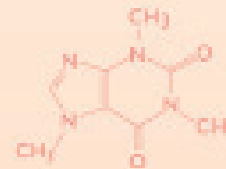


$$\frac{1}{\zeta(s)} = \sum_{n=1}^{\infty} \frac{\mu(n)}{n^s}$$



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# Reports Scientific Society

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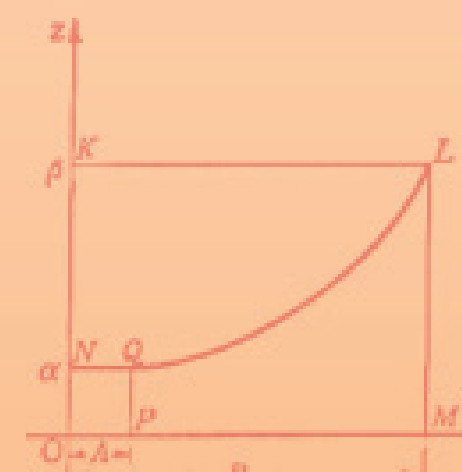


Fig. 1

$$\zeta(n) = 1 + \frac{1}{2^n} + \frac{1}{3^n} + \frac{1}{4^n} + \dots$$

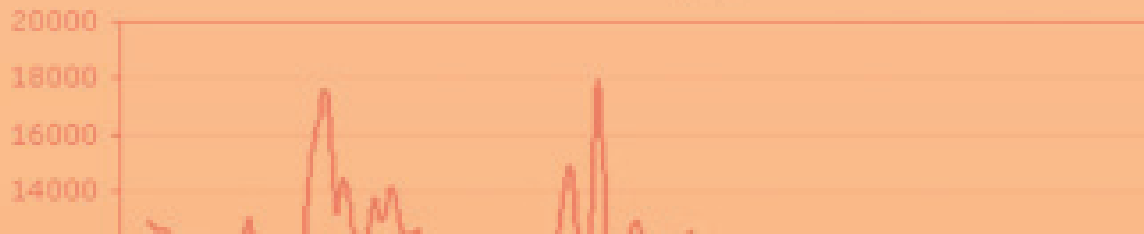
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$$\sum_{n=1}^{\infty} \frac{1}{n^x}$$

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$$\alpha(x) = \frac{\alpha(x)}{1 - \int \alpha(x) dx}$$

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UDK 37.378

## Raising Motivation of International Students for Studying the Russian Language and Culture at University



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**Key words and phrases:** learning motivation; motivation for learning Russian; Russian as a foreign language; Thailand; Thai students.



**Abstract:** The article aims to identify the sources of motivation of Thai students to learn Russian language and culture. The diagnostic sample consisted of 286 Thai students studying the Russian language and culture in universities in Russia and Thailand. The study showed that both groups of students have a predominantly external motivation to study the Russian language, which is due to their ideas about the demand for knowledge of the Russian language in the labor market. In addition, the motivation of Thai students on the learning situation level in Russian universities – the teacher uses techniques to facilitate the study of the Russian language.



...

Globalization has played a significant role in the development of motivation to learn foreign languages. According to O.N. Orlov, the study of foreign languages in the 21st century has become not just an interest, but a vital necessity. Knowledge of foreign languages in the modern world is becoming especially relevant for people who strive for success in their chosen profession [1]. According to the studies conducted by I.I. Lyubanets, O.N. Petrunina, a foreign language at the present stage of modernization of higher education is considered as an important prerequisite for the successful activities of a specialist, and most importantly – his demand on the labor market [2]. Zoltán Dörnyei identified three aspects in motivation to learn a foreign language.

1. The linguistic aspect includes various components related to categories such as culture, society, as well as intellectual and pragmatic values associated with the language.
2. The personal aspect (of the student) consists of those individual characteristics of a student of a foreign language that affect the learning process.
3. The aspect of the educational situation is associated with motives that are caused by the educational process itself, for example, the personality of the teacher, etc. [3].

This study examines the relationship of motivation for the study of the Russian language by Thai students, with their level of proficiency in them and the aspect of the learning situation.

The focus of our study was on a quantitative analysis of the results of a survey of Thai

An assessment of the motivation of Thai students to study the Russian language and culture in comparison with the personal aspect

Thai students motivation and personality						
	In Russian universities			In Thai universities		
	$\bar{x}$	S.D	Level	$\bar{x}$	S.D	Level
Learning Russian with pleasure	3.25	0.95	Medium	3.33	0.94	Medium
I think Russian is an unusual, exotic language	3.50	0.92	Medium	3.61	0.91	High
I think Russian is easy to learn	2.28	0.89	Low	2.41	1.07	Medium
Russian language will help me in my future work	3.97	0.90	High	4.03	0.97	High
The content of the educational material corresponds to the level of training of students	3.72	0.89	High	3.75	0.86	High
3–6 hours a week – the norm of hours of the curriculum for learning the Russian language	3.31	1.06	Medium	3.51	0.99	High
Total	3.34	0.93	Medium	3.44	0.96	Medium

students. The first stage was carried out according to the results of a survey of Thai students in Thai universities. At the second stage, a comparative analysis of the results of a survey of Thai students in universities in Russia and Thailand was carried out.

### Research sample

Two hundred and eighty-six (286) people participated in the survey, of which 253 people study at universities in Thailand: 194 girls (76.68 %) and 59 boys (23.32 %); 33 people indicated that they were going to study at Russian universities. Of these, 20 female (62.50 %) and 13 male (37.50 %) are young respondents.

The study used questionnaires regarding the aspect of motivation in comparison with the personal aspect and the aspect of the learning situation. Five levels of assessment were identified in the questionnaire: very high: 4.51–5.00, high: 3.51–4.50, medium: 2.51–3.50, low: 1.51–2.50 and very low: 1.00–1.50.

According to the Table, it can be concluded that an important component of motivating Thai students to study the Russian language in Russia is the practice of using a teacher's techniques to facilitate the process of studying the subject. An equally important component of motivating Thai students in Thai universities is the teacher's use of methods to stimulate student activity.

### Conclusions

1. The main component of the motivation to study the Russian language and culture by Thai students is an external factor - the idea that knowledge of the Russian language will positively affect the chances of finding a job in the near future.

2. Thai students studying Russian language and culture in Russia, presumably, have a higher educational interest, because they are forced to overcome a much greater number of

difficulties in adaptation, socio-cultural, everyday life in comparison with their colleagues who are educated at home. The question requires additional study, which should include an analysis of the results achieved in the educational process.

3. Differences in the methodological approach of Thai and Russian teachers are manifested, including, in their attitude to motivation, the development of students' interest in the Russian language and culture. Orientation of Thai and Russian higher education teachers to stimulate student activity and help them overcome difficulties, respectively, indicates not only the validity of the previous conclusion, but also poses a challenge for the next possible stage of the study: a detailed study of the socio-cultural characteristics of modern Thai students who want to study Russian language and culture. The latter is becoming more and more, which increases the demand for relevant and universal methods in the context of global lifelong education.

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### **Формирование интереса к изучению русского языка и культуры у иностранных студентов**

Чалоейсук Данупол (Россия, Таиланд)

**Ключевые слова и фразы:** учебная мотивация; мотивация к изучению русского языка; русский язык как иностранный; Таиланд; тайские студенты.

**Аннотация:** Проведено исследование источников мотивации тайских студентов к изучению русского языка и культуры на материале выборки из 286 тайских студентов, изучающих русский язык и культуру в вузах России и Таиланда. Было проведено очное и дистанционное анкетирование в учебных условиях. Было установлено, что обе группы студентов имеют преимущественно внешнюю мотивацию к изучению русского языка, которая обусловлена их представлениями о востребованности знания русского языка на рынке труда. Кроме того, мотивация тайских студентов зависит от условий обучения в вузах России, а именно от тех приемов, которые используются для изучения русского языка.

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UDK 316.4

## The Impact of Artificial Intelligence Technologies on Society

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...

**Key words and phrases:** artificial intelligence technologies; economy; ethics; society; security; philosophy and law.



**Abstract:** Great importance is attached to the problem of using artificial intelligence technologies and their integration into society. All countries involved in the application of artificial intelligence technologies are forced to start solving ethical problems of artificial intelligence technologies. This is an important step towards integrating artificial intelligence technologies into society. The study of the application of artificial intelligence technologies from the point of view of society deals with a range of fields of science – economics, ethics, policy development, philosophy and law.

...

In the development of artificial intelligence technologies, leading countries pay great attention to the ethics of the application of artificial intelligence technologies and its integration into society. Some countries, such as Canada, have established institutions – Canadian Institute for Advanced Study (**CIP**) – dealing with ethical issues of artificial intelligence technologies. This has proved to be an important step towards integrating artificial intelligence solutions into society. For example, the AI & Society CIFAR program has been created for government investments of 125 million dollars to study the application of artificial intelligence technologies from the point of view of society, including various topics: economics, ethics, policy development, philosophy and law.

The topical issues of the 2019 workshop held by AI & Society in partnership with CNRS & UKRI included the problems of artificial intelligence technologies and culture, safety and confidentiality of artificial intelligence technologies. Issues on ethics of possible human improvements with the help of artificial intelligence technologies are considered. Using the example of Arctic problems and climate change, an analysis of the role of artificial intelligence technologies in potential scenarios of global conflicts is proposed. Problems of ethical future and medicine of artificial intelligence are analyzed. The question is raised as to how the development of artificial intelligence technologies affects cultural diversity and expression and what the impact of artificial intelligence technologies will be on ethnic, gender and sociocultural discrimination. Options for social governance to preserve diversity and human rights are proposed. The issues of fairness, interpretability and privacy for algorithmic systems in

consumer services are dealt with separately.

The Australian Government, for example, along with the creation of the Technology Roadmap, is developing a national scheme for the ethics of artificial intelligence technologies, where the most important challenges are the impact of artificial intelligence technologies on human social security.

The China's "Next Generation Artificial Intelligence Development Plan" sees artificial intelligence technologies as capable of violating legal and social ethics, violating personal privacy and challenging the norms of international relations, which will have far-reaching consequences for public administration, economic security and social stability, as well as for global governance.

In Finland, a group established by the Government of Finland to study Finland's opportunities to become one of the world's leading countries in the application of artificial intelligence technologies in its report "The Work of Artificial Intelligence Technologies" considers ethics and social consequences of artificial intelligence technologies as a priority. For example, the Organization for Economic Cooperation and Development published recommendations on the use of artificial intelligence – "Recommendation of the Council on OECD Legal Instruments Artistic Intelligence" in 2019.

Another well-known organization, the European Union Commission, adopted Communication Artistic Intelligence for Europe in 2018, which identifies three main challenges in the development of artificial intelligence technologies, two of which are to prepare Europeans for socio-economic changes caused by artificial intelligence technologies and to ensure that there is an appropriate ethical and legal framework for the application of artificial intelligence technologies.

In the area of socio-cultural and humanitarian security, there is another problem that does not often sound today - the deliberate use of artificial intelligence technologies against man and society. Unfortunately, the probability of such application of artificial intelligence technologies is very high. Very little time passed between the creation of the first computer program aimed at "good" and the development of a computer virus directed at "evil". Obviously, artificial intelligence technologies are waiting for the same. Various groups of destructive orientation, for example, some groups on social networks, attempts to destructive influence on the mental state of a person and on the state of social groups occasionally occur and create serious problems in public life. The realization of these destructive motives with the help of artificial intelligence technologies (and also with discrete technologies, when it is almost impossible to track that such activity) will further complicate social functioning and contribute to the creation of social tension).

The issues identified by the most likely and understandable at the current level of understanding of the situation do not create an exhaustive idea of the scale of the problem of ethics of the application of artificial intelligence technologies, most likely their set in reality will be much more complicated and diverse.

Possible ways to solve such a confused number of problems related to the application of AI and its integration into the public life of Russia are seen as possible through the creation of an interdisciplinary-oriented scientific and practical institute engaged in analysis, Prediction, development of new research methods and experimental study of the impact of artificial intelligence technologies on humans, Social groups and culture and the development of proposals on the basis of these studies to regulate the relationship "of artificial intelligence technology – Society", similar to how it is done in most other countries actively involved in the development of artificial intelligence technologies and their assimilation into society.



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### **Влияние технологий искусственного интеллекта на жизнь общества**

О.В. Воронкова (Россия)

**Ключевые слова и фразы:** безопасность; общество; технологии искусственного интеллекта; философия и право; экономика; этика.

**Аннотация:** Сегодня придается большое значение проблеме применения технологий искусственного интеллекта и их интеграции в социум. Все страны, занимающиеся применением технологий искусственного интеллекта, вынуждены приступить к решению этических проблем технологий искусственного интеллекта. И это оказалось важным шагом к интеграции технологий искусственного интеллекта в жизнь общества. Современное изучение вопросов применения технологий искусственного интеллекта с точки зрения общества включает различные темы: экономику, этику, разработку политики, философию и право.

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## Creating Interstate Logistics System: Russia and China

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**Key words and phrases:** logistics system; Russia; China; development; prospects.



**Abstract:** The article describes the state and prospects of formation of the interstate logistics system of China and Russia. The study focuses on the prerequisites for the development of multilingual interstate logistics systems in China and Russia. The authors analyze the current state of interstate logistics systems between states; assess the prospects for the development of interstate cooperation in the field of formation of unified logistics. The development of the Chinese economy as one of the fundamental prerequisites for the formation of the interstate logistics system of Russia and China was analyzed. The dynamics of certain types of transport and logistics operations in China was studied. The directions and practical examples of formation of separate elements of the interstate logistics system of Russia and China are given. The research is based on the scientific assumption that the formation and development of interstate logistics systems of China and Russia becomes the main condition for the realization of the transit and economic potential of the countries.

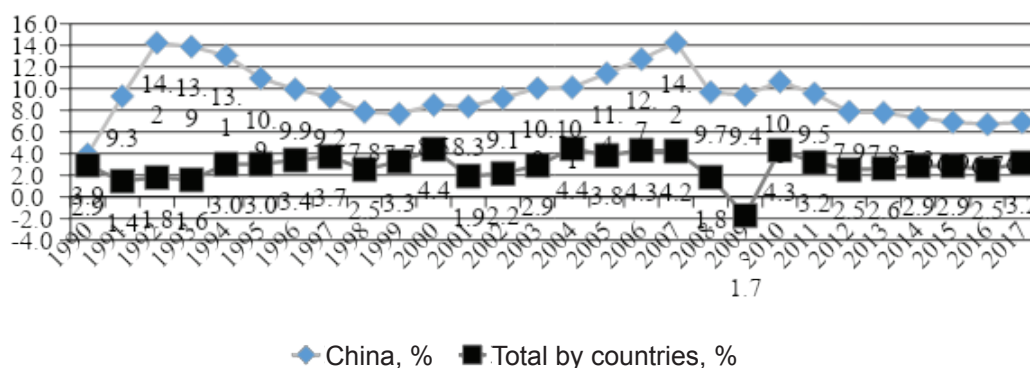


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The dynamic development of the Chinese economy, which is much faster than the world growth rate [5] (Fig. 1) increases the interest of other countries in the possibilities of trade and economic cooperation with China. Significant volumes of products manufactured and consumed by the PRC economy require the creation of effective systems for the movement of tangible and intangible resources for both consumption and production.

In modern conditions, the economic growth is impossible without established foreign economic relations with other countries. In recent years, China's economic growth has been accompanied by an increase in foreign trade. This circumstance also actualizes the issue of creating effective interstate logistics systems in China and other countries.

The growth of economic activity in China entails an increase in indicators characteristic of developing logistics systems. In the current conditions, due to the increased interest of participants in foreign economic activity in intermodal transport, there has been an increase in the volume of cargo transported in containers, which is also characteristic of China (Table 1).



**Fig. 1.** Comparison of the growth rate of China's GDP and the total GDP of the countries of the world in 1990–2017, %. Source: compiled from World Bank data

**Table 1.** Comparison of container transportation volumes in China and countries of the world, 2000–2017. Source: compiled from World Bank data

Years	China, million units			Total in the countries of the world	
	Million units	Growth rate, % of the previous year	Specific gravity, % to world transportation, %	Million units	Growth rate, % of the previous year
2000	41,00	–	18,2	224,77	–
2001	44,73	9,1	19,0	235,08	4,6
2002	55,72	24,6	21,1	263,46	12,1
2003	61,90	11,1	20,8	297,00	12,7
2004	74,73	20,7	22,1	338,43	14,0
2005	67,25	–10,0	17,9	376,27	11,2
2006	84,81	26,1	20,4	416,75	10,8
2007	103,82	22,4	21,2	489,82	17,5
2008	115,94	11,7	22,5	516,15	5,4
2009	108,80	–6,2	23,0	472,18	–8,5
2010	142,97	31,4	25,5	560,16	18,6
2011	157,42	10,1	26,0	606,17	8,2
2012	166,51	5,8	26,3	634,28	4,6
2013	175,94	5,7	26,8	656,33	3,5
2014	186,68	6,1	27,2	687,08	4,7
2015	195,28	4,6	28,1	695,80	1,3
2016	199,55	2,2	28,1	710,06	2,0
2017	213,72	7,1	28,4	75	

The deterioration of relations with Western countries requires even greater efforts from Russia to reorient the vector of economic development to the East. China in this direction is becoming a key partner, which in turn requires the formation of effective interstate logistics systems. Tangible cultural and linguistic differences also affect the formation of logistics

systems. Under such conditions, elements of several language systems are inevitably incorporated into logistics systems, and interstate macro-logical systems appear.

Attention is paid to the development of the interstate logistics systems of Russia and China at the state level: in March 2018, the President of the Russian Federation in his Address to the Federal Assembly noted the need to increase container transportation by the Russian Railways network by 4 times, and interaction with countries in the Asian region was noted as one of the sources of growth [4].

Positive trends in the growth of interstate logistic relations between Russia and China are associated with the deepening of Russia's integration in the strategic perspective of the EAEU development and the development of the Chinese initiative "One Belt, One Path". Trade and economic relations between Russia and China, which determine the nature of interstate logistics systems, are characterized by acceleration of trade volumes; improved quality of cooperation - from simple forms between private enterprises to complex forms of cooperation with state participation; a change in the structure of Russian exports to China from mainly raw to diversified, which affects the development of the interstate logistics system [1].

Positive trends and examples have already been outlined in the formation of the logistics system of Russia and China. Thus, the Chinese side of the logistics system is actively developing the direction of transportation using international container trains along the China-Russia-Europe transport corridor from various parts of China as a condition for the efficient functioning of the logistics system. So, the number of container trains on this route for the period from 2011 to 2018 amounted to 10 thousand.

Given the significant increase in intermodal transport, the Yankou port implements a container development strategy. This is how logistic infrastructure facilities are created to ensure the implementation of this strategy. In terms of the number of containers that are exported through the eastern branch of the "One Belt – One Way" project, Yingkou Port takes the first place, and the share of traffic falling at this port exceeds half of the total volume of container traffic.

Another example of the emerging logistics system of China and Russia is the activity of the Yingkou port, which creates a transport and logistics artery for cargo flows from China to Russia and further to Europe. Russian Railways is actively involved in the formation of an interstate logistics system on the Russian side in this direction. In accordance with the Strategy for the development of railway transport in Russia until 2030 [2], Russian Railways plans to actively develop the international logistics system in the territories adjacent to the countries of Europe and Asia, increase the degree of integration of logistics services and diversify operations.

An example of building an integrated logistics system at the level of interaction between large enterprises is the activities of Russian Railways and the port of Yingkou. In particular, within the framework of the general strategic priorities, companies in Moscow are creating a terminal and logistics center "Bely Rast". This logistics project and an element of the logistics system of countries will increase the efficiency of interstate interactions in the field of ensuring rational distribution of goods by combining marketing, managerial, informational, technological and other advantages. Ultimately, this interaction increases the competitiveness of integrated logistics infrastructure facilities and allows the provision of competitive services in the international transport and logistics market.

It is planned that the area of the Bely Rast transportation and logistics center will be 1.79 million square meters, besides this, six railway fronts with a length of more than one kilometer each, 17 warehouses, auxiliary infrastructure and other facilities will be constructed [1]. The significance of this element of the interstate logistics system is evidenced by the planned

scale – it will become the largest international transport and logistics center in Russia, which will offer transit, storage, distribution, and customs services on a one-stop basis.

Under current conditions, the territory of Russia does not fully realize its transit potential and interaction with China, building a logistics system of countries becomes a condition for realizing the international potential of countries. Having an important territorial advantage, Russia does not receive all the advantages from its strategic location [3]. Thus, in the future, the formation of the interstate logistics system of Russia and China requires the development of logistics infrastructure facilities on both sides; the establishment of strategic development priorities at the level of government bodies and the largest companies of the transport and logistics sector of countries, in particular rail and water transport; the formation of an appropriate regulatory framework for the development of the logistics system; taking measures of economic support for transport operators.

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## Строительство межгосударственной логистической системы: Россия и Китай

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**Ключевые слова и фразы:** Китай; логистическая система; перспективы; развитие; Россия.

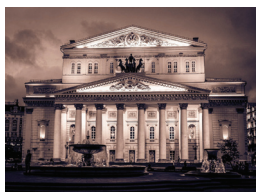
**Аннотация:** Обозначены перспективы развития взаимоотношений Китая и России в условиях создания межгосударственной логистической системы. Проведено исследование предпосылок развития многоязычных межгосударственных логистических систем Китая и России, проанализировано современное состояние межгосударственных логистических систем; дана оценка перспектив развития межгосударственного взаимодействия в области формирования единых логистических систем. Изучена динамика отдельных видов транспортно-логистических операций Китая. Приведены направления и практические примеры формирования отдельных элементов межгосударственной логистической системы России и Китая.



Сделано предположение о том, что формирование и развитие межгосударственных логистических систем Китая и России становится главным условием реализации транзитного и экономического потенциала стран.

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## Hurst Exponent for NASDAQ Index

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**Key words and phrases:** Hurst exponent; stock index; R/S-analysis.



**Abstract:** One of the main fractal approaches in technical analysis is the R/S-analysis method, with which you can calculate the Hurst exponent  $H$ . The purpose of the work is to show the algorithm for calculating this indicator on the example of the NASDAQ stock index for 2018 and 2019. Tasks include collecting an array of data, processing it according to the described algorithm, and interpreting the result obtained. The hypothesis is that due to strong fluctuations in the index in the summer of 2018  $H$  will be close to 0.5. As a result of the study,  $H = 0.6$  was obtained.



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### Introduction

As part of the fractal market analysis, the behavior of dynamic series describing the economic processes occurring in the market is investigated. The behavior of changes in the numerical indicators of these processes over time is non-periodic and can be represented by the presence of a trend as well as its absence. To analyze the dynamic series of such processes, their fractal characteristics, which can be directly calculated, are used [7]. One of the methods for studying the fractal dimension of a dynamic series is the R/S-analysis method, which gives to us a reliable indicator of the fractal properties of this series, the Hurst exponent, by processing a large array of data.

### R/S-analysis method

Earlier in article [2] the Hurst exponent and its role in fractal analysis were already considered. This article will discuss the algorithm for its calculation. The formula itself has the form:

$$R/S = (c \cdot N)^H,$$

where  $R/S$  – normalrange;  $N$  – number of observations;  $c$  – const;  $H$  – Hurst exponent.

Hurst's exponent can take the following values:

- $0 \leq H < 0.5$  – anti-persistent series with high noise levels;
- $H = 0.5$  – Brownian motion described by a normal distribution;

- $0.5 < H \leq 1$  – lownoise persistent series [5].

An algorithm for calculating the Hurst exponent is presented below.

1. A series of  $N + 1$  observations is converted into a logarithmic series of increments:

$$n_i = \ln\left(\frac{N_{i+1}}{N_i}\right), i = 1, 2, 3, \dots, N.$$

2. The obtained series of  $N$  elements is divided into groups of  $k$  elements ( $k \geq 10$ ) by integer division of  $N$ . The average value is calculated for each group:

$$\bar{n}_k = \frac{1}{k} \cdot \sum_{i=1}^k n_i.$$

3. The standard deviate is calculated for each group:

$$S_k = \sqrt{\frac{1}{n} \cdot \sum_{j=1}^k (n_j - \bar{n}_k)^2}.$$

4. The standardized range is calculated:

$$R_k = \max(D_{k,m}) - \min(D_{k,m}), k \leq m,$$

where  $D_{k,m}$  is accumulated deviations:

$$D_{k,m} = \sum_{j=1}^k (n_j - \bar{n}_k), k = 1, 2, 3, \dots, m.$$

5. As the standardized range for a given partition, the ratio of the average value of the standardized range to the standard deviation is taken:

$$\left(\frac{R}{S}\right)_k = \frac{\bar{R}_k}{\bar{S}_k}.$$

6. When  $\left(\frac{R}{S}\right)_k$  is found for a set of groups of  $k$  elements, for this partition the Hurst exponent is calculated from the formula (1):

$$H_k = \frac{\ln(R/S)_k}{\ln(ck)}.$$

7. The algorithm is repeated for the new  $k_{i+1} > k_i$ .

8. For the obtained data set, a linear regression equation is constructed, in which  $\ln(R/S)$  is the dependent variable and  $\ln(k)$  is a factor sign:

$$\ln((R/S)_k) = C + H \cdot \ln(k),$$

where  $C = H \cdot \ln(c)$ .

**Table 1.** Normalized range  $R/S$  for splitting into  $k$  elements.

k	16	32	64	128	256
R/S	4,07709	5,765335	8,618392	13,8172	21,09312
$\log_2(k)$	4	5	6	7	8
$\log_2(R/S)$	2,02754	2,527404	3,107419	3,788393	4,3987

The parameters of equation (9) of linear regression are by the method of least squares [6].

### Calculation of the Hurst Exponent for NASDAQ Index

As a researched dynamic series, we consider the dynamics of the NASDAQ index change over the past year: from May 15, 2018 to May 24, 2019. A total of 257 levels of the dynamic series, each of which corresponds to the closing price of day trading, are taken from the site tradingview.com [8].

Thus, on May 15, 2018, the closing price was 6888.54 points, 16.05.2018 – 6929.97. In the logarithmic series  $n_1 = \log_2\left(\frac{6929.97}{6888.54}\right) = 0,005996$  etc. A total of 256 values will be obtained, for the grouping of which you can take powers of two.

We take the first group of 16 elements, calculate for its standardized range and the standard deviation:

$$R = 0.09416 - (-0.04453) = 0.13869; S = 0.03612.$$

Next, we find the magnitude of the normalized range. Similarly, we calculate for all other groups. After that, we take a new partition and repeat the whole process. If the data obtained is presented by logarithmic series, then dependence close to linear can be obtained (Table 1).

Using the least squares method, we construct a regression model equivalent to equation (9):  $\log_2(R/S) = -0.4321 + 0.6003 \cdot \log_2(k)$ , where  $H = 0.6$ . For obtained regression

$$R^2 = 0.997, F = 70.57 > K_{tab} = x_{1-0.01}[F(2 - 1.5 - 2)] = 34.1,$$

$$t = 10.614 > t_{tab} = t_{1-0.01}[St(5 - 2)] = 9.925,$$

therefore, the Hurst exponent found and the equation itself are statistically significant [4].

Derived from the equation  $H = 0.6 > 0.5$  corresponds to the persistent series. Thus, this series is characterized by the presence of a trend.

Modern financial market is characterized by a high complexity of the processes taking place in it, therefore standard methods of modeling and forecasting processes often give unsatisfactory results. While the graph does not always give full information about the process in progress, the Hurst exponent can accurately show the presence of a trend or its absence. In addition, the Hurst exponent can be applied to other assets, including stocks and currencies [3]. It should be borne in mind that currencies are prone to “inertial trade”, i.e. for them, technical analysis is more important due to, for example, national bank’s interventions, which makes R/S-analysis in this case especially useful in identifying such interventions. In addition, using the Hurst indicator, you can select the best tools to predict future price movements. The value of  $H$

itself does not provide data on the trend direction, however, gives information about the degree of risk for the stock market investor, since at values close to 1, the value of future increments is likely to be small and more predictable [1].

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## Показатель Херста для индекса NASDAQ

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**Ключевые слова и фразы:** показатель Херста; фондовый индекс;  $R/S$ -анализ.

**Аннотация:** Одним из основных фрактальных подходов в техническом анализе является метод  $R/S$ -анализа, с помощью которого можно вычислить показатель Херста  $H$ . Цель работы – показать алгоритм вычисления данного показателя на примере фондового индекса NASDAQ за 2018 и 2019 гг. К задачам относится сбор массива данных, его обработка по описываемому алгоритму и интерпретация полученного результата. Начальная гипотеза заключается в том, что вследствие сильных колебаний индекса  $H$  летом 2018 г. будет близок к 0,5. В результате исследования был получен  $H = 0,6$ .

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## Sino-Russian Joint Construction of Arctic Waterway

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**Key words and phrases:** China; People's Republic of China; RF; Russia; Northern Sea Route; Arctic; "Ice Silk Road"; "One Belt, One Road".



**Abstract:** Arctic development plays a major role in strategic cooperation between China and Russia. Construction of the Arctic Waterway Initiative is a mutually beneficial cooperative program that combines the "One Belt, One Road" initiative with the Arctic cooperation practice between China and Russia. Although in the short term, there are still challenges such as the harsh natural environment, backward infrastructure, and concerns and resistance of Western countries in the process of building the Arctic waterway between China and Russia, the development prospects of this initiative has vast space. This paper attempts to analyze the development opportunities brought by the joint construction of the Arctic Channel for China and Russia, summarize the challenges faced in the process of co-construction, and propose solutions. The article shows the process proposed by the joint construction of the Arctic Channel, the advantages of the Arctic Northeast Channel and the reasons why China and Russia choose to jointly build the Arctic Channel. The author analyzes the development opportunities brought by the Arctic navigation channels for China and Russia and summarizes the challenges faced by China and Russia in the construction of the Arctic waterway. The fourth part proposes solutions to the challenges. It is concluded that the Arctic waterway is challenges in joint construction can be properly solved through complementary advantages and mutual consultation. The Arctic Channel will surely be built as a new engine and new highland for cooperation and development between the two countries.

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In January 2018, the Information Council of the State Council of the PRC published a White Paper "The Arctic Policy of China". The White Paper states that China is ready to use the Arctic Sea Route to build an "Ice Silk Road" with interested parties. The Ice Silk Road, referred to in the White Paper, is a maritime shipping route crossing the Arctic Circle and connecting the three economic centers of the world: North America, East Asia and Western Europe. And with

Russia, of course, this initiative is called the “Initiative for the joint construction of the Northern Sea Route”. Global warming has made the Northern Sea Route an important transport route for international trade. The Russian Northern Sea Route passes the Barents Sea, the Kara Sea, the Laptev Sea, the Novosibirsk Sea and the Bering Strait; it is the most important component of the “Ice Silk Road”. The Northern Sea Route is the shortest sea route connecting North-East Asia and Western Europe; therefore it is quite naturally a priority direction for the joint construction of the “Ice Silk Road” of China and Russia. Recently, in the second forum of international cooperation, “One Belt, One Road,” Putin noted that Russia is considering the possibility of docking the Northern Sea Route and the Chinese Sea Silk Road to create a global and competitive route connecting Asia with Europe. This once again says that the initiative to jointly build the Northern Sea Route is a necessary and relevant program for mutually beneficial cooperation in promoting the One Belt, One Road initiative and the opportunity to work together to develop the Arctic. This initiative corresponds to the position of the Sino-Russian comprehensive strategic cooperation and partnership relations, as well as the theme of “Peace and Development” throughout the world in the modern era.

With the constant change in the natural and geopolitical environment of the Arctic in recent years, the Arctic issue has become one of the main issues of modern international affairs, while the issue of the Northern Sea Route has increasingly attracted the world attention. At the One Belt, One Road International Forum, held in Beijing in May 2017, Russia invited China to jointly develop the Northern Sea Route and expressed its desire to combine the Northern Sea Route initiative with the One Belt, One Road initiative. On July 4, 2017, Chinese President Xi Jinping paid a state visit to Russia, during which Xi noted that “China welcomes this initiative and is ready to take an active part in the proposals for the creation of the Primorye International Transport Corridor,” he also expressed hope that both the parties will be able to jointly develop and use sea corridors. It was a clear response to the joint construction of the Northern Sea Route between China and Russia at the highest level. In the period from October 31 to November 2 of the same year, during the 22nd regular meeting, the prime ministers of China and Russia, the leaders of both countries again exchanged views on this issue, proposed joint development and use of the Northern Sea Route, and wished to expedite the construction work “Ice Silk Road”. In January 2018, the Information Council of the State Council of the PRC published a White Paper “The Arctic Policy of China”. The White Paper states that “China is ready to use the Arctic Sea Route to build the Ice Silk Road with interested parties”. In April 2019, in a second international cooperation forum, “One Belt, One Road”, Vladimir Putin noted that “Russia is considering the possibility of connecting the Northern Sea Route and the Chinese Sea Silk Road to create a global and competitive route connecting Asia with Europe”. Russia, possessing the Northern Sea Route and dominating its development, will become China’s most important partner in the joint construction of the Northern Sea Route.

The Northern Sea Route under the joint construction of China and Russia has unique development advantages and huge potential. Conducting international trade with European countries, on traditional sea routes, Chinese vessels must pass through the Strait of Malacca, the Indian Ocean and the Suez Canal in order to reach European ports. Currently, along the traditional sea routes to Europe, it is necessary to go through the territories of Southeast Asia, South Asia, West Asia and North Africa, in these regions ethnic, religious and cultural problems are extremely complex, piracy, terrorist and extreme events quite often occur. These unstable factors seriously threaten the safety of shipping. Compared to the traditional shipping route, the Northern Sea Route has significant advantages. Along the northeastern sea route, the distance from the northern ports of Shanghai to the ports of the western regions of Europe,

the North Sea, the Baltic Sea and other ports is reduced by 25–55 %, saves 53–127 billion US dollars in the cost of shipping per year, compared to traditional sea route. Regions located along the Northern Sea Route are calmer, ships mainly pass through the north of Russia, and, accordingly, risks are reduced. At the same time, the special geographical conditions of the Arctic to some extent protect shipping from a number of dangerous factors, thereby increasing the safety of navigation.

China and Russia have already achieved some successes in the development of Arctic cooperation, for example, in the development of Arctic energy, among which the Yamal Project is a great example, which opens a new chapter in Russian-Chinese cooperation in the Arctic. The accumulated experience lays a favorable basis for cooperation between both countries in other areas of the Arctic. China and Russia choose the joint construction of the Northern Sea Route mainly because the two countries have common interests and complementarity in the construction of the Northern Sea Route. In recent years, there has been depressive domestic economic growth in Russia, in addition, Russia is subject to economic sanctions by Western countries, its economic power is not able to guarantee commercial shipping on this intercontinental sea route. Russia needs the support of a strong economy and important international markets, China as the second world economy, Chinese and European international markets just satisfy this requirement. That is why Russia made a proposal for the joint construction of the Northern Sea Route to China. This was a sensible step that is in line with the common interests of both countries. Firstly, Russia has geographical and technical advantages for the construction of the Northern Sea Route, as well as extensive experience in building infrastructure in harsh Arctic climatic conditions, in turn, China has financial, political advantages and a huge international trade market. Secondly, the Northern Sea Route is under the control of Russia. Thus, Russia has a dominant right to shipping and huge advantages in rescue operations, navigation technologies and much more. Thirdly, China's participation in Arctic merchant shipping could attract South Korea, Japan and other countries. Fourth, the Northern Sea Route not only solves the problem of supplying goods to the European market, but also facilitates the market supply to the European part of Russia, which greatly increases the commercial value of the Northern Sea Route.

From the standpoint of geopolitics, the development of the Northern Sea Route helps alleviate the problem of the “Malacca plight” faced by China and the negative consequences of Europe's long-term sanctions against Russia, all of which help both countries to increase their strength in the geopolitical confrontation.

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## **Китайско-российский проект строительства Северного морского пути**

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**Ключевые слова и фразы:** КНР; Китай; РФ; Россия; Северный морской путь; Арктика; «Ледяной шелковый путь», «Один пояс, один путь».

**Аннотация:** Освоение Арктики является одним из приоритетных направлений стратегического сотрудничества между КНР и РФ. Инициатива совместного строительства Северного морского пути является программой взаимовыгодного сотрудничества продвижения инициативы «Один пояс, один путь», а также возможностью совместного освоения Арктики Москвой и Пекином. Вместе с тем, в процессе совместного строительства Северного морского пути наши страны столкнутся с такими трудностями, как суровые природные условия, отсталость инфраструктуры, опасения и бойкот от западных стран, но перспективы развития этой инициативы весьма широки. В данной статье проанализированы возможности КНР и РФ по совместному строительству Северного морского пути, рассмотрены возможные трудности строительства и предложены пути их решения. Описание процесса выдвижения инициативы «Ледяного шелкового пути», отмечены главные преимущества Северного морского пути и причины китайско-российского совместного строительства Северного морского пути. Выделены возможные проблемы, с которыми столкнутся Китай и Россия в процессе строительства, и предложены ответные меры для их решения.

Сделан вывод о том, что инициатива совместного строительства Северного морского пути для обеих стран является не только программой взаимовыгодного сотрудничества, но и представляет собой уникальные возможности развития, дает большой стимул экономическому и региональному развитию обеих стран. Китай и Россия имеют прочную



основу политических отношений и успешный опыт сотрудничества в различных областях. Возникающие трудности и вызовы в совместном строительстве Северного морского пути могут быть решены за счет преимуществ взаимодополняемости, а также взаимных консультаций. Северный морской путь непременно станет двигателем сотрудничества и развития обеих стран.

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