existing types of price competition, such as direct, indirect, promotional, omnanal, the study suggests a new type of competition such as the "double price maneuver" – a strategy that helps to bring exported products to the market economically. Choosing the moment of "sliding" is a strategy of flexible pricing policy, adapted to the conditions of a dynamically developing export market. A nonlinear deterministic model describing processes and phenomena using unambiguous dependencies between parameters and variables is represented by a universal differential equation (Equation 3). According to the forecasting results, a downward trend has been revealed. The dynamics of changes in the average price of exported products until 2027 predicts a drop in the average price in the range from $ 55 to $ 42 per 1 cubic meter, with a probability of 0.4349. The value of the Hearst index indicates the anti-persistence of the time series, which is prone to change after 2027. The fractal dimension is closer to the geometric plane. Fluctuations in the average price within the range can be sharp, and a low probability of an extreme event (default) has been determined. The nonlinear dynamics method is used to analyze the time series of statistical data "raw timber" and consists in analyzing the time series based on the Hearst index. The nonlinear dynamics method acts as an export marketing management tool. A price maneuver involves adjusting the average price at a given moment. By the time the trend reverses from downward to upward, the industry enterprise has the opportunity to increase production capacity and apply a second price maneuver to adjust the price of exported timber after 2027. The scientific novelty is the development of export marketing management provisions based on the nonlinear dynamics method. The research is aimed at studying the economic development and growth of the industry. By developing and improving the provisions of export marketing, an industry-specific financial policy is being formed. The financial policy is formed in such a way that by the time the trend transitions from downward to upward, the industry enterprise has time to increase production capacity. Knowledge of the moment of transition influences the formation of corporate financial policy. The achievement of the required values of economic indicators such as profitability, net present value or net present effect, given so far, is interpreted as profit, and the higher the achieved profit value, the marketing management strategy, including export marketing, is considered to be formed at a high professional level.

5 CONCLUSIONS

Nnonlinear deterministic model describing processes and phenomena using unambiguous relationships between parameters and variables is represented by a universal equation. According to the forecasting results, a downward trend has been revealed. The nonlinear dynamics method has become an export marketing management tool. The strategy, form and method of price competition in modern markets of goods and services determine the following:

1. the product is an industry-specific exported product;
2. the modern market is the international export market;
3. the method of price competition is a double price maneuver;
4. the approved methodology has a procedure for processing statistical data of a time series;
5. a universal mathematical model of the trend of the future average price of the exported product "unprocessed timber" has been developed;
6. the "modeling and forecasting" function is added to the functional model of export marketing management, to the main management functions;
7. a systematic approach has been applied to the study of the dynamics of the behavior of socio-economic systems at the mesoeconomic level;
8. among the existing forms of marketing, such as functional, commodity, regional, segment, the commodity-industry form of marketing is used.;
9. the use of prescriptive business analysis to identify the vector of the industry development is justified;
10. among the existing methods of product promotion to the market, such as telemarketing, merchandising, event marketing, seo optimization, contextual advertising and the method of promotion in the form of viral advertising, etc., the study suggests using a method of promotion based on preferences (special benefits provided by one state to friendly foreign customers).

The Ministry of Economic Development and other federal executive authorities are interested in forecasting prices, as an unforeseen situation has developed in the international export market in recent years (Veretekhina, 2023). In Russia, it is planned to develop artificial intelligence (AI) algorithms for predicting prices for goods and services, and perhaps the forecasting approaches proposed by the author can be used in AI algorithms (Interfax, 2025). Export marketing management is aimed at ensuring the competitiveness of the product in the international export market. Analysts disagreed on the supply of sawn timber ("unprocessed timber") abroad. According to Forbes, lumber exports from Russia decreased by a quarter in 2023. The reason was the closure of EU markets and difficulties with the transition of exports to new countries, including China, the Middle East, North Africa and the redirection of exports to Iran, Tunisia, Jordan, the OEA, South and Southeast Asia. Igor Novoselov, a consultant at WhatWood, focuses manufacturers' attention on the fact that the share of raw lumber in the total export volume is 20-30%. Alexey Bogatyrev, director of the Lesprom Network timber marketplace, justifies the resale of harvested lumber to large exporters in his regions by saying that the cost of drying plants requires modernization. In the context of the new economic reality, when the choice of export markets is limited due to sanctions and financial constraints, the Ministry of Industry and Trade supported the abolition of protective duties on rough-hewn lumber, as reported by the information agency Alta-soft on February 14, 2025. The issue of the abolition of protective duties is a measure of support for the timber industry. The timber industry is guided by a new marketing management strategy, which includes not only an overview of competitors in the international export market, but also forecasting price trends, including the dynamics of changes in the average price of timber for future periods. One of the ways to attract customers is through price, and price competition in the export market is linked to accurate forecasting. The Order of the Federal State Statistics Service No. 513 "On Approval of the Official Statistical Methodology for calculating Average Prices and indices ..." defines the purpose of the methodology for subsequent scientific research at the meso- and macro-economic levels for making forecasts. The main task of the study is to predict the dynamics of changes in the average price of exported "unprocessed timber products" in the short term for the near 2026-2027. The issues of supporting the Russian timber industry were discussed by the Commission on improving the sustainability of the financial sector and economic sectors, chaired by Deputy Prime Minister Alexander Novak. The assessment of the state of the industry was carried out by assessing the main economic indicators: profitability, creditworthiness, pricing, and exports. Based on the results of the analysis, the need to study the problem of timber exports for future periods has been determined. Novak instructed the Ministry of Economic Development, together with the Ministry of Industry and Trade of Russia and the Ministry of Finance, to review the competitiveness of timber products on the international export market, identify the main problems and propose solutions for regulatory and legislative regulation. Russian President Vladimir Putin has stated the need for internal support for the woodworking industry due to export difficulties, and the Russian News Agency includes conducting marketing research to identify market niches (Interfax, February 11, 2025). Current trends and prospects of scientific and technological development of the Russian Federation were considered in the works (Gokhberg and Sokolov, 2017). Russian scientists have determined that in the context of global competition and accelerating scientific and technological progress, business models are being transformed. The main imperative is to focus on global competitiveness, which for the Russian timber industry is determined not only by the quality of the product and its consumer properties, but also by the price. The interest of the Ministry of Industry and Trade in the export of timber is associated with ensuring the inflow of foreign capital and strengthening the position of the national currency. Russia, being in the context of geopolitical turbulence, is experiencing a paradigm shift, namely, methods, business models and tools for promoting exported timber products to the international export market (Balatsky, 2022). The average actual export prices are calculated according to the data of the Federal Customs Service (FCS) of the Russian Federation. The main financial aspect of timber sales is forecasting the average price of the product for future periods. The study provides a forecast of the dynamics of changes in the average price of exported timber for the future period, and identifies the price range (Kulibaba I., Kuchmezov H., Laamarti Y., Shamshurina N., 2022). The results of forecasting the average price of exported timber materials are required by the Government of the Russian Federation for making managerial decisions, including short-term measures to support producers and suppliers, and methods of industry regulatory and legislative regulation. The Ministry of Economic Development and other federal executive authorities are interested in forecasting prices, as an unforeseen situation has developed in the international export market in recent years.

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