

# ДИАЛОГ КУЛЬТУР

## МАТЕРИАЛЫ XVI МЕЖДУНАРОДНОЙ НАУЧНО-ПРАКТИЧЕСКОЙ КОНФЕРЕНЦИИ НА АНГЛИЙСКОМ ЯЗЫКЕ

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## **МАТЕРИАЛЫ**

### **XVI Международной научно-практической конференции на английском языке «ДИАЛОГ КУЛЬТУР»**

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*Под общей редакцией заведующей кафедрой иностранных языков,  
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## ECOSYSTEM IN THE MARKET OF ELECTRIC VEHICLES IN RUSSIA

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**Abstract.** This article raises the problem of the disorganization of the electric vehicle market. Difficulties with charging, finding a place to rent, etc. The authors consider that the most logical option in this situation is to create a single ecosystem in the market.

**Keywords:** ecosystem, electric car, electric car market, charging, respondents.

## ЭКОСИСТЕМА НА РЫНКЕ ЭЛЕКТРОТРАНСПОРТНЫХ СРЕДСТВ РОССИИ

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**Аннотация.** В данной статье освещаются вопросы неорганизованности рынка электромобилей. По мнению авторов, самыми актуальными проблемами являются: зарядка электромобиля, поиск места аренды и т. д. В качестве решения данных проблем в статье предлагается создание единой экосистемы на рынке.

**Ключевые слова:** экосистема, электромобиль, рынок электромобилей, зарядка, респонденты.

In recent years, mankind has begun to think more about environmental problems, and a rather large number of electric vehicles have appeared all over the world. The resources of our planet are finite, and the transition from gasoline to electricity in the transport issue seems to many a logical way out. On electric cars, instead of the classic internal combustion engine, an electric unit is used, which is structurally much simpler than an internal combustion engine, since it contains fewer parts and mechanical connections [1].

The number of electric vehicles purchased is growing at a record pace. For the whole of 2022, residents of the Russian Federation bought 2.998 new passenger electric vehicles, which is 33 % more than a year earlier. According to the experts of the agency "AUTOSTAT" with reference to the data of JSC "PPK", this is a record figure in the history of the Russian market [2].

At the same time, the situation with charging stations remains in question. In 2022, 439 fast electric charging stations (ECS) were installed in Russia, Andrey Belousov, First Deputy Prime Minister of the Russian Federation, announced on February 8, 2023. We are talking about equipment with a capacity of 150 kW, which allows you to charge an average electric car by 80 % in about half an hour [3].

In addition, do not forget that car sharing services have become extremely popular in large cities of the country. Electric cars are quite a popular item in the car sharing system.

Thinking about this situation, we decided to conduct a survey of the population in order to substantiate the relevance of the existing problem.

115 respondents aged 18 and over took part in the survey. At the same time, almost 70 % of respondents aged 23 to 29, that is, we are primarily considering the problems of the young working population. Among them were slightly more than 60 % men, the rest women. More than 79 % of respondents have higher education. As for the field of activity, most of the respondents (43.5 %) are involved in economics and management. The rest are employed in various fields: law, industry, education, medicine, technology and IT, and so on. 64.3 % of those surveyed have a driver's license. The rest of the respondents, in our opinion, are also stakeholders in the formation of the ecosystem, since the passenger is also an important participant in the transport issue, and he also needs to get from point A to point B with a minimum of inconvenience.

Car sharing is used by 42.6 % of respondents. Considering that some of our respondents do not have a driver's license, it turns out that the percentage of people using this service is quite high.

Interestingly, among the respondents using carsharing, most of them have their own car. However, this is not surprising, because experienced drivers often decide to drive someone else's car and bear responsibility for it. However, this information suggests that even if you have your own car, car sharing may be a more convenient option. Here again the question arises about the relevance of creating a high-quality ecosystem.

When asked if they were thinking about buying an electric car, almost half of those surveyed answered positively. It turns out that many people are interested in buying an electric car. However, 53.9 % say that they did not think about buying an electric car. Seeing this trend, we asked the respondents what factor most influences their decision to make or not purchase an electric car. The result of this survey turned out to be quite interesting, and it can be seen in Figure 1.



### What factor influence your decision to consider an electric vehicle purchase more?

115 ответов

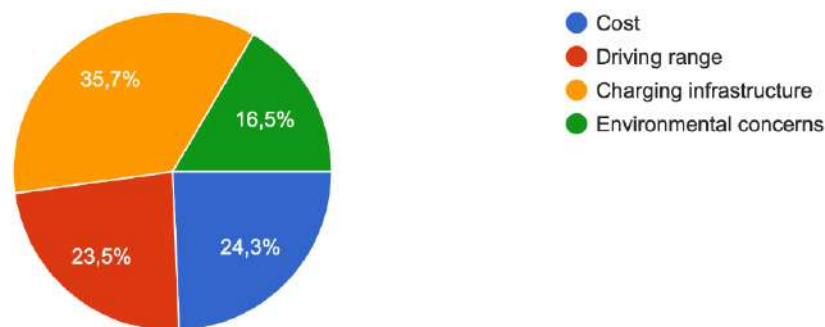


Figure 1. Factors influencing the decision to buy an electric car

So, more than 35 % said that the main factor influencing the decision to buy an electric car is the charging infrastructure. That is, if there is a competent ecosystem and a sufficient number of charging stations, people would be ready to buy an electric car. Cost was the second most important factor. New electric vehicles are not too expensive compared to gasoline ones, but the secondary car market is popular in our country, and used gasoline cars can be bought at a relatively low cost. Almost the same number of respondents chose drive range as the determining factor. Of course, this is almost the same as not having enough charging stations. People are simply afraid to stand in the middle of the street with an empty battery in just half an hour of driving. And only 16.5 % declared the environment to be the determining factor for themselves when buying a car. This suggests that in our country at the moment the current problems do not allow people to think about global environmental problems.

More than 75 % of respondents are familiar with the charging infrastructure situation in our country. Respondents were also divided on whether the Russian government should focus more on developing charging infrastructure or creating incentives to buy electric vehicles. This can be seen in Figure 2.

### Do you think the Russian government should focus on developing charging infrastructure or providing incentives to purchase electric vehicles?

115 ответов

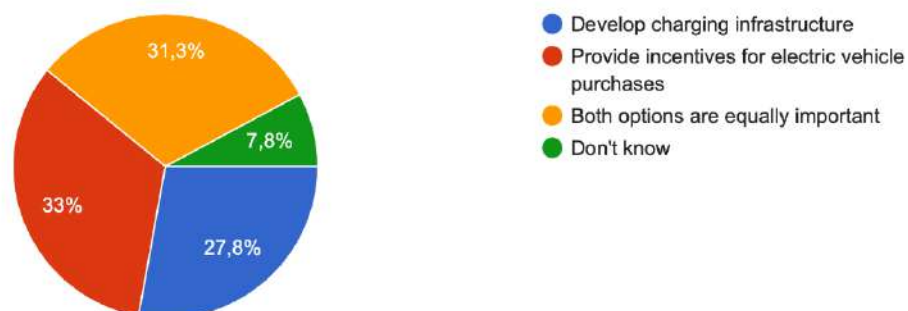


Figure 2. Opinion on the future activities of the government

Therefore, almost a third of the respondents believe that both development options are extremely important. 27 % think that charging infrastructure should be developed first. However, if the offer will significantly exceed the demand, this is also bad. We need an ecosystem with enough charging stations, but we also need ready-made electric car owners in sufficient numbers.

Speaking about improvements to the charging infrastructure, the opinions of the population were again divided. This can be seen in Figure 3.

What kind of charging infrastructure improvements would you like to see in Russia?

115 ответов

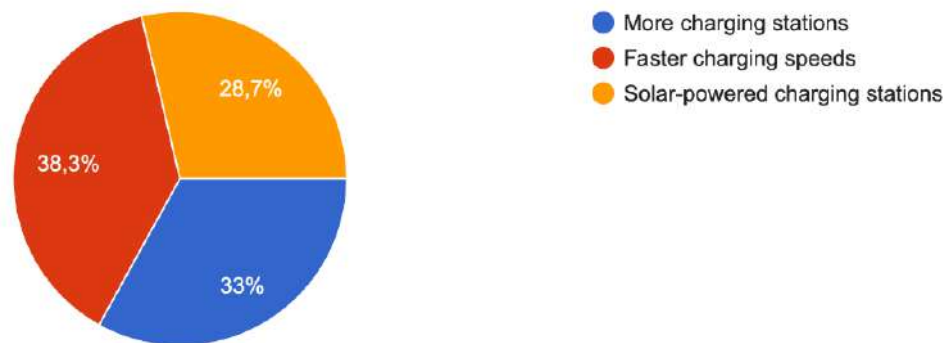


Figure 3. Opinion on the charging infrastructure improvements

As can be seen from the graph, here the opinions of the respondents were divided almost equally. Nearly 40 % of those surveyed dream of faster charging speeds, 33 % just want more charging stations and 28.7 % want solar-powered charging stations. Based on these data, it can be concluded that almost a third of the respondents are seriously worried about the environment and think about the environment. Of course, this type of charging stations would be good, but within the framework of an ecosystem, this is a rather complicated process. For example, in Sant Petersburg such stations will be profitable only in May and July, and even then not always.

Also interesting was the opinion of respondents about the willingness to pay more for an electric car. This can be seen in Figure 4.

Would you be willing to pay a premium price for an electric vehicle over a traditional gasoline-powered vehicle?

115 ответов

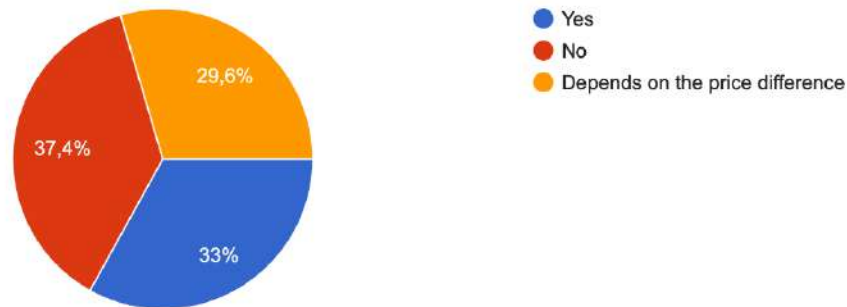


Figure 4. Willingness to pay more for an electric car

Here, as can be seen from the graph, opinions were divided almost equally. However, only 37.4 % are not at all ready to overpay for an electric car. Almost a third of respondents are ready to overpay if it is within their budget, and a third are ready to pay in any case. This suggests that more than 60 % of respondents take care of the environment sufficiently to give their own money for it.

Finally, we asked respondents about whether they consider electric vehicles to be the future of our country. The result of this question can be seen in Figure 5.

Do you think electric vehicles are the future of transportation in Russia?

115 ответов

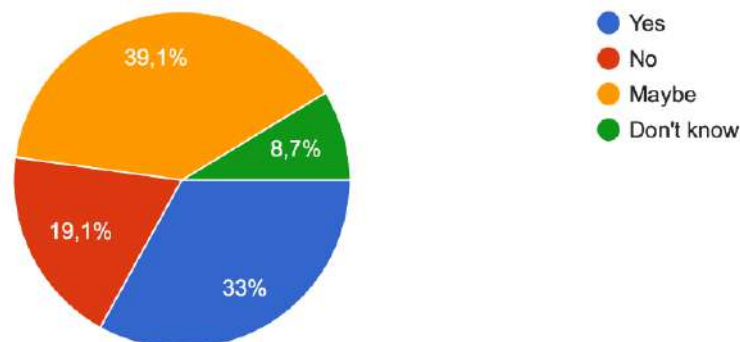


Figure 5. Opinion about future of electric cars in Russia

Only 19.1 % of respondents believe that electric vehicles will definitely not become the future of transport in Russia. At the same time, almost 40 % of respondents consider it possible and a third of respondents are confident in this outcome.

Based on the data obtained, we can say that for the development of the future in the transport sector of Russia, the creation of an ecosystem is necessary. What do

we mean by ecosystem? An ecosystem in business (business ecosystem) is a collaborative structure of interdependent companies that create an integrated value proposition in which end users make the usage decision [4].

What companies do we want to unite into a single structure in the electric vehicle market? As is clear from the above, in the first place it will be all companies providing charging stations. In addition, the system will include all car sharing services offering electric cars and taxi services on electric cars. Yes, we believe that the creation of an electric taxi system is also necessary, and in the survey we used only the opinion of drivers for a reason. Everyone is worried about the environment, and ordinary passengers may have a desire to drive an electric car. Also, drivers also use taxi services and it would be convenient to combine this into one application. After all, from time to time a taxi can be more profitable than carsharing and vice versa. So, we believe that in a single ecosystem with a single mobile application and website, you need to define all companies related to electric vehicles on the market. And this system requires serious state control. Moreover, at the present stage, the state in any case plans to support the development of domestic ecosystems [5].

To draw a conclusion, we can say that having studied the opinion of the inhabitants of our country, we managed to justify the need to create a single ecosystem in the electric car market in Russia. After all, the future of the transport system of our country is connected with this.

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## FACTORS AFFECTING THE INVESTMENT ATTRACTIVENESS OF COMMERCIAL REAL ESTATE

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**Abstract.** The investment attractiveness of commercial real estate has been studied. The analysis of the commercial real estate market in Novosibirsk in the current period of time was carried out in order to predict prices. A conclusion is made about a constant trend in price growth, a growth confidant is determined to continue the graph of price changes using the maximum likelihood method. This method will allow statistical analysis of data for the purpose of forecasting price changes in the commercial real estate market. If similar trends are noticed, then at the next stage of the analysis it is possible to construct an approximating function.

**Keywords:** investment attractiveness, investment, real estate, classification, factor, characteristics.

## ФАКТОРЫ, ВЛИЯЮЩИЕ НА ИНВЕСТИЦИОННУЮ ПРИВЛЕКАТЕЛЬНОСТЬ КОММЕРЧЕСКОЙ НЕДВИЖИМОСТИ

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**Аннотация.** В статье изучена инвестиционная привлекательность коммерческой недвижимости, проведен анализ рынка коммерческой недвижимости в г. Новосибирск в текущем периоде времени с целью прогнозирования цен. Авторами сделан вывод о постоянном тренде роста цен, определен конфидент роста для продолжения графика изменения цен по методу максимального правдоподобия. Этот метод позволит провести статистический анализ данных для целей прогнозирования изменения цены на рынке коммерческой недвижимости. Если похожие тренды будут замечены, то на следующем этапе анализа возможно построить аппроксимирующую функцию.

**Ключевые слова:** инвестиционная привлекательность, инвестиции, недвижимость, классификация, фактор, характеристики.

Commercial real estate is real estate used for commercial purposes, such as the production of goods, the provision of services, rent and sale. Depending on the type

of business that will be carried out in the property, the following types of commercial real estate are used:

1. Offices are premises used for the organization of business;
  2. Shops and retail areas – premises for trade and sale of goods;
  3. Restaurants, cafes, canteens – premises for catering;
  4. Warehouses and production areas – premises for the storage and production of goods;
  5. Hotels and hotels – premises for temporary accommodation of people;
  6. Multifunctional centers – buildings that are used for various commercial purposes.
- In addition, there are different types of commercial real estate, depending on the ownership.

The management of such real estate consists in the management and maintenance of buildings and premises owned or leased by an enterprise or organization. The process of managing commercial real estate includes many aspects and nuances, ranging from infrastructure maintenance and building repairs to document management and maintenance.

The following operations can be implemented within the management: maintenance of buildings, structures, premises, rental and (or) sale of property owned, documentary support of real estate transactions.

In addition, the management of commercial real estate also implies strategic planning, which allows you to determine the investment attractiveness and what investments are needed to increase the value of real estate, increase the profit received from the property. To do this, it is necessary to consider the directions of development of the real estate market as a whole, trends in supply and demand in the real estate market, apply new technologies in the construction and maintenance of buildings, structures and other commercial real estate objects.

The relevance of the topic is due to the high level of influence of various factors on the investment attractiveness of commercial real estate at different times and the diversity of their influence. Understanding the processes of price formation in the real estate market is important for the development of the entire economy. Any enterprise within the framework of its activities focuses on the value of real estate and determines the effectiveness, expediency of its activities, taking into account the costs of buying or renting real estate. The price of real estate is influenced by many factors. There are various ways to analyze pricing in this market. For example, methods related to geoanalytics. In the case of their application, the environment of the real estate object, accessibility, environmental and other conditions of the surrounding space are analyzed.

The real estate market provides the investor with opportunities to make a considerable profit [1].

The purpose of the study is to identify the factors and their characteristics that determine the investment attractiveness of real estate at the current stage of market development. The object of the study is real estate, the subject of the study is the factors and characteristics that form its investment attractiveness.

One of the variants of the interpretation of this thesis: “The ratio of maximum profit and minimum risk for investors” [2]. This method generally allows you to

analyze the likely trends in the development of the market. In the case of crisis phenomena, typical trends will also be observed, albeit of a negative nature.

At this moment, there is a widespread decline in demand and an oversupply of real estate in the country, which caused their prices to fall. Figure 1 shows the average decline and increase in real estate prices according to data for the past months of 2023.

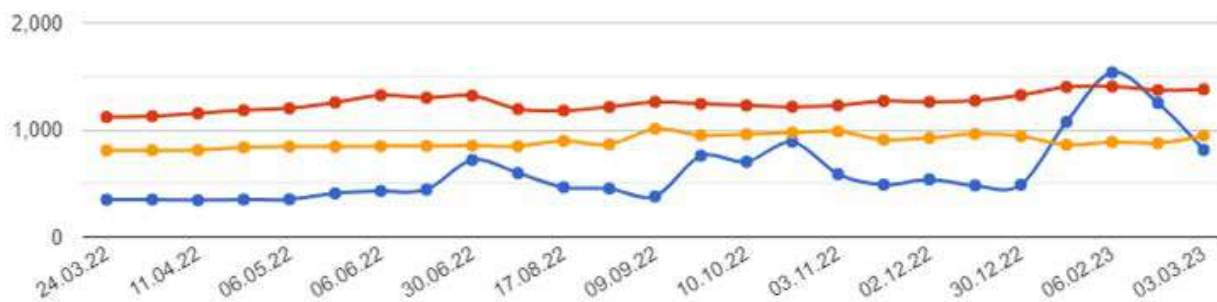


Figure. Change in the cost of commercial real estate in Novosibirsk

Figure shows the dynamics: the blue line is the change in the cost of industrial premises. The red line shows the change in the cost of retail premises and retail space, the yellow line shows the dynamics of premises for free use.

Crisis phenomena tend to fade. The market adjusts to new trends, there is a leveling correction of prices. In a limited real estate market, for example, the Novosibirsk market, the law of supply and demand works. The influence of external factors may cause a short-term change. Further, everything is regulated according to market principles and the law, for example, the competition of developers.

Already in 2016, economic growth contributed to an increase in the purchasing power of citizens. Together with the influx of new population to the Novosibirsk region and state support for mortgages under various programs and programs to support small and medium-sized businesses. Despite the negative trends, the real estate market remains investment-attractive, due to the combined influence of exogenous (external) factors that ultimately contributed to the growth of average prices for residential and commercial real estate. The growth trend has been outlined for longer until 2020. Further, due to the pandemic, there was a market correction, but by the end of 2022, there was again a trend of steady growth in the turnover of funds in the commercial real estate market. Due to the cyclical nature of the economy, real estate, like any other financial assets, is subject to the variability of the investor's income and profitability, as well as the degree of risk and investment attractiveness.

To date, the investment attractiveness of an object is determined after studying a set of external and internal factors, the assessment of which is characterized by a system of qualitative and quantitative indicators that take into account, for example, the ratio of the rate of return on invested capital and the level of risk for the investor.

Investment attractiveness, including real estate, is characterized by the interaction of two categories: investment risk and investment potential, and is determined by the interaction of these two components [3, 4]. In turn, the following groups of external and internal factors influence the level of risk and potential.

The group of external factors includes political and economic factors that characterize state regulation through standard legislative, executive and supervisory measures implemented by competent state institutions. As a rule, the investor is unable to influence the characteristics of these factors, but can adjust to them, which is their distinctive feature. The factors of state regulation include: construction standards; restriction of real estate turnover and methods of land use; the cost of public transport and utilities; methods of land use.

Economic factors are mainly determined by government agencies that analyze the ratio of supply and demand at the present time, with a forecast for future changes in the future, as well as the purchasing power of the population. To a large extent, the demand of these factors is determined by the average salary, its distribution, employment, the degree of economic development of the region, the possibility and conditions of obtaining a loan.

It is customary to refer to the group of internal factors the properties that a real estate object possesses. The peculiarity of these factors is that they can have different properties for absolutely identical objects built at the same time, from the same materials and with the same high quality of work [4, 5].

The location in the first line of houses, proximity to the transport arteries of the city; proximity to interconnected objects, which opens up promising opportunities for the multifunctional use of real estate; the type of object; its number of floors, this factor is important when purchasing not the entire building, but only the premises in it; - all of the above factors collectively affect the investment attractiveness of the object.

A significant role in this group of factors is played by the characteristics of the development of the district. In addition, it should be taken into account that over time the profitability of the selected object may change. Therefore, universal purpose objects will always have a greater profitability in comparison with specialized objects.

The investment attractiveness of the property should be considered individually. Since in addition to general (external) indicators and factors affecting the level of profitability and risk of the investor, there are private (internal) indicators that vary between the objects of the proposed investments and often play a major role for the investor in making an investment decision. All of the above indicators may change over time, as well as people's views and preferences. Which entails changes in the final value of real estate. In this connection, personnel capable of conducting a competent analysis of the factors affecting the investment attractiveness of objects in the real estate market, as well as personnel able to increase it, will be in demand at any time.

All these factors affect the change in the price of commercial real estate. By observing repeated fragments of the price change schedule, it becomes possible to continue the schedule for the future period and predict prices on the commercial real estate market.

The commercial real estate market is constantly influenced by external and internal factors. Due to their influence, there is a constant change in prices for both sale and rental of commercial real estate. The task is to identify trends in the market



in the medium term. Usually trends, trends can be fixed in relatively short periods, seasons. An example of seasons are the seasons. Objectively, in some seasons the demand for real estate is growing, in others it is decreasing. Following the demand, the price also changes.

Based on statistical data, it is possible to plot the dynamics of price changes. Studying this chart, you can notice repeating trends in the commercial real estate market. These trends are quite long-lasting in some cases. It becomes possible to continue the price change schedule for the future period. Thus, to assume the development of the market situation. This approach can work if the market situation is relatively stable, stable trends are observed. In applied statistics, this research method is called maximum likelihood. In the absence of pronounced crisis phenomena, the method allows you to make a forecast and assume how the price will change.

Sometimes the exact value of an economic parameter is not required for market analysis. It is enough to understand the trend and the order of growth (increment) of the indicator in the analyzed period. This information is quite enough to make a management decision in our case whether it is advisable to buy real estate or rent real estate. Also, understanding the order of growth or decline in the value of commercial real estate in the future, this indicator can be compared with other economic indicators.

For example, assessing the dynamics of revenue growth, it can be concluded that the company is able to make a profit after covering all costs in the framework of doing business, including the cost of renting real estate. In the case of buying a property, it is also possible to assess the likely future benefit in the event of its sale.

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## INTERNATIONAL TOURISM IN THE SYSTEM OF INTERNATIONAL RELATIONS

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**Abstract.** Tourism has a special significance in the world economy and the economy of individual countries as a whole. In the conditions of post-industrial world economy and processes of globalization of economic, political, and social spheres, international tourism is one of the rapidly developing branches of the world economy.

International tourism is a complex economic phenomenon in constant development. It is one of the most highly effective spheres of the world economy, competing with such industries as oil and gas extraction.

**Keywords:** tourism, international tourism, world economy, GDP, tourists, COVID-19 virus.

## МЕЖДУНАРОДНЫЙ ТУРИЗМ В СИСТЕМЕ МЕЖДУНАРОДНЫХ ОТНОШЕНИЙ

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**Аннотация.** Туризм имеет особое значение в мировой экономике и экономике отдельных стран в целом. В условиях постиндустриальной мировой экономики и процессов глобализации экономической, политической и социальной сферы международный туризм является одной из быстро развивающихся отраслей мирового хозяйства.

Международный туризм – это сложное экономическое явление, находящееся в постоянном развитии. Он является одной из наиболее высокоэффективных сфер мировой экономики, конкурируя с такими отраслями, как добыча нефти и газа.

**Ключевые слова:** туризм, международный туризм, мировая экономика, ВВП, туристы, вирус COVID-19.

International tourism, on the other hand, is an activity aimed at providing tourist services and tourist goods in order to meet a wide range of cultural and spiritual needs of tourists.

Despite economic, political and social crises, tourism is growing rapidly. Studies of the World Tourism Organization (UNWTO) show that the tourism industry provides the highest export earnings for most countries, affects the balance of payments, and contributes to gross domestic product (GDP).

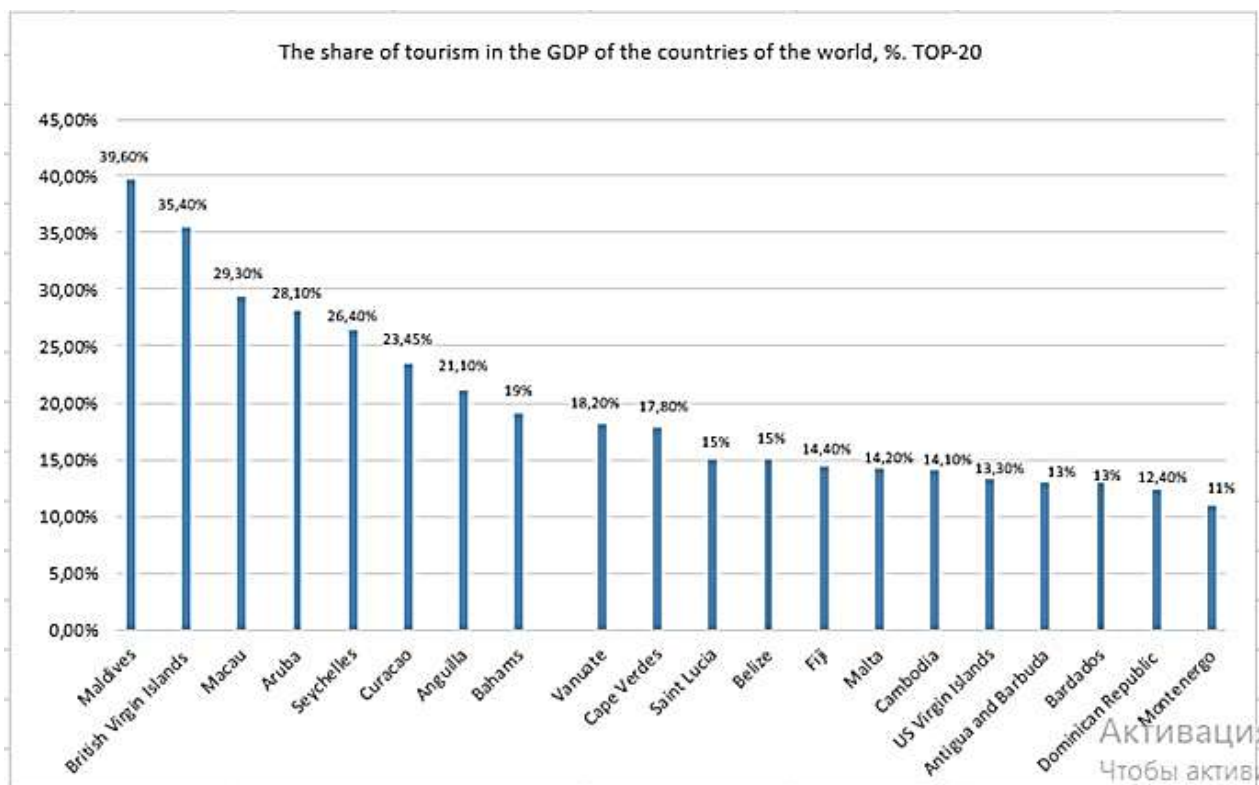


Figure 1. Share of tourism in the GDP of the countries of the world

The coronavirus infection (COVID-19) had a particular impact on international tourism. In 2020, compared to 2019, the number of international travel decreased by 73 %. In 2021, tourism gradually began to recover, experts say, thanks to vaccinations and the easing of travel restrictions [1]. "The pace of recovery remains slow and uneven in different regions of the world due to varying degrees of travel restrictions, vaccination levels, and traveler confidence," the UNWTO report said [2].

International tourism in 2022 was up 172 % from last year to 474 million people. "In 7 months, the number of international travel in Europe increased 190 % over the same period in 2021. This is due to strong demand for intra-regional travel, as well as an increase in tourists from the United States. In the Middle East in January-July 2022 the number of international arrivals increased by almost 4 times: in July the number of trips exceeded the pre-pandemic level by 3 %, primarily due to the pilgrimage to Saudi Arabia," – noted in the organization [3]. In 2022, international tourism recovered only 60 % of pre-pandemic levels [4].

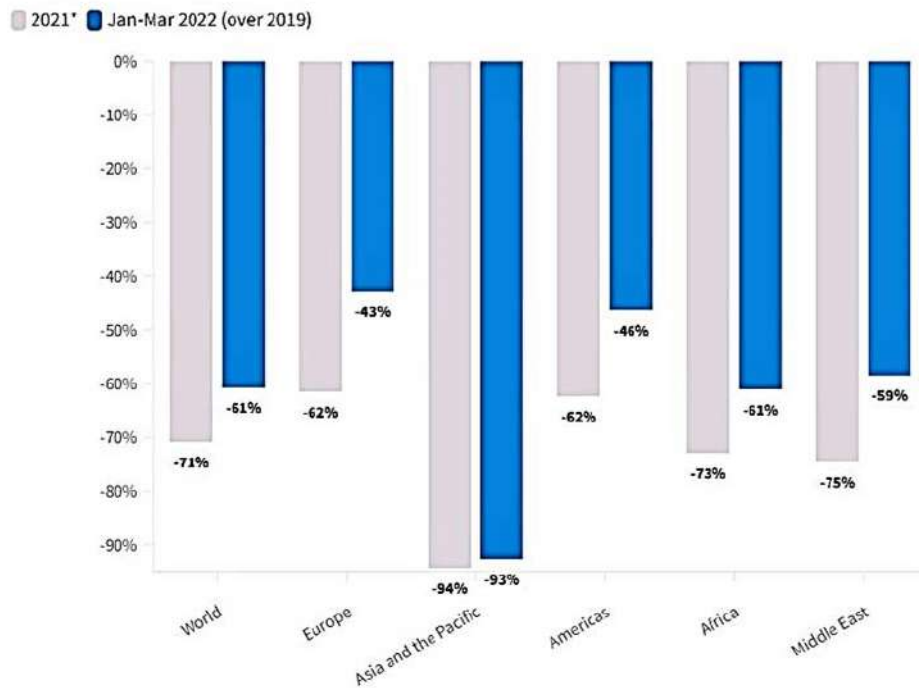


Figure 2. International tourism compared to 2019

Using the official data of the UN World Tourism Organization (UNWTO), the countries with the main tourist flow in 2022:

List of most visited countries in the world		
Nº	Country	Million people
1.	France	89,4
2.	Spain	83,5
3.	USA	79,3
4.	China	65,7
5.	Italy	64,5
6.	Turkey	51,2
7.	Mexico	45
8.	Thailand	39,8
9.	Germany	39,6
10.	UK	39,4

Figure 3. World's Most Visited Countries in 2022

The reason for the uneven distribution of tourism in the world lies in the differences in the socio-economic, cultural or domestic industries of countries and regions [5].

The largest flow of tourists in 2022 was in Europe. It received 4 times as many tourists as last year, which is +350 %. However, it is 36 % less compared to 2019. The Americas doubled the flow of tourists compared to 2021, which is +112 %. But the number of tourists is 40 % lower than in 2019.

The Middle East (+157 %) and Africa (+156 %) also saw increases over 2021, but it lagged 54% and 50 % behind 2019 levels.

Asia Pacific (+94 %) saw nearly double the number of travelers from last year. Compared to 2019, there was a 90 % decrease, as some borders remained closed.

There are also countries where the flow of tourists exceeded the pre-pandemic level: the U.S. Virgin Islands (+29 %), St. Maarten (+19%), the Republic of Moldova (+16 %), Albania (+11 %), Honduras (+7 %), Puerto Rico (+7 %), Ethiopia (+7) and Andorra (+4 %).

Based on data from the United Nations World Tourism Organization (UNWTO), a table of the distribution of international tourism by sub-region for 2019, 2020 and 2021, as well as a comparison of 2022 with 2021 and 2019:

	Share			Change (%)			Change (%)*						Change (%)*						
	(million)			2021*			2022 over 2021*						2022 over 2019						
	2019	2020*	2021*	2021*	20/19	21/20*	21/19*	YTD	Jan.	Feb.	Mar.	Apr.	May	YTD	Jan.	Feb.	Mar.	Apr.	May
<b>World</b>	<b>1465</b>	<b>406</b>	<b>429</b>	<b>100</b>	<b>-72.3</b>	<b>5.8</b>	<b>-70.7</b>	<b>221</b>	<b>143</b>	<b>232</b>	<b>218</b>	<b>274</b>	<b>229</b>	<b>-53.9</b>	<b>-65.4</b>	<b>-58.7</b>	<b>-53.8</b>	<b>-49.0</b>	<b>-45.8</b>
Advanced economies <sup>1</sup>	777	218	227	52.8	-71.9	4.0	-70.8	401	265	418	414	541	370	-49.9	-62.5	-52.8	-48.7	-45.3	-44.4
Emerging economies <sup>1</sup>	689	188	203	47.2	-72.8	8.0	-70.6	122	81	130	116	144	135	-58.1	-67.9	-64.1	-58.8	-53.1	-47.6
<i>By UNWTO regions:</i>																			
<b>Europe</b>	<b>745.2</b>	<b>238.1</b>	<b>288.4</b>	<b>67.2</b>	<b>-68.0</b>	<b>21.1</b>	<b>-61.3</b>	<b>350</b>	<b>244</b>	<b>339</b>	<b>356</b>	<b>458</b>	<b>336</b>	<b>-36.4</b>	<b>-48.1</b>	<b>-36.4</b>	<b>-34.2</b>	<b>-33.3</b>	<b>-33.7</b>
Northern Europe	83.7	23.3	22.4	5.2	-72.1	-4.1	-73.3	801	392	643	923	↑	847	-35.6	-65.1	-46.1	-32.7	-21.2	-23.1
Western Europe	204.2	79.8	72.4	16.9	-60.9	-9.3	-64.6	545	392	539	545	785	469	-32.1	-50.6	-39.8	-37.1	-21.2	-21.2
Central/Eastern Eur.	153.3	46.7	54.7	12.7	-69.5	17.2	-64.3	124	130	146	143	117	99	-51.3	-52.5	-47.0	-47.6	-53.1	-54.4
Southern/Medit. Eur.	304.0	88.3	138.9	32.4	-70.9	57.3	-54.3	366	242	362	347	523	362	-31.3	-36.1	-22.3	-24.8	-35.0	-34.4
- of which EU-27	540.5	181.4	209.5	48.8	-66.4	15.5	-61.2	430	289	427	458	611	384	-36.8	-47.2	-34.9	-33.2	-35.1	-36.1
<b>Asia and the Pacific</b>	<b>359.6</b>	<b>59.2</b>	<b>20.6</b>	<b>4.8</b>	<b>-83.5</b>	<b>-65.1</b>	<b>-94.3</b>	<b>94</b>	<b>39</b>	<b>96</b>	<b>56</b>	<b>97</b>	<b>179</b>	<b>-90.4</b>	<b>-93.3</b>	<b>-93.9</b>	<b>-91.7</b>	<b>-88.3</b>	<b>-84.2</b>
North-East Asia	170.3	20.3	11.3	2.6	-88.1	-44.1	-93.3	-9	-14	23	-33	-12	8	-94.4	-94.5	-96.6	-95.6	-93.5	-91.8
South-East Asia	138.0	25.5	2.9	0.7	-81.5	-88.8	-97.9	280	109	95	134	381	651	-93.5	-96.5	-97.2	-95.8	-91.9	-84.8
Oceania	17.5	3.6	0.7	0.2	-79.2	-80.2	-95.9	462	301	573	↑	538	296	-82.1	-92.4	-91.6	-83.0	-71.3	-67.6
South Asia	33.7	9.7	5.7	1.3	-71.1	-41.3	-83.1	215	119	143	171	215	677	-59.4	-74.3	-70.8	-59.3	-47.5	-35.4
<b>Americas</b>	<b>219.3</b>	<b>69.8</b>	<b>82.4</b>	<b>19.2</b>	<b>-68.2</b>	<b>18.1</b>	<b>-62.4</b>	<b>112</b>	<b>99</b>	<b>150</b>	<b>117</b>	<b>126</b>	<b>86</b>	<b>-40.1</b>	<b>-51.6</b>	<b>-44.9</b>	<b>-39.6</b>	<b>-32.9</b>	<b>-32.1</b>
North America	146.6	46.5	57.0	13.3	-68.3	22.8	-61.1	98	77	123	107	113	80	-39.2	-47.6	-44.8	-39.4	-33.4	-33.3
Caribbean	26.3	10.3	15.0	3.5	-60.8	44.9	-43.2	89	122	156	86	86	38	-18.4	-28.0	-15.6	-21.7	-11.9	-13.9
Central America	10.9	3.1	4.9	1.1	-71.6	58.1	-55.2	157	188	238	144	163	99	-27.4	-46.1	-30.7	-24.8	-17.4	-12.7
South America	35.4	9.9	5.5	1.3	-72.0	-44.5	-84.5	349	198	302	337	524	464	-63.8	-77.3	-69.4	-61.1	-54.2	-48.1
<b>Africa</b>	<b>68.1</b>	<b>18.8</b>	<b>19.4</b>	<b>4.5</b>	<b>-72.5</b>	<b>3.3</b>	<b>-71.5</b>	<b>156</b>	<b>56</b>	<b>156</b>	<b>170</b>	<b>198</b>	<b>215</b>	<b>-49.9</b>	<b>-65.8</b>	<b>-54.7</b>	<b>-47.8</b>	<b>-49.1</b>	<b>-30.5</b>
North Africa	25.6	5.6	7.0	1.6	-78.2	25.8	-72.6	238	-20	173	224	459	547	-48.2	-82.3	-55.8	-44.3	-49.9	-10.7
Subsaharan Africa	42.5	13.2	12.4	2.9	-69.0	-6.2	-70.9	127	88	149	147	135	125	-50.7	-59.0	-54.2	-49.6	-48.6	-40.8
<b>Middle East</b>	<b>73.0</b>	<b>19.8</b>	<b>18.6</b>	<b>4.3</b>	<b>-72.9</b>	<b>-6.2</b>	<b>-74.5</b>	<b>157</b>	<b>55</b>	<b>126</b>	<b>172</b>	<b>236</b>	<b>200</b>	<b>-54.4</b>	<b>-69.4</b>	<b>-63.5</b>	<b>-51.9</b>	<b>-45.1</b>	<b>-43.5</b>

Figure 4. Distribution of international tourism by sub regions

"UNWTO experts are cautious in their forecasts for the recovery of world tourism to the level of 2019: about 61 % of them see a potential return to the pre-pandemic level only in 2024 or later," – noted in ATOR [6]. Also the recovery of world tourism is complicated by the tense economic and geopolitical situation in the world.

Thus, international tourism is a very important industry for the world economy. The pandemic caused by the COVID-19 virus caused serious damage to this sphere. In 2022, there is a positive trend in tourism compared to 2020 and 2021. However, experts predict a full recovery of international tourism (reaching the level before 2019) only in 2024 or later.

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## THE PRINCIPLES OF OPERATION OF A LEAD BATTERY AND THE PROBLEMS OF ITS DISPOSAL

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**Abstract.** This article describes the principle of operation and properties of lead batteries, their features and applications. The popularity of these types of sources of storage and accumulation of electricity as a short-term supply of high currents is justified today. The problem of battery recycling, technologies and methods for their recycling was also raised. Annual statistics on lead battery emissions are provided.

**Keywords:** lead batteries, operation of acid batteries, recycling, environment, lead, sulfuric acid.

## ПРИНЦИПЫ РАБОТЫ СВИНЦОВОГО АККУМУЛЯТОРА И ПРОБЛЕМЫ ЕГО УТИЛИЗАЦИИ

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**Аннотация.** В данной статье описан принцип работы и свойства свинцовых аккумуляторов, их особенности и области применения. Обоснована популярность на сегодняшний день этих типов источников хранения и накопления электроэнергии в качестве кратковременной подачи высоких токов. Также поднята проблема утилизации аккумуляторов, технологии и методы по их переработке. Приведена ежегодная статистика по выбросам свинцовых батарей.

**Ключевые слова:** свинцовые аккумуляторы, работа кислотных батарей, утилизация, окружающая среда, свинец, серная кислота.

For more than 150 years of history from the creation to the present day, lead-acid batteries are the closest production population among all European systems. Moreover, the global production of lead-acid batteries and batteries annual growth. Low unit cost, high reliability, acceptable characteristics and service life, relatively simple and well-established recycling – all this allows lead-acid batteries to remain on the market, despite the dynamic development and increase in the production of



various lithium systems. It should be noted that these two most common types are rarely found in application, so at the moment there is no serious competition between them.

A few storage cases are consumed by relatively small stocks and have a narrow focus. The main one today is a way of accumulating and storing energy in various types of batteries.

A battery is a device designed to study the concentration of infection, which makes it possible to develop its cyclic operation for charge and discharge. The most important indicators of battery quality indicators are: capacity, voltage, dimensions, weight, size, allowable discharge depth, term, efficiency, operating range, allowable charge and discharge current temperature. It is also necessary to take into account that all manufacturer's specifications are given at high temperature – usually 20 or 25 C.

The amount of energy that can be stored in a battery is called its capacity. In the SI system, the capacity of batteries is measured in coulombs (C); in practice, an off-system unit is often used – ampere-hour (Ah).  $1 \text{ Ah} = 3600 \text{ C}$ . Battery capacity. Currently, more and more batteries consume energy capacity – the energy given off by a fully charged battery when discharged to the lowest allowable voltage. In the SI system, it is measured in joules (J), in practice an off-system unit of measurement is used – watt-hour (Wh).  $1 \text{ Wh} = 3600 \text{ J}$ .

Lead-acid batteries designed for use in autonomous power supply modes have a service life of 300 to 3000 cycles, depending on the type and frequency of discharge. In batteries based on RES, the battery can be discharged much more than in buffer mode. For a long time of service, under cyclic discharge conditions, it should not exceed 20-30 % of the battery capacity, deep discharge – no more than 80 % of the capacity [1].

The principle of operation of a lead-acid battery is shown in figure.

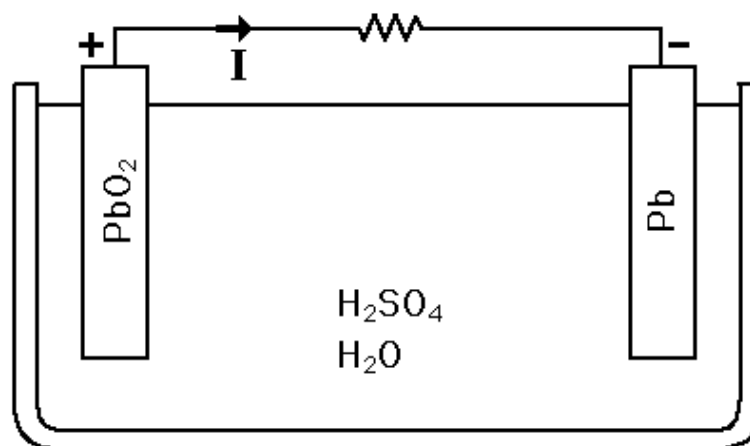


Figure 1. The principle of operation of a lead-acid battery

The main trouble of any battery is deep discharges, which not all devices can handle. If you often allow a full discharge, store the device in a discharged state, or try to connect a powerful consumer, for example, an engine starter using a discharged battery, then it will very quickly become useless for operation due to a decrease in



capacity. Calcium batteries are especially bad at deep discharges – only a relatively small number of such cases can reduce their capacity by up to 80 %. The source of deep discharges is mainly the inactivity of the owner, which can bring the battery to write-off. Often owner just forgets to turn off the power, for example, when the owner leaves the car in the parking lot overnight. In the morning, a deep discharge of the battery is guaranteed. In this regard, in recent years there has been a rapid growth of scientific and industrial interest in the methods of processing lead alloys [2].

To date, the use of lead-antimony and lead-calcium alloys in car batteries is the most common version of acid battery current collectors. A characteristic feature of the production of lead-acid batteries is the use as the main raw material used for the manufacture of parts, expensive and scarce non-ferrous metals – lead, antimony and their alloys.

With positive operational properties, lead in terms of concentration in the air belongs to the 1st hazard class. The environmental situation in the Russian Federation, especially in densely populated regions and large cities, makes us pay attention to the problem of recycling millions of units of lead-acid batteries that fail every year. Experts are concerned not only by the uncontrollable turnover of lead batteries, but also by the use of outdated methods of their processing, accompanied by the formation of harmful emissions – sulfur dioxide, lead sublimates, toxic slags and others.

In Russia, about 3 million batteries are thrown away annually from road transport, which is about 90 thousand tons of lead, 22 thousand tons of sulfuric acid solution and about ten thousand tons of other hazardous components. Thus, used batteries are dangerous for acid and lead poisoning of the environment.

The main goal of recycling used car batteries is to minimize the level of danger of a used product for the environment and ecology.

This can be achieved only with the full processing of batteries, due to which only lead, polymer components, sulfuric acid and other metals remain from the product – all this raw material is quite suitable for reuse and is not thrown into a landfill.

There are two technologies for recycling old batteries:

Manual: It implies a banal disassembly of the battery using improvised means, tools and physical strength. This is a simple method, during which the electrolyte is drained from the battery, the sealing mastic is removed by heating, the top cover is removed, the bores, jumpers are drilled, the lids of the jars are removed, the electrode blocks are removed, etc. Automatic: Dismantling of old batteries in this case is carried out at processing plants using specialized equipment. The process is as automated and safe as possible. Lead and other batteries, as well as conventional batteries, are automatically disposed of.

Pyrometallurgical and hydrometallurgical processing are distinguished by known methods of battery processing. The essence of pyrometallurgical processing: This method of disposal involves melting metal in a special furnace. The advantage of the method lies in its relative versatility. The furnaces can recycle a variety of cells, including organic electrolyte, which contain lithium-manganese batteries. Recycling of this type of battery occurs in stages: recycling also allows you to isolate

other components from the battery: copper, nickel, iron, cobalt, chromium, manganese. The combination of these factors is the main reason for the low prevalence of pyrometallurgical battery disposal. The main disadvantages of pyrometallurgical battery recycling are the low efficiency of recycling and the high probability of the formation of a large amount of waste.

Disposal of batteries by hydrometallurgical method involves leaching of pretreated battery components. After that, a set of physic-chemical effects is performed, the result of which is the isolation of valuable elements and their processing to the stage of a semi-finished product / finished commercial product. Hydrometallurgical processing is a multi-stage and energy-intensive technology with high efficiency. With its help, it is possible to extract up to 99.5 % of the components that are later used for the production of new batteries.

The general algorithm for processing lead batteries is as follows:

1. Removal of electrolyte. With the help of special tools, cans filled with conductive liquid are exposed. Next, the old electrolyte is carefully and systematically pumped out using a pear or syringe. Empty cans are washed with distilled water. After removing the electrolyte, the battery case is closed.

2. Preparation for disposal. Empty batteries are packed tightly on pallets. After full filling, the pallets are sent to the conveyor, which delivers the battery to the crushing plant.

3. Grinding. A machine with a large number of hammers crushes batteries into pieces. The lead-acid paste is separated from the lattice plates using a series of special filters.

4. Flushing of components. The resulting pieces of plastic and metals fall into a tank filled with water. In it, light plastic floats to the surface, and lead and other heavy elements settle to the bottom.

5. Removal of plastic. Surfaced plastic parts are collected from the surface of the water, dried and loaded into containers for transportation to specialized polymer processing plants. There, all the plastic will turn into pellets, which can be put into production again.

6. Acid neutralization. The remaining mass of lead and other components is processed, thanks to which the acid is converted into water and removed.

7. Water purification. The resulting liquid settles in tanks. The resulting precipitate is added to the mixture of lead and metals.

8. Enrichment and drying of metals. Solid waste is enriched with purified coal, and then enters the drying drum for the final removal of moisture.

9. Melting. The metal mass melts in the furnace. Lead purified from impurities of other metals is poured into molds and cools down.

10. The resulting lead and plastic pellets will be used again in the future for the production of new batteries.

Collectively, the processing enterprises of Russia and Moscow, in particular, produce about 200 thousand tons of commercial metal and its alloys obtained from battery scrap [3].

The emergence of new technologies for recycling old batteries allows for a responsible approach to several problems at once: saving the world's lead reserves

and protecting the environment from heavy metal pollution [4]. Hopefully, people will take a responsible approach to the issue of recycling products and products containing heavy metals. After all, the health of the environment directly affects the health of people [5].

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## CAPITAL MIGRATION IN THE CURRENT STAGE OF GLOBAL ECONOMIC DEVELOPMENT

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**Abstract.** One of the most important topics of the world economy is the theory of international capital movement (migration). The article considers the concept of capital migration, its forms, causes and consequences, and analyses the participation of developed countries in international capital migration

**Keywords:** capital migration, investments, lending capital, import merchant, export merchant.

## МИГРАЦИЯ КАПИТАЛА НА СОВРЕМЕННОМ ЭТАПЕ РАЗВИТИЯ ЭКОНОМИКИ

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**Аннотация.** Одной из важных тем мировой экономики является теория международного движения (миграции) капитала. В статье рассмотрены понятия миграции капитала, формы, причины и последствия, а также проведен анализ участия развитых стран в международной миграции капитала.

**Ключевые слова:** миграция капитала, инвестиции, ссудный капитал, импортер, экспортер.

International capital migration is a form of international economic relations that has developed rapidly since the second half of the twentieth century and is now a key element in the functioning of the world economy and the development of other forms of international economic relations.

In other words, it is the investments and subsequent operation of capital.

The process of capital export has evolved into international capital migration at the current stage of development of international economic relations. This is due to the following factors [1, p. 13]:

- Capital exports are carried out by both developed and developing countries;
- Countries can be both exporters and importers of capital;
- Capital exports result in the return of capital in the form of interest, dividends and profits.

Capital has become significant and fluid in the twenty-first century. The global crises have contributed to its fluidity. Over the past decade, capital flows have been transformed by the 2008 economic crisis, economic and technological change, and the COVID-19 pandemic.

This form of international economic relations is comparable in volume to foreign trade. For example, exports of goods and services were \$24.73 trillion in 2019, \$22.36 trillion in 2020, and \$27.93 trillion in 2021, export of capital was \$10 trillion [2]. The lag between capital flows and external trade is due to its contraction and slower ability to recover from the crisis.

Capital is exported principally with the aim of increasing profits [2]. At the same time, the investor seeks the security and liquidity of the placement of his funds and the desire to reduce his risks. Hence, the acquisition of less profitable and no less risky assets abroad in order to diversify their assets by balancing the risks available in the capital exporting country. An example is the expansion of Russian oil companies abroad into countries with less rich deposits and a less stable political regime.

Table 1 – Capital migration types

<i>Characteristics</i>	<i>Capital migration type</i>
By source of origin	- official capital flows - private capital flows
By function	- enterprise capital - loan capital
By purpose of investment	- direct investments - portfolio investments - international lending - economic support

The irregularity of economic development of countries is the basis of international capital migration is, namely [1, p. 27]:

- the mismatch between the supply of and demand for capital in different countries;
- the irregularity of capital accumulation in different countries.

The main causes of international capital movements are:

- the mismatch between the objects of demand and supply of capital in countries;
- exposure to the scientific, technological and managerial experience of other countries

- the desire to enter the markets of countries that have set high tariffs and duties, as well as tariff restrictions (if a country sets customs restrictions on imports of any goods, capital begins to migrate);
- cheaper raw materials and workforce;
- lower transport costs;
- low environmental standards in the country to which the capital is transferred;
- anti-monopoly legislation;
- stable political environment and pleasant climate in the host country.

Loan capital exported abroad is represented by loans, borrowings, lending as well as bank deposits. In this case, the capital is eventually repaid.

Direct investment is investment with a view to the participation of the investor in the management of the enterprise and the production of income from its activities [3, p. 33]. This usually requires the acquisition of a majority shareholding.

Portfolio investments are investments in the securities of foreign enterprises without the possibility of participating in their management.

A separate form of capital migration is international aid. These are concessional loans, non-repayable loans, aid in the form of goods or services, mainly provided through public funds.

Capital migration is of great importance for the development of the world economy and the economies of individual countries. The volume of production and foreign trade turnover is growing, economic development is accelerating, foreign economic relations are strengthening, the competitiveness of goods is increasing and the international division of workforce is developing.

The movement of capital plays a stimulating role in the world economy and has various effects on it [1, p. 42].

Table 2 – Impact of capital flows on national economies

	<i>Impact of capital flows on national economies</i>	
	<i>positive</i>	<i>negative</i>
Importers	<ul style="list-style-type: none"> <li>- economic growth;</li> <li>- job openings;</li> <li>- attraction of new technologies;</li> <li>- improved balance of payments;</li> </ul>	<ul style="list-style-type: none"> <li>- a threat to the economic security of a country;</li> <li>- pollution of the environment;</li> <li>- sale on the market of goods that have already passed their life cycle;</li> <li>- loan capital leads to an increase in the country's foreign debt;</li> </ul>
Exporters	<ul style="list-style-type: none"> <li>- generate additional profits;</li> <li>- develop new markets;</li> <li>- strengthen economic and political security.</li> </ul>	<ul style="list-style-type: none"> <li>- a slowdown in economic development;</li> <li>- a decline in employment;</li> <li>- negative impact on the country's balance of payments.</li> </ul>

The consequences of international capital movements are different for developed and developing countries.

Public policy has to find trade-offs in the contradictory process of capital migration by prioritizing its objectives [1, p. 12].

In terms of the territorial and geographical structure of capital migration (both capital imports and exports), developed countries dominate.

The main participants of this market are Western Europe, the USA and Japan/

Western Europe, especially Germany and France, has been the leader in capital migration since the post-war period. The USA has become the leading importer of capital from the EU, with half of its investment coming from the UK. France and Germany follow the UK. Of the investment flowing from the USA to Europe, 2/3 comes from the UK [4].

In terms of investment as a percentage of Gross Domestic Products (GDP), the main exporters are Japan, Switzerland and Taiwan. The main importers are the USA and the UK.

The USA is the biggest player among the developed countries, both in terms of the investment it attracts and the amount of capital it exports. However, the USA has recently turned from an exporter to a net importer.

In 2019, France emerged as the leader in attracting direct investment, while pan-European activity was modest. This was due to low economic growth and uncertainty surrounding Brexit. France was able to achieve these results thanks to labour law and tax reforms, which were well received by investors [5].

A large flow of developed-country investment is directed towards Asia and Latin America, primarily because of cheap workforce.

Direct investment flows in large volumes to secondary industry and services, and in smaller amounts to extractive industries.

An important recent trend in capital migration is that there is a struggle to attract capital, especially to attract capital to the textile and wearing-apparel industry in developing countries. The main flow of developed-country investment is towards Asia and Latin America, primarily due to cheap workforce.

Recently there has been an increase in the flow of foreign capital to Eastern European countries, former socialist countries such as Poland, Ukraine, Georgia and Moldova.

It should also be noted that the share of developing countries in international capital migration, both in exports and imports, is increasing rapidly, although it is still low. Sufficient capital hasn't been accumulated for capital exports and insufficient development for imports yet.

Thus, in 2020, foreign direct investment inflows from developed countries fell by half compared to 2019 and were below the level of developing countries [3, p. 7].

The COVID-19 crisis has led to a rapid decline in foreign direct investment. Global flows fell by 35 % from \$1.5 trillion in 2019 to \$1 trillion in 2020. This is 20 % below the 2009 low, where the decline was caused by the global financial crisis. The decline was mainly in developed countries, where direct investment flows fell by

58 %. The decline in direct investment in developing countries was 8 %, due to sustained investment flows to Asian countries. As a result, developing countries accounted for 2/3 of global investment in 2020, compared with just under half in 2019 [2].

In conclusion I would like to point out that a completely the situation is very different for new projects, which are important for developing countries. New project announcements fell by 42 % in developing countries and by 19 % in developed countries. Investments in new projects continued the negative trend in 2020 and 2021. The most important factor in attracting capital in the form of new projects in developed countries is advanced digital technology and the availability of skilled professionals.

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## ABOUT NEW CHALLENGES AND THREATS TO INTERNATIONAL SECURITY SYSTEMS

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**Abstract.** The paper examines various definitions of international security, the fundamental principles and important tools to ensure it. Several levels of international security are identified and new challenges and threats that may arise are described. New challenges and threats in the international security system are complex and ambiguous. To combat them, States must work together and cooperate at the international level. The article also presents measures to combat threats to the international security system.

**Keywords:** international security, instruments of international security, levels of international security, principles, threats.

## О НОВЫХ ВЫЗОВАХ И УГРОЗАХ СИСТЕМЫ МЕЖДУНАРОДНОЙ БЕЗОПАСНОСТИ

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**Аннотация.** В работе рассматриваются различные определения международной безопасности, основополагающие принципы и важные инструменты ее обеспечения. Выделяются несколько уровней международной безопасности и описываются новые вызовы и угрозы, которые могут возникнуть. Новые вызовы и угрозы в системе международной безопасности представляются сложными и неоднозначными. Для борьбы с ними государства должны работать вместе и сотрудничать на международном уровне. В статье также представлены меры по борьбе с угрозами системы международной безопасности.

**Ключевые слова:** международная безопасность, инструменты международной безопасности, уровни международной безопасности, принципы, угрозы.

In the modern world, the international security system is facing new challenges and threats that arise due to various reasons and can have a serious impact on the world order as a whole. The relevance of this topic is due to the fact that over the past decades the world has increasingly begun to face new emerging processes of a global nature, new challenges and threats that actively influence the change in all spheres of society. Global processes have a significant impact on the emergence of more dangerous threats, not only for the international legal order, but also for international security in general. These challenges and threats have become increasingly complex and ambiguous, and require new approaches and solutions to ensure international security.

There are several definitions of the concept of “international security” given by various international organizations. The UN defines international security as a state in which there are no threats and challenges that could lead to conflicts between states or disruption of the world order. The Ministry of Foreign Affairs of the Russian Federation gives the following definition: it is a system of measures aimed at ensuring peace and stability in it, as well as at preventing threats and challenges that could violate international security. The European Union, in turn, emphasizes that this is a state in which states cooperate with each other within the framework of international organizations and rules in order to prevent threats and challenges that may violate international security [1].

From the presented definitions of international security, we can conclude that this concept has many different interpretations and approaches. However, all definitions indicate that international security is a state in which states do not feel threatened by their security from other states, terrorist organizations, cyber attacks and cyber crimes, international conflicts and wars. In addition, all definitions point to the need for cooperation between states to achieve international security.

To resolve conflicts and prevent threats in the world community, various instruments of international security are used:

- states – the main participants in international relations and subjects of international law;
- international organizations – are organizations created by states to cooperate in various fields, including international security;
- international treaties and agreements – are documents that regulate the behavior of states towards each other, they can cover various aspects of international security, such as control over nuclear weapons and the fight against terrorism;
- principles of international security;
- measures to prevent and combat threats – actions that are taken to prevent and combat threats.

Thus, it should be noted that ensuring international security is a complex and multifaceted process that requires cooperation and coordination between states and international organizations [2].

Depending on the scale of manifestation, several levels of international security can be distinguished (Figure).

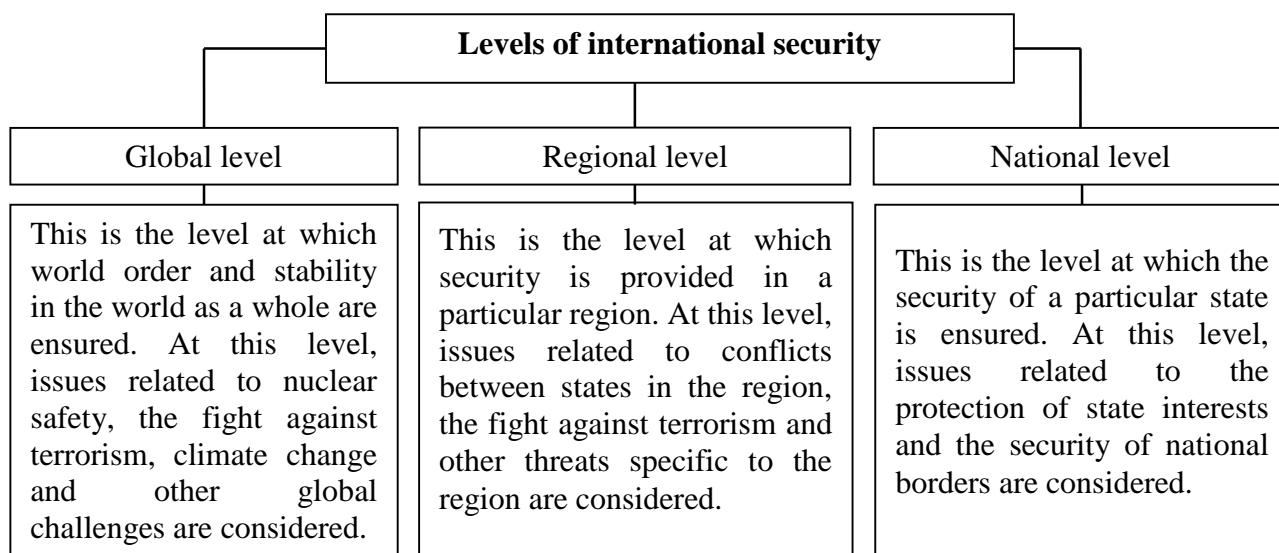


Figure. Levels of international security

Each of these levels of international security has its own characteristics that can be applied to ensure peacetime security and conflict resolution. Solving problems at one level can have an impact on other levels, so it is important to take into account all aspects and take comprehensive measures to ensure international security.

International security, as one of the main components of the modern world, is based on the basic principles that determine relations between states. International security covers a wide range of issues, from the fight against terrorism to the protection of the environment. However, to understand international security, it is necessary to understand the basic principles that underlie it. Table 1 presents the principles of international security that are recognized by the international community [3].

Table 1 – Principles of international security

<i>Principle</i>	<i>Description</i>
Sovereign equality of states	Each state has equal rights and obligations in the international community.
non-aggression	States must not use force or the threat of force against other states.
Non-intervention in internal affairs	States must not interfere in the political, economic or social affairs of other states. Violation of this principle can lead to conflicts and tensions between states.
Resolving conflicts peacefully	To achieve peace and stability in the world, states must use diplomatic and peaceful methods of conflict resolution, such as negotiations or arbitration.
Cooperation and interdependence	States must be aware that they are interdependent on each other and that their actions may affect other states and the world community as a whole.
Respect for human rights	Respect for human rights and fundamental freedoms is an integral part of international law. States must respect human rights and fundamental freedoms such as freedom

	of expression, freedom of conscience, freedom of assembly and association, and the rights to equality and justice.
Navigation safety	States must ensure the safety of navigation and combat piracy.

Based on the above table, we can conclude that the principles of international security are an important element of international relations and international law. They define relations between states and help prevent conflicts and wars. The principles and threats to international security are closely linked.

The system of international security is fundamental for the existence of peace and the stability of global relations and is considered as a separate aspect of international relations, which is based on the concentration of most states on the norms and principles recognized by society in world law.

Challenges and threats in the context of international security are various factors that can disrupt international stability and security. Among the modern challenges and threats on the world stage, one of the most relevant is the use of force on a global scale, and not always by official state structures. Also, various types of conflicts include civil wars, territorial disputes, international extremism, environmental threats, terrorism, cyber attacks, pandemic threats and international conflicts (Table 2).

Table 2 – Threats to the international security system

<i>Threat</i>	<i>Description</i>
The threat of international terrorism	Terrorism has become one of the main challenges to the international security system. It leads to a threat to human life, destruction of infrastructure and crisis situations in society. The most sinister form of terrorism is international terrorism, which is carried out by international organizations and may include the use of weapons of mass destruction.
Cyber security threat	With the development of information technology, cybersecurity has become one of the key tasks of the international security system. Cyberattacks can lead to disruption of government and commercial structures, theft of personal data and funds, and other serious consequences.
Threat of nuclear proliferation	Nuclear weapons remain one of the main challenges to the international security system. The proliferation of nuclear weapons can lead to a threat to world peace and security, as well as to a violation of the balance of power in world politics.
Threat to environmental safety	Environmental problems have become one of the main challenges to the international security system. Climate change, environmental pollution and the destruction of natural resources lead to environmental crises and threats to

	human life.
Threat of pandemics and diseases	In the light of recent global pandemics such as COVID-19, diseases have become one of the new challenges for the international security system. Diseases can lead to mass loss of life, disruption of the economy and social order, and cause international crises.
The threat of global economic instability	The current situation in the world economy leads to instability and possible crises. This, in turn, can lead to social tensions, injustice and international conflicts, which undermine the system of international security.
Threat of nationalism and extremism	Nationalism and extremism can lead to a rift between states and disruption of the international order. These tendencies can cause a threat to security at the global level, exacerbate social problems and ethnic conflicts.

Drawing a conclusion from the above table, we can say that all of the above challenges and threats are associated with changing global trends and require joint efforts on the part of the international community [4].

There are many measures to prevent and combat threats to international security (Table 3).

Table 3 – Measures to combat threats to international security

<i>Measure</i>	<i>Description</i>
Diplomatic efforts	Using diplomatic channels to resolve conflicts and resolve disputes between states.
International law	Compliance with international law and norms such as the Universal Declaration of Human Rights, the Geneva Conventions and other international treaties.
International organizations	Actions of international organizations such as the UN, NATO, OSCE and others to coordinate efforts to prevent and combat threats to international security.
Economic sanctions	The use of economic sanctions to put pressure on states that violate international law or pose a threat to international security.
Intelligence and counterintelligence	The use of intelligence and counterintelligence services to collect information about potential threats to international security and prevent their implementation.
Cybersecurity	Protection of information systems and networks from cyber attacks and cyber crimes that may pose a threat to international security.

These are just some of the measures that can be used to prevent and combat threats to international security. Each situation requires an individual approach and a combination of measures in order to achieve the best result. It is also important to take into account the opinions and interests of all interested parties and strive for a peaceful resolution of conflicts [5].

Thus, we can conclude that new challenges and threats to the system of international security have become more and more complex and ambiguous. To combat all these threats, states must work together and cooperate internationally. This may include the creation of international organizations and agreements, the exchange of information and technology, and peace negotiations and diplomatic efforts to resolve conflicts. Solving these problems requires new approaches and international cooperation. To achieve global stability and security, it is necessary to develop dialogue and interaction between states and organizations, strengthen international law and institutions, and improve technologies and approaches in the field of security.

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## FIREFIGHTER'S PROTECTIVE EQUIPMENT WHEN WORKING IN A GASSY ATMOSPHERE

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**Abstract.** This article describes the basic means of protection for firefighters when working in a gassy atmosphere, the importance of ensuring the safety of firefighters while on duty in a gassy atmosphere. Measures to train firefighters in the proper use of protective equipment and safety techniques are discussed, as well as the need for quality and reliable equipment.

**Keywords:** safety, firefighters, fireman's protective gear, fireman's outfit, gassy atmosphere.

## СРЕДСТВА ЗАЩИТЫ ПОЖАРНОГО ПРИ РАБОТЕ В ЗАГАЗОВАННОЙ АТМОСФЕРЕ

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**Аннотация.** В статье описываются основные средства защиты пожарных при работе в загазованной атмосфере, важность обеспечения безопасности пожарных во время выполнения служебных задач в условиях загазованной атмосферы. Рассматриваются меры по обучению пожарных правильному использованию средств защиты и технике безопасности, а также необходимость обеспечения качественной и надежной экипировкой.

**Ключевые слова:** безопасность, пожарные, средства защиты пожарного, экипировка пожарного, загазованная атмосфера.

Working in a gassy atmosphere poses a serious danger to human life and health. Firefighters who frequently encounter such conditions must be particularly

attentive to their safety and the use of personal protective equipment. In this article, we will review the types of firefighter's protective equipment, the specifics of their selection, and the rules for their use, to ensure maximum safety when working in a gassy atmosphere.

Threats to the health of firefighters can be associated with the presence of harmful gases, fumes, and smoke in the air, which can cause poisoning, smoke inhalation, and fire. When working in these conditions, special care must be taken in the use of protective equipment, as improper use or lack of the necessary equipment can lead to serious consequences, including injury or even death.

Firefighter's protective equipment allows you to minimize all risks as well as provide maximum protection for possible negative consequences. Firefighter protective equipment can include various types of masks, suits, gloves, goggles, and other devices that help protect the respiratory system, skin, and eyes from harmful substances and high temperatures. Without the use of protective equipment, a firefighter risks his or her life and health, so the proper selection and use of this equipment is critical to successfully working in a gassy atmosphere.

There are several types of firefighter's protective equipment that are used depending on the specific situation:

1. Breathing apparatus and masks – designed to protect the respiratory system from harmful substances and gases. Depending on the type of mask, they may have different filters and valves that provide reliable protection. They are intended for individual protection of respiratory organs and vision of a fireman against harmful influence of unsuitable for breathing, toxic and smoky gas environment during extinguishing fires in buildings and constructions and at production facilities, as well as during other kinds of emergency works in different branches of economy at ambient temperature from –50 to +60 degrees Celsius. As a rule, personal respiratory protection equipment consists of:

1. Suspension system for securing the component parts.
2. An air cylinder with a valve.
3. Reducer for the air pressure conversion.
4. Automatic lung machine for automatic air supply; Panoramic mask with continuous airflow.
5. Air pressure reducer.
6. Lung machine for automatic airflow.
7. Panoramic mask with continuous air supply.
8. Signaling device to alert you to insufficient oxygen in the cylinder.
9. Adapter for rescue device.

Approximate appearance of breathing apparatus with a mask is shown in Figure 1 [1].





Figure 1. Exterior view of a breathing apparatus with a mask

Protective suits (PS) and gloves – used to protect the skin from high temperatures and chemicals. The suits are usually insulated and have a protective layer that prevents the penetration of liquids and gases. A firefighter's suit includes a hooded jacket and pants (or dungarees). There are various requirements for firefighter's clothing, which must be taken into account by the manufacturers. In order not to restrict movement and not to cause discomfort to the personnel, the jacket should be selected so that its length not more than 300 mm covers the pants. There should be no seams on the sleeves. According to the rules, all fittings placed on the protective clothing must not come into contact with the inner part of the thermal insulation layer. This is necessary to increase the thermal insulation qualities. The presence of fluorescent and fluorescent strips (5 cm wide) is mandatory to indicate their presence in poor visibility conditions. PS has a significant amount of padding (on the back, sleeves, chest, bottom of the jacket, shoulder belt). There is also a reflective inscription with the name of the fire department. It is perfectly visible in poor visibility. Protect your face from open flames helps hood, which is going to a special ribbon. The size of the hood allows you to put it on a helmet. The clothing has a stand-up collar 10 cm in height, on the inside of which is a special padding, which has no adverse effects on the skin and meets all the necessary requirements. To carry the radio station there is a roomy pocket on the twist, as well as all other pockets, it has holes for water drainage and fasteners.

The following requirements must be met when using the PS.

1. Use only for its intended purpose.
2. PS should be suitable for the height and size of the firefighter.
3. Do not use without special head, arm and leg protectors.
4. Do not use without insulating padding.
5. PS must have the appropriate safety certificate.

The appearance of the protective suit is shown in Figure 2 [2].



Figure 2. Appearance of the protective suit

2. Goggles and helmets – Designed to protect the firefighter and provide head and eye protection from exposure to elevated temperatures, mechanical shocks, and corrosive environments. The internal equipment of the helmet includes:

1. The chin strap, which, together with the other elements of the inner equipment, ensures a secure fixation of the helmet on the head.
2. The headband strap, designed to adjust the size of the inner harness to the circumference of the head.
3. The side straps that adjust the angle of the helmet to the horizontal.
4. The mesh suspension system, which is the main element of load distribution and kinetic energy absorption upon impact.
5. A belt-catcher system duplicating the suspension system to provide a safe vertical impact clearance.
6. An insulating cap that serves to protect against thermal influences.

The appearance of the helmet with goggles is shown in Figure 3 [3].



Figure 3. Appearance of the helmet with goggles

Also for the work of firefighters are necessary means of communication, which ensure communication between members of the firefighting team and allow a rapid response to changes in the situation and firefighting equipment, which includes various types of fire extinguishers, fire hoses and other tools that help quickly and effectively extinguish fires [4, 5].

The total weight of all necessary equipment can reach up to 40 kg. Therefore, in order not to complicate the already physically demanding work, it is necessary to choose carefully the means to be used in a particular case of extreme situation. Features of the choice of means of protection of the firefighter include:

1. Type of fire – different types of fires require different means of protection. For example, a building fire with a lot of smoke requires masks and breathing apparatus, while an open space fire requires protective suits and gloves.

2. Presence of hazardous substances – If there are hazardous substances in the building, you need to use specialized protective equipment that will provide reliable protection from their effects [6].

Proper selection and use of firefighter's protective equipment requires firefighters to be trained and educated so that they can use the equipment effectively in any situation. In general, the selection of firefighter protective equipment is the most important step to ensure firefighter safety and successful firefighting [5]. There are rules for the use of any protective equipment, but to summarize, the following rules can be identified:

1. Before use, the condition and integrity of the means of protection should be checked so that it does not compromise the safety of firefighters.

2. It is necessary to properly put on and fasten the means of protection, following the manufacturer's instructions.

3. When masks and breathing apparatus are used, care should be taken to ensure that they are working properly and that filters and batteries are replaced in a timely manner.

4. When working in high temperature environments, monitor the temperature of the protective equipment and its ability to provide protection at that temperature.

5. When using protective suits, care must be taken to ensure that they are not damaged and do not allow fire or hazardous substances to enter.

6. Protective equipment should be properly stored and maintained so that it will remain functional and will not impair the safety of firefighters.

7. It is important to follow the manufacturer's instructions and recommendations when selecting and using firefighter's protective equipment [7].

Thus, the proper use and maintenance of protective equipment is essential to the safety of firefighters in the performance of their duties. Firefighters should follow the manufacturer's instructions, monitor the performance of the protective equipment, and store it properly. Only then can firefighters be effectively protected from fire hazards.

In addition, it is important to remember to regularly train firefighters in the proper use of protective equipment and safety techniques in the performance of duty tasks. Training should be provided both in the training of new firefighters and in periodic refresher training. It is also equally important to provide firefighters with

quality and reliable equipment that meets current standards and safety requirements. In general, ensuring safety and properly training firefighters are important aspects of any fire department's regulatory agencies. It requires constant attention and effort on the part of management, firefighters, and protective equipment manufacturers. Only by a joint effort on the part of management, firefighters, and protective equipment manufacturers can maximum effectiveness be achieved and risks to the lives and health of firefighters be minimized.

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## YOUTH AWARENESS AND PERCEPTION OF SOCIAL ADVERTISING

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**Abstract.** The article describes the effectiveness of social advertising for young people and the emotional and behavioral responses it generates. The paper highlights a shift towards a more positive-based style of social advertisement and issues general recommendations for advertising development.

**Keywords:** social advertising, effective advertising, youth perception, negative social phenomena, emotional response, “fight, flight or freeze”.

## ОСВЕДОМЛЕННОСТЬ И ВОСПРИЯТИЕ МОЛОДЕЖЬЮ СОЦИАЛЬНОЙ РЕКЛАМЫ

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**Аннотация.** В статье описывается эффективность социальной рекламы в отношении молодежи и провоцируемая ею эмоциональная и поведенческая реакция. Делается упор на переход к социальной рекламе, основанной на положительных эмоциях, даются общие рекомендации по развитию подобной рекламы.

**Ключевые слова:** социальная реклама, эффективная реклама, восприятие молодежью, социально-негативные явления, эмоциональная реакция, «бей, беги или замри».

Society is far from ideal: in our life we may encounter various social problems. It is in the interests of the government, non-profit organizations and, above all, ourselves to make it more ethical and morally developed. The key role of youth in a progressive society is becoming more and more obvious today; this social group aged 14 to 35 [1] makes up about 30 % of the Russian population [2]. Young people are also prone to suggestibility and copying the behavior that is not always positive. According to the All-Russia Public Opinion Research Center (VCIOM), almost half of young people believe that they tend to copy other people’s judgments or actions (45 %) [3]. One of the ways to promote ethical fundamental behavior that will help a

person make the right choice is social advertising (public interest advertisement or public service announcement).

The research is aimed at evaluating the effectiveness of social advertising for young people and the emotional and behavioral response it generates. Also, we want to highlight a shift towards a more positive-based style of social advertisement and issue general recommendations for advertising development.

In order to ascertain youth awareness of social advertising and its effectiveness, we resorted to conducting a quantitative study. This study took the form of an online survey at the end of 2021. The survey covered 96 people from different regions of Russia aged 14 to 35 years. The results were analyzed using the methods of graphical representation of data and descriptive statistics. The research determined that young people perceive social advertising as non-commercial advertising that draws attention to acute social problems, triggers a big emotional response and motivates a person to take a certain action; this definition is a result of compiling the definitions offered by all respondents.

The most significant topics for young people proved to be environmental problems (85 %), low income and unemployment (64 %), demographic problems (29 %) and drug addiction (27 %). At the end of 2021, the most memorable advertising topic of the year was obviously the topic of coronavirus preventive measures. Also, almost 46 % of young people believe that social advertising only partially copes with the issues, 27 % claim that social advertising is not an effective way to provide solutions to social problems. Our analysis has shown that after viewing ads, 51 % of respondents have never altered their behavior pattern, 28 % have done it at least once. In terms of emotions, all social advertising evokes mostly anxiety (41 %), compassion (28 %) and indifference (23 %).

It has to be said that the results of the online survey cannot represent the process of social advertising influence on human emotions; five interviews complemented the results of the quantitative research. We have conducted the narrative and the content analyses of the interviews. The narrative analysis has revealed that the process of perception of social advertising begins with drawing the attention of the respondent to the advertisement: often it is a video on social media that cannot be missed and must be watched, or a catching image on a poster. As for the interviewees' emotions, all reactions come down to anxiety or regret for one's own life or for someone else's.

In stressful situations our brain responds in one of the three basic psychological ways – “fight, flight or freeze response” [4]. The reaction and influence algorithm looks like this: a person sees a social advertisement; an instant stress reaction occurs; then a person can behave in one of the two ways: take thought or remain indifferent. Based on the survey, it was revealed that 20 % of people remain indifferent to social advertising; they believe that this problem does not concern them, or advertising did not affect them at all. In 80 % of cases, social advertising affects and excites a person, and for some time he thinks about the negative social phenomenon.

The results of content analysis have shown that people classify social advertising into “positive” and “negative”. The process of perception of “negative” advertising is shown in Figure 1: when people see shocking frames, they experience a

very strong feeling of anxiety and compassion, which stuns and makes them think; the emotional “hit” comes from feelings of fear and remorse. This advertising works at the level of basic human needs for security and is based on the principle “if you don’t do this, you will feel bad”. What behavioral response does it generate? Some people choose to forget, others get distracted by current affairs, while still others remember it and take action.

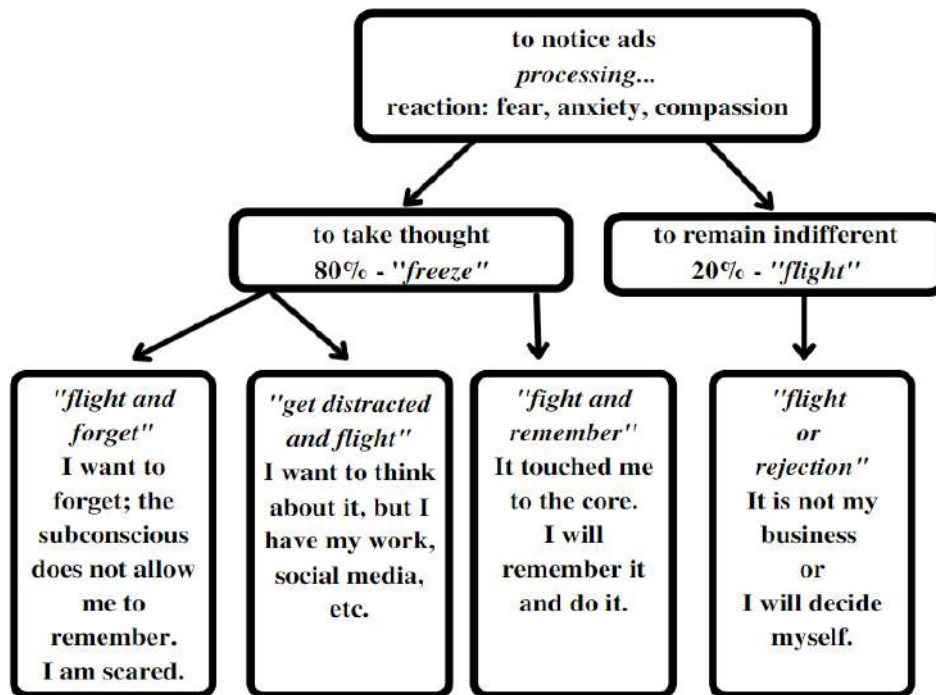


Figure 1. The process of perception of “negative” advertising

However, there is a tendency for interviewers to better perceive “positive” advertising, one that can cause not only anxiety, but also injects humor or offers stories from real life to inspire and support people. Such advertising also generates the positive response of astonishment and interest as presented in Figure 2. Here the process is based on secondary needs for recognition and self-expression, manifestation of altruism and love for yourself and others. The core principle of such advertising can be described as “if you do this, you will feel good”. This more positive-based style of social advertisement does not scare young people and more of them decide to reflect on the problem.

Based on the data from the interviews and the survey, we can issue recommendations for development of social advertising. Firstly, it is most effective to do social advertising online, in photo or video format. Secondly, it is important to establish a balance between “positive” and “negative” social advertising, the exact ratio depending on the topic. The “negative” format can be used for indifferent people, capturing them with shock and anxiety, and the “positive” format will help to affect people who tend to get distracted or subconsciously want to get away from problems. Thirdly, it is necessary to keep advertising simple and concise, choosing motivational phrases and pictures to demonstrate the importance of the issue.



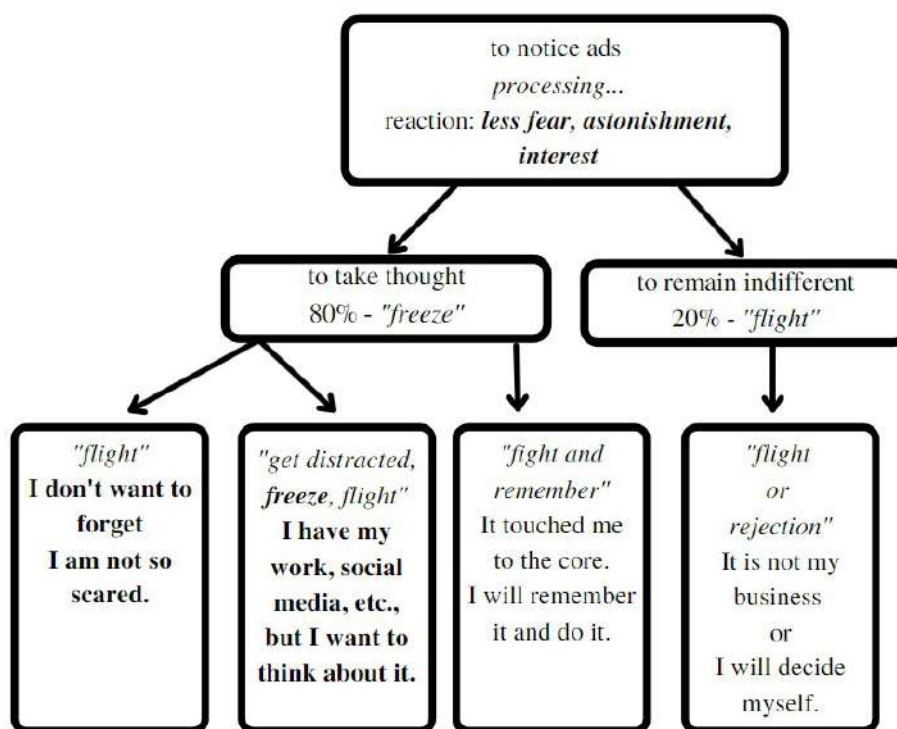


Figure 2. The process of perception of “positive” advertising

Therefore, it can be concluded that social advertising can have an impact on young people though this impact is still quite low. By applying the best ways to deliver advertising messages, connecting advertising formats and shifting towards a more positive-based style, well-designed social advertising will be able to convey the message to young people and motivate them to perfect themselves and the society around them.

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**DIALOGUE OF CULTURES AS A KEY FACTOR IN THE DEVELOPMENT OF GLOBAL CULTURE (BY THE EXAMPLE OF K. L. KHETAGUROV'S PUBLIC ACTIVITIES)**

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**Abstract.** Based on factual material, the article reveals K. L. Khetagurov's historical role in the development of enlightenment, education, aesthetic education of the mountaineers of the Caucasus. In a number of his works, the writer draws the attention of society to the discrepancy between schools and the requirements of the time. K. L. Khetagurov did not confine himself to the issues of preserving and increasing educational institutions, he also paid attention to the organization of educational work in them.

**Keywords:** Khetagurov, public figure, educator, education, dialogue of cultures.

**ДИАЛОГ КУЛЬТУР КАК КЛЮЧЕВОЙ ФАКТОР РАЗВИТИЯ ГЛОБАЛЬНОЙ КУЛЬТУРЫ (НА ПРИМЕРЕ ПРОСВЕТИТЕЛЬСКОЙ ДЕЯТЕЛЬНОСТИ К. Л. ХЕТАГУРОВА)**

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**Аннотация.** В статье на основе фактического материала раскрывается историческая роль К. Л. Хетагурова в вопросах развития просвещения, образования, эстетическом воспитании горцев Кавказа. В ряде своих работ писатель обращает внимание общества на несоответствие школ требованиям времени. К. Л. Хетагуров не ограничивался вопросами сохранения и приумножения учебных заведений, он обращал внимание и на постановку учебно-воспитательной работы в них.

**Ключевые слова:** Хетагуров, общественный деятель, просветитель, образование, диалог культур.

The relevance of the topic is due to the fact that at present Russia is actively searching for a national idea. We believe that the revival of cultural dialogue between representatives of different nationalities in Russia can become a worthy analogue of modern Western models that are being aggressively planted in Russian society. The joint glorious past of the multinational Russian society gives us the opportunity for a

confident future. Outstanding public figures, writers, educators, scientists, who laid the foundations of the all-Russian identity, were the bearers of the ideas of humanism, tolerance, and friendship between peoples. In this regard, it is difficult to overestimate the activities of Kosta Levanovich Khetagurov, an Ossetian educator, poet, artist, and public figure who made great efforts to change social inequality in the North Caucasus.

The study of K. L. Khetagurov's creativity and his influence on the revolutionary educational views are devoted to the works of V. I. Abaeva, S. A. Aylarova, V. A. Blazhko, Z. N. Vaneeva, K. E. Gakkaeva, V. Zagieva, B. A. Kaloeva, M. S. Totoeva and others, who noted that the poet of friendship of peoples, writer-fighter and internationalist Kosta Khetagurov, with all his work, with his very life, fully justified the noble mission of a friend and defender not only of his native people, but also of many other peoples [1, p.74-98]. Alexander Fadeev, who highly appreciated the versatile talent of Kosta Khetagurov, called him a kind of Leonardo da Vinci of the Ossetian people [1, p.189].

Only boundless love for the working people, only the ardent desire of "a great citizen to do everything possible for the happiness of the people could give such a person as Kosta Khetagurov. So much will, so much emotional strength and bold daring was laid in him that he managed to be at the same time a poet, prose writer, playwright and artist, ethnographer, publicist and public figure. Kosta Khetagurov's predecessors were the first educators and public figures of Ossetia of the last century. He also had contemporaries who had undeniable merits. But none of them was able to give what he gave with his versatile talented creativity, remarkable in form and content, in revolutionary spirit and humanity, in effective educational influence on the broad masses of working people.

Kosta Khetagurov is the founder of Ossetian fiction and the Ossetian literary language, the creator of the multifaceted culture of the Ossetian people. He is a thinker, a revolutionary democrat who devoted his whole fiery life to serving the working people. Costa's life is a constant struggle. The noble aspirations of Khetagurov are especially understandable in our country, in the country of humanism and creation, which is why the Russian people so honor the memory of the great fighter and thinker. Marietta Shaginyan calls Kosta Khetagurov the moral conscience of the people, who not only created, but also tirelessly sought to put into practice their liberation ideas, which are distinguished by high social purposefulness [1, p. 77].

In his poems "Before Judgment" (1893), "Weeping Rock" (1894), in the collection of poems "Autumn Lyre" (1899), Kosta Khetagurov raised topical problems of the social, political and spiritual life of the North Caucasian peoples. The poem "Fatima" (1889) is dedicated to the transition from the era of feudal-clan relations in the life of the highlanders to the period of reforms. At this time, the consciousness of a mountain woman, deprived of civil rights for centuries, begins to wake up. On the example of this courageous woman, Costa showed us the moral foundations of the mountain woman and her difficult lot. He called on society to rise up to protect women and their education. Khetagurov is one of the few who fought for women's emancipation.

In 1891, the Georgian exarch closed the women's shelter in Vladikavkaz, which trained teachers for mountain women, which caused discontent among the advanced public of the Terek region, which protested against the brutal arbitrariness of the authorities. The Association of Progressive Intelligentsia, headed by K. L. Khetagurov, petitioned the Viceroy of the Caucasus, Grand Duke Mikhail Nikolayevich, with a request to preserve this school, so necessary not only for the Ossetians, but for all the peoples of the Caucasus. A submission was also drawn up and sent to the Chief Prosecutor of the Synod, who granted the request. After some time, the school was returned to the highlanders [2, p. 126].

Costa's attention was also drawn to the education of children in Karachay. In the archives of the department of local history literature and bibliography of the Stavropol Regional Universal Scientific Library named after M. Yu. Lermontov, there is an article written by K. L. Khetagurov in defense of the rights of Karachay teachers. The true humanism of the national Ossetian poet is fully visible in the text of this article, when the Orthodox Costa is sincerely indignant about the difficult working conditions of Muslim teachers: children from auls scattered over the gorges do not have to run half-naked to school in the winter in the frost. Teachers of these schools receive 600 rubles. (50 rubles per month) with an apartment, servants, heating and lighting. The school building in Uch-Kulan is large, two-storied, built under the former district chief Petrushevich... the same schools as in Karachai are needed”.

In the article “On the Eve”, Kosta Khetagurov, exposing the colonial policy of tsarism, pointed out the progressive significance of the annexation of the Caucasus, including Ossetia, to Russia: “Over the past half century, Russian influence in the Caucasus has so changed the identity of the natives, and in particular Ossetians, that the last the word persona (Ossetianism. – Auth.) began to characterize a backward phenomenon that does not meet the modern requirements of life. A correct and comprehensive study of the Caucasian natives in connection with their past is a very significant factor in the most successful development of the region”.

In his works, such as “The Troubles of the North Caucasus”, “The Development of Schools in Ossetia”, the writer draws the attention of society to the inconsistency of schools with the requirements of the time, especially those that belong to the Spiritual Department, the tasks of teaching and educating young fellow citizens. These educational institutions did not provide knowledge, but also were in their appearance “more like a barn than educational institutions” [3, p. 26].

K. L. Khetagurov did not confine himself to the issues of preserving and increasing educational institutions, he also paid attention to the organization of educational work in them. That is why he has many statements about the teacher. Depicting the difficult conditions of life and work of teachers in parochial schools, especially in the mountainous regions of the North Caucasus, he wrote that “the pedagogical activity to which these distributors of the reasonable, kind and eternal give their best years is financed by beggarly handouts.” That is why Costa demanded that the educational department decisively improve their financial situation by providing them with apartments, heating and lighting [4, p. 137].

Kosta Khetagurov, as a spokesman for the worldview of the people, has repeatedly expressed hope for the coming revolution, which will solve all social

problems. The life of the peoples of the Caucasus and their freedom-loving spirit were for Costa the arsenal from which he drew themes for his revolutionary work. Questions of the socio-political struggle are reflected not only in Costa's journalism, but no less clearly in his revolutionary poetry, the leitmotif of which is sympathy for the oppressed people, faith in their future freedom. Costa not only himself was selflessly devoted to the people, but also demanded this from others. Kosta Khetagurov had a great influence on the younger generation of the Ossetian intelligentsia, who took an active part in the liberation struggle. Studying in Russia and absorbing the culture of the great Russian people from their student years, these people matured, mastering the advanced principles of Russian social thought of the 60s and 70s of the last century. Suffice it to say that many of them, together with their Russian, Georgian and Armenian associates, back in 1874 organized a secret revolutionary circle in Vladikavkaz, which included Ossetians – A. Ardasenov, X. Tuskaev, I. Shanaev, E. Gazdanov, D. Sokhiev, D. Goliev, Russians – V. Kizer, V. Lavrov and others. Kosta Khetagurov gives an assessment of these figures in a poem dedicated to the death of one of them – M. Z. Kipiani:

How many of them were capable of people  
Just surrender completely, loving,  
Just fight for our freedom  
Bringing the light of knowledge into the sakli?

K. L. Khetagurov's enlightenment views concern most of the issues of reforming national education. In his articles, he harshly criticized the controversial educational nature of government circles in the North Caucasus, which was aimed at ignoring the national mentality of the Caucasian peoples and the rude attitude of officials to the problems of raising and educating mountain children. K. L. Khetagurov condemns the negative aspects of the work of pre-revolutionary schools, consisting in class and scholasticism of education. Not being a teacher himself, he supported the aspirations of teachers to make the school really accessible to all, giving solid knowledge to their pupils, advocated the formation of women's education and was a representative of the formation of intercultural dialogue. Being imbued with the spirit of his work, we are convinced that, among other things, Costa's views on the organization of education in national schools are still of great value.

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## TERMINOLOGY OF THE ENGLISH LANGUAGE IN THE ELECTRIC DRIVE

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**Abstract.** The article deals with the terminology of the English language in the electric drive. The necessity of creating a special terminology in the electric drive for the work of specialists in this highly specialized field, which includes direct communication in English, as well as translation of technical texts, is substantiated.

**Keywords:** terminology, term, electric power, electrical engineering, terminology field, electric drive.

## ТЕРМИНОЛОГИЯ АНГЛИЙСКОГО ЯЗЫКА В ЭЛЕКТРОПРИВОДЕ

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**Аннотация.** В статье рассматривается терминология английского языка в электроприводе. Обоснована необходимость создания специальной терминологии в электроприводе для работы специалистов в данной узкоспециальной области, которая включает в себя непосредственную коммуникацию на английском языке, а также перевод технических текстов.

**Ключевые слова:** терминология, термин, электроэнергетика, электротехника, терминополье, электропривод.

Terminology is a set of terms of a certain branch of knowledge or production, as well as the doctrine of the formation, composition and functioning of terms.

The subject of the general theory of terminology is: the study of the formation and use of special words, with the help of which the accumulated knowledge of mankind is accumulated and transmitted; the improvement of existing terminological systems; the search for optimal ways to create new terms and their systems; the search for universal features inherent in terminologies of different fields of knowledge.

A term is a special word or phrase adopted in a certain professional field and used in special conditions.

A term is a member of a certain terminological system related to a particular field of science, technology, production, and its conceptual content is determined by its place in the system. Each term has its own definition among other terms in the same field [1].

Terms, unlike commonly used words, are usually unambiguous within their terminological field; the same word can be a term of different fields of knowledge, but this is not a polysemy, but a homonymy. The terms are also opposed to the general vocabulary in the sense that they are associated with a certain scientific concept: the term reflects the results of scientific research and their theoretical understanding.

The need for an accurate and adequate language in the course of the development of science led to the creation of a special terminology – scientific nomenclature using special rules for constructing names of objects and operations with them. Scientific terminology is a set of special expressions from the field of this science – terms.

Unlike natural language words, the term always describes a strictly defined, uniform for all, set of material objects or their interactions and relationships. Each term has a strict definition. To understand a term, it is necessary to know both its own definition and the definitions of all the terms used in its definition, up to the basic, indefinable, concepts. At the same time, in order to understand the term, it is necessary to imagine the physical reality that stands behind it. If there is no physical reality behind the term, it has no meaning.

In science, it is permissible to use only its terms. Therefore, any relationship or interaction in science must first of all be defined, and only after that a new term obtained in this way can be used.

In such fields of science and technology as electric power and electrical engineering, there is also its own terminology.

Electric power engineering is a science dealing with the generation, transmission and consumption of electric current. This also includes the development and implementation of power equipment, the organization of power transmission systems and all related devices and devices.

Electrical engineering is a set of technical sciences, at the same time it is a separate branch of industry. Basically, electrical engineering is the transmission of electricity, electronics is entirely devoted to computer technology and the creation of integrated electronic circuits.

The electric power industry plays a special role not only in the fuel and energy complex, but also in the economy of any country, including Russia. This was beyond doubt in the XX century; it is not by chance that it is considered to be the century of electricity. And the reason for this is not the intensive growth of generating capacities and electricity generation, not the fantastic increase in the length of power

transmission lines that are increasingly tightly entangling the planet and, oddly enough, not the growth of the contribution of the electric power industry to the gross domestic product. All this, of course, is important, but the modern “electric breakthrough” occurred not so much in the production of electricity, as when it was introduced into scientific and technological progress, into the sphere of using its unique physical properties: the development of electronics, global and local communication systems, the use of computers, the Internet, all kinds of control systems, etc.

Electricity is the main energy product on which the existence of modern civilization depends. This explains the advantage of electricity over other energy sources. Since the second half of the XIX century, two scientific directions began to form: electric power engineering and electrical engineering. Subsequently, technical advances led to the creation of two industrial branches with the same names [2].

Power engineers design and maintain power transmission grid systems. Specialists are engaged in the development of energy systems controlled by satellite communications. This will ensure the delivery of electricity to the consumer without sudden outages and power surges. The widespread use of electricity has almost doubled the daily rate of human activity and dramatically increased the time for education, culture and entertainment.

One of the systems widely used in the modern electric power industry is an electric drive.

An electric drive is an electromechanical device that includes its constituent parts:

- converters of electrical energy into mechanical;
- device for transmitting motion to the working mechanism;
- a control system for the movement of the executive organs of the working machine, which provides the technological processes of the required movements with the specified accuracy and speed [3].

In world practice, the adjustable electric drive is recognized as one of the most efficient energy-saving and resource-saving environmentally friendly technologies.

The high efficiency of the use of an automated controlled electric drive to regulate the parameters and optimize the operation of various technological systems with mechanisms, especially with pumping and ventilation units operating in variable modes, has been confirmed by many years of international experience.

As a rule, electric motors are installed in most technological systems of energy, industry, utilities and other industries in order to maximize the performance of the equipment, while peak load hours account for only 10-15 % of the total operating time of the equipment.

As a result, electric motors operating at a constant rotational speed consume significantly, up to 50 %, more electricity than is required to ensure an optimal technological process.

The main directions of electric drive development:

1. Expand the scope of application of the adjustable electric drive. In Russia, they make up about 10 %, abroad – more than 40 %. To make the electric drive of turbomechanisms adjustable. These mechanisms consume about 90 % of the energy consumed by all electric drives. If the electric motors of turbomechanisms are not regulated, then energy losses reach 60 %.

2. Increase the requirements for dynamic and more accurate indicators, expand the functions of the electric drive associated with process control.

3. Improve the energy efficiency of the electric drive. Currently, electricity losses in Russian electric drives reach 75 % of the total losses in the power supply system. The energy intensity of Russian Gross domestic product (GDP) is 2 times higher than in Western countries.

4. Provide all electric drive systems with continuous internal diagnostics of parameters and operating modes.

5. To expand the use of digital electric drives with microprocessor control, working according to algorithms developed in advance for the required operating modes of the electric drive.

6. To increase the output of engineering and scientific personnel, of which there are still very few in Russia, about 20 % of the required number.

The use of an adjustable electric drive makes it possible to optimize the operation of electric motors, eliminate unproductive electricity consumption, and in heating and water supply systems, in addition, provide significant heat savings and reduce water consumption [4].

Since there is a huge number of terms and their meanings in the electric drive, a separate terminology for the electric drive has been developed.

The rapid development of the electric drive in recent years has made it an object for the creation of a separate terminology in this area. The choice to create a separate terminology field “automated electric drive” is not accidental. The choice lies in the fact that most modern automated electric drives are manufactured by foreign corporations and the descriptions are mostly in English. Given the complexity of the tasks solved by specialists in electric drive, and the fact that the main developments in this area are carried out in English, a separate terminology is simply necessary.

“Automated electric drive” is a young terminology, its age is about 70 years old with a developed, formed and stable system of concepts, this is indicated by a small number of ambiguous terms – 16.7 %. It is characterized by semantic integrity and the absence of terminological lacunae.

Five subfields are identified within the framework of the studied terminology field, fully describing all aspects of an automated electric drive: its design, sensors, drive control devices, their commissioning and determination of production characteristics. There are 250 to 300 terms in each subfield.



The terminology of automated electric drive, as well as the corresponding technical discipline, was formed as a result of the interaction of a number of sciences: theoretical mechanics, resistance of materials, theory of automatic control, thus, 25.1 % of their own terms were found, and the main part consists of general technical and intersectoral terms.

The analysis of the increase in the number of terms and the development of their meanings during the three periods of development of the term system identified by us during the study showed that the terminology of the automated electric drive is actively developing, but at the same time quite orderly; it is noted that a large number of three- and four-word terms appeared in the second period. Also, since the 60s-70s of the XX century, there has been a constant increase in the number of compound adjectives.

The main structural type of the term in English and Russian is two-word. The main trend in the formation of new terms is the increase in the physical extent of the term. Complex terms appear, formed from several simpler ones in structure.

Structurally, Russian terminological phrases demonstrate a greater variety of educational models for each type – two-, three-word, etc.

Since the degree of similarity of translated equivalents to the original is average 43.7 %, transformations are actively used, the most frequent of which are the replacement of part of speech and the rearrangement of components of the original phrase in 32 % of translations; techniques such as shortening and adding words are used next in frequency; integral transformation is less common.

The theoretical significance of the terminology of the electric drive is determined by the fact that:

- 1) a separate terminology field “automated electric drive” in English and Russian is highlighted and its comprehensive description is given;
- 2) the main features and features of the units that make up the specified terminology field in the named languages are determined, and similarities and differences between English and Russian terminology in this area are revealed;
- 3) a multidimensional synchronic and diachronic analysis of words and phrases forming the terminology field “automated electric drive” is carried out, and the specifics of their formation are disclosed [5].

The practical value lies in the fact that the systematization of vocabulary in the field of “automated electric drive” made it possible to identify patterns, trends and prospects for its development, as well as to identify the most productive models and ways of translating terms in this field. The terminology of the electric drive is used in the translation of engineering articles and descriptions of drives, as well as in the practice of teaching English to engineering students.

Thus, since most modern automated electric drives are manufactured by foreign corporations and the descriptions are mostly made in English, this has led to the development of a special terminology of the electric drive, which is used in the translation of engineering articles, descriptions, instructions, as well as in the practice

of teaching English to engineering students. The need to create a special terminology for such a highly specialized field as an electric drive lies in the fact that the translator cannot correctly translate the information needed for an electric drive due to the many different meanings of words and phrases. That's what a special terminology is needed for.

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## ASSESSMENT OF INFORMATION SUPPORT FOR PERSONNEL RECORDS

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**Abstract.** The purpose of the work is to assess the quality of information resources and determining the efficiency ratio of this information resource. The article deals with software products for the personnel department. As a result of the analysis, ten common programs are compared and the best one is calculated.

**Keywords:** personnel department, accounting tasks, quality assessment, information resources.

## ОЦЕНКА ИНФОРМАЦИОННОГО ОБЕСПЕЧЕНИЯ КАДРОВОГО УЧЕТА

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**Аннотация.** Целью работы является оценка качества информационных ресурсов и определение коэффициента эффективности данного информационного ресурса. В статье рассматриваются программные продукты для отдела кадров. В результате анализа сравниваются десять распространенных программ и вычисляется лучшая.

**Ключевые слова:** отдел кадров, бухгалтерские задачи, оценка качества, информационные ресурсы.

The work of the personnel department becomes more and more difficult as enterprises grow and new positions appear [1]. The Human Resources Department handles a wide range of tasks. There is a large list of software products in the modern life so for solving accounting problems we need to choose the most convenient for using.

The purpose of the information resource is personnel management. The information resource must meet the following requirements:

- 1) information resource should have the whole spectrum opportunities;
- 2) information resource should be intuitive, reflect ease of navigation through the program;

- 3) information resource should have information about use and functions of this program;
- 4) information resource should have a convenient user interface;
- 5) information resource should be provided with fast technical support in case of a malfunction;
- 6) information resource should not be filled with unnecessary information.

Based on these points, a common vision of criteria emerges, that information resources should have in order to reduce the number of errors in recording working hours, maintaining finances, accounting personnel and personnel analysis.

The following software products are considered on this paper:

1. "1C: Payroll and personnel management" makes possible to conduct payroll in various companies and personnel records from small to large enterprises [2].

2. Due to salary and personnel makes it possible not only to automate the calculation of wages but also to organize employee records, register official movements and receive statistical information on personnel composition.

3. Monolith: Personnel is a system for recording working hours, automating personnel records, calculating taxes, wages and deductions from wages [3].

4. HR Management – OLYMP is a comprehensive solution with advanced functionality for automating all HR tasks. The software product will allow you to organize time accounting, build a program to retain specialists, create conditions for further growth of employees and more efficient performance of labor responsibilities.

5. BOSS-Kadrovik is a system for personnel management that combines the latest methodologies in the field of human resource management and traditional personnel records. The use of the BOSS-Kadrovik software system gives management companies a single tool for staff organization and effective working with it, assessing the labor motivation of employees and development of the program of their stimulation.

6. The BambooHR – is a system for HR and personnel specialists that solves the main tasks of managing HR data in small and medium-sized enterprises.

7. Resources Plus is a solution for the rapid preparation of all types of HR documentation and getting the most out of performing the duties of HR specialists in an organization. "Personnel Plus" allows you to create reports, statements and orders, keep records of working time and monitor the movement of personnel. This program allows you to maintain a database of employees, working under labor contracts; possibility of any the number of organizations in one program; accounting for the movement of employees and maintaining personnel statistics. The disadvantage of this program is the possibility of entering only a list of employees, with a minimum description.

8. "Employees of the enterprise" is a program for storing information about the employees of the organization.

9. COMPASS. Human Resource Management is a program for human resource management (HRM) and is an important element of enterprise automation.

10. Galaxy HCM is a comprehensive software solution for automating HR processes in organizations [4]. Software product Galaktika HCM (formerly Galaktika ERP: Kontur personnel management) from the company Galaxy Corporation refers to

classes of human capital management systems and personnel management systems. But in this program, when navigating through the buttons, they do not reflect their purpose and service does not have technical support Software system covers a wide range of tasks: maintaining personnel documentation, accounting personnel, staffing management, time tracking, recruitment and work with candidates, training management workers and more.

General properties of software products: personnel accounting and analysis of personnel composition; remuneration management, settlements with personnel, management of personnel costs; management of financial motivation of personnel. To show the structure of organization through the field of groups and positions; tracking and accounting of working time and paid time; the ability to obtain photos of an employee and documents from web-camera and scanner. These properties are inherent only in selected software products.

Based on the analysis of software products the following criteria were selected for evaluation. In the first class of positive signs, the following signs are accepted for evaluation: the range of opportunities provided, intuitiveness, information about the program, user interface, quality of technical support.

In the second class of negative signs, the following signs are accepted for evaluation: the presence of a mobile version, the presence of unnecessary information, relevance and design attractiveness.

Having made a choice of criteria for assessing the quality of information resources, gradation scales have been established that allow to assess the degree of influence of signs on the effectiveness of information resources, quantitative values of each level of the scale of gradation division of individual quality signs have been determined (taking into account the assigned weight coefficients of each feature), all the necessary calculations have been made. The resulting set of information and calculations allows you to start the implementation of the application for assessing the quality of information resources in the Visual Studio 2019 programming environment. The interface is provided in Figure 1.

Figure 1. Selection of criteria

The result of the calculations is shown in Figure 2.

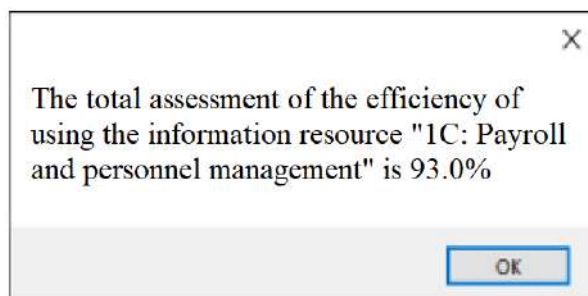


Figure 2. Calculations

Area various information resources were considered during the analysis of the subject. Ten programs were identified. On the basis of which positive and negative criteria for assessing the quality of information resources were formulated. Each of the criteria was determined on a gradation scale.

Its levels show the feature`s influence on the overall assessment of the effectiveness of the information resource.

The quantitative values of each of the levels were also determined. scales of gradation division of individual criteria. Were calculated normalization coefficients, ranks, as well as gradation steps for each of feature class. The total score of all features was calculated, as well as generalized assessment of the information resource. For every sign there was a sheet of expert evaluation of the effectiveness of use information resource. Sheets were filled out for ten programs expert evaluation. An application for evaluating performance has been developed information resource. With the help of the developed application a comparative analysis of all ten applications was carried out.

The best turned out to be 1C: Salary and personnel management. The worst resource turned out the Galaxy HCM. Based on the written program, the user can easily determine the assessment of the effectiveness of the information resource and draw a further conclusion about its quality.

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## PEACEKEEPING IN THE CIS AS A MODERN MEANS OF ACHIEVING PEACE AND SECURITY

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**Abstract.** The article considers peacekeeping as one of the main means of achieving peace and security in the zones of armed conflicts in the Commonwealth of Independent States (CIS). Peacekeeping not only protects the local population, but also contributes to global security, prevents the growth of extremist ideologies, and strengthens peace and stability. There are differences between peacekeeping missions, so in the article the author analyzes the features of the peacekeeping process in the context of the CIS region, studying its significance, history, organization and coordination.

**Keywords:** peacekeeping, peacekeeping operations, CIS, maintaining peace and security, post-Soviet space, conflict resolution.

## МИРОТВОРЧЕСТВО В СНГ КАК СОВРЕМЕННОЕ СРЕДСТВО ДОСТИЖЕНИЯ МИРА И БЕЗОПАСНОСТИ

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**Аннотация.** В статье миротворчество рассматривается как одно из главных средств достижения мира и безопасности в зонах вооруженных конфликтов Содружества Независимых Государств (СНГ). Миротворческая деятельность не только защищает местное население, но и вносит вклад в глобальную безопасность, предотвращает рост экстремистских идеологий, укрепляет мир и стабильность. Существуют различия между миротворческими миссиями, поэтому в статье автор анализирует особенности миротворческого процесса в контексте региона СНГ, изучая его значение, историю, организацию и координацию.

**Ключевые слова:** миротворчество, миротворческие операции, СНГ, поддержание мира и безопасности, постсоветское пространство, урегулирование конфликтов.

Since its creation, the Commonwealth of Independent States (CIS) has faced many conflicts, so peacekeeping operations to strengthen peace remain a critical issue in this region.

Peacemaking is an international practice of using peaceful forces aimed at preventing, localizing and resolving conflicts, maintaining peace and security in regions at risk of violence [1, p. 99].

The history of peacekeeping operations in the CIS began in 1991, after the collapse of the Soviet Union, when multiple interethnic clashes began in a number of former republics. The first peacekeepers in the CIS were soldiers of the Russian Army, who were deployed in the post-Soviet space to conduct peacekeeping missions, they included truce monitoring, supporting dialogue between conflicting sides, assisting in peace and security, post-conflict peace building, etc. (Table 1).

Table 1 – Peacekeeping operations in the CIS [2]

<i>Conflict</i>	<i>Peacekeeping operations</i>
The Transnistrian conflict	Preventing the transformation of small conflicts into large-scale clashes; conducting educational activities with the local population; monitoring the storage of weapons, and, if necessary, their seizure.
Georgian-South Ossetian conflict	Monitoring the implementation of the armistice agreement and cessation of hostilities; disarmament of the local population.
The Tajik conflict	Organization of events for the peaceful settlement of the conflict; signing of a bilateral agreement on military cooperation.
Georgian-Abkhaz conflict	Creating security in the territory through the visible presence of military and peacekeeping forces; providing humanitarian aid to the population.
South Ossetia (2008)	Monitoring the actions of the local population in the zone of armed conflict; countering terrorism; post-conflict peace building.
The Karabakh conflict (2020)	Inclusion of peacekeeping forces, supervision of ceasefire; facilitation of negotiations between Armenia and Azerbaijan; signing of trilateral agreement.

From the table above, we can conclude that during large-scale interethnic conflicts in the CIS territories, peacekeeping, with Russia in the lead, played an important role because it was able to prevent the conflicting parties from returning to open hostilities.

Peacekeeping in the CIS remains relevant today, as the region continues to face conflicts and tensions. Some of these conflicts have a long history, such as the conflicts in Nagorno-Karabakh, Transnistria and South Ossetia.

In addition, peacekeeping in the CIS is important for international security and stability. The region is an important source of energy resources and transit routes, and



any conflicts in this region can have negative consequences for the world economy and security.

Therefore, in order to maintain peace on the territory of the CIS, groups are functioning today to promote the peaceful settlement of disputes and armed conflicts, whose tasks include:

- establishment of facts of non-compliance with the terms of the truce and ceasefire agreement;
- control over the destruction of fortifications;
- organization of negotiations and dialogue between the parties to the conflict;
- provision of food aid to local residents;
- development of economic cooperation and restoration of destroyed infrastructure;
- combating the illegal passage of weapons and explosives into the territory of the CIS;
- participation in the implementation of decisions and recommendations of the UN Security Council, OSCE bodies and other international organizations on the peaceful settlement of the conflict [3].

To implement the tasks set, the peacekeepers adhere to a number of principles presented in Figure 1.

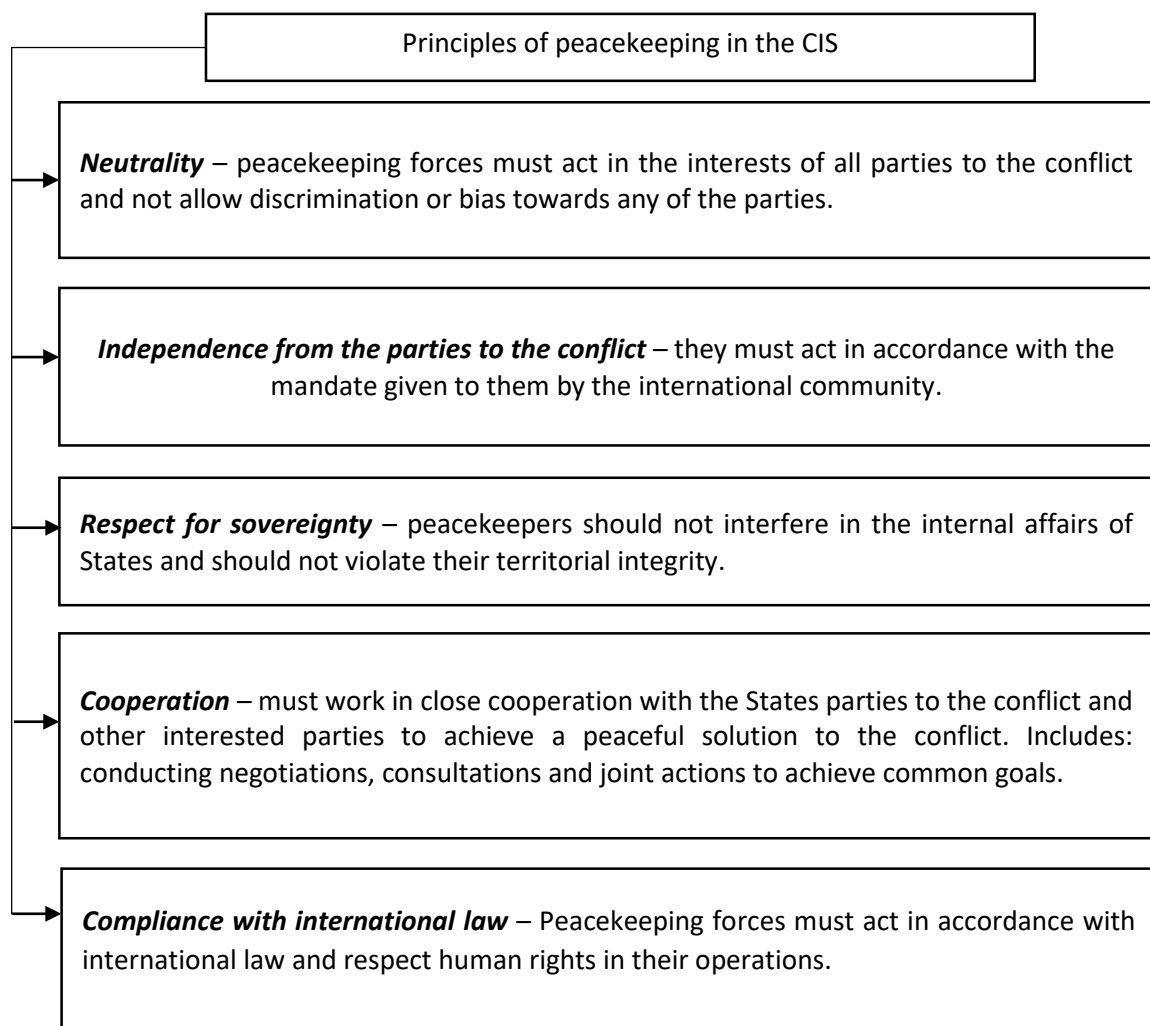


Figure 1. Principles of peacekeeping in the CIS [4]

These principles help peacekeepers effectively carry out their tasks to maintain peace and security in the region, as well as ensure neutrality, objectivity and fairness in their actions. In addition, respect for culture and traditions helps peacekeepers to receive support from the local population and provide assistance in areas of peacekeeping operations.

It follows from the above that peacekeeping activities in the CIS are reduced to three main areas, presented in Figure 2.

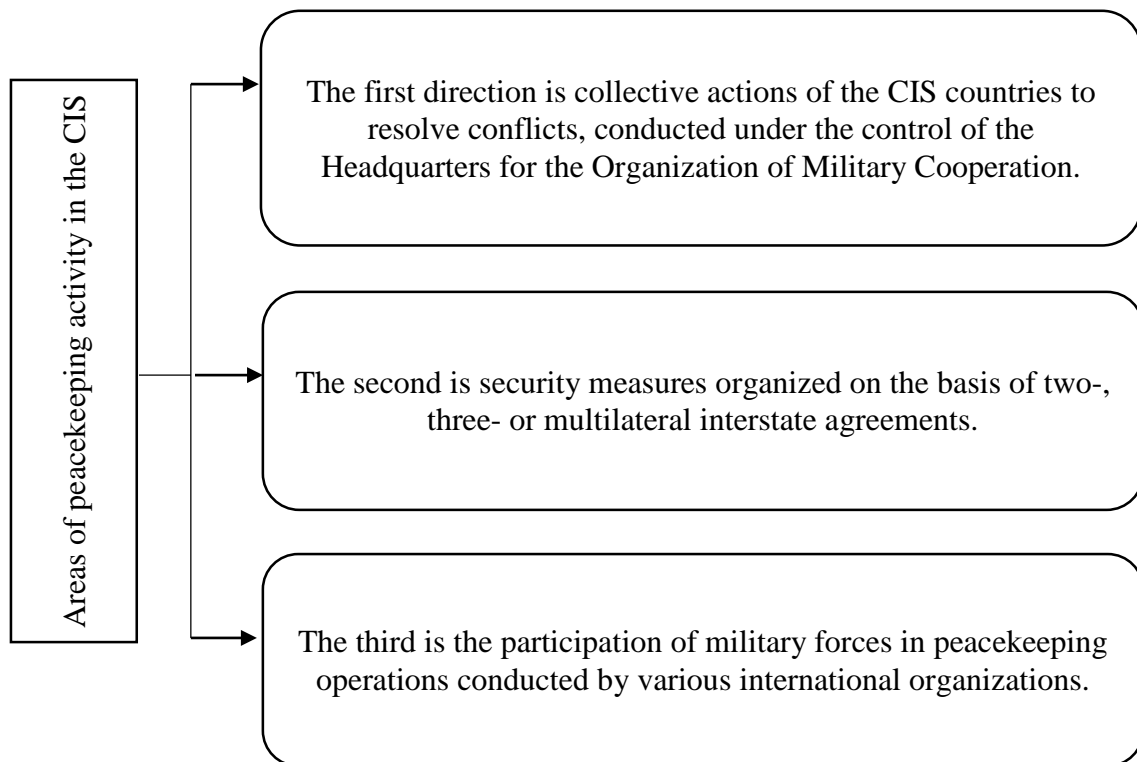


Figure 2. Areas of peacekeeping activity in the CIS.

Summing up all of the above, we can conclude that peacemaking today occupies an honorable place not only in the system of ensuring international security, but also in international relations as a whole because it helps to strengthen trust between the conflicting parties, promotes negotiations and agreements, strengthens international solidarity. However, peacekeeping in the CIS at the present stage faces a number of problems.

1. The use of peacekeeping operations by Western countries in their personal interests (the factor of double standards). At the same time, an attempt is made to implement two ways:

- forcible enforcement of peace, through military and military operations;
- division of the world into “zones of responsibility”.

2. Transfer of conflict resolution responsibilities from the UN to a military-political union or a leading state.

3. Insufficient funding for peacekeeping operations, which significantly limits their capabilities and effectiveness.

4. In the CIS, peacekeeping has not taken on a truly international character, since peacekeeping missions in these regions are conducted mainly by the forces of the Russian Federation [5 p. 107].

Thus, despite some shortcomings, peacekeeping plays an important role in maintaining peace and security in the CIS, due to its ability to reconcile and build trusting relations between the parties to the conflict. The development of peacekeeping activities is an important step towards achieving stability and prosperity in the region.

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## USE OF MODERN EDUCATIONAL TECHNOLOGIES IN TEACHING A FOREIGN LANGUAGE

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**Abstract.** By applying new pedagogical technologies in foreign language classes, the process of teaching English can be viewed from a new point of view and master not only pedagogical, but also psychological mechanisms of personality formation, and achieve better results. The purpose of the article is to review the pedagogical technologies used in their activities as a teacher of a foreign language in SVE. The integrated use of all the above technologies in the educational process stimulates personal, intellectual activity, develops cognitive processes, and contributes to the formation of competencies that a future specialist should possess.

**Keywords:** pedagogical technologies, modern education, flipped classroom, information technologies, project activities, communicative learning.

## ИСПОЛЬЗОВАНИЕ СОВРЕМЕННЫХ ОБРАЗОВАТЕЛЬНЫХ ТЕХНОЛОГИЙ В ПРЕПОДАВАНИИ ИНОСТРАННОГО ЯЗЫКА

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**Аннотация.** Применяя новые педагогические технологии на занятиях иностранного языка, процесс обучения английскому языку можно рассматривать с иной точки зрения и осваивать не только педагогические, но и психологические механизмы формирования личности, добиваться более качественных результатов. Целью статьи является обзор педагогических технологий, применяемых автором в своей деятельности в качестве преподавателя иностранного языка СПО. Комплексное использование в учебном процессе технологий, рассмотренных в данной статье, стимулируют личностную, интеллектуальную активность, развивают познавательные процессы, способствуют формированию компетенций, которыми должен обладать будущий специалист.

**Ключевые слова:** педагогические технологии, современное образование, перевернутый класс, информационные технологии, проектная деятельность, коммуникативное обучение.

Modern education is experienced significant changes that affect almost all areas of the pedagogical process. One of the main tasks of a modern teacher is to improve pedagogical skills, using modern pedagogical technologies in their work. Educational technology is the design of the educational process through the use of methods, techniques and forms of organizing educational activities that increase the effectiveness of learning. One of the most difficult tasks of foreign language teachers is how to stimulate the imagination of their students so that they would more motivated to learn. As a result, the tireless process of searching for and developing teaching materials that can be used in addition to the main textbooks for the course of study is one of the most important activities of the teacher in planning the lesson.

Using different educational technologies in teaching a foreign language, the process of teaching English can be viewed from a new perspective. The use of technology also helps to master not only pedagogical, but also psychological mechanisms of personality formation, to achieve better results.

Educational technologies used in English classes implement student-oriented, activity-based and competence-based approaches. When using pedagogical technologies, it is necessary to take into account the age characteristics of students, as well as the level of foreign language proficiency. Properly selected pedagogical technologies:

- increase the efficiency of education;
- develop in students the ability to carry out productive communication with carriers of other cultures;
- develop the ability of students to carry out various activities;
- develop the pursuit for self-development and self-education.

In my work I use different pedagogical technologies. Technology of communicative learning – the learning process for this technology is a model of the communication process. This technology helps students to improve a foreign language at the level of a confident user in a foreign language environment. At the engagement stage, the teacher involves the student in the learning process: he initiates an exciting discussion, offers to discuss a picture, etc. At the study stage, the student is explained the grammatical topic and the use of new words and expressions, that is, they work to expand vocabulary and master grammar. At the stage of activation of knowledge, the student performs various exercises to consolidate new grammar and words. This may be a continuation of the discussion of the topic under study, but with the application of the acquired knowledge. Different forms of work can be applied while the technology of communicative learning is used: project, pair, and group work. Activities in which communication technologies are used can be: educational, game, labor. In the application of technology, an important role is played by the formation of the skill of the so-called spontaneous speech, dialogues, monologues, discussions or commenting [1]. On lessons students can be offered to play a situational game: "At the enterprise", "On the street", "In the store", "At the doctor"; a

role game: employer and employee, searching of employee, dissatisfied customer, computer purchase/repair and other.

Critical thinking technology is a technology that allows students to independently identify learning goals, also search for the necessary material and analyze the information received. The technology of critical thinking gives the teacher the opportunity to:

- Create an atmosphere of openness and responsible cooperation in the classroom;
- Use a system of effective methods that contribute to the development of independence;
- Help students become practitioners and analysts at the same time, who can simultaneously correctly analyze their activities;
- Become a source of valuable information for colleagues.

Various methods of working with literature are used, record keeping, selection of significant information, compilation of stages and registration of the information received. One of the most effective techniques of this technology is a cluster. Cluster – the selection of semantic units in the text and their graphic design in a certain form (in the form of a bunch).

Flipped classroom technology is the principle of learning, where the main study and assimilation of new material by students takes place at home, and in the classroom they consolidate the material, perform exercises, laboratory and practical, as well as individual teacher consultations. At the lesson, the studied material is consolidated and the acquired knowledge is updated. This technology has many advantages:

- Students have more time for extracurricular and other activities;
- It is possible to choose a student-oriented topic;
- Videos are usually no more than 10 minutes long, which allows students to remain engaged and interested;
- Teachers are available for one-on-one communication with students;
- Learning flexibility – everyone works at their own place;
- Students take responsibility for their own learning.

The flipped class has certain disadvantages:

- Technical problems (low Internet speed, outdated computer or laptop).
- The success of the flipped lesson depends on student participation;
- Increasing the load on the teacher: searching, preparation of material, assistance to all students individually.
- Standardized testing can become a problem within a flipped lesson. A significant part of the teacher's teaching time must be allocated to preparing for testing, which is out of the standards of this type of lesson.

Project technology (project method) is a technology aimed at developing active independent thinking of students and teaching them not only to memorize and reproduce knowledge, but also to apply it in practice. In order to competently apply

this technology, significant training is required, which is carried out in a holistic learning system. Work on the design technology should be carried out in stages:

1) Making a project plan, posing a problem, developing tasks for oral and written work.

2) Independent preparation of students, search for information, literature, discussion of issues, exercises.

3) Protection of projects, problem solving, analysis, results [2].

Working on projects develops imagination, fantasy, creative thinking, independence and other personal qualities. The reserves of developmental education are revealed most densely if this is facilitated by a favorable psychological climate in the classroom and adequate behavior as a speech partner. Project work can be done individually or in groups. The teacher should help assign roles and explain that overall success depends on the contribution of each participant. Work on the project begins in the lesson under the guidance of the teacher, continues at home, and the presentation of the project is carried out at the next lesson. It is important to organize the work on the project, creating the most favorable conditions for the disclosure and manifestation of the creative potential of the participants. Particular attention should be paid to the presentation of the project, which should be carried out in the classroom.

In the context of the implementation of the requirements of the Federal State Educational Standard, information and communication technology, which is given great importance, becomes the most relevant. Today, all new information technologies are being introduced into the learning process in the era of the so-called digitalization of education. Information and communication technologies (ICT) – expand the possibilities of the educational process, increase its practical significance, enhance the independent activity of students and increase cognitive activity.

With the help of ICT, a number of didactic tasks are solved in foreign language classes:

- development of oral and written speech;
- replenishment of students' vocabulary;
- formation of motivation for learning a foreign language,
- broadening one's horizons [3].

The use of ICT in foreign language classes provides for activities such as the use of electronic resources and textbooks, online tests, the use of various platforms and programs, watching videos, etc.

Technology of using computer programs. There are many interesting tutorials and platforms out there these days.

One of them is Fluent U, a platform based on the so-called "language immersion" method. This platform offers individual lessons in the form of videos from the real world. You can watch clips from films, animations, advertisements, motivational speeches, documentaries and even video blogs. Everything is provided by language levels and categories.

The Complete English Web Suite is suitable for reviewing grammar rules and memorizing individual words. The program develops writing and speaking skills, mini-lessons are offered. You can perform various tests, work with interactive texts, answer questions.

The Professor Higgins program is a teaching program for learning English, which consists of two courses: phonetics and grammar. The student has the opportunity to compare his pronunciation with the original.

Miro Realtime Board is a tool that can be used to create spreadsheets, notes, plan, draw, write, and more. I use this platform for distance learning, in conjunction with zoom, to fill in tables, or as a whiteboard.

In addition to programs, there are many sites and blogs for learning English. I use materials from the following sites: falsefriend.ru, engblog.ru, laem.ru, puzzle-english.com. When teaching foreign languages, such technologies make it possible to effectively solve a number of educational problems. Of great importance in computer learning of a foreign language is the motivation to achieve the best results and the most efficient use of educational material.

However, despite all the advantages, the use of information technology can also lead to negative consequences, including, in particular, the lack of skills for direct communication with a teacher and interaction with peers, the inability to formulate and argue one's point of view, a low level of speech development, a lack of independence, creative thinking.

Testing technology – is used to check the level of assimilation of grammatical and lexical skills at a certain stage of learning. This technology allows the teacher to identify and systematize aspects that require additional study. Within each type of test, test formats are distinguished that determine the following characteristics of the test: test length, number and type of sections, controlled skills and abilities, test units, tasks and their number, expected answers of the tested. Methodology operates, as a rule, with such varieties of formats:

- multiple choice;
- alternative choice (True/False; Yes/No);
- selection of pairs (matching);
- information transfer;
- permutation in a logical order (ordering tasks);
- editing;
- filling in gaps (gap-filling);
- C-test;
- short answers [4].

When compiling tests, various types of tasks are used that allow you to determine and measure the level of students' ability to solve new specific problems based on the information received.



Game technology – allows for a differentiated approach, includes a fairly extensive group of methods and techniques for organizing the educational process in the form of various pedagogical games: didactic, business, role-playing [5].

The use of gaming technologies in teaching vocabulary and grammar of the English language is aimed at automating the use of lexical and grammatical structures, bringing them to automatism.

The integrated use of the above technologies in teaching stimulates personal, intellectual activity among students, develops cognitive activity, contributes to the formation and development of competencies that a future specialist should have.

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## RESEARCH OF NETWORK PROTOCOLS FOR REMOTE ACCESS

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**Abstract.** This article is devoted to the study and comparison of remote access network protocols SSH and Telnet. The article discusses the features of these protocols, carried out a comparative characteristic. The analysis of traffic by means of data transmission by protocols was carried out. The scope of these protocols is described. The advantages and disadvantages of each of the above protocols are noted.

**Keywords:** remote access protocols, network protocols, SSH, Telnet, network interfaces.

## ИССЛЕДОВАНИЕ СЕТЕВЫХ ПРОТОКОЛОВ УДАЛЕННОГО ДОСТУПА

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**Аннотация.** Данная статья посвящена изучению и сравнению сетевых протоколов удаленного доступа SSH и Telnet. В статье рассмотрены особенности данных протоколов, проведена сравнительная характеристика. Выполнен анализ трафика посредством передачи данных по протоколам. Описана сфера применения данных протоколов. Отмечены достоинства и недостатки каждого из приведенных протоколов.

**Ключевые слова:** протоколы удаленного доступа, сетевые протоколы, SSH, Telnet, сетевые интерфейсы.

Often in various films about special agents or superheroes, we see how hackers help them. Such hackers sit in front of a computer and quickly type commands on the keyboard, then in a matter of seconds they manage to bypass even the most complex systems with just a couple of commands on a black screen.

You might think that in today's world where convenience reigns, almost everything has an application and a GUI, typing commands on a black screen is a thing of the past. But it is not uncommon for information technology professionals to solve applied problems also use the command line for human-network device interactions.

First of all, this phenomenon is connected with history, since the first personal machines did not have peripheral devices, but at the same time it was necessary to come up with a device that would become an assistant in solving this problem. The terminal became such a device at that time.

Next, it was necessary to come up with certain technologies that would help ensure the operation of these devices. Network protocols have been developed. A network protocol is a set of rules that define how devices interact on a network.

Zhikharev A. G. in the review of data transfer protocols from the standpoint of their security, especially focuses on the importance of network protocols in the development of data transfer, and as a result, information security in general [1].

Lysenko A. F. in his research notes that in the history of the evolution of computer networks [2], a large number of network data exchange protocols have been developed. Along with this, the TCP / IP protocol has become the most common of the network layer protocols [2, 3, 4].

According to D.S. Vorozhaikin, a prerequisite for the emergence of network layer protocols was an increase in throughput, as a result of which the possibility of remote access appeared [5].

Network protocols prescribe rules for the operation of computers that are connected to a network. Network security layer protocols imply ease of protection, use, and also ensure the reliability, integrity and security of the network and data [6].

According to researchers in the field of communication, network protocols and remote access have great potential [7]. Telnet and SSH network protocols are used to provide remote access. In this article, we will consider the main advantages and disadvantages of these protocols, as well as their main differences.

Telnet is a standard TCP/IP protocol used to provide remote access. It allows you to establish a TCP connection to the server. This allows users to access an application on a remote computer as well as establish connections to a remote system [3]. This protocol is mainly used by network administrators for remote access and device control [1, 7]. Telnet uses port 23.

To analyze the two protocols, let's implement local authentication as an example (Figure 1).

```
R1>en
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#enable secret level 15 passfor15
R1(config)#username user1 password qwerty12
R1(config)#line vty 0 15
R1(config-line)#login local
R1(config-line)#transport input telnet
R1(config-line)#
```

Figure 1. An example of local authentication in the network

A user with login user1 and password 123n was created on the server.

Then, using Wireshark, we will arrange the interception of the packet (Figure 2).

64	50.2717010	192.168.58.2	192.168.58.1	TCP	60 49160+23 [ACK] Seq=45 Ack=12
65	51.4661810	50:00:00:02:00:02	Spanning-tree-(for-STP	60	RST. Root = 32768/1/50:00:00
66	52.1455100	192.168.58.2	192.168.58.1	TELNET	55 Telnet Data ...
67	52.3480930	192.168.58.1	192.168.58.2	TCP	60 23-49160 [ACK] Seq=686 Ack=4
68	52.4178560	192.168.58.2	192.168.58.1	TELNET	55 Telnet Data ...
69	52.6209810	192.168.58.1	192.168.58.2	TCP	60 23-49160 [ACK] Seq=686 Ack=4
70	52.7852320	192.168.58.2	192.168.58.1	TELNET	55 Telnet Data ...
71	52.9885730	192.168.58.1	192.168.58.2	TCP	60 23-49160 [ACK] Seq=686 Ack=4
72	53.4732960	50:00:00:02:00:02	Spanning-tree-(for-STP	60	RST. Root = 32768/1/50:00:00
73	54.3770000	192.168.58.2	192.168.58.1	TELNET	55 Telnet Data ...
74	54.5792670	192.168.58.1	192.168.58.2	TCP	60 23-49160 [ACK] Seq=686 Ack=4
75	55.2013260	192.168.58.2	192.168.58.1	TELNET	56 Telnet Data ...
76	55.2038460	192.168.58.1	192.168.58.2	TELNET	61 Telnet Data ...
77	55.2047010	192.168.58.1	192.168.58.2	TELNET	10 Telnet Data ...
78	55.2047140	192.168.58.2	192.168.58.1	TCP	54 49160+23 [ACK] Seq=45 Ack=12

Figure 2. The structure of packet transmission using Telnet

Consider the structure of this package (Figure 3).

```

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*****P*****
**

User Access Verification

Username: .....ANSI..uusseerr11

Password: 123n

*****
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*****
!1>

```

Figure 3. Package structure

When implementing remote access using an example, you can see that the protocol is not secure due to the lack of security of information transmitted over the channel. It is worth noting that the password and login are transmitted in plain text. Any attacker can easily intercept such important information. Therefore, when working with this protocol, it is necessary to additionally encrypt information that will be transmitted over an open communication channel (Figure 4).

```

R1(config)#service password-encryption
R1(config)#

```

Figure 4. Password Encryption Command

Only then will the information be protected (Figure 5).

```

R1(config)#do show run
Building configuration...

Current configuration : 3013 bytes
!
version 15.5
service timestamps debug datetime msec
service timestamps log datetime msec
service password-encryption
!
hostname R1
!
boot-start-marker
boot-end-marker
!
!
enable secret 5 $1$nNzy$UDfnOGB8.UPwTELkTgkJc/
!
no aaa new-model
ethernet lmi ce
!
!
username user1 password 7 101F5B4A0B
!

```

Figure 5. Type of passwords after additional protection

Of course, it will not be difficult to decrypt this password, but at least it is not transmitted in the form of a text understandable to any user (Figure 6).

Enter Your Encrypted Password Below:

Encrypted Password:

Decrypted Password:

Figure 6. Password decryption using Cisco 7 Type Password

The SSH protocol took over to solve Telnet problems. Unlike Telnet, SSH provides strong authentication and secure communications over insecure channels. Information security professionals have long known that once data has been encrypted using SSH, it is quite difficult to decrypt it [8]. This is what makes passwords transmitted in this way safe for transmission over a public network.

Let's configure the SSH ver 2 protocol on the router (Figure 7).

```

R1(config)#ip domain-name lab1
R1(config)#crypto key generate rsa general-keys modulus 2048
The name for the keys will be: R1.lab1
!
% The key modulus size is 2048 bits
% Generating 2048 bit RSA keys, keys will be non-exportable...
[OK] (elapsed time was 1 seconds)

R1(config)#
*Dec 15 20:30:38.539: %SSH-5-ENABLED: SSH 1.99 has been enabled
R1(config)#login block-for 30 attempts 3 within 10
R1(config)#login delay 2
R1(config)#ip ssh version 2
R1(config)#ip ssh authentication-retries 3
R1(config)#ip ssh time-out 60
R1(config)#line vty 0 15
R1(config-line)#transport input telnet ssh
R1(config-line)#logging synchronous
R1(config-line)#

```

Figure 7. An example of local authentication in the network



Unlike Telnet, the SSH protocol runs on port 22. This network protocol is often used in tunneling [3]. Connect to R1 remotely using SSH.

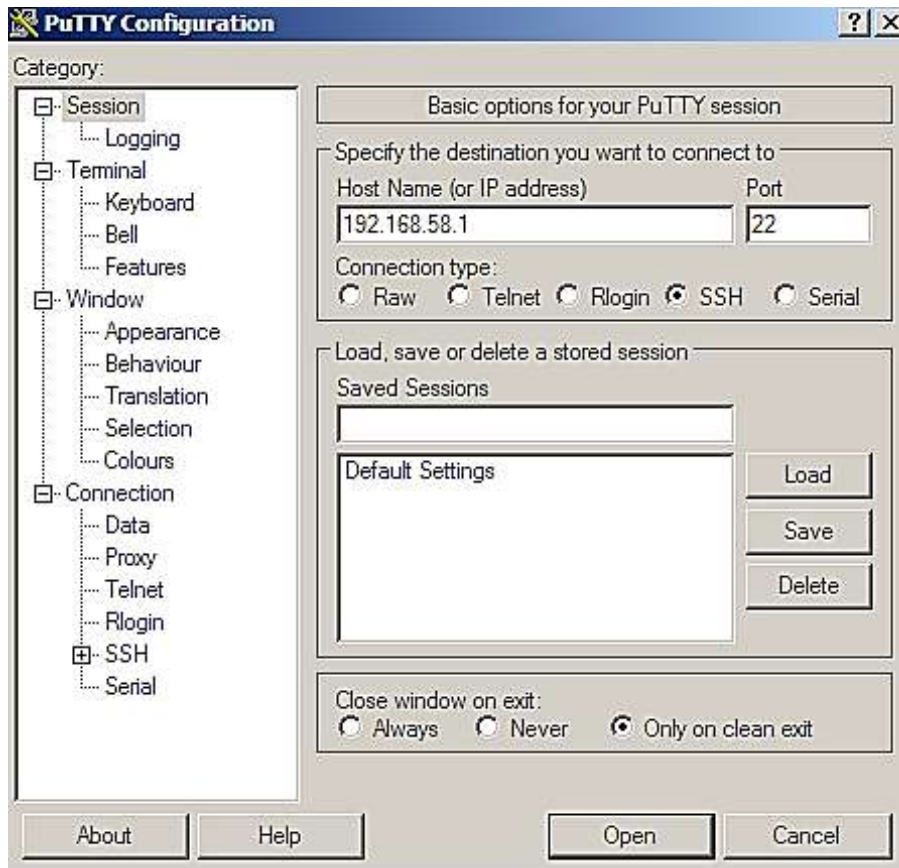


Figure 8. SSH connection

For clarity, let's look at the traffic transmitted using the SSH network protocol (Figure 9).

9	12.7490100	192.168.58.1	192.168.58.2	TCP	60	22-49165 [SYN, ACK] Seq=0 AC
10	12.7490280	192.168.58.2	192.168.58.1	TCP	54	49165-22 [ACK] Seq=1 Ack=1 w
11	12.7534090	192.168.58.1	192.168.58.2	SSHv2	73	Server: Protocol (SSH-2.0-Ci
12	12.7606110	192.168.58.2	192.168.58.1	SSHv2	550	Client: Protocol (SSH-2.0-Pu
13	12.7608260	192.168.58.2	192.168.58.1	SSHv2	258	Client: Key Exchange Init
14	12.7634530	192.168.58.1	192.168.58.2	TCP	60	22-49165 [ACK] Seq=20 Ack=70-
15	12.7648780	192.168.58.1	192.168.58.2	SSHv2	422	Server: Key Exchange Init
16	12.7649670	192.168.58.2	192.168.58.1	SSHv2	70	Client: Diffie-Hellman Group
17	12.7683280	192.168.58.1	192.168.58.2	SSHv2	334	server: Diffie-Hellman Group
18	12.7814150	192.168.58.2	192.168.58.1	SSHv2	326	client: Diffie-Hellman Group
19	12.8092740	192.168.58.1	192.168.58.2	TCP	60	22-49165 [ACK] Seq=989 Ack=1
20	12.8094710	192.168.58.1	192.168.58.2	SSHv2	326	server: Diffie-Hellman Group
21	12.8094830	192.168.58.2	192.168.58.1	TCP	54	49165-22 [ACK] Seq=989 Ack=1
22	12.8103390	192.168.58.1	192.168.58.2	SSHv2	70	Server: New Keys
23	12.8287490	192.168.58.2	192.168.58.1	SSHv2	70	Client: New Keys
24	12.8291260	192.168.58.2	192.168.58.1	SSHv2	106	client: Encrypted packet (1e
25	12.8325120	192.168.58.1	192.168.58.2	TCP	60	22-49165 [ACK] Seq=1516 Ack=
26	12.8343630	192.168.58.1	192.168.58.2	SSHv2	106	Server: Encrypted packet (1e

Figure 9. SSH protocol traffic

Consider one of the packets in the received traffic (Figure 10).

```

SSH-2.0-CISCO-1.2b
SSH-2.0-PUTTY_Release_0.64
...
kq.lak .i.f.....diffie-hellman-group-exchange-sha256,diffie-hellman-group-
exchange-sha1,diffie-hellman-group14-sha1,diffie-hellman-group1-sha1,rsa2048-
sha256,rsa1024-sha1...ssh-rsa,ssh-dss...aes256-ctr,aes256-cbc,rijndael-
cbc@lysator.liu.se,aes192-ctr,aes192-cbc,aes128-ctr,aes128-cbc,blowfish-ctr,blowfish-
cbc,3des-ctr,3des-cbc,arcfour256,arcfour128...aes256-ctr,aes256-cbc,rijndael-
cbc@lysator.liu.se,aes192-ctr,aes192-cbc,aes128-ctr,aes128-cbc,blowfish-ctr,blowfish-
cbc,3des-ctr,3des-cbc,arcfour256,arcfour128...-hmac-sha2-256,hmac-sha1,hmac-
sha1-96,hmac-md5...-hmac-sha2-256,hmac-sha1,hmac-sha1-96,hmac-
md5...none,zlib...none,zlib.....E..X..Od.K..l...%.....@tv...Ydiffie-
hellman-group-exchange-sha1,diffie-hellman-group14-sha1,diffie-hellman-group1-
sha1...ssh-rsa...Jaes128-ctr,aes192-ctr,aes256-ctr,aes128-cbc,3des-cbc,aes192-
cbc,aes256-cbc...Jaes128-ctr,aes192-ctr,aes256-ctr,aes128-cbc,3des-cbc,aes192-
cbc,aes256-cbc...hmac-sha1,hmac-sha1-96...hmac-sha1,hmac-
sha1-96...none...none...S4.....!
h.4..b....).N..g.t...;..QJ.y.4.....:C.O+
m..70.5mmQ.E...vbA~.LB..7.k..8k.Z....S.|K..I(fq...[=..|.c...H6.U..i?...
$.e]#...b.V.R...).p.mg.5NJ...t|...|2.^F.6;..w.....].oLR..
+...X..9.I|.j..&.....r.Z..h.....?.....&.D:.5.&=.9.U7..
]M..+.....9..!..v|Fb,P3[k..V..p.S...a..b.A....)*.d}Q..y.
S.....G....>Y...%P.../.D.....rq...r.9n 1
%3w...if...2...z..U.l@.G..K.oz.kyQ.i....x...e...{t...S..m\SbH...tr...
%>...w;B..2...x.2.JQ
U{.....N9."..V...<!.....ssh-rsa.....".....7..wx...!
3.....g.t..A/..7..H.S...).j...V.w....NO.4...+XO...w.w.4B..>#4...'.v
(.:...13.x...M...9.Z..7h.mN...tb...r.SP.O...]G\HKl.....:w1..j.VS.P>RE....)
\R."c.#.x.t...Tq..z+..<.7.D09[.:".E<A..)...k..j...U#@...E.....7..qc?.fCA!
4H.8.y.....I.....{...3K.(.&.g.a..n....)...I".K..s
\g.t..5S.U*...W...>?..p...E...@)...O.....-;AE..R...K.Ww...~P..N,.n..!@...

```

Figure 10. Packet in SSH traffic

Carrying out the same manipulations as with Telnet, we can see that the password transmitted via the SSH protocol cannot be read explicitly, it is encrypted.

Based on the above, we will compile a table describing the difference between the considered protocols.

Table 1 – Comparative characteristics of the protocols

Protocol property	SSH	telnet
Supports encryption	Yes	No
Type of authentication	public key	Doesn't use authentication
Working port	22	23
Format of transmitted data	Ciphertext	plain text
Recommended scope	Both public and private networks	Only private networks

Summing up, the following can be noted:

- Telnet and SSH are remote access network protocols.
- Telnet is a legacy technology and is used less frequently than SSH, more for educational purposes.
- SSH is a more secure protocol, as data is encrypted during transmission. The data is not passed explicitly.

After analyzing all of the above, we can confidently indicate that when transmitting data over an open communication channel, the best solution would be to use the SSH protocol. Using Telnet will lead to a violation of data confidentiality, which can be easily exploited by attackers.

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## NUCLEAR POWER IN THE USA

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**Abstract.** This article discusses nuclear power industry in the USA. The USA is one of the countries with the largest nuclear power generation in the world. The development of this industry, the feasibility of using it on an industrial scale is described.

**Keywords:** atomic energy, nuclear energy, the USA, atoms, reactions, waste, uranium, industry.

## ЯДЕРНАЯ ЭНЕРГЕТИКА США

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**Аннотация.** В данной статье рассматривается ядерная энергетика США. США является одной из стран с самой большой выработкой ядерной энергии в мире. Описывается развитие данной отрасли, целесообразность использования в промышленных масштабах.

**Ключевые слова:** атомная энергия, ядерная энергия, США, атомы, реакции, отходы, уран, промышленность.

The growth of the world needs of modern society for energy, with significant resource and environmental limitations of traditional energy, necessitates the preparation of new energy technologies that can take on a significant part of energy needs. These technologies include new advanced nuclear technologies. These technologies are entrusted with the task of spreading the advantages of nuclear energy and depriving it of its current disadvantages.

Nuclear energy, also known as atomic energy, is energy released in large quantities from operations that affect atomic nuclei, the dense centers of atoms. Controlled fission in the reactors currently used to generate electricity in many parts of the world is one way to release nuclear energy [1].

The development of nuclear energy began even before the outbreak of the Second World War. Great attention was paid to this area in England, the USSR,

Germany and the USA, where some of the best European emigrant scientists were involved in research and design. The President of the United States received a letter from Albert Einstein himself calling for large-scale experiments. The possibility of creating such a colossally powerful weapon as the atomic bomb became more and more real. In August 1942, under the leadership of Robert Oppenheimer, the Manhattan Project was founded to build the atomic bomb. In December of the same year, the world's first nuclear reactor was launched. In parallel with military developments, research was also carried out on the possibilities of atomic energy for peaceful use. After World War II, the demand for electricity increased. The need for the creation of nuclear power plants was determined by the exhaustibility of the resources of large-scale hydropower and thermal power, and subsequently by a jump in energy prices. In addition, atomic energy began to find application in agriculture and medicine [2].

There are several types of nuclear reactions:

1. Reactions of nuclear fission;
2. Reactions of nuclear fusion.

Nuclear fission reactions refer to the fission of an atomic nucleus into two or more lighter nuclei. This process can occur as a result of a nuclear reaction or radioactive decay. These reactions regularly release large amounts of energy, accompanied by the emission of neutrons and gamma rays (photons with enormous energies, sufficient to extract electrons from atoms).

This reaction was first discovered by German chemists Otto Hahn and Strassmann in 1938. The energy obtained from fission reactions is converted into electricity in nuclear power plants. This culminates in the use of the heat released from the nuclear reaction to turn water into steam. The steam is used to turn turbines to generate electricity.

An important illustration of nuclear fission is the fission of a uranium-235 nucleus when it is bombarded with neutrons (Figure 1).

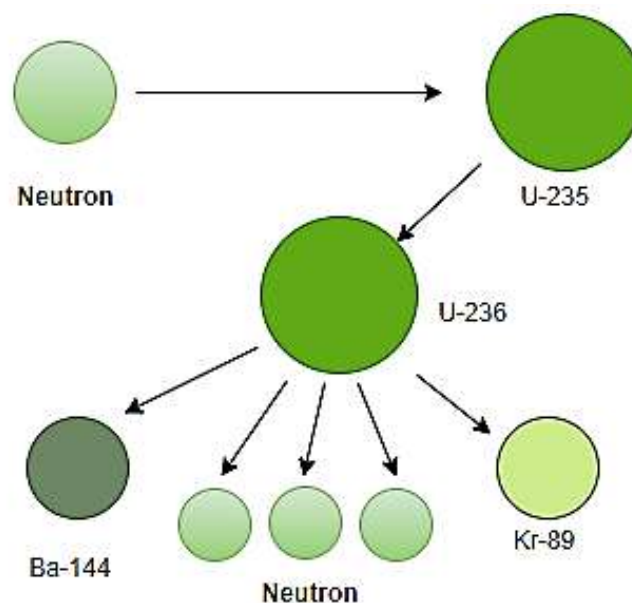


Figure 1. Fission of a uranium-235 nucleus by bombarding it with neutrons

In nuclear fusion reactions, two or more atomic nuclei combine to form one nucleus. Subatomic particles such as neutrons or protons are also formed as products of these nuclear reactions. An example of this reaction is the reaction between deuterium ( $2\text{H}$ ) and tritium ( $3\text{H}$ ), which produces helium ( $4\text{He}$ ) and a neutron ( $1\text{n}$ ). These thermonuclear reactions usually take place in the center of the Sun and various stars [3].

It is important to understand the balance of positive and negative aspects of this industry on humanity and the environment. Nuclear energy has a significant number of advantages. It has far fewer greenhouse gas emissions, avoiding over 470 million metric tons of carbohydrate per year. Keep in mind that renewable energy sources such as solar and wind only provide enough energy to meet residential or office needs. They do not yet have the nuclear capability to meet large-scale energy needs, especially in the manufacturing world. Nuclear power plants provide a stable base load of energy. Nuclear energy is widely used in America and accounts for about 20 % of all electricity produced in the United States. Nuclear power produces very cheap electricity and is cheaper than gas, coal, or any other fossil fuel plants. It is also worth noting here that nuclear power does not depend on fossil fuels.

The cost of uranium, which is used as fuel in this process, is low, and very little is needed to produce a lot of energy. In addition, even though the costs of building nuclear power plants are moderately high, the costs of operating them are quite low. No less important is the fact that at the current rate of uranium consumption, we will have enough for another 70-80 years. A nuclear power plant in power generation mode can operate without interruption even for a year or more without interruption or maintenance, which makes it a more reliable source of energy.

Compared to other energy sources, nuclear energy has a number of advantages. Innovations in nuclear power have made it a much more viable choice than others. Solar and wind power are weather dependent, a nuclear power plant has no such limitations and can operate without interruption in any climate. The atom has a higher energy density than fossil fuels. The amount of fuel required for a nuclear power plant is comparatively less than that required for other power plants, since the energy released by nuclear fission is about ten million times greater than the amount of energy released by a fossil fuel atom.

No less important and decisive is the negative impact of nuclear energy. First and most important is the environmental impact of uranium. As a rule, a nuclear power plant produces 20 tons of nuclear fuel per year, and with it a lot of nuclear waste. Most of this waste emits radiation and heat, meaning that it will inevitably engulf any compartment it is in. It can also harm living things in and around plants. Typical renewable energy sources such as solar and wind are in unlimited supply. Nuclear energy is not a renewable fuel source. Like other sources of fuel, uranium is also limited and exists in a few countries. Uranium is in limited supply, although it is currently plentiful. There is a risk that it will eventually end. It should be taken into account that nuclear accidents, such as at Three Mile Island in 1979 (Figure 2), and at the Chernobyl nuclear power plant in 1986, leave their mark for many years and cause not only a serious environmental disaster, but also mass diseases of the inhabitants of the affected areas [4].



Figure 2. Three Mile Island Nuclear Power Plant

On the other hand, using breeder reactors and fusion reactors, we can produce fissile elements other than uranium. One such element is plutonium, which is produced by the by-products of a chain reaction. In addition, if you know how to control atomic fusion, the same reactions that fuel the sun, you can get almost unlimited energy. It should be emphasized that nuclear power brings many benefits to the economy due to the number of jobs and the wealth that the new plant brings.

In total, there are currently 99 reactors operating in the United States at 62 nuclear power plants, which generate 19.5 % of all energy in the country. In principle, the newest completed reactor in the United States was launched back in 1996 at the Watts-Bar nuclear power plant. In 2001, the US government adopted guidelines for a new energy policy. In particular, it included the development of nuclear energy, through the development of new types of reactors with a higher efficiency factor, new methods for processing spent nuclear fuel. It was planned to build several dozen new nuclear reactors by 2020, with a total capacity of 50,000 MW, and, also, to achieve an increase in the capacity of existing nuclear power plants by an additional 10,000 MW. It was thanks to this program that four new reactors were laid down in the United States in 2013 – two each at the Vogtle and V.C. Summer nuclear power plants. All four reactors are of a new type – AP-1000 from Westinghouse.

It is necessary to highlight a number of the largest companies for the production of nuclear energy and reactors in the United States:

1. Cameco Corporation (NYSE: CCJ)

Cameco Corporation, headquartered in Saskatoon, Canada, is one of the largest uranium producers in the world, accounting for 17 % of total global uranium production. The company operates in the United States, Canada and Kazakhstan.

2. Entergy Corporation (NYSE: ETR)

Founded in 1913, Entergy Corporation is an integrated energy company that supplies electricity to nearly 3 million customers in Louisiana, Mississippi, Arkansas and Texas. The main activities of the company are the production and distribution of

electricity. Entergy Corporation has a generating capacity of 24,000 megawatts and owns approximately 16,100 km of interconnected high-voltage transmission lines in the ring. The company is headquartered in Jackson, Mississippi. The company's nuclear fleet includes five nuclear installations with a total nuclear capacity of 5,000 MW.

### 3. Constellation Energy Corporation (NASDAQ: CEG)

Constellation Energy Corporation, headquartered in Baltimore, Maryland, USA, is an energy company that provides sustainable and renewable energy solutions to a variety of wholesale customers, including homes, businesses, government agencies, and community organizations (such as municipalities, cooperatives etc.). Constellation Energy Corporation boasts the largest fleet of nuclear power plants with 21 nuclear units, and the electricity it generates accounts for half of the country's carbon-free energy and 20 % of the country's total electricity.

### 4. Public Service Enterprise Group Incorporated (NYSE: PEG)

Public Service Enterprise Group Incorporated is a diversified energy company operating through several subsidiaries including PSEG Power, PSEG Long Island and PSEG Energy Holdings. The company serves customers in New Jersey, Pennsylvania and Maryland. PSEG's generating park includes coal, gas, oil, solar and nuclear power plants. PSEG Nuclear is a subsidiary of a company that operates three nuclear facilities in South Jersey. In addition to the plants in South Jersey, PSEG Nuclear also owns a small stake in two nuclear power plants in Pennsylvania [5].

Thus, the next decade will be decisive for the future fate of the US nuclear industry. At the moment, the United States has serious prospects in this industry. For the rational use of nuclear energy in the United States, it is necessary to develop new, more economical types of reactors and mechanisms for the American nuclear industry, including solving the issue of recycling waste from this industry.

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## STAGES OF THE TECHNOLOGICAL PROCESS OF PAPER PRODUCTION

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**Abstract.** This article is devoted to the problem of paper making. The following issues are considered in detail: the composition of paper, improving its quality. The issues of production technology and paper quality criteria are revealed. It is concluded that, although we live in the age of information technology, paper has not become something unnecessary, paper still occupies an important place in our lives.

**Keywords:** paper, manufacture, technology, raw material, process.

## ЭТАПЫ ТЕХНОЛОГИЧЕСКОГО ПРОЦЕССА ПРОИЗВОДСТВА БУМАГИ

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**Аннотация.** Данная статья посвящена проблеме изготовления бумаги. Подробно рассмотрены такие вопросы, как: состав бумаги, повышение ее качества. В работе раскрываются также вопросы технологии производства продукции и критерии качества бумаги. Несмотря на то, что мы и живем в век информационных технологий, бумага не стала чем-то ненужным, она по-прежнему занимает важное место в нашей жизни.

**Ключевые слова:** бумага, производство, технология, сырье, процесс.

Paper is a material that consists mainly of plant fibers bound together into a thin sheet in which the fibers are bonded by surface adhesion forces. The interweaving of small fibers into a paper web is usually carried out by precipitation and filtration on the grid of a paper machine.

Usually, in the production of various types of paper, three or more fibrous semi-finished products are used, (obtained by shallow cooking of vegetable raw materials, as a result of which only a part of non-cellulose components is excluded)

forming a paper composition by the type of fibers. Sometimes it is produced from a single fibrous semi-finished product. Coloring agents and mineral fillers are also introduced into the composition of the paper.

We should look into the history of papermaking. Its prototype is ancient Egyptian papyrus, the plant from which writing material was made. At first, the Egyptians cut the reed stems into thin fibers. Then these fibers were laid out on a smooth surface very close to each other, so that the fibers form a solid layer. After that, another similar layer was put on top, but only across the first one. Then all this was pressed down with another stone, while the reed fibers released a sticky juice. After exposure to the press, the sheets were dried in the sun, then cut and polished. Many ready-made flexible scrolls, which were made at the beginning of the XX century, have survived to the present day [1].

The production of paper from the materials we are familiar with has been put on stream in China. The technology of processing mulberry bark gradually spread around the world during the II century A. D. From China, it passed through the Middle East, and then to Europe.

In the XVI century the first paper mill appeared 30 km from Moscow. However, paper production in Russia has hardly developed for a long time, and paper was purchased abroad, mainly in the Netherlands.

The purpose of my work is to consider the primary issues of paper production technology.

What is paper made of? Some grades of paper and paperboard are made from recycled paper. Recycling of old newspapers, magazines, books and other paper waste reduces the need for deforestation, which is especially important in the modern world with its ecological problems. Also the raw materials are plants that have long fibers. In the process of mixing with water, they create a pliable, homogeneous semi finished product. It is made of:

1. Rice.
2. Straw and reeds (from which a material of increased whiteness is obtained).
3. Secondary raw materials – waste paper, rags.
4. Wool, asbestos and other fibers.

For the manufacture of paper are used:

1. Pine, cedar – coniferous species are suitable for the manufacture of packaging materials.
2. Maple, oak – hard species have a smooth base, but they are less strong.
3. Canadian fir – it makes a durable, but elastic material.
4. Chestnut, birch, etc.

Oak and pine raw materials can be mixed for the production of book paper. To improve the quality of products, wood raw materials are sorted, filtered, and treated with chemicals.

Hardwood fibers usually provide opacity, bulk, breathability and absorbency of paper. On the other hand, soft rock fibers give the paper a relatively large transparency, dense structure and high tear resistance.

Usually, two, three or more fibrous semi-finished products are used in the production of different types of paper, thus forming a paper composition according to

the type of fiber. Sometimes it is made from fibrous semi- finished products prepared for this purpose in an appropriate way. Very often, mineral fillers, sizing agents and dyeing auxiliary are added into the composition of the paper [2].

The technology consists of the following processes:

#### 1. Preparation and sorting of raw materials

One of the important conditions for success in work is the correct preparation of raw materials. The raw materials coming into processing must be carefully reviewed, foreign impurities, usually found in the collected waste paper and in old rags, are removed.

And the wood coming to the plant is cleaned of bark, crushed into chips and sorted by size using a special screen.

Sorted chips are crushed into fibers. Mechanical processing is the most economical method, but it is used mainly in the production of newsprint, since cellulose fibers are very short, and web has a low density. And with chemical grinding of wood pulp, long fibers can be obtained (such paper is more durable). Next, the finished mass is filtered and washed to get rid of impurities. By the way, it will take 1 kg of wood to produce 50 A4 sheets.

Next, they are dipped in water in a ratio of five parts of wood to 95 parts of water. As a result, the chips bulk up.

#### 2. Fiber forming, additive compound and coloring

It is necessary to introduce kaolin and sizing materials into the paper mass in the following order: first glue, then alumina solution and last kaolin milk. Solutions should be poured gradually, achieving a good mixing of them with fiber.

In this way after getting wet, the mass enters special machines, where it is mixed with glue (it can also be mixed with chalk, caustic, acids, etc.), which changes the shape and structure of the fibers and makes them more resistant to moisture. It is also necessary in order to obtain a homogeneous viscous composition without impurities. The quality, grade and color of the paper depend on this stage.

Then the pigments and dyes are used to color the paper. Adding such coatings is very popular because it allows you to get smooth, opaque paper for printers. Then the paper is sent to the paper machine [3].

#### 3. Processing in a paper machine

The pulp stock enters the paper machine. First, the composition falls on a wire mesh screen, where water flows out from. At the same time, the fibers are intertwined throughout the entire movement of the machine, providing a solid foundation. The pulp is sent to the presses, where it is compacted and more water comes out of it.

#### 4. Rolling

The paper passes through metal drums, where it dries. The final processing takes place on the spindles, the paper web is compressed, leveled, compacted and finally dried.

#### 5. Pressing

In this area, the paper is completely dehydrated and becomes thicker as much as possible, and then it is sent to the winding machine.



To dehydrate paper by pressing, a variety of presses can be used, which will be at the place of paper production – from a conventional manual office copy or bookbinding press to powerful drive presses.

Under the pressure of the press, a large amount of water is squeezed out of the wet sheets, after which the press can be unloaded. Previously, it is necessary to squeeze out the water from the ends of the cloth with a wooden rail, since it will be absorbed back into the paper when unloading the press.

#### 6. Paper drying

To reduce the size of the drying part of the paper machine, a vacuum drying method is used. Paper drying cylinders can be placed in a chamber in which a vacuum is created. Continuous entry into and exit from the paper web chamber is carried out through seals. Due to the vacuum in the chamber, the temperature of moisture evaporation decreases sharply with a reduction in the drying time by about 2 times. At the same time, due to a sharp reduction in the duration of the drying process, the paper shows a slight shrinkage, reduced mechanical strength and increased porosity, plumpness and absorbency. Therefore, only porous types of paper can be obtained by such a drying method, which, however, can be manufactured using less complex equipment. Therefore, in industry, the method of drying paper under vacuum has not received practical application.

In combination with the usual method of drying paper on paper drying cylinders, radiant drying is sometimes used heat (radiation drying) [4].

#### 7. Cutting

Paper rolls are necessarily cut into pieces. You should get smaller rolls. Then they are divided by laser into ready-made sheets.

#### 8. Packaging

This is the final stage of web production. The paper can be packed in different ways. It can be packed in packs of 250–1000 sheets. It can be packed in bundles up to 10 kg, if the canvas is technical. Palletizing and a mixed method of packaging are commonly practiced.

#### Quality criteria:

**Density.** One of the key characteristics of paper, which is expressed in the mass of one square meter of canvas. The density of coated paper is usually in the range of 70 to 300 grams per square meter. For office equipment, the best option is paper with a density of 80 g / m<sup>2</sup>.

**Whiteness.** This qualitative (visual) indicator shows the proximity of the leaf color to the reference white color. This characteristic is especially important for printing paper, because the closer the sample is to the standard, the more accurate the color reproduction will be when printing products.

**Thickness.** This parameter is measured in microns or tenths (hundredths) of a millimeter. The thicker the sheet, the less transparent it is. For medium–quality office paper, the optimal thickness is 104–106 microns.

**Rigidity** is a key measure of the paper's resistance to deformation when passing through a copier. The stiffer the sheet, the better it will pass through the rollers and the less likely it is to jam.

Smoothness/roughness. The so-called geometry of the surface of a sheet of paper is determined by the presence of macro- and micro-roughness on it. They are responsible not only for the roughness and smoothness of the surface, but also for the uniform distribution of mass over the area.

Opacity is a measure of how well the paper prevents the printed image from showing through on the back of the sheet. This parameter is especially important for double-sided printing.

Tensile strength and fracture strength are the most important strength characteristics of paper [5].

Today we live in a time of tremendous information progress. But this does not mean that the paper era is coming to an end. Paper is still an important element in the printing process, for many people reading books remains a great pleasure, and a book in a beautiful edition can be a wonderful gift for any holiday. So, we can say with confidence that paper will occupy an important place in our lives for a long time.

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## **BUSINESS STRATEGY AND PERFORMANCE IN THE SERVICE SECTOR IN RUSSIA**

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**Abstract.** The article deals with the financial strategy as one of the main elements of the enterprise management policy. Specifically, with the help of the financial strategy chosen optimally the enterprise gets the possibility to function successfully in the market and to adapt to the market conditions. The article also emphasizes the role of financial analysis and forecasting in developing effective financial strategies. It provides examples of successful companies that have implemented strong financial strategies, such as Mariott.

**Keywords:** business strategy, financial position, financial development, service sector, market research, efficiency, analysis.

## **БИЗНЕС-СТРАТЕГИЯ И ЭФФЕКТИВНОСТЬ В СФЕРЕ УСЛУГ В РОССИИ**

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**Аннотация.** В статье рассматривается финансовая стратегия как один из основных элементов политики управления предприятием. Именно с помощью оптимально выбранной финансовой стратегии предприятие получает возможность успешно функционировать на рынке и адаптироваться к рыночным условиям. В статье также подчеркивается роль финансового анализа и прогнозирования в разработке эффективных финансовых стратегий. Приводятся примеры успешных компаний, которые внедрили сильные финансовые стратегии, например, Mariott.

**Ключевые слова:** бизнес-стратегия, финансовое положение, финансовое развитие, сфера услуг, исследование рынка, эффективность, анализ.

The service sector in Russia is one of the most dynamic and promising industries of the economy, which provides a significant share of the country's GDP. However, in the face of economic challenges and changing market conditions, the financial strategy of companies operating in this sector becomes increasingly important. Every business leader wants their organization to succeed. Turning a profit and satisfying stakeholders are worthy objectives but aren't feasible without an effective business strategy.

Business strategy itself is the strategic initiatives that a company pursues to create value for the organization and its stakeholders and gain a competitive advantage in the market. This strategy is crucial to a company's success and is needed before any services are delivered. The service sector or the tertiary sector includes hospitality, transportation, financial services, retail sales, real estate, banking, media and entertainment, information technology, and education [1, p. 15].

The purpose of this article is to analyze the financial strategies of some large Russian companies. To achieve this goal it is necessary to consider and solve the following tasks:

- To study the essence of financial strategy;
- To consider the process of financial strategy development;
- To determine the peculiarities of financial strategy implementation;
- To evaluate financial strategies of some Russian companies.

Research methods of business strategies in companies of the service sector can vary depending on the size of the organization, and available resources. However, some common methods used by enterprises to develop and refine their business strategies include:

**Market research:** This involves gathering data about the target market, including consumer behavior, preferences, and needs. This information can be used to develop products and services that meet the needs of customers and gain a competitive advantage.

**Competitor analysis:** This involves analyzing the strategies of competitors, such as their pricing, marketing, and distribution strategies. This information can be used to identify potential opportunities and threats to the business and adjust strategies accordingly.

**SWOT analysis:** This involves analyzing the strengths, weaknesses, opportunities, and threats of the organization. This helps identify areas where the business can improve and opportunities to pursue.

**Customer feedback:** This involves soliciting feedback from customers through surveys, focus groups, and other methods. This can help identify areas where the business can improve and better meet the needs of customers.

**Data analysis:** This involves analyzing data related to the organization's operations, finances, and other key areas. This information can be used to identify areas where the business can improve efficiency, reduce costs, and improve profitability.

**Expert opinions:** This involves consulting with experts in the industry or related fields to gain insights and advice on business strategies. This can provide valuable perspectives and help identify new opportunities.

**Scenario planning:** This involves developing different scenarios for the future and analyzing how the business can respond to each scenario. This can help the business prepare for unexpected events and develop strategies to minimize risk.

Overall, a combination of these research methods can be used to develop effective business strategies that help the enterprise achieve its goals and succeed in a competitive market [2].

One of the main challenges for service sector companies is the instability of the ruble and high inflation, which leads to increased costs for equipment procurement, rent and employee salaries. As a result, companies are forced to take measures to reduce costs and increase business process efficiency.

However, challenges also present opportunities. For example, there is a growing demand for entertainment, tourism and hospitality services in Russia, opening up new prospects for companies in this industry. In addition, with restrictions on international travel, Russian tourism companies have the opportunity to develop domestic tourism and create new products and services. These research methods can be used individually or in combination to develop effective business strategies that help service sector companies achieve their goals in the development of business performance and succeed in a competitive market using their strategy.

Some of the biggest hospitality service companies in Russia in recent years include:

1. Azimut Hotels – this is the largest hotel chain in Russia, with over 30 hotels across the country.
2. Hilton Hotels & Resorts – this international hotel chain has a strong presence in Russia, with several properties in Moscow and St. Petersburg.
3. Marriott International – another international hotel chain with a significant presence in Russia, offering luxury accommodations in major cities.
4. Four Seasons Hotels and Resorts – a high-end hotel chain with locations in Moscow and St. Petersburg, offering luxury accommodations and world-class amenities.
5. Radisson Hotel Group – with over 20 hotels in Russia, this hotel chain offers a range of accommodations from budget-friendly to upscale.
6. AccorHotels – this international hotel group has a strong presence in Russia, with several brands including Novotel, Ibis, and Mercure.
7. InterContinental Hotels Group – this hotel group has several properties in Moscow and St. Petersburg, including the iconic Hotel Astoria [3].

The essence of all mentioned hotel chains in the Russian tourism sector is to provide high-quality services to tourists and create a memorable experience for them. This involves understanding the needs and preferences of different types of tourists, such as leisure travelers, adventure seekers, cultural enthusiasts, and business travelers. Many of the leisure businesses' financial strategies are to focus on maximizing revenue and profitability while maintaining a strong financial position. This involves expanding the company's portfolio of hotels and resorts, optimizing pricing strategies, and implementing cost-saving measures. For instance, Marriott hotel line also focuses on leveraging technology to enhance customer experiences and streamline operations. Additionally, the companies prioritize investments in

sustainability and social responsibility initiatives to align with consumer preferences and regulatory requirements.

Besides that, the strong competitiveness forces business in the service sector to maintain their attractiveness to the customers. For instance, Marriott's main competitor is stated to be Hilton hotel line. Both companies operate in the same industry which is a key factor for increased competition. However, compared to Marriott's 30 brands and 7,642 properties, Hilton has 18 brands and 6,478 properties (according to Citations Journal of Undergraduate Research 2021).

According to S&P Global company's report business activity in the Russian service sector in July 2022 grew at the highest rate in more than a year, having 54,7 points in total. That means the Russian service sector has expanded which makes it essential to prioritize the development of businesses' performance.

One of the steps that Russian companies have taken was paying attention to the HR and increasing the number of workers for the first time since November 2021. Russia's composite PMI, which combines manufacturing and services, rose to 52.2 in July from 50.4 in June. This means a slight uptick in private business activity, and it was primarily driven by the services sector: manufacturing output, on the other hand, declined in July, S&P Global said in a survey [4].

Nevertheless, Russian economy in total has a tendency to be mixed since there are plenty of government owned and sponsored companies even within the domestic service sector [5]. Their strategies are often regulated by the official authorities such as The Bank of Russia. In its statement 'Financial market developing programme 2023-2025' the main tools for influencing the business performance and creating conditions and incentives for its development are:

1. Regulation and supervision;
  - Soft regulation in the form of codes and standards of self-regulatory organizations (SROs) and letters with recommendations;
  - Creation and development of digital infrastructure elements of the financial market with equal access;
  - Creation and support by the state of mechanisms for collective insurance (guarantee) of individuals' savings both in the banking sector, the insurance market and non-governmental pension funds (NPFs);
  - Tax incentives and subsidies;
  - Enhancement of financial literacy and educational activities;
  - Training of personnel for the financial industry;
  - Information policy and interaction with market participants;
  - Restrictions on capital movement [6].

Marriott's revenue management strategy involves dynamically adjusting room rates based on supply and demand. By utilizing data analytics and forecasting, Marriott can optimize pricing to maximize revenue and occupancy rates. Marriott's asset management strategy aims to maximize the value of its owned or leased properties. This includes strategies such as property renovations and upgrades, selecting the most profitable franchises, and optimizing revenue streams. Marriott's

customer loyalty program, Marriott Bonvoy, is a key aspect of its financial strategy. By incentivizing repeat business, Marriott can increase revenue and customer satisfaction. The program includes rewards such as exclusive access to events and experiences, free nights, and airline miles.

Also, Marriott has a global presence and is constantly seeking new opportunities for expansion. Its financial strategy includes identifying and entering new markets, developing local partnerships, and adapting to regional market conditions. This can be shown in the SWOT analysis of Marriott's hotel brand in order to identify areas where the business can improve its activity.

### *Strengths*

Marriott's strong brand portfolio and global presence are strengths that help to maintain its success. Each of Marriott's brands is designed to target a specific part of the market and to provide customers with an experience that fits their wants and needs. As a result, customers are very loyal to the company. This is another strength of Marriott that can be seen through the dedication of customers within the Marriott Bonvoy loyalty program. Relating to global presence, as mentioned in the prior background section, Marriott owns 30 brands and operates 7,642 properties in 133 different countries and territories (MAR 10K 2020, p. 25). These factors combined contribute to Marriott's biggest strength of being a leading hotel chain in the market.

### *Weaknesses*

A weakness that can be seen in Marriott is data protection. A data breach occurred in Marriott's systems in 2020 that affected over 330 million guests (Airoldi, 2020). Marriott failed to protect the personal data of its customers, and this led to damage in its customers' trust. Another weakness is negative media coverage and controversies of Marriott in recent years. Marriott has been questioned for blocking guests from using personal Wi-Fi. The company was also questioned after it was accused of leaving people stranded during Hurricane Irma (Berr, 2017). Another weakness of Marriott is the code of conduct that all of its employees are expected to follow. Employees are required to follow the code at all times, and the strict regulations may turn away potential employees.

### *Opportunities*

An opportunity for Marriott is to expand into emerging economies. There is a demand for higher-end hotels in developing countries. Expansion into these areas could prove to be profitable and advantageous for the company. Shifting demographics is also an opportunity for Marriott. Marriott could adapt itself to be more appealing to younger generations and millennials, since more of these individuals are entering the market. By appealing to younger individuals, Marriott can grow its customer base.

### *Threats*

Currently, the biggest threat to Marriott International is the coronavirus pandemic. As mentioned, COVID-19 has had a significant impact on the travel and hospitality industry, leading to fewer individuals traveling. COVID-19 is still affecting companies, and Marriott is looking for the best way to adapt its business

with the pandemic. Another threat comes from competitor hotels in the industry. Hilton Worldwide, alongside many other chains, offers competition to Marriott. Also, online renting platforms and travel services, such as Airbnb and Travelocity.com, have gained popularity. Terrorist attacks also pose a threat, due to hotels being an easy public target [7].

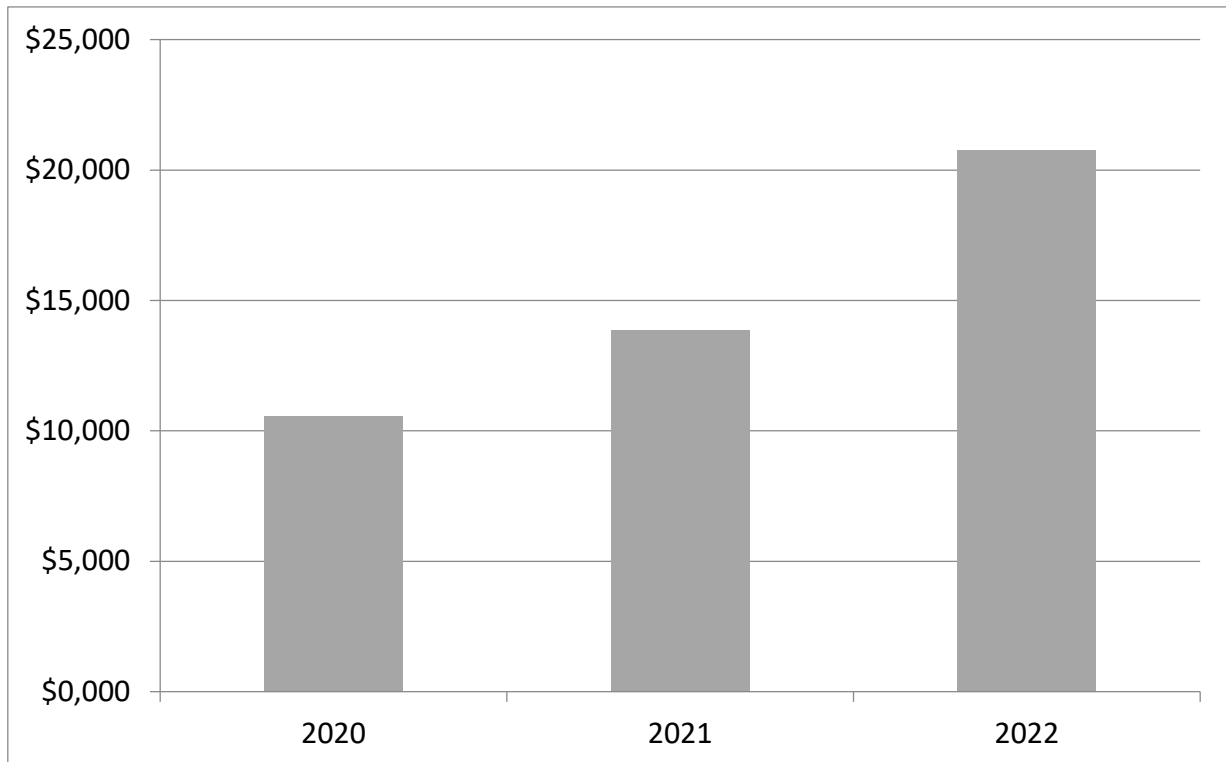


Figure. Marriott's revenue per year

Marriott International, along with the travel and hospitality industries as a whole, was significantly impacted by COVID-19. The negative effects can be seen in revenue, which decreased 49.6 %. However, there was a significant increase in 2022 (Figure).

As a result, Russian tourism sector has a lack of customer communication which may impact the overall revenue since the absence of customer loyalty.

Businesses need to adopt a comprehensive strategy that includes improving infrastructure, investing in technology and innovation, partnering with local companies and organizations, and enhancing workforce training and development programs, as well as structuring the company and improving the customer service. Furthermore, companies need to focus on providing high-quality services that meet customers' needs, demands, and expectations while ensuring cost-efficiency and sustainability.



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## THE IMPORTANCE OF TOURISM IN THE EGYPTIAN ECONOMY

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**Abstract.** Tourism plays a special role in economic sectors. At the end of the decade, this sector of the Egyptian economy is showing stable growth, interrupted by some countries in 2015, which banned air traffic. Analyzing and comparing the economic indicators of 2016-2021, it is possible to determine the role and importance of tourism activity in the Egyptian economy.

**Keywords:** Egypt, tourism, economy, economic indicators, Egyptian economy, the importance of tourism on the economy, GDP.

## ЗНАЧЕНИЕ ТУРИСТИЧЕСКОЙ ДЕЯТЕЛЬНОСТИ В ЭКОНОМИКЕ ЕГИПТА

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**Аннотация.** Туризм играет особую роль в отраслях экономики. По итогам десятилетия этот сектор экономики Египта демонстрирует стабильный рост, прерванный некоторыми странами в 2015 году, запретившими авиасообщения. Анализируя и сравнивая экономические показатели 2016-2021 гг., можно определить роль и значение туристической деятельности в экономике Египта.

**Ключевые слова:** Египет, туризм, экономика, экономические показатели, экономика Египта, значение туризма на экономику, ВВП.

Today, tourism activity is one of the most rapidly developing forms of trade in services on the world market. The tourism industry has important economic functions: providing jobs to the population, stimulating the dynamic development of transport, road, hotel production, and also serves as support for the preservation of cultural heritage and plays a significant role in the development of Gross Domestic

Product (GDP). Tourism brings great profits to many countries, which increases every year and is invested in the development of new areas and tourist sites.

For the development of the travel industry, first of all, a favorable environment is needed, which includes: safety and security, health and hygiene, and a business environment. In addition, the sustainability of tourism is important: ecological balance and socio-economic conditions. The infrastructure of air, land, port and tourist transport is needed. Travel policy plays a special role: international openness and competitive prices. Factors affecting the influx of tourists are important: cultural, natural, historical resources. Most countries have a large influx of travelers every year, but Egypt is the second most popular country among Russian tourists [1]. We propose to consider the topical issue of how tourism affects the economy, using the example of this country.

Egypt has the greatest baggage of historical heritage. The ancient Egyptian civilization began its origin from the middle of the IV millennium BC. Nowadays there are many cultural monuments of the past left here, for example, pyramids, sculptures, temples, and the white desert is listed as a UNESCO World Heritage Site. There is no bad weather in Egypt: it is always warm and sunny here. The population is distinguished by its friendliness and hospitality. Tourists love the Red Sea of Egypt because it is the cleanest and warmest. Russian travelers appreciate holidays in this country for the absence of a visa and a fairly short flight: a flight by plane from the capital to Hurghada will take no more than five hours [1].

Egypt today belongs to the developing countries of the world and has the strongest economy among the countries of North Africa. The share of Egypt's tourism in total exports by the end of 2019 is 26.6 %, which means that the country's economy is quite dependent on tourism activities [2]. Favorable climatic conditions and geographical location contribute to the development of the country's tourism industry. In addition to the already existing tourist sites on the Red Sea coast, the Egyptian government wants to build complexes on the Mediterranean coast near the cities of al-Alamein and Mersa Matruh.

Egypt is an agro-industrial country in which the service sector is the most developed. The public sector plays a major role in the country's economy. It mainly covers industry. The private sector includes agriculture, trade, services and small enterprises producing food, metal products, furniture, etc. [3].

According to the statistics of Egypt's economic indicators (Figure 1), in 2021, the share of industry in the creation of the state's GDP is about 38 %, the share of agricultural production is about 12 %, and the share of the service sector (tourism and logistics) forms about 48 %. The main industries of Egypt are the oil and gas industries, mechanical engineering, metallurgy, as well as light, food, construction and pharmaceutical industries. The industrial sector employs 23 % of the country's population. Egypt has developed crop production (cultivation of rice, wheat, cotton, sugar cane, etc.) and animal husbandry and fishing. About 30 % of the economically active population of the state are employed in the agricultural sector. The largest share of the population is employed in the service sector – more than 47 %. The tourism sector was most affected in 2020 by the COVID-19 pandemic, but at present its gradual rise is observed [4].

Tourism is one of the largest industries, and its main component is tourists. Most tourists come to Egypt from Russia, Great Britain, France, Italy and Germany. The number of Russian tourists who arrived in Egypt in the period from 2010 to 2021 is 7,740.1 thousand people [5].

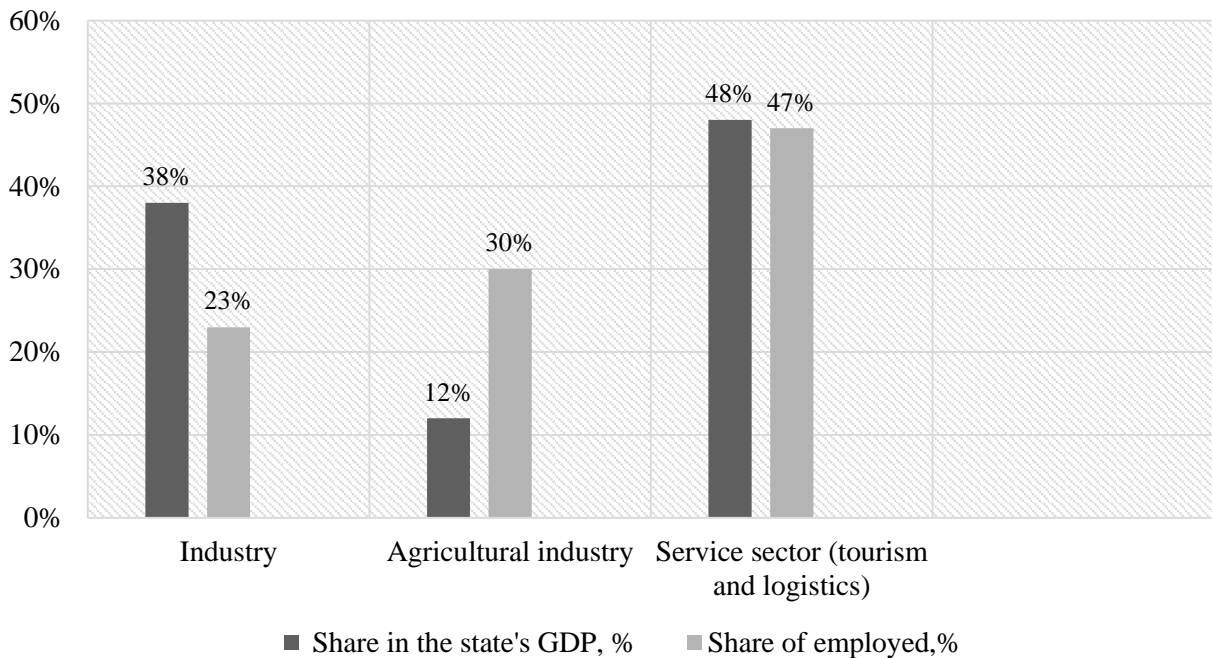


Figure 1. Statistics of economic indicators of Egypt [1]

If we look at Figure 2, we can see that in 2016, 2017, 2018, 2019 and 2020, the number of Russian tourists is significantly less than in other years. The reason for this was the suspension of air traffic between Russia and Egypt on November 6, 2015. For security reasons, all flights of Russian air carriers to Egypt were canceled. For 5 years, Russians could not visit this country. Later, checks were carried out at airports, and experts gave various recommendations for improving security, special attention had to be paid to passenger screening. In January - February 2021, specialists from Russia engaged in security checks at the airports of Hurghada and Sharm el-Sheikh. After assessing the readiness of the airports, Russian President Vladimir Putin, after talking with Egyptian President Abdel Fattah al-Sisi on April 23, agreed to restore air traffic in the main directions. And already on July 8, Vladimir Putin canceled Decree No. 553 "On certain measures to ensure the national security of the Russian Federation and protect citizens of the Russian Federation from criminal and other illegal actions", which prohibited flights of Russian airlines to resorts in Egypt [5].

Also in 2015, the United Kingdom, Germany, Belarus, and the Netherlands suspended flights with Egypt. For this reason, revenues in the tourism industry have fallen significantly. Already in 2021, the number of Russian tourists amounted to 695,439 thousand people. According to the Border Service of the FSB of the Russian Federation, in 2022 the number of Russian tourists to Egypt amounted to 905.5 thousand [5].

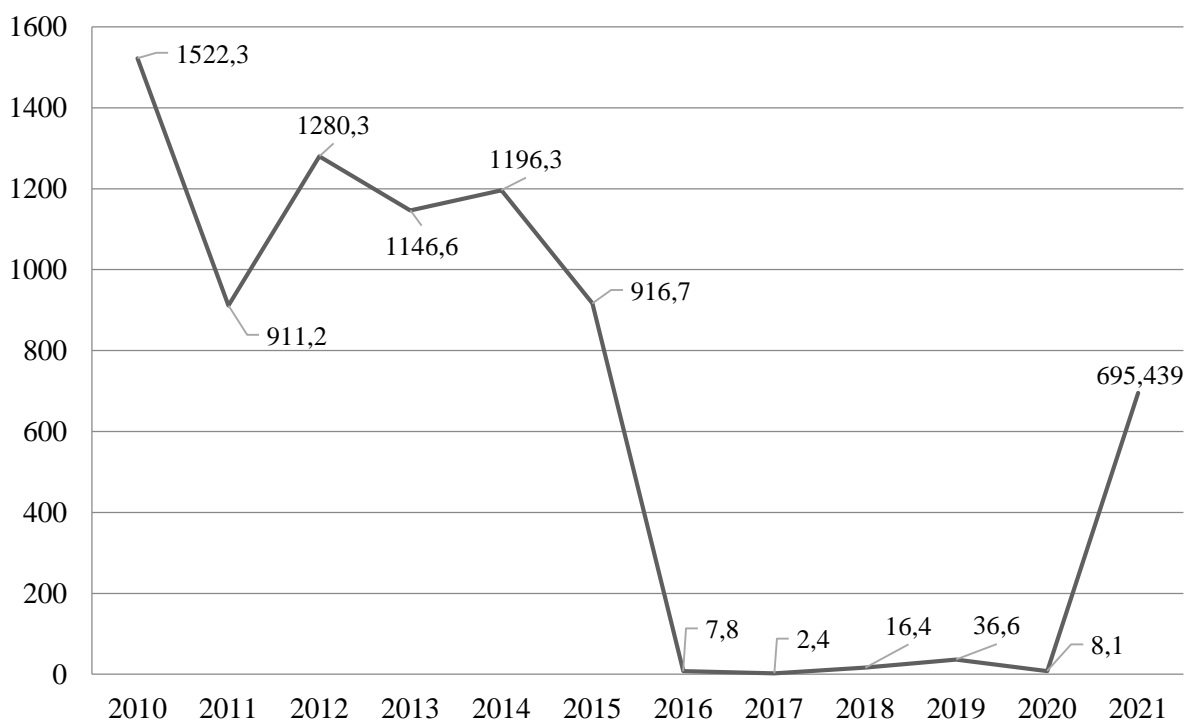


Figure 2. The number of Russian tourists who arrived in Egypt

To date, the value of Egypt's GDP (2021) is 404.14 billion dollars. It is the maximum absolute value recorded by the World Bank for the economy of Egypt in the entire history of monitoring this state [6]. Over the past decade, the dynamics of the pyramid country's GDP has shown mainly positive changes: the average relative growth is 6.56 % per year. However, during the period of restriction of air traffic with Russia, Great Britain, Germany, Belarus and the Netherlands, Egypt's GDP indicated a noticeable decline in the country's economy. According to the table (Table). In 2017, the maximum drop in the indicator was recorded, amounting to - 96.71 billion dollars (-29.09 %). It can be noted that the maximum increase over the past ten years was in 2020, despite the restrictions associated with the COVID-19 pandemic, it amounted to 20.51 % (+62.17 billion dollars) [6].

Table 1 – Egypt's GDP for 2014-2021 [3]

Year	Meaning	Change	
		In absolute values	In relative values
2014	\$305,60 млрд	+\$17,16 млрд	+5,95%
2015	\$329,37 млрд	+\$23,77 млрд	+7,78%
2016	\$332,44 млрд	+\$3,08 млрд	+0,93%
2017	\$235,73 млрд	-\$96,71 млрд	-29,09%
2018	\$249,71 млрд	+\$13,98 млрд	+5,93%
2019	\$303,08 млрд	+\$53,37 млрд	+21,37%
2020	\$365,25 млрд	+\$62,17 млрд	+20,51%
2021	\$404,14 млрд	+\$38,89 млрд	+10,65%

Tourism is a special sector of the economy of many countries, in particular Egypt. Here, this industry is considered a priority in economic development. Based on the above, it can be concluded that in the absence of tourists in Egypt, the inflow of funds has significantly decreased. Consequently, tourism and services are the main sources of income of the pyramid country. Analyzing the statistics of economic indicators and the illustrations presented above, we can note the dependence of the level of income from tourism on the amount of demand for these services. A noticeable drop in GDP in 2017 and growth in 2021 emphasize the importance of the role of this industry for the economy as a whole. The impact of the tourism sector is also assessed by the employment index, which in Egypt is the largest in comparison with the industries and agriculture. Measures to improve the tourism industry in Egypt will be considered by us in the following publications.

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## THE ADVANTAGE OF USING NATURAL GAS AT THE CHPP

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**Abstract.** This article discusses the advantages of operating a natural gas CHPP in relation to other types of fuel. The article raises the issues of environmental and economic benefits when using natural gas-fired CHPP. The paper also reviews the methods of selection and analysis of the main pollutants during the operation of the CHPP.

**Keywords:** CHPP, natural gas, fuel, oil, environment, analysis.

## ПРЕИМУЩЕСТВА ИСПОЛЬЗОВАНИЯ ПРИРОДНОГО ГАЗА НА ТЭЦ

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**Аннотация.** В данной статье рассматриваются преимущества работы ТЭЦ на природном газе по отношению к остальным видам топлива. В статье поднимаются вопросы экологического и экономического преимущества при использовании ТЭЦ на природном газе, также отражены методы отбора и анализа основных загрязнителей при работе ТЭЦ.

**Ключевые слова:** ТЭЦ, природный газ, топливо, нефть, окружающая среда, анализ.

Combined heat and power plants (CHPPs) are one of the main sources of electricity production in the world. They play an important role in ensuring the energy security of the country, as they make it possible to provide a reliable and constant power supply to the population and industry. CHPPs use different types of fuel, which affect the efficiency of the plant and its impact on the environment. The

main types of fuel are coal, oil and gas. Each type of fuel has its own advantages and disadvantages. Coal is the most common type of fuel at CHPP, but its use is associated with high emissions of greenhouse gases and other harmful substances [1]. Oil also has a high energy value, but its use is also associated with a negative impact on the environment. Natural gas is one of the most environmentally friendly fuels, which makes it attractive for use in CHPP. Greenhouse gases such as carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) are major contributors to global warming and climate change. When natural gas is burned in combined heat and power plants, CO<sub>2</sub> is emitted, which is a major greenhouse gas. However, compared to other fuels, CO<sub>2</sub> emissions from combustion of natural gas in CHPPs are much lower.

Fuel combustion in thermal power plants is associated with the formation of combustion products containing fly ash, particles of unburned pulverized fuel, sulfur and sulfur dioxide, nitrogen oxides and gaseous products of incomplete combustion, and when burning fuel oil, in addition, vanadium compounds, sodium salts, coke and soot particles [2, 3]. Ashes of some fuels contain arsenic, free silicon dioxide, free calcium oxide and others. Combustion of coal and oil in thermal power plants releases heavy metals such as mercury, lead and cadmium, as well as other hazardous substances such as dioxins and furans. These substances can be hazardous to human health and the environment. When converted to lethal doses, annual emissions from 1 million kW of combined heat and power plants contain over 100 million doses of aluminum and its compounds, 400 million doses of iron, and 1.5 million doses of magnesium. The lethal effect of these pollutants does not manifest itself only because they get into the organisms in insignificant quantities. This, however, does not exclude their negative effect through water, soils and other parts of ecosystems.

Natural gas does not contain heavy metals and other hazardous substances. This makes the use of gas safer for the environment and human health. In addition, the absence of waste, such as ash, also reduces the risk of environmental pollution.

There are several advantages to choosing natural gas as a fuel for CHPP. First, natural gas has a lower cost than other fuels, making it economically viable. Secondly, the use of natural gas at CHPPs helps reduce the level of greenhouse gas emissions and other harmful substances, which has a positive impact on the environment. Thirdly, gas is a more reliable and safe type of fuel, which reduces the risk of accidents and improves the efficiency of equipment at CHPPs.

Thus, the use of natural gas as a fuel for CHPPs is an urgent topic, which helps reduce environmental pollution and improve the efficiency of stations.

As part of the benefits analysis, two advantages of using natural gas at CHPPs can be generalized:

1. Economic advantages. One of the main economic advantages of using natural gas at CHPPs is its relatively low cost compared to other fuels. This makes gas an economically advantageous choice for power generation and reduces production costs [4]. In addition, the use of gas at CHPPs reduces dependence on imported oil and coal, which contributes to the economic security of the country. Another economic advantage of using natural gas is its high efficiency. Gas turbines, which are used at CHPPs, have a high efficiency – more than 40 %, while using other types of fuel no more than 36 %, which means that they can produce more electricity from one unit of



fuel. This reduces the cost of electricity generation and makes gas a more cost-effective choice.

2. Environmental advantages. One of the main environmental advantages of using natural gas at CHPPs is its low level of emissions of harmful substances. The combustion of gas at CHPPs does not emit such hazardous substances as sulfur and ash, which are emitted during the combustion of coal and oil. In addition, gas does not contain heavy metals, which can also be hazardous to the environment. Another environmental advantage of using natural gas is its low level of greenhouse gas emissions. As a result, the replacement of coal-fired facilities with gas-fired cogeneration plants gives a reduction of CO<sub>2</sub> emissions by 50-70 %. Gas does not contain sulfur and nitrogen oxides, which are the main sources of greenhouse gas emissions from cogeneration plants. This makes it possible to reduce the impact of electricity production on the climate and reduce the negative impact on the environment.

I want to emphasize that regardless of the fuel used, it is important and necessary to conduct a number of environmental analyses:

1. Analysis of emissions at the chimney outlet. Analysis of emissions at the outlet of chimneys is an important step in controlling emissions of harmful substances into the environment. For this purpose, special instruments are used, such as gas analyzers, which allow you to determine the concentration of various substances in the emissions. Domestic gas analyzer PEM-4 (M) [5] can serve as such a gas analyzer. It allows you to measure with high accuracy the temperature of flue gases, OS parameters, measures the level of oxygen, carbon and nitrogen oxides, sulfur dioxides and nitrogen. Exterior view of the PEM-4M gas analyzer is shown in Figure 1.



Figure 1. Exterior view of the PEM-4M gas analyzer

Studies have shown that near powerful stations and central stations, 280-360 tons of SO<sub>2</sub> per day is emitted into the atmosphere. The maximum concentration of sulfur dioxide from the leeward side at distances: 200-500, 500-1000, 1000-2000 meters, respectively, are: 0.3, 4.9; 0.7-5.5; 0.22-2.8; mG/m<sup>3</sup>. It follows from this that sulfur dioxide is very well dispersed at a distance, and naturally there is a proportional decrease in its concentration when moving away from the source of pollution.

In the case of natural gas use in CHPP, the analysis of emissions shows a much smaller number of harmful substances than in the case of coal or oil. In particular, CO<sub>2</sub>, NO<sub>x</sub> and SO<sub>x</sub> emissions from natural gas combustion in combined heat and power plants are significantly lower than from other fuels.

2. Air quality monitoring in the vicinity of CHPPs. Air quality monitoring in the vicinity of CHPP is an important step in controlling the emission of harmful substances into the environment. For this purpose, special devices are used, such as air quality sensors, which allow to determine the concentration of various substances in the air. Portable methane and carbon dioxide analyzers "Signal", methane analyzers AT1-1 and AT3-1, infrared gas analyzer sensors, methane concentration alarm SGSHR and others can serve as such sensor [6]. In case of using natural gas at CHPPs, air quality monitoring shows a much smaller number of harmful substances in the environment than when using coal or oil. In particular, the content of NO<sub>x</sub>, SO<sub>x</sub> and other hazardous substances in the air is much lower, which contributes to improving air quality and protecting human health.

3. Laboratory analysis of soil and water samples. Laboratory analysis of water and soil samples is a necessary step in controlling environmental pollution in the vicinity of the TPP. For this purpose, special methods and instruments are used to determine the concentration of various substances in the samples. Various analyzers are used to analyze the quality of water and soil used in the process of CHPP [7]. For example, to determine the level of water pollution, chemical analyzers are used to determine the concentration of various substances such as metals, organic compounds and other pollutants.

Special devices such as photometers and spectrophotometers are used to analyze soil quality, which allow us to determine the concentration of various elements and compounds in the soil. In addition, special stations are used for water and soil quality monitoring, which allow to determine the level of contamination in real time and to take measures for its elimination.

One example of water analyzers used to monitor water quality in CHPP is the Hach Lange DR 3900 water chemistry analyzer, Figure 2. Different instruments, such as photometers and spectrophotometers, can be used for soil quality analysis in CHPP, depending on the specific tasks and requirements.



Figure 2. Hach Lange DR 3900 Water Chemistry Analyzer

Control of pollutant emissions in the process of CHPP operation is one of the key aspects of ensuring environmental safety and preserving public health [4, 8]. Emissions of harmful substances into the atmosphere can lead to serious consequences for the environment, such as pollution of air, soil and water, as well as an increased risk of respiratory diseases in people. It is important to note that control of pollutant emissions should be carried out at all stages of power generation, from fuel combustion to venting of exhaust gases into the atmosphere. This will help to minimize the harmful impact on the environment and ensure environmental safety.

Constant improvement of methods of analysis and minimization of harmful environmental impact is a necessary step in the fight for environmental safety and reduction of harmful impact on the environment. It is also necessary to develop new technologies that will reduce the harmful effects on the environment. For example, the use of renewable energy sources, such as solar and wind energy, can significantly reduce harmful emissions and ensure the sustainable development of the energy industry.

In addition, regular monitoring of air, water, and soil quality is necessary to determine the concentration of various harmful substances and to take measures to clean them up. This will help minimize the harmful effects on the environment and ensure environmental safety.

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## FURTHER GROWTH PROSPECTS OF THE RUSSIAN ONLINE EDUCATION MARKET

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**Abstract.** The paper presents the dynamics of the online education market in Russia, discusses the factors contributing to its growth and the challenges it faces, considers emerging educational models and approaches and highlights the prospects of online education. The marketing analysis of Skyeng, the largest national online English language training school, is conducted including the company's opportunities and threats, microenvironment and competitors.

**Keywords:** online education, marketing analysis, microlearning, blended learning, virtual and augmented reality, opportunities and threats, Skyeng.

## ПЕРСПЕКТИВЫ ДАЛЬНЕЙШЕГО РОСТА РОССИЙСКОГО РЫНКА ОНЛАЙН-ОБРАЗОВАНИЯ

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**Аннотация.** В статье представлена динамика развития рынка онлайн-образования в России, обсуждаются факторы, способствующие его росту, и проблемы, с которыми он сталкивается, рассматриваются новые образовательные модели и подходы, а также освещаются перспективы онлайн-образования. Проводится маркетинговый анализ крупнейшей российской онлайн-школы английского языка Skyeng с учетом возможностей и угроз компании, микроокружения и конкурентов.

**Ключевые слова:** онлайн-образование, маркетинговый анализ, микрообучение, смешанное обучение, виртуальная и дополненная реальность, возможности и угрозы, Skyeng.

Online education has been gaining popularity over the recent years. According to the estimates of EdTechReview, the online education market is believed to reach \$350 bln by 2025, with a compound growth rate of 15.4 % per year, from 2020 to 2025 [1]. This growth can be attributed to the increasing demand for flexible and personalized learning options. With the global pandemic causing many schools and universities to shift to online learning, this method of education has gained even more attention and recognition. This has led to an increased focus on the potential of online education and numerous opportunities for educators, learners, and investors it entails. The paper aims to describe the dynamics of the online education market, discuss the factors contributing to its rise, consider emerging educational models and approaches, and highlight the prospects for online education with its potential to shape the future of learning.

What are the current trends of the Russian online education market? Until 2022, the Russian EdTech market was developing at an extremely fast pace. From 2017 to 2019, the average annual growth rate was about 70%. From 2019 to 2021, investment in online education in Russia grew by an average of 2.5 times annually. However, at the end of 2022, the volume of investment in the services of online education in Russia was 4 billion rubles, down 3.5 times compared to a year ago, equal to 14 billion rubles. It is testified by the data of agency “Smart Ranking” published at the end of February 2023 [2].

The same dynamics can be seen in the total revenue of Russia’s top 100 EdTech companies. In 2022, it amounted to 87.8 bln rubles, a growth of 17.4 % related to the previous year. This is based on the data provided by the Smart Ranking agency and made public on February 13, 2023. Later, the extension of the online education market in Russia slowed down a lot. In 2021, the growth rate was estimated to be 70 %. At the same time, as stated by Smart Ranking, in the third quarter of 2022, the rate decreased by about 10-15 % [2].

According to the general director of online school “Netology” Marianna Snigireva, one of the chief reasons that led to the decline in the market in question can be attributed to a decrease in the solvency of the population. An additional factor is the departure of several foreign online platforms from Russia, which were used by schools for promoting their courses: Instagram and Facebook (owned by the American company Meta, which is recognized as extremist and prohibited in Russia), Google Ads [3].

However, in spite of a slowdown, there is still an overall growth of the market. Let us consider the factors contributing to this growth of online education. Online education has the potential to address some of the challenges of traditional education systems. Traditional education systems are often plagued by issues such as limited access, high costs, and outdated teaching methods.

Online education can provide access to education for learners who might not be able to attend traditional schools, offering more flexible education options and utilizing cutting-edge technologies to enhance the learning experience. One of the most significant benefits of online education is its accessibility. Students from all over the world can access high-quality education from the comfort of their homes.

This can be particularly beneficial for students who live in remote or underserved areas, as they may not have access to traditional educational institutions.

Moreover, online education also offers flexibility in terms of scheduling. Students can learn at their own pace and on their own schedule, which can be particularly useful for those who have work or family commitments.

A further advantage of online education is that it can be more cost-effective than traditional education. Students can save money on travel, accommodation, and other expenses associated with attending a physical institution.

Furthermore, online education can be personalized to meet the needs and learning styles of individual students. This can lead to a more effective and engaging learning experience. It also relies heavily on technology, which can enhance the learning experience. New technologies can make online learning more immersive and interactive.

While online education has many potential benefits, there are still problems to be considered, such as the digital divide (the need for reliable Internet access and access to technology), the need for effective teacher training, and the need for better metrics to measure learning outcomes. Additionally, some students may struggle with the lack of face-to-face interaction with teachers and peers, the need for self-discipline and motivation, which can be essential for their learning experience. Furthermore, the quality of online courses can vary, and not all online programs are accredited. Exploring the prospects for online education can help identify these challenges and find solutions to address them.

Another factor contributing to the growth of online education is the increase in the number of Massive Open Online Courses (MOOCs). MOOCs are designed to be online courses that are open to anyone, anywhere, and are often offered for free or at a low cost. They are delivered through online platforms and can be accessed by anyone with an Internet connection [4]. This has made it possible for learners from all over the world to access high-quality education from some of the top universities in the world.

The employment of artificial intelligence (AI) as well as machine learning is also expected to play a significant role in the future of online education. AI-powered platforms can help personalize the learning experience for each student, providing tailored recommendations on what they should study next based on their progress and preferences [5].

The growth of online education has also led to the emergence of new educational models and approaches. One such approach is *microlearning*, which involves breaking down complex topics into smaller, more manageable pieces. This approach can be particularly beneficial for online learning, as it allows students to learn at their own pace and provides them with bite-sized pieces of information that are easier to digest [6].

Another educational model gaining popularity in the online learning space is *blended learning*. Blended learning involves combining traditional classroom-based teaching with online learning. This model allows for a more personalized and flexible approach to education as students can access course materials and complete

assignments online, while still benefiting from face-to-face interaction with teachers and peers [7].

The use of *virtual and augmented reality* in online education is also expected to grow in the coming years [8]. These technologies can provide immersive and interactive learning experiences allowing students to visualize complex concepts and explore virtual environments in a way that was previously not possible.

In order to identify emerging trends and ascertain the prospects of online education in Russia, we have conducted a marketing analysis of the company “Skyeng”. It is a major online English language training school in Russia. The enterprise conducts lessons on its own Vimbox platform, known to be used by about 10 thousand educators and 100 thousand students. The main target audience is men and women aged 16 to 55 who are striving for self-development and want to learn English [9].

Skyeng uses several marketing approaches in its activities, *traditional marketing* being one of them. It markets itself as a company with an individual approach to each student: they select a teacher for their needs, interests and language level. It also provides a student with a personalized program. Besides the company offers services that can satisfy several needs at once, ranging from helping in preparing for school exams to obtaining additional professional education.

Another concept is *interaction marketing*, which is aimed at building long-term relationships with the client. For this purpose, Skyeng uses several methods: weekly mailings with free materials, retaining customers by offering them new courses, for example, programming, and promoting a referral program – students receive bonuses for inviting friends to school.

Finally, the company implements the concept of *engagement marketing*. Marketing specialists provide a lot of free and useful content, involve people in surveys and research and make them part of a virtual community. Skyeng also actively maintains social media content and makes use of advertising from bloggers.

The company’s *opportunities and threats* were analyzed. The events of February 2022 urged many people to study English intensively, as active migration to other countries began. Also, some English schools left the Russian market, so the demand for Skyeng services grew significantly. However, there are some problems: the company closed international projects, which caused financial losses. There were also problems with mutual settlements: interruptions in the system [10].

As for the economic environment, there was a decrease in the solvency of the audience, as there were problems with the approval of installments in banks. Inflation increased, and the number of advertising channels decreased, which led to a reduction in demand [10]. Thus, political and economic factors adversely affected the activities of Skyeng. However, the crisis phenomena in the economy can also lead to the growth of the online education market. For example, people faced with the risk of losing their jobs will more actively learn new professions.

Moreover, our analysis of the company’s *microenvironment* has shown that its share in the market decreased from 2019 to 2021. The reason for it lies in the fact that the online education market grew significantly over these years, sales reached huge values having increased from 19 billion rubles to 200 billion rubles [11].



Next, the company's main *competitors* were considered: online English language schools Inglex, Tetrica and PuzzleEnglish. We came to the conclusion that Skyeng has some competitive advantages: it has an original Vimbox platform, highly qualified teachers, a large selection of courses for any request.

We also conducted a survey, the purpose of which was to find new channels for advertising and promotion. It was revealed that the majority of respondents rated the quality of classes positively, but there are some shortcomings that school's clients suggested considering. For example, it was proposed to introduce more personalization and increase the level of service. The lowest rated indicator is the price per lesson. The teachers' experience is highly appreciated, which indicates their high qualification.

The results of the survey are depicted below, with the use of the importance-expression matrix (Figure 1) and the perception map (Figure 2).

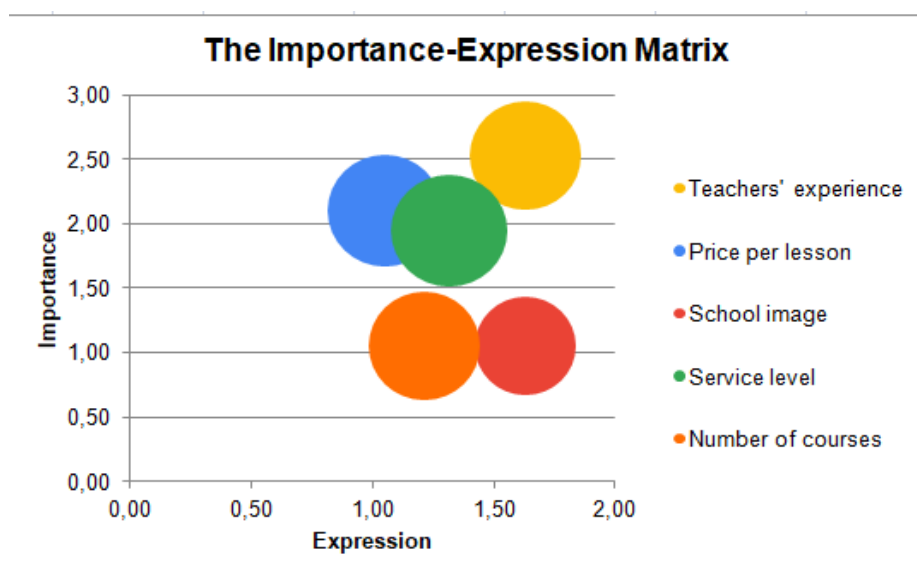


Figure 1. The importance-expression matrix

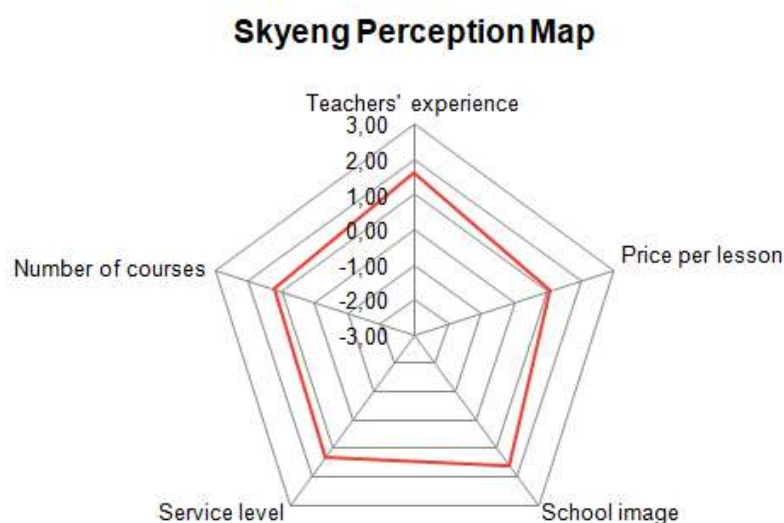


Figure 2. Skyeng perception map

The assessment of the company's services based on the needs matrix has shown that Skyeng meets most of the needs of potential consumers. And yet, based on the received data, we can issue some *recommendations* for increasing the consumer value of the company's services. Firstly, it is possible to introduce the possibility of paying for one separate lesson, since currently only packages of services are sold on the platform. The company can also reduce the prices for classes with an English-speaking teacher by introducing a loyalty system – providing discounts for those who have been a client for a long time. The study of the company's reviews revealed that consumers are not fully satisfied with the level of the support service. Based upon these results, it can be recommended that the company should speed up the work of the support service and resolve the issue of frequent disruptions of lessons.

The prospects of online education are vast, with many opportunities for growth and innovation in the coming years, with the advancements in new technologies and emerging educational models that have the potential to transform the future of learning. The rapidly growing online education industry, improving online learning platforms can address some of the challenges facing traditional education systems. It has a promising future due to its accessibility, flexibility, cost-effectiveness, personalization, and technological advancements. While it may not replace traditional education entirely, it can complement it and provide new opportunities for students around the world reaching those who may otherwise be left behind.

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## IMPLEMENTATION OF ASYMMETRIC CRYPTOGRAPHY USING RSA ALGORITHM

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**Abstract.** The paper discusses the use of symmetric and asymmetric information coding methods and the use of data hashing. The possibilities of encrypting and decrypting messages using the RSA algorithm are being considered. The implementation of the algorithm using the C # programming language on the .NET platform is presented. Described are possibilities of using the developed software application for asymmetric data coding.

**Keywords:** encryption, asymmetric cryptography, .NET, C #, software application, RSA algorithm, key.

## РЕАЛИЗАЦИЯ АСИММЕТРИЧНОЙ КРИПТОГРАФИИ С ПОМОЩЬЮ АЛГОРИТМА RSA

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**Аннотация.** В работе обсуждаются вопросы применения симметричных и асимметричных методов кодирования информации и использования хеширования данных. Рассматриваются возможности шифрования и дешифрирования сообщений при помощи алгоритма RSA. Представлена реализация алгоритма с помощью языка программирования C# на платформе .NET. Описаны возможности применения разработанного программного приложения для асимметричного кодирования данных.

**Ключевые слова:** шифрование, асимметричная криптография, .NET, C#, программное приложение, алгоритм RSA, ключ.

Currently, there are many cryptographic algorithms used, but in general they can be divided into three categories: symmetric cryptography, asymmetric cryptography and hash functions.

Symmetric cryptography [1, 2] is widely used to ensure data privacy. This can be very useful, for example, for preserving the privacy of the local hard drive, since the same user usually encrypts and decrypts the protected data, while sharing the private key is not a problem. Symmetric cryptography can also be used to

ensure the confidentiality of messages transmitted over the Internet, or for user authentication in the software application [3] and data analysis [4].

In asymmetric cryptography [5, 6], each participant has two keys. One is public and sent to anyone with whom the party wants to communicate. This is the key used to encrypt messages. But the other key is private, not transmitted to anyone, and these messages need to be decrypted. To use the metaphor, it is necessary to imagine that the public key opens a slot in the mailbox wide enough to omit the letter. You give this key to anyone who you think can send you a letter so they can open the slot and deliver the envelope. A private key is what you use to open a mailbox so you can receive emails.

Symmetric and asymmetric cryptographic algorithms involve converting plaintext to ciphertext and then back to plaintext. In contrast, the hash function [7, 8] is a one-way encryption algorithm. Once you've encrypted your plaintext, you can never recover it from the resulting ciphertext, which is called a hash. This makes hashing algorithms an excellent tool for ensuring data integrity.

In this article, we will consider one of the asymmetric encryption algorithms – RSA [9, 10]. RSA encryption is often used in conjunction with other encryption schemes or for digital signatures that can confirm the authenticity and integrity of a message. It is not typically used to encrypt entire messages or files, as it is less efficient and requires more resources than symmetric key encryption.

For greater efficiency, a file is usually encrypted using a symmetric key algorithm, and then the symmetric key is encrypted using RSA encryption. As part of this process, only an object that has access to the RSA private key will be able to decrypt the symmetric key.

Without symmetric key access, the source file cannot be decrypted. This method can be used to secure messages and files without taking too much time or consuming too much computing resources.

Let's consider encrypting and decrypting messages using the RSA algorithm in the .NET environment.

To work with asymmetric cryptosystems in the .NET Framework, there is an abstract `AsymmetricAlgorithm` class and its derived classes. For encryption and decryption, the `RSACryptoServiceProvider` class is used, which will be discussed in this article.

The `RSACryptoServiceProvider` class uses the `Encrypt` method for encryption. The syntax for accessing this method is:

```
public byte [] Encrypt(byte[] rgb, bool fOAEP);
```

The `Encrypt` method receives two parameters at the input, the first of which should be a byte array containing input data. The second parameter, `Boolean`, must indicate the padding mode that the method will use. The addition is required because the input may generally not correspond to the required size in bits. Since the algorithm requires a fixed block size of input data, to achieve this size it will be necessary to complement it with real data.

If the second parameter is set to `True`, the OAEP technology will be used for the addition. Optimal Asymmetric Encryption Padding (OAEP) is an add-on technique developed by Meir Bellare and Phil Rogaway in 1993 specifically for the

RSA algorithm. The OAEP technique provides an addition much better in terms of safety than the commonly used PKCS # 1 v1.5 technique. The OAEP add-on is available on Microsoft Windows XP, Windows 2000 and higher systems when installing the encryption package. Earlier versions of Windows do not support OAEP, and for this reason calling the Encrypt method with a second parameter of True will result in a CryptographicException.

The Encrypt method returns the resulting encrypted data as a byte array. Asymmetric encryption is used to encrypt small amounts of data (number of bytes <= 80). Large messages should be broken down into parts. CryptoStream is not used for asymmetric encryption.

The opposite operation is performed by the Decrypt method of the RSACryptoServiceProvider class. The syntax for accessing this method is:

```
public byte [] Decrypt(byte[] rgb,bool fOAEP);
```

The first parameter is a byte array containing encrypted data. The second parameter has exactly the same meaning as in the Encrypt method. The return value is a byte array with decrypted data.

Next, let's look at an example of using the RSACryptoServiceProvider class for asymmetric encryption and decryption of messages. To do this, the Windows Form application was created. This developed application will generate a secret and public key, encrypt a text message using a public key, and decrypt messages into text using a private key. To do this, we will use the Security.Cryptography library and the RSACryptoServiceProvider class.

When “Key generation” button is pressed, the following is generated on the developed software application form (Figure 1):

- $P$  and  $Q$  –two large integers;
- $E$  – public key;
- $D$  – secret key.

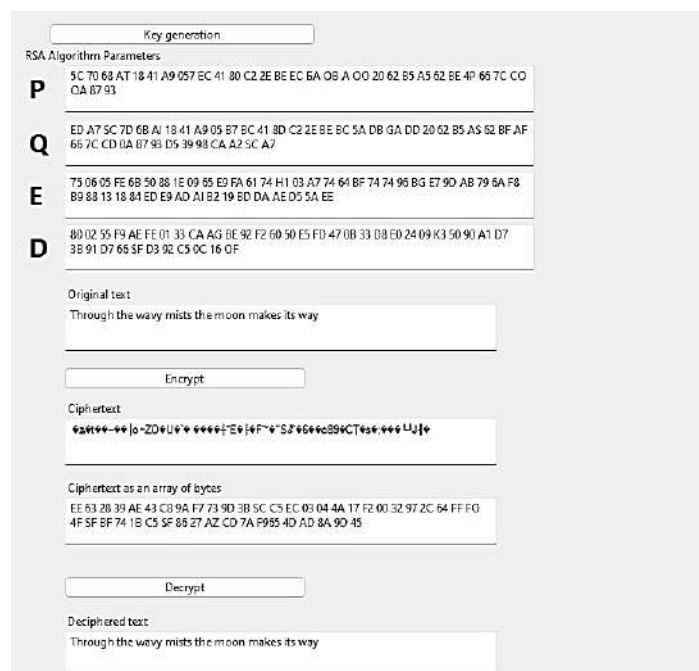


Figure 1. RSA Encryption Application

The first two RSA parameters are generated when the program starts by calling the `GenerateNewRSAParams` method inside the `Form1_Load` method. Also, the `GenerateNewRSAParams` method is called every time you click on the RSA Algorithm Parameters button. These clicks are processed by the `buttonNewRSAParams` method.

```
private void Form1_Load(object sender, EventArgs e)
{
    GenerateNewRSAParams();
}
```

The `GenerateNewRSAParams` method creates an object of the `RSACryptoServiceProvider` class, retrieves its external and internal parameters using the `ExportParameters` method of the `RSA` class, and displays these parameters in the user interface. In fact, these parameters are stored in fields of type `RSAParameters`.

```
private void GenerateNewRSAParams()
{
    // set asymmetric RSA algorithm
    RSACryptoServiceProvider rsa =
        new RSACryptoServiceProvider();

    // retrieve open and secret RSA parameters
    rsaParamsIncludePrivate =
        rsa.ExportParameters(true);

    // retrieve only open RSA parameters
    rsaParamsExcludePrivate =
        rsa.ExportParameters(false);

    // output RSA parameters in hexadecimal form
    StringBuilder sb = new StringBuilder();
    for (int i = 0;
         i < rsaParamsIncludePrivate.P.Length; i++)
    {
        sb.Append(String.Format("{0,2:X2} ",
                                rsaParamsIncludePrivate.P[i]));
    }
    textBoxP.Text = sb.ToString();
    sb = new StringBuilder();
    for (int i = 0;
         i < rsaParamsIncludePrivate.Q.Length; i++)
    {
        sb.Append(String.Format("{0,2:X2} ",
                                rsaParamsIncludePrivate.Q[i]));
    }
    textBoxQ.Text = sb.ToString();
    sb = new StringBuilder();
}
```

```

for (int i = 0;
     i < rsaParamsIncludePrivate.Modulus.Length;
     i++)
{
    sb.Append(String.Format("{0,2:X2} ",
                           rsaParamsIncludePrivate.Modulus[i]));
}
textBoxE.Text = sb.ToString();
sb = new StringBuilder();
for (int i = 0;
     i < rsaParamsIncludePrivate.D.Length; i++)
{
    sb.Append(String.Format("{0,2:X2} ",
                           rsaParamsIncludePrivate.D[i]));
}
textBoxD.Text = sb.ToString();
buttonEncrypt.Enabled = true;
}

```

A field of this type named `rsaParamsExcludePrivate` contains the values of the public RSA parameters that are required for encryption performed by the `buttonEncrypt_Click` method. Another field of type `RSAParameters` named `rsaParamsIncludePrivate` gets a set of open and secret parameters that are required for decryption in the `buttonDecrypt_Click` method.

The two fields that store RSA parameter information when the `ExportParameters` method is called are declared as `RSAParameters`. The `rsaParamsExcludePrivate` field is used for encryption, and the `rsaParamsIncludePrivate` field is used for decryption.

The `buttonEncrypt_Click` method creates a new instance of the `RSACryptoServiceProvider` class and initializes it with the stored public key information using the `ImportParameters` method of the RSA object. At the same time, using the `rsaParamsExcludePrivate` field as an argument. Then, the main action is performed when calling the `Encrypt` method of the RSA object. This call returns a byte array named `cipher bytes`. This is not a local variable, but a property of a specific object instance, since this array will need to be passed to the decrypting method.

From here, we can draw the following conclusions that today the RSA cryptosystem is in demand and relevant. Since this algorithm was developed a long time ago, it can be called one of the safest and most reliable. Therefore, the RSA algorithm is still used for modern technologies in different information systems [11], such as encrypted key transfer. Users should always encrypt any messages they send, ideally using the public key encryption form. It is also recommended to encrypt important or confidential files – from family photo sets to company data [12, 13]. This helps to ensure regular use of encryption functions and prevents data loss even if a mobile device, hard drive or storage medium falls into the wrong hands.



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## DEVELOPMENT AND USE OF VIRTUAL LABORATORY WORKS IN PHYSICS LESSONS

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**Abstract.** The article discusses the approach to the definition of the concept of “virtual laboratory”. The features of the development and use of virtual laboratories at various stages of laboratory work and the main virtual laboratories in physics are analyzed. The results of the study can be used in laboratory work in physics.

**Keywords:** virtual laboratories, physical environment, laboratory work, information technology, e-learning.

## РАЗРАБОТКА И ИСПОЛЬЗОВАНИЕ ВИРТУАЛЬНЫХ ЛАБОРАТОРНЫХ РАБОТ НА УРОКАХ ФИЗИКИ

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**Аннотация.** В статье рассматривается подход к определению понятия «виртуальная лаборатория». Проанализированы особенности разработки и использования виртуальных лабораторий на различных этапах проведения лабораторной работы и основные виртуальные лаборатории по физике. Результаты исследования можно использовать при проведении лабораторных работ по физике.

**Ключевые слова:** виртуальные лаборатории, физическая среда, лабораторная работа, информационные технологии, электронное обучение.

In the modern world, a wide range of software tools are used to search, analyze and process various types of data. Powerful research support software products in various fields of knowledge are created by researchers and scientists jointly to solve generalized problems of a particular science through a specific set of commands. Such teams cover a significant range of issues, but they can always solve the problem assigned to the researcher.

It should be noted that almost all types of research activities in the natural sciences today have developed software products to support scientific developments (analysis, automation, presentation of results, etc.), and there are software products that are distributed under an open license. And the researcher is faced with the task of

choosing the optimal package, which, with minimal time spent on development, would save effort on calculations and analysis.

One of the most promising areas of using information technologies in physical education is computer modeling of physical phenomena and processes. Using educational computer models, it is possible to present the material being studied more clearly, to demonstrate its new and unexpected aspects in a previously unknown way, which in turn increases students' interest in the subject being studied and contributes to a deeper understanding of the educational material.

Conducting experiments in the classroom in the natural disciplines in our time is quite difficult. This is due to a number of reasons, some of which are outdated and expensive equipment on the laboratory tables of educational institutions and the risk of danger during work [1, p. 248]. Therefore, virtual laboratories (VL) have replaced the standard, real traditional laboratories.

The term “virtual” according to Ojegov’s dictionary means “non-existent, but possible”. In computer science, the term “virtualization” generally means the separation of the logical process from the physical way of its implementation. Virtual space is considered an environment that does not require physical space to organize activities.

A virtual laboratory is a virtual learning environment that allows you to simulate the behavior of real world objects in a computer environment and helps in mastering new knowledge and skills. Such a laboratory can act as a research apparatus for various natural phenomena with the possibility of constructing their mathematical and physical models [2, p. 33].

By definition, V.V. Trukhin [3, p. 58], VL is a software and hardware complex that allows experiments to be carried out without direct contact with a real installation or in its complete absence. In the first case, we are dealing with a so-called laboratory setup with remote access, which includes a real laboratory, software and hardware for managing the setup and digitizing the data obtained, as well as communication tools. In the second case, all processes are modeled using a computer.

For E.O. Kozlovskiy and M. Kravtsov, VL is a virtual software environment in which the opportunity is organized to conduct research on object models, their sets and derivatives, specified with a certain degree of detail relative to real objects, within a certain branch of knowledge [4, p. 102].

Also, such scientists as T. V. Podgornaya [5, p. 81], I. B. Galelyuk [6, p. 33], T. A. Klimenko, T. L. Petrovskaya [7, p. 90], M. N. Morozov [8, p. 155], A. Alexiou [9, p. 268].

To achieve the goal, a theoretical analysis of scientific, scientific and methodological sources and information resources of the Internet was carried out in order to clarify the basic concepts of research, such as “virtual laboratory”, “virtualization”, “physical environment”; generalized approaches to teaching physics when using VL in laboratory work; systematized approaches to the divisibility of VL into groups and their introduction into scientific and pedagogical activities.

VL refers to the complete replacement of the laboratory installation – when the whole process of measurement and data processing is handled by a computer, and the

researcher's hand is needed only for the correct configuration of computer equipment.

In our time, overhead lines have been developed for a variety of disciplines – physics, chemistry, biology, ecology. Most modern such overhead lines are designed in such a way that the researcher can successfully work with them remotely using an Internet connection and appropriate software. Although these virtual laboratories are designed to support the study of natural sciences, virtual experiments can be used to familiarize themselves with the methodology of conducting experiments, fixing measurements, mastering communication skills, interpreting data, and therefore, in order to attract people to research and scientific activities.

Among the various advantages of performing laboratory work in a virtual laboratory, it is worth highlighting: illustrations of natural laws; the possibility of independent organization and conduct of a virtual experiment and observation of the process; the possibility of individual experiments with a parallel study of the results under extreme conditions; the complete safety of conducting experiments; providing subjective experience in solving non-standard and problematic situations.

Technically, virtual laboratory work is a complex resource that includes: 1) the actual virtual laboratory as a computer program that simulates the main stages of laboratory work; 2) a set of virtual elements and equipment; 3) guidelines containing theoretical information, specific tasks, the procedure for performing work, reporting requirements.

Virtual laboratory work can replace the real object of research completely or at certain stages, allowing you to guarantee the results of experiments, avoid harm to researchers, focus on the key aspects of the phenomenon under study, and reduce the time needed for the experiment. Works of this kind can be carried out completely in a computer version or made one of the stages in a wider work, which also includes work with natural objects and laboratory equipment.

Today there are a large number of virtual physical laboratories. These virtual laboratories can be classified into three groups based on the level of user control [5, p.81]:

Programs for visualization of experiments with the establishment of some parameters of its passage. For example, VirtuLab is a program that allows users to develop and change some parameters of the experimental process, and observe the changes that occur based on the chosen parameters (Figure 1).

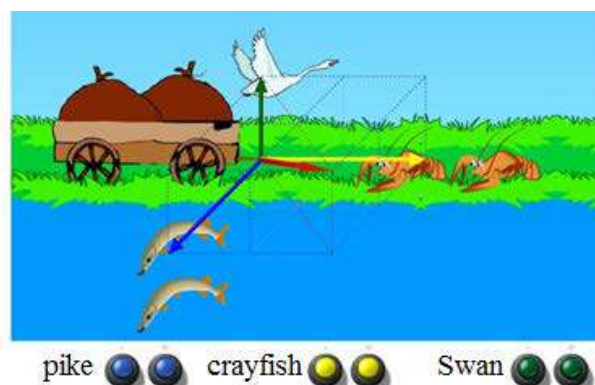


Figure 1. “Addition of forces directed at an angle”, VL “VirtuLab”

Programs for modeling a separate class of experiments. For example, such programs include PhET Interactive Simulations. The program consists of modules with the help of which modeling of individual experiments is carried out with the establishment of various parameters of their course and the choice of tools for their implementation (Figure 2).

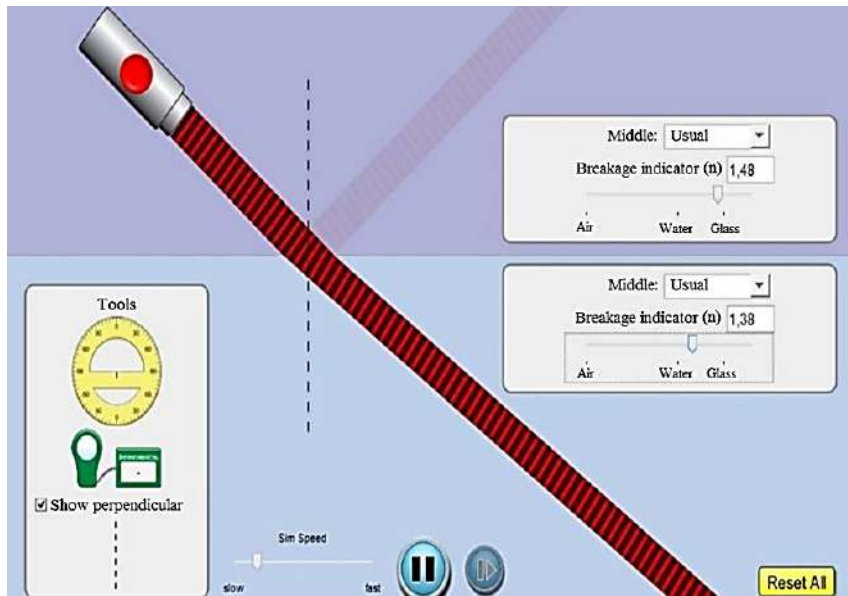


Figure 2. “The study of the laws of refraction of light”, VL “PhET”

Programs for modeling the work of the laboratory are complex systems, the functioning of which is based on a powerful mathematical apparatus. A significant difference between the programs of this group is that the user can add simulations of new experiments with setting the parameters for their passage. An example of such a laboratory is the Yenka commercial program (Figure 3), developed by Crocodile Clips Ltd.

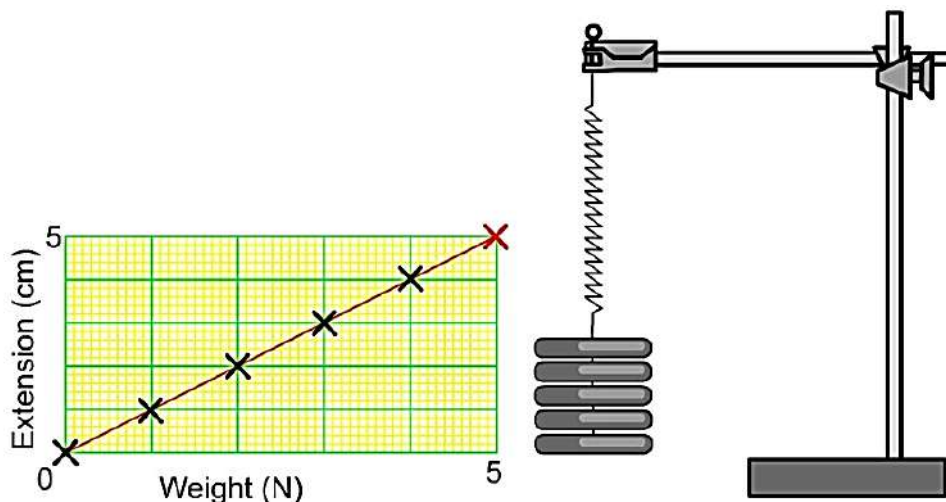


Figure 3. “Experimental investigation of Hooke’s law”, VL “Yenka”

As the analysis of software according to the scheme of technical modeling shows, at the stage of initial development of computer-aided design methods and at the stages of conducting search and research work of students of pedagogical and technical educational institutions, it is advisable to consider the possibility of using applied design packages or overhead lines when studying special courses “Fundamentals of Modern Electronics”, “Radio Engineering”, “Information Systems” Electronics Workbench, Lab VIEW, NI Multisim.

These overhead lines have ample opportunities and are used to study and analyze complex electronic circuits, for example, when modeling various statistical and dynamic modes of operation: semiconductor devices – diodes, transistors, and, based on them, various functional units – analog and digital devices. As practice shows, the use of VL in the educational process allows, on the one hand, to provide an opportunity for the researcher to conduct experiments with equipment and materials that are not available in the real laboratory of the educational institution, to gain practical skills in conducting experiments, to get acquainted in detail with the computer model of the object under study, to investigate the processes and phenomena occurring in the real world without fear for the possible consequences.

On the other hand, connecting existing laboratory equipment and instruments to a computer within the framework of a virtual laboratory allows you to transfer a traditional laboratory to a new level of technology, corresponding to the current level of development of science and technology.

The introduction of VL into their scientific and pedagogical activities is the choice of each teacher individually, but summarizing the above, we can conclude that VL is an integral element of modern physical laboratories. But, from our point of view, active and interactive forms of physics classes should contain both real experiments on modern equipment and virtual laboratory work on the study of physical phenomena and processes in an optimal, scientifically based proportion, which will allow dynamically developing the structure and methodology of teaching physics on the basis of modern achievements of science, technology and methods of knowledge.

Such laboratory work significantly increases the efficiency of the educational process and provides ample opportunities for the formation and improvement of professional skills and intuition, as well as developing the creative abilities of students. In the future, it is planned to consider in more detail the principles of functioning and operation of virtual laboratories and their difference from digital laboratories.

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**ANALYSIS OF THE ECONOMIC ACTIVITY OF THE ENTERPRISE  
ON THE EXAMPLE OF LLC PLEMZAVOD “ROSSIA” OF THE  
DURTYULINSKY DISTRICT OF THE REPUBLIC OF BASHKORTOSTAN**

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**Abstract.** Animals in cultivation and fattening are an integral part of the enterprise under study. The purpose of the study is to substantiate ways to improve the efficiency of the use of production resources in a breeding farm.

**Keywords:** animal accounting, accounting problems, slaughter, case, offspring, inventory of animals.

**АНАЛИЗ ХОЗЯЙСТВЕННОЙ ДЕЯТЕЛЬНОСТИ ПРЕДПРИЯТИЯ НА  
ПРИМЕРЕ ООО ПЛЕМЗАВОД «РОССИЯ» ДЮРТЮЛИНСКОГО  
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**Аннотация.** Животные на выращивании и откорме являются неотъемлемой частью исследуемого предприятия. Целью исследования является обоснование путей повышения эффективности использования производственных ресурсов в племязаводе.

**Ключевые слова:** учет животных, проблемы учета, забой, падеж, приплод, инвентаризация животных.

Accounting and operational accounting of inventory is one of the most difficult areas, as it must meet all the needs of the organization, and timely regulatory and methodological requirements. Responsibility for the economical use of economic resources increases when the organizational structure contributes to the efficient conduct of business in order to avoid bankruptcy or liquidation.

Working in the conditions of the market and competition, the owner is forced to constantly analyze the profitability of the acquisition and production of various types of funds, to measure the costs caused by the inefficient use of resources and the potential profit from their effective use [1].

The purpose of the study is to substantiate ways to improve the efficiency of the use of production resources in a breeding plant. The subject of the study is to increase the economic efficiency of the use of production resources.

The object of research: LLC Plemzavod "Rossia" Dyrtyulinsky district. Accounting not only reflects economic activity, but also affects it. It provides important information that allows you to control the safety of material resources, their correct use and the identification of additional reserves to reduce costs. Therefore, it is necessary to properly organize control over the condition and use of stocks at the enterprise.

This can be achieved through the proper organization of the warehouse economy; a rational system of primary and summary documents and well-established document management; rational accounting of material and production stocks [2].

Organizational and economic characteristics of the enterprise LLC Plemzavod "Rossia" is a legal entity, has an independent balance sheet, settlement ruble and foreign currency bank accounts, a seal with its brand name, letterheads, a stamp and other details. LLC Plemzavod "Rossia" is a commercial organization, has civil rights and bears civil duties necessary for the implementation of any activities not prohibited by law.

The full corporate name of the company is Limited Liability Company LLC Plemzavod "Rossia".

The abbreviated company name of the company is LLC Plemzavod "Rossia". The Company has the purpose of activity: satisfaction of public needs in its products, works, services and profit-making. The General Meeting is the supreme governing body of the company and is authorized to resolve any issues related to the company's activities. The executive management body of LLC Plemzavod "Rossia" is the management board headed by the head.

The main activity of the company was the breeding of dairy cattle, the production of raw milk.

Also, LLC Plemzavod "Rossia" works in another 25 directions. The size of the authorized capital is 250,000 rubles.

The organization had 18 branches.

The functions of the supreme management body of the company are performed by its participant. A citizen or a legal entity may be a member of the company. Responsibility for the organization of accounting in LLC Plemzavod "Rossia", compliance with the law when performing the facts of economic life is borne by the head of the enterprise – director. He directly manages top-level specialists (chief accountant, accountant) [3].

The chief accountant of the enterprise is responsible for accounting in LLC Plemzavod "Rossia", timely provision of complete and reliable accounting statements.

The Chief Accountant is guided in his work by job descriptions and regulations approved in accordance with the established procedure, and is responsible for compliance with the requirements and rules of accounting contained therein. We conducted an analysis of the economic activity of the enterprise on the example of LLC Plemzavod "Rossia" of the Dyrtyulinsky district of the Republic of Belarus. In

conclusion, it can be concluded that, tracing the main economic indicators of the company's activity during 2019-2021, revenue from the sale of goods and products increased, but profit from sales fell. In order to increase the profit from sales, it is necessary to reduce the cost of production, or increase the revenue from products. This is where the profitability of products comes from. Profitability will also increase and resources such as raw materials, personnel, money and other assets will be used more efficiently.

The increase in the economic efficiency of the enterprise partly depends on the optimal choice of resources, raw materials and materials for production. It is necessary to reduce the cost of goods and increase labor productivity.

Also, I can suggest reducing the number of defects in production, thereby reducing costs and the company will receive more profit [2].

Further, I believe that it is necessary to increase the quality of products in order to increase the demand for their products and increase profits. The company needs to understand which products are in the greatest demand in order to produce what the consumer needs. And thus these factors will help the company to be more competitive in relation to other firms in the modern conditions of the global market economy.

Indicators of the efficiency of the use of land resources in LLC Plemzavod “Rossia” are given in Table 1.

Table 1 – Indicators of the efficiency of the use of land resources

<i>Indicators</i>	<i>2019</i>	<i>2020</i>	<i>2021</i>	<i>2021/2019, %</i>
Agricultural land, ha	4984	5314	5314	106
Arable land area, ha	4125	4584	4584	111,1
The area of arable land to the area of agricultural land, %	82	86	86	104,8
Production per 100 hectares of arable land				
Grains, ts	17596	19763	25579	145,3
Production on 100 hectares of agricultural land				
Milk, c	25972	26836	26838	103,3
weight gain	-	-	-	-
Revenue received for 1 ha of arable land, thousand rubles	22,5	21,6	21,8	97

From this table 1 it can be seen that the ploughing of land is 82 % of the total area of agricultural land. Grain production per 100 hectares of arable land for 2019-2021 increased by 45.3 %. Milk production per 100 hectares of agricultural land is increasing by 3.3 %.

An important role in solving the problems of increasing production efficiency is played by the analysis of the economic activities of organizations, the methodology of which is aimed at substantiating business plans and management decisions. Systematic control over the implementation of business plans; study of the influence of factors on the results of economic activity; search for reserves to increase

production efficiency and development of measures for their development; evaluation of the organization to use the opportunities to increase production efficiency.

Next, let's look at the main performance indicators of LLC Plemzavod "Rossia". Profitability is an economic indicator that shows how efficiently resources are used: raw materials, personnel, money and other assets.

Table 2 – Main economic indicators of activity LLC Plemzavod "Rossia"

<i>Indicators</i>	<i>2019</i>	<i>2020</i>	<i>2021</i>	<i>2021/2019, %</i>
Revenue from the sale of products, goods, works, services thousand rubles	99098	99896	108173	109,1
Cost of goods, products, works, services sold thousand rubles	88231	90099	102452	116,1
Profit from sales, thousand rubles	10867	9797	5721	52,6
Profitability, %	12,3	10,9	5,6	-6,7

From the data in Table 2, it can be seen that revenue from the sale of products, goods, works and services in 2021 increased by 7.7 % compared to 2019. Due to the increase in the amount of revenue, the cost of products, works and services is also growing, which increased by 10 % during the analyzed periods. At the same time, the amount of profit from sales also increases. Net profit in the reporting year was received in the amount of 7737 thousand rubles.

The data in Table 2 indicate a decrease in the profitability of production for the analyzed periods by 6.7 %, which is a negative indicator. Considering this table 2, it can be seen that the Profit from sales and profitability in 2021 is decreasing compared to 2019, and the revenue from the sale of products, on the contrary, is increasing [4].

I believe that the cost of goods and products sold had a great impact on this.

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## EVALUATION OF THE EFFECTIVENESS OF RECYCLING IN THE PROCESSING OF CONSTRUCTION WASTE

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**Abstract.** The article discusses the effectiveness of recycling in the processing of construction waste based on the growing relevance to reducing the amount of construction debris in Russia, which, with high-quality processing, can be used for a second time. The algorithm of economic evaluation of recycling is disclosed, which allows to conduct a qualitative analysis with the conclusion of the final results on the effectiveness of implementation in construction production.

**Keywords:** construction waste, recycling, efficiency, economic calculation.

## ОЦЕНКА ЭФФЕКТИВНОСТИ ПРИМЕНЕНИЯ РЕЦИКЛИНГА ПРИ ПЕРЕРАБОТКЕ СТРОИТЕЛЬНЫХ ОТХОДОВ

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**Аннотация.** В статье рассматривается эффективность применения рециклинга при переработке строительных отходов, что является актуальным в связи с тенденцией к сокращению образования строительного мусора в России, который при качественной переработке может использоваться вторично. Раскрыт алгоритм экономической оценки рециклинга, позволяющий провести качественный анализ с выводом конечных результатов по эффективности внедрения в строительное производство.

**Ключевые слова:** строительный мусор, рециклинг, эффективность, экономический расчет.

In recent years, during the construction, reconstruction, renovation of infrastructure facilities, such a topic as the disposal and recycling of construction debris has become relevant, growing every year into a large-scale problem. The construction of new buildings and structures, shopping complexes, the demolition of buildings that have fallen into disrepair – all this leads to a continuous increase in the volume of construction debris that is taken to disposal sites for recycling, burial or incineration.

More than several tens of millions of tons of construction waste are generated annually in Russia. According to Rosprirodnadzor data [1], 71.3 million tons of such garbage were formed in the country in 2021. However, only 22 % of the total amount of construction waste (approximately 15.5 million tons) was sent for recycling, and the percentage of secondary waste use did not exceed 1%.

On December 27, 2019, Federal Law No. 473-FZ "On Amendments to the Housing Code of the Russian Federation and the Federal Law "On the Fund for Assistance to Housing and Communal Services Reform" regarding the Relocation of Citizens from Emergency Housing Stock" came into force, in this regard, under the program "Dilapidated Housing" in Russia, it is necessary to demolish 19.24 million m<sup>2</sup> of residential premises [2], as a result of the demolition of which thousands of tons of construction debris will be formed. Figure 1 and Figure 2 show the dynamics of the increase in the volume of construction waste and the demolition of houses under the renovation program in Moscow.

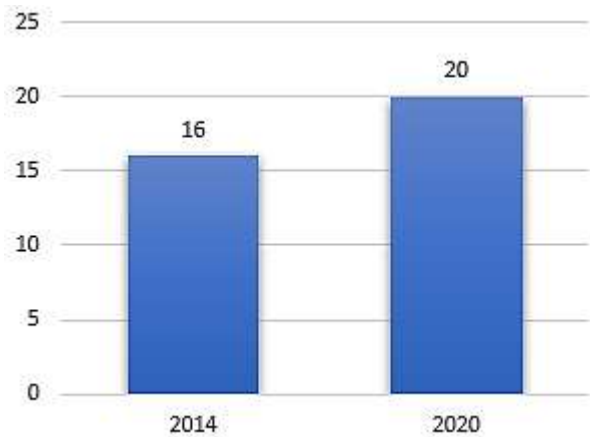


Figure 1. Volume of construction waste

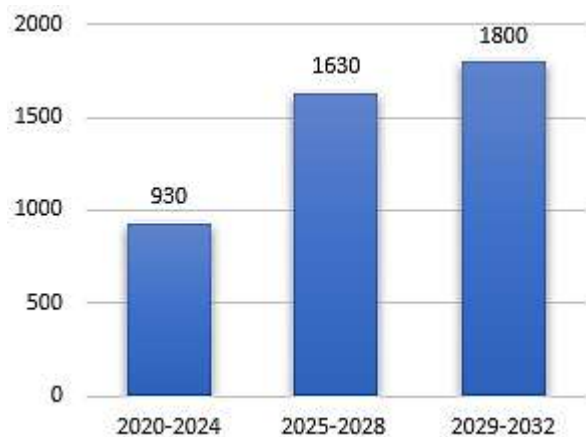


Figure. 2. Dynamics of demolition of houses under the housing renovation program in Moscow

In this regard, today in the construction industry, in particular, in the system of processing and disposal of construction waste, it is necessary to carry out qualitative transformations and the introduction of innovative technologies in order to improve the quality of the efficiency of processing construction waste for their secondary use. For example, in Russia only about 10 % of all construction waste is recycled, whereas in one of the advanced countries for the processing of construction waste, this value reaches 90 %. This ratio is explained by the diagram shown in Figure 3.

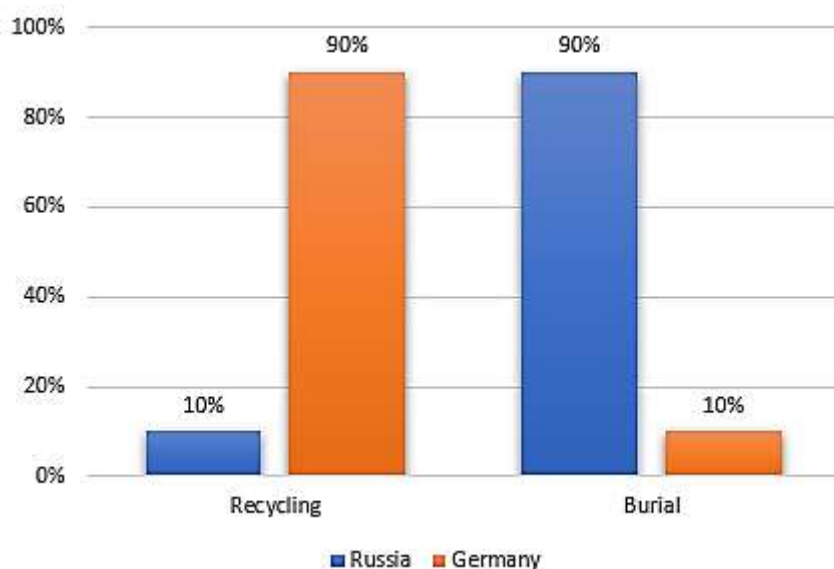


Figure. 3. The ratio of indicators of processing of construction waste in Russia and Germany

In addition, according to various expert estimates [3], about 20 million tons of recycled material are offered to the market annually, which is waiting for its turn for processing. The share of stone, brick and reinforced concrete structures in the total supply is about 67 %. Also, due to the growth of construction waste, the number of new landfills and the territory of existing ones is expanding. The total area of landfills in Russia as of 2022 is about 4 million hectares [3]. For comparison, the area of Switzerland is 41,285 km<sup>2</sup>, which is 4,128,500 hectares.

Also, in Russia there is a low level of use of secondary raw materials obtained by recycling technology. Figure 4 shows a diagram revealing the comparative values of the use of secondary raw materials obtained by recycling technology. It is noted that according to the program [4], by 2030 the share of construction waste that is reused in construction should reach 40 %.

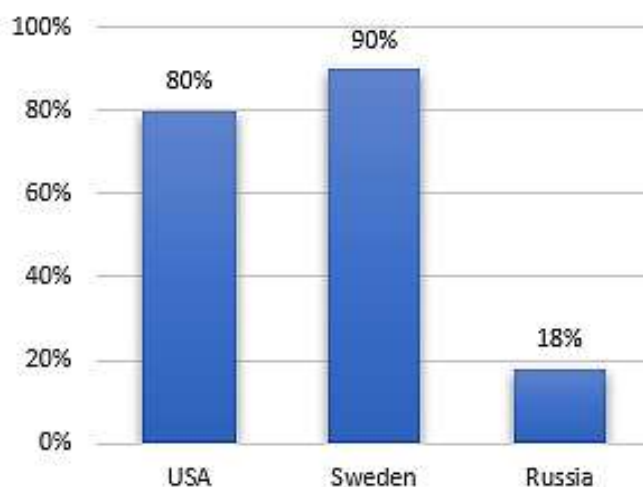


Figure. 4. The ratio of indicators of the use of secondary raw materials obtained by recycling technology in the USA, Sweden, Russia

When introducing recycling technology for the recycling of construction debris for the purpose of secondary use in the construction industry, the question arises about the effectiveness of the use of technology. Since this technology requires certain financial investments in the acquisition and operation of technological equipment. Thus, when deciding on the introduction and use of recycling on a construction site or in a certain region, an assessment of the effectiveness of recycling for the processing of construction waste should be carried out.

That is, the technological process of waste processing is carried out in the existing economic conditions and, like any production process, must either be cost-effective or the costs of its implementation must be compensated from some source.

Given that the initial information on a particular technology is limited and is of an advertising nature, in this case it should be limited to evaluating the effectiveness of technologies by the main cost items

$$E_{ef} = R_t - W_t, \quad (1)$$

when  $E_{ef}$  – economic efficiency of waste processing technology;

$R_t$  – the result of the company's work;

$W_t$  – waste recycling costs.

The cost assessment of the results of the work consists mainly of the volume of sales of products in value terms:

$$R_t = P_{pr} \cdot V_{pr}, \quad (2)$$

when  $P_{pr}$  – sales price of products;

$V_{pr}$  – the annual volume of sales of products in kind.

In some cases, an additional contribution to the valuation of the results of the work can be given by:

1. Proceeds from receiving waste for recycling:

$$R_{was} = P_{was} \cdot V_{was}, \quad (3)$$

when  $P_{was}$  – the price at which waste is accepted for recycling;

$V_{was}$  – volume of waste.

2. Cost savings on payments for waste disposal, which consists of payments to environmental funds:

$$C_{sav} = B_r \cdot k \cdot K, \quad (4)$$



when  $C_{sav}$  – cost savings on waste disposal payments;

$B_r$  – basic rates of payment for waste disposal;

$k$  – coefficient of the ecological situation in the region;

$K$  – the conversion rate of basic payments for the current year.

To assess the environmental effect, the prevented environmental damage (ED) is given, which is proposed to be calculated in a simplified way:

$$ED = B_r \cdot k \cdot ID, \quad (5)$$

when  $ID$  – the index is a deflator for GDP.

It is assumed that the use of a deflator most adequately reflects the change in the base rates of payments for waste disposal when assessing the prevented environmental damage.

The cost estimate of waste processing costs consists of current production costs and taxes:

$$W_t = P_c + T, \quad (6)$$

when  $P_c$  – production costs;

$T$  – taxes.

Current costs consist of a number of costs that make up the cost of annual production volume:

$$P_c = CP_{pr} \cdot V_{pr}, \quad (7)$$

when  $CP_{pr}$  – cost of annual production volume;

$V_{pr}$  – production volume.

As characteristics of production processing, it is necessary to cite the estimated price per unit of production, the calculation of the profit of the enterprise, the total amount of taxes from profit, the price per unit of competitive products, cost savings on waste disposal payments, prevented environmental damage.

Based on the results of the calculation according to formulas 1-7, a table is compiled that reflects the result obtained and analyzes the degree of efficiency of using recycling technology, allowing at the evaluation stage to adjust the volumes or other indicators necessary for the introduction of recycling of construction waste.

However, in the process of preparing construction debris for recycling, there may be materials that can be used without recycling, having an insignificant percentage of physical wear and tear. In this regard, the indicator [5] should be taken

into account, taking into account the proportion of recyclable materials without the use of recycling technologies:

$$O_{ef} = f(E, Ec_s, S_s, O_v, O_{re}), \quad (8)$$

when  $E$  – indicator of economic efficiency of recycling;

$Ec_s$  – indicator of the ecological significance of recycling;

$S_s$  – indicator of the social significance of recycling;

$O_v$  – indicator of the relative volume of the intended recycling;

$O_{re}$  – an indicator that takes into account the proportion of building elements suitable for reuse without the use of additional recycling technologies.

In turn, the calculation of the volume and other indicators of construction waste is possible when using software products [6, 7] that have passed the examination and registered with Rospatent.

Thus, the recycling of construction waste in Russia is at the nascent stage as one of the processes in the construction industry of the country. The analysis given in the article reveals a low degree of use of this technology, and comparative indicators with other countries show a lag behind other countries. Against the background of the annual generation of construction waste in a large volume in Russia, recycling will improve the waste recycling system, as well as increase the percentage of use of secondary raw materials. But due to the complexity of using technological equipment and the high-tech nature of recycling processes, a primary efficiency assessment is required, which at the calculation stage allows you to find out the required financial costs, and also reflects the main indicators necessary for the implementation of recycling.

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## MEANS OF PROTECTION OF THE FIREMAN WHEN WORKING AT HEIGHT

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**Abstract.** The article deals with safety issues when working at height and suggests means of protection for the firefighter to minimize the risks. Different types of means, their advantages and disadvantages are considered. Describes the requirements for the use of firefighter's protective equipment. The article raises the importance of knowledge in the use of equipment, and the training of firefighters.

**Keywords:** firefighters, heights, safety, firefighting equipment.

## СРЕДСТВА ЗАЩИТЫ ПОЖАРНОГО ПРИ РАБОТЕ НА ВЫСОТЕ

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**Аннотация.** В статье рассматриваются вопросы безопасности при работе пожарного на высоте и предлагаются средства защиты для минимизации рисков. Рассмотрены различные типы средств, их преимущества и недостатки. Описаны требования к использованию средств защиты пожарного. В статье поднимается важность знаний в использовании оборудования и подготовки бойцов пожарной охраны.

**Ключевые слова:** пожарные, высота, безопасность, пожарное оборудование.

The safety of firefighters when working at heights is one of the most important tasks that must be addressed when conducting firefighting work. Working at heights can pose serious risks to the lives and health of firefighters, so it is important to ensure that they are as protected and safe as possible. In this article, we will look at the basic protective equipment that is used when working at heights.

One of the main means of protection when working at heights is special equipment. This includes safety harnesses, carabiners, ropes, and other devices that help firefighters stay at height and prevent falls. They are designed to insure firefighters when working at height, rescue people and self-rescue firefighters during firefighting and related primary emergency rescue work, as well as to carry a firefighter's axe and carabiner [1].

Carabiners are metal locks that are used to connect various elements of firefighters' equipment with each other. They come in different types: automatic, semi-automatic and manual. Automatic carabiners self-lock when you release the lever, which makes them safer to use. Semi-automatic carabiners require some extra action to close, and manual carabiners only close when you pull the lever. They are solidly built and highly reliable to ensure the safety of firefighters and the people they rescue. Firefighter's carabiners must meet certain standards and safety requirements established in each country. It is also important to use the carabiners correctly and to check them regularly for damage and wear and tear to avoid possible accidents. Firefighter's carabiners can be of various types and sizes depending on the specific task the firefighter is performing. When operating the rifle, the following requirements of occupational safety rules must be met:

1. Before going on duty and after it, the carbine is subjected to an external inspection to confirm the integrity and serviceability of its elements;
2. When the rifle is in contact with aggressive environments (acid, alkali), it is washed with water, wiped, dried and tested for durability.

For example, screw-threaded locking carabiners are used to secure rope equipment, and some carabiners also have a special coating that protects them from corrosion and damage. The carabiner design includes:

1. Hook – the power bracket of the carabiner, which absorbs the working loads.
2. The bolt – a mechanism designed to close the hook.
3. Hinged joint - a knot for attaching the bolt to the hook of the carbine.
4. Locking connection – knot of connection of the hook and hinged part of the bolt.
5. Locking device – movable coupling fixed to the hinged part of the bolt, designed to lock the locking connection.
6. Working section – the section of the carabiner on which the fire rescue rope is wound during the operation of self-rescue (rescue of the victim).

The appearance of the fire carabiner is shown in Figure 1 [2].



Figure 1. Appearance of the fire carbine

Belts are a basic piece of firefighter gear for working at height. They must be sturdy and comfortable enough to ensure safety and comfort when working at height. Belts can be of different types: seated, lap belts and combination belts. Sitting belts are used for vertical descent and ascent, lap belts are used for horizontal movements, and combination belts are used for various tasks at height. Lift belts have wide straps and multiple fasteners to provide a secure hold on the firefighter. Belts for working in hard-to-reach areas, such as tunnels and shafts, usually have narrower straps and are lighter in weight. An important aspect of firefighter belts is their safety. They should be made of high-quality materials that can withstand heavy loads. They should also have a fall protection system that prevents the firefighter from falling if the safety line breaks. Firefighters should receive special training and instruction in the proper use of belts and other equipment. They must know how to properly put on and adjust the belt and be able to check it before each use. When using a fire escape harness, the following health and safety requirements must be met:

1. The belt shall be adjusted to the size of the belt;
2. Before and after going on duty, the belt shall be externally inspected to confirm the integrity and serviceability of its elements;
3. The belt shall be tested in accordance with the requirements of the technical documentation of the manufacturer and shall have the appropriate test markings (date).

The belt construction includes: waist strap, buckle, carabiner holder, clasp, and lanyard.

1. The waist belt is a structural element of the belt, directly covering the human body around the waist. The width of the waist belt must be at least 80 mm.
2. Belt buckle – a structural element of the belt designed for fixing it on the human body and adjusting its length.
3. Carabiner holder – a structural element of the belt designed for fixing a fire carabiner to it.
4. Strap – a structural element of the belt designed to reserve the free end of the lap belt.
5. Loop – a structural element of the belt, designed for fixing the fire carabiner on the belt in a horizontal position.

The belt is removed from the calculation if:

1. Damage to the waistband (tear, cut);
2. Faulty (broken, bent) buckle and buckle studs;
3. Violation of the integrity of the rivets and the absence of washers on them;
4. Tearing of the belt material by rivets or blocks;
5. Absence of a clip for setting the end of the belt;
6. Cracks and dents on the surface of the blocks or absence of at least one of them;
7. The leather lining of the belt is torn.

The appearance of the firefighter belt is shown in Figure 2 [3].



Figure 2. Appearance of the fireman's belt

Ropes are another important piece of equipment for firefighters working at height. They must be strong enough to support the weight of a person and other pieces of equipment. Ropes can be of different types: dynamic and static. Dynamic ropes provide smoother movement when descending and ascending, while static ropes are stronger and more resistant to wear and tear. Firefighter ropes are made of high quality materials such as nylon, polyester or aramid fibers. They are highly durable and wear-resistant, allowing them to withstand heavy loads. One important aspect of firefighter ropes is their length. The length of the rope should be long enough for the task, but not too long to avoid unnecessary weight and increased risk of falling. Firefighter's ropes should be inspected regularly for damage and wear and tear. If the rope has any damage, it must be replaced to avoid the risk of breaking during the operation. In order to preserve the physical and mechanical properties, the rope must be stored in a cover of waterproof fabric, wrapped in a ball, and protected from moisture, direct sunlight, oil, gasoline, kerosene and other solvents. One end of the rope at the loop is wrapped with white tape (2-5 cm wide) indicating the inventory number and date of the last test.

Metal shackles are woven into the ends of the rope. The inventory number is applied to the metal shackles securing the ends of the rope by punching or engraving. It is prohibited to put an inventory number on the metal rings securing the ends of the rope with erasable, fading means (paint, marker, felt-tip pen). On the bag-case is attached a tag with the date of the last test and indicating the inventory number of the rope. Rescue and self-rescue begins after making sure that:

1. The length of the rescue rope ensures a full descent to the ground (balcony);
2. The lifeline is securely attached to the rescued person;
3. The rescue rope is secured to the building structure and properly wound on the fire lap carabiner.

No rescue or self-rescue rope may be used:

1. Wet or highly damp rescue ropes;
2. Rescue ropes not in the calculation;
3. Ropes intended for other purposes.

Rescue or self-rescue can be started by making sure that the length of the rope provides a descent to the ground (balcony). Work must be carried out wearing gloves to avoid hand injuries. The rope is removed from the calculation if during the work it has been subjected to influences that caused the destruction of the braid and has not passed the test. The appearance of a fire rope is shown in Figure 3 [4].



Figure 3. Appearance of a fire rope

It is important to choose and use such equipment correctly, and to check it regularly for safety compliance.

Another important means of protection when working at heights is to train and train firefighters. They need to know all the safety rules when working at height, know how to use the equipment correctly, and be able to react quickly to possible hazards. Therefore, education and training must be conducted regularly and include both theoretical training and practical exercises. In addition, all safety standards and requirements set by legislation and professional organizations must be observed when working at heights. These include the rules for organizing the workplace, checking the condition of equipment and gear, and monitoring the actions of firefighters at heights. In general, safety when working at heights is an important task for firefighters, and its solution requires a comprehensive approach and compliance with all necessary safety measures [5].

In addition, it is important to be physically fit and healthy, as working at height requires stamina and strength. Firefighters must also be prepared to work in extreme conditions, such as bad weather or fire hazards. When working at heights, communication between firefighters and supervisory agencies must also be ensured to quickly respond to possible problems and coordinate actions. It is also important to monitor the psychological state of firefighters, as working at height can be stressful and requires concentration and attention. Overall, safety when working at height is an important challenge for firefighters, and it requires a comprehensive approach and compliance with all necessary safety measures. This is the only way to ensure effective and safe work at heights [6].



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## MAGNETIC LEVITATION TECHNOLOGY IN TRAINS: APPLICATIONS AND PROSPECTS

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**Abstract.** Every year, technologies in the construction of trains, as well as ways to move trains, are developing more and more actively. This article considers the technology of magnetic levitation, with the help of which modern trains have become the fastest and most comfortable ground means of transporting passengers.

**Keywords:** electromagnetic induction, magnetic levitation, magnetic cushion, high-speed trains, maglev.

## ТЕХНОЛОГИЯ МАГНИТНОЙ ЛЕВИТАЦИИ В ПОЕЗДАХ: ПРИМЕНЕНИЕ И ПЕРСПЕКТИВЫ

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**Аннотация.** С каждым годом все активнее и активнее развиваются технологии в строении поездов, а также способы перемещения поездов. В данной статье рассматривается технология магнитной левитации, с помощью которой современные поезда стали самым быстрым и комфортным наземным средством перевозки пассажиров.

**Ключевые слова:** электромагнитная индукция, магнитная левитация, магнитная подушка, скоростные поезда, маглев.

The phenomenon of magnetic levitation has become one of the most significant discoveries in recent years. This technology has found wide application in the transport system of many countries, in particular, in relation to trains.

Magnetic levitation (ML) is a technology due to which an object is lifted by a magnetic field, when a magnetic effect is applied to the object to compensate for the gravitational effect. Magnetic levitation technology is based on the phenomenon of electromagnetic induction.

Electromagnetic induction is a phenomenon in which a change in the magnetic field causes an electric current in a conductor located in this field (Figure 1).

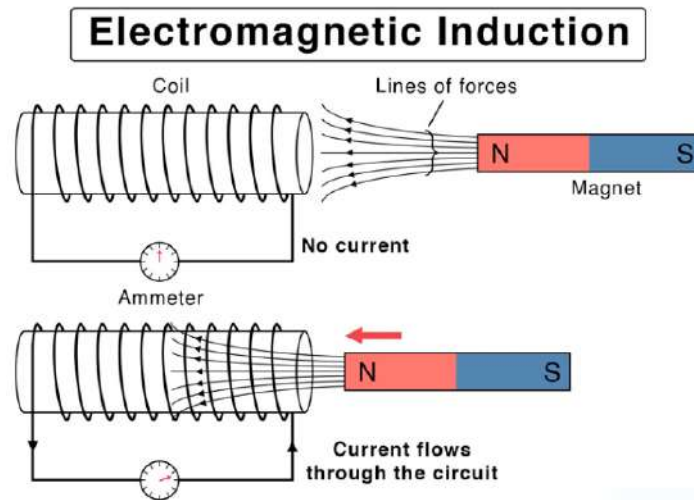


Figure 1. The phenomenon of electromagnetic induction

Magnetic levitation technology uses electromagnetic induction to create a magnetic field that holds the train above the rails. This technology was developed in Japan in the 1960s and has since been introduced in many countries, including China, Germany, Korea and Russia. ML is used in high-speed systems (speeds over 400 km/h), which uses a magnetic field to maintain and hold the train at a height of 6-15 cm above the rails. Electromagnets under the train create a magnetic field that pushes the train away from the rails, creating a suspension. This allows the train to move with low friction, which ensures high speed and reduces noise.

A magnetic cushion is a phenomenon based on the properties of magnets to repel each other by the poles of the same name. Thus, a magnetic suspension is created, for which electromagnets located along the lower surface of the train are used on trains on a magnetic cushion. When an electric current flows through these electromagnets, they create a magnetic field that excites currents in the metal rails and creates opposing fields. This counteraction leads to a slight rise of the train over the rails, which leads to the creation of a magnetic suspension. At this height, a balance of magnetic forces is achieved between the train and the rails, which allows the train to move without friction. Magnetic cushion trains are a promising method of transportation that can significantly improve the speed and comfort of movement.

Magnetic levitation systems are used to achieve high speeds, as friction and drag reduce the speed of transport. In addition, magnetic levitation also allows for smooth and silent train movement.

Magnetic levitation technology is based on the striking force of electromagnetic induction and creates a magnetic flux that makes it possible to keep the train above the surface of the rails. In addition, the magnetic cushion suspension provides a low level of friction between the train and the rails, which allows the train to develop high speed. There are two types of magnetic levitation that are in widespread use. The first type, used in the 80s, is a "magnetic suspension". This device was created on the basis of electromagnets and enabled the locomotive to

move with the help of magnetic force. However, the disadvantage of such a system was that it was very expensive and required a lot of energy. The modern type of maglev train that is used today is a magnetic levitation train, which has a simplified name – maglev (Figure 2). It also works on the basis of magnetic force, but permanent magnets are used instead of electromagnets. This type of maglev is more efficient and economical compared to the first type. It reaches speeds of up to 600 km/h and is the fastest mode of transport on earth [1].

Previously used permanent magnets were too weak to lift the train. An alternative was proposed by physicist Richard Post, who decided to use the Halbach method. The method consists in arranging permanent magnets in such a way as to concentrate their total fields in one direction. Inductrack is what the Post called this system. Halbach's installations are mounted in the bottom of the car. The Halbach installation concentrates the magnetic field at a certain point, reducing it at others. Being mounted in the bottom of the train car, it generates a magnetic field that induces sufficient currents in the windings of the web under the moving car to lift the car a few centimeters and stabilize it. When the train stops, the effect of levitation disappears, the cars are lowered onto additional chassis [2].

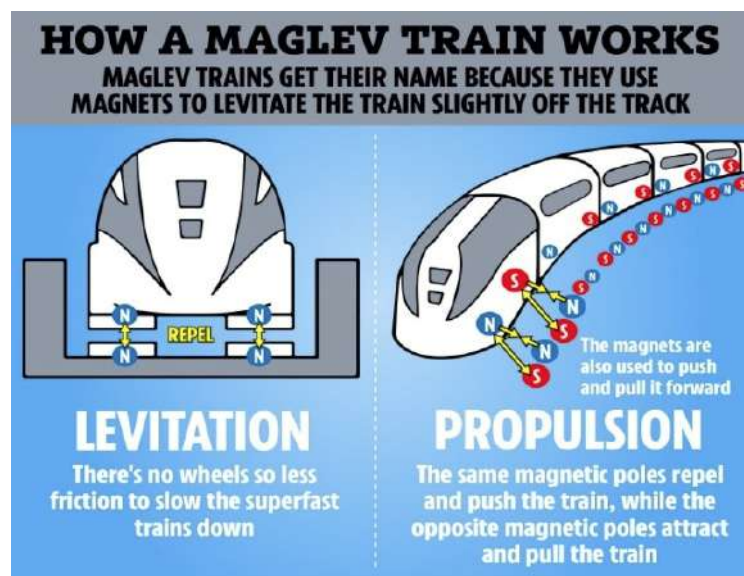


Figure 2. How maglev train works

At the moment, many countries are researching, designing and commissioning high-speed trains based on magnetic levitation. And several high-speed magnetic levitation systems have already been built and tested in China. China is a leader in the construction of magnetic cushion systems, where many magnetic cushion expressways have been built throughout the country, including routes between Shanghai and Beijing and Shanghai and Guangzhou. The highest-speed maglev highway is the Shanghai Line. It is worth noting that this is the world's first commercial maglev train. It travels from Pudong Airport to Shanghai at a distance of 30 km and is one of the fastest trains in the world. Here are some characteristics of the maglev train in Shanghai: The train can reach speeds of up to 430 km/h in 10 – 15 seconds thanks to streamlined shapes, but on average its speed is about 250 km/h. On

the way, the train can cover 30 km of distance between the airport and the city in just 7 minutes and 20 seconds. Each cabin of the train accommodates about 100 passengers, where each train consists of 7 cars. The magnetic levitation system makes the train very safe and reliable, since it does not come into contact with railway rails. Also, the train is environmentally friendly, since it does not emit harmful substances into the atmosphere. In addition to this highway, two more maglev lines operate in China and two more are under construction [3].

Also, developments in the field of ML systems are being carried out at the Central Institute of Industrial Robotics of Russia, universities in Germany and Japan. In Korea, a magnetic cushion system was built connecting the cities of Busan and Incheon. In Germany, efforts have also been made to develop a system that should connect Berlin, Hamburg and Munich. A multibillion-dollar Chuo Shinkansen project is being built in Japan (Figure 3), which provides for the creation of a wide-economy network of maglev trains. Chuo Shinkansen will be a high-speed highway between Tokyo and Osaka. It is worth noting that the construction of the first section from Tokyo to Nagoya has already begun, its opening is scheduled for 2027. The cost of the work is estimated at about \$ 100 billion [4].



Figure 3. Japanese high-speed maglev train system

In Russia, experiments were conducted to install a magnetic cushion system in Moscow, where a wire-parallel magnetic levitation system for high-speed transportation was built. At the moment, this is the only maglev trip that has been put into operation – the line between Sheremetyevo Airport and Moscow. The Sheremetyevo-Moscow line was opened in 2008 and was created on the basis of the latest technology of combining monorails and magnetic levitation without the use of rails, which was developed by research institutes in Moscow. This technology allows you to increase the speed of the train to 150 km / h and provides a significant level of safety. However, such a line is not a typical maglev, because it uses rails with large washers that are placed in a special way between the poles of the magnet and ensure the train's conductivity by interference on the line. Also, the construction of a high-speed magnetic levitation highway between Moscow and Kazan is considered a

promising project in this area. The project was launched in 2010, but due to financial and economic problems, its implementation was frozen. Thus, at the moment, the development of maglev trains in Russia is not a priority, but the development of technology in the long term remains significant [5].

Magnetic levitation systems have several advantages over other modes of transport. They provide significant time savings and provide more comfortable and safe transportation. In addition, such systems do not expend energy to overcome the friction force, which reduces fuel costs and rail lubrication.

However, ML systems have some disadvantages. This is the high cost of design, construction, operation, as well as the high price of tickets. In addition, there are dangers of failures in security systems and malfunctions in the magnetic field. If the magnetic field is lost, the train may accelerate too fast and cause an accident [6].

Thus, ML systems are an impressive achievement of modern science and technology, which provide cost-effective conditions for accelerated and comfortable transportation of passengers and cargo. However, given the existing limitations in cost, safety and technical complexity, further development and improvement of the ML system is necessary in order to become a more accessible and safe mode of transport.

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## ARCHITECTURE OF CORPORATE DATABASE SERVERS

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**Abstract.** This article discusses in detail the main characteristics of corporate database servers that are necessary for modern business applications. The main characteristics of database servers are high availability, security and performance. In addition, the article discusses new features such as cloud databases and big data analytics.

**Keywords:** databases, data, servers, architecture, performance, management, security.

## АРХИТЕКТУРА СЕРВЕРОВ КОРПОРАТИВНЫХ БАЗ ДАННЫХ

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**Аннотация.** В данной статье подробно рассматриваются основные характеристики серверов корпоративных баз данных, которые являются необходимыми для современных бизнес-приложений. Главными характеристиками серверов баз данных являются: высокая доступность, безопасность и производительность. Кроме того, в статье описаны новые возможности, такие как облачные базы данных и аналитика больших данных.

**Ключевые слова:** базы, данные, серверы, архитектура, производительность, управление, безопасность.

Corporate databases are an integral part of modern business. They are centralized data repositories used to manage information about a company, its customers, and products. In this article, we will discuss the architecture of servers for corporate databases.

Key components of the architecture of servers for corporate databases include:

1. Database server: the database server is the main component of the architecture of corporate databases. It is a program that manages access to data and stores information in the database. The database server can run on a physical server or a virtual machine. Some popular database servers include Oracle Database, Microsoft SQL Server, and MySQL.



2. Data storage: data storage is the place where data is stored in the database. Data storage can be implemented as a file system or as specialized data storage, such as SAN or NAS [1, p. 54].
3. Client applications: programs that access the database server to access data. Client applications can be implemented as desktop, web applications, mobile applications.
4. Network: the infrastructure that provides communication between client applications and the database server. The network can be implemented as a local network or a global network.
5. Security systems: are an integral part of the architecture of corporate database servers. Security systems provide protection against unauthorized access and safeguard data from hacking. Security systems may include authentication, authorization, encryption, and monitoring.
6. Backup and recovery systems: provide data protection against system failures. The systems may include regular data backups, automatic recovery, recovery testing.

Key principles of the architecture of corporate database servers:

1. Reliability: the architecture of corporate database servers should be designed with high reliability in mind. This is achieved through the use of data backup and replication, as well as backup and recovery systems.
2. Scalability: the architecture of corporate database servers should be designed with scalability in mind. This allows companies to scale their databases as their business grows. Database clusters and data replication can be used to achieve scalability.
3. Security: the architecture of corporate database servers should be designed with a high level of security in mind. This is achieved through the use of authentication, authorization, encryption, and monitoring systems.
4. Performance: the architecture of corporate database servers should be designed with high performance in mind. This is achieved through query optimization and the use of data caching.

Benefits of using corporate databases:

1. Centralized data storage: corporate databases allow storing all company data in one place, which makes data management easier and ensures data uniformity.
2. Access management: corporate databases allow managing data access, which ensures data protection against unauthorized access.
3. Performance improvement: corporate databases can be optimized to improve performance, which provides fast access to data [2, p. 239].
4. Convenience of use: corporate databases can be integrated with various applications and systems, which makes data access easier [3].
5. Decision-making improvement: corporate databases provide data uniformity, which makes data-driven decision-making easier.

It is important to remember that the architecture of corporate database servers is not static and should constantly adapt to new business requirements. Therefore, companies should regularly analyze and optimize their corporate databases to ensure maximum efficiency and reliability of data management.

It is also worth noting that corporate databases can be used in various industries and sectors, such as finance, healthcare, education, manufacturing, and



many more. Each sector has its unique requirements and features that may require specialized database architecture.

For example, in healthcare, corporate databases must comply with legal requirements, ensure patient confidentiality, and manage medical data. In the manufacturing industry, corporate databases must manage production data and optimize production processes.

It is also important to consider requirements for scalability, handling large volumes of data, high demands for performance and reliability, as well as ensuring data availability and security. The use of corporate databases is becoming increasingly popular among companies that seek to optimize data management and enhance business processes' efficiency. However, it is crucial to remember that the architecture of corporate database servers should be designed taking into account the unique requirements of each company and industry and be subject to regular analysis and optimization.

One of the key tasks in designing the architecture of corporate databases is the selection of suitable database servers and their configuration. There are many different database management systems (DBMS), such as Oracle, Microsoft SQL Server, MySQL, PostgreSQL, MongoDB, and many others. Each of them has its unique features, advantages, and disadvantages, so the choice of a DBMS should be based on business requirements and each company's unique characteristics.

When selecting database servers, it is necessary to consider requirements for scalability, performance, reliability, security, and manageability [4, p. 20]. Clustering database servers can be used to ensure scalability, while data caching and query optimization can improve performance. It is also essential to provide backup and data recovery to minimize the risk of data loss in case of system failures.

In addition to selecting appropriate database servers, the architecture of corporate databases also includes organizing network infrastructure, such as local and remote networks, VPN (virtual private network), firewalls, and other technologies that ensure data security and availability.

Moreover, the architecture of corporate databases should include access management mechanisms that allow controlling access rights to data in accordance with the company's security policy and legislative requirements. Technologies such as role-based access control, authentication and authorization mechanisms, access auditing, and many others can be used for this purpose.

So, the architecture of corporate database servers is a key element of effective data management in companies. It should be designed taking into account the unique requirements of each industry, providing high scalability, performance, security, and reliability, as well as regularly analyzed and optimized to ensure maximum efficiency in data management and minimize risks of data loss or security breaches.

One of the key trends in corporate database architecture is the transition to cloud solutions. Cloud DBMS, such as Amazon RDS, Microsoft Azure SQL Database, Google Cloud SQL, and others, provide a wide range of opportunities for managing data in the cloud. They allow companies to reduce costs for hardware, server management, and maintenance of database servers, as well as provide high scalability, performance, and reliability.

However, when transitioning to cloud solutions, it is necessary to consider the specific features of working in a cloud environment, such as access management, data security and confidentiality, as well as integration capabilities with other company applications and systems. It is also important to consider potential costs of using cloud solutions, such as data transfer expenses, data storage, and additional service usage.

Thus, the architecture of corporate database servers is a key element of successful data management in companies. It should be designed taking into account the unique needs of each company, providing high scalability, performance, security, and reliability, as well as regularly analyzed and optimized to ensure maximum efficiency in data management and minimize risks of data loss or security breaches.

To achieve these goals, various technologies and tools can be used, including cloud solutions, relational and non-relational DBMS, as well as various automation and performance monitoring tools.

An important aspect of the architecture of corporate database servers is data access management. For this purpose, authorization and authentication mechanisms are often used, as well as access control systems at the table and field level. It is also important to ensure data confidentiality using encryption mechanisms and other security measures.

Another important task is to ensure high performance of the database. To achieve this, data sharding, replication, caching, and other technologies can be used, which allow improving the performance of the database and ensuring high availability of data.

Finally, the architecture of corporate database servers should be designed taking into account the business needs of the company and providing opportunities for integration with other systems and applications. For this purpose, APIs and various integration platforms, such as MuleSoft, Boomi, and others, can be used.

To ensure effective management of corporate databases, it is also necessary to pay attention to monitoring and analyzing the performance of the database. Various monitoring tools are used for this, such as notification systems, query profiling, performance analyzers, and others. It is also important to have well-designed data recovery processes to minimize data loss in the event of system failures.

In the modern world, where data is a key asset of companies, the architecture of corporate database servers is a fundamental element of business. Well-designed database architecture ensures efficient data management, improves system performance and reliability, ensures data security, and reduces security risks. All of this allows companies to maximize the benefits of their data and compete successfully in the market.

The use of modern technologies and tools allows companies to create flexible, scalable, and reliable data management systems that can effectively solve various business and data management tasks. At the same time, it is important not to forget about regular analysis and optimization of the database architecture to maintain the system at a high level of performance and security in the face of rapidly changing market and business environments.

In addition, when developing database architecture, data security requirements should be taken into account. Modern corporate databases contain a large amount of confidential information that needs to be protected from unauthorized access. Various methods are used for this, such as data encryption, access control at the user and role level, user action auditing, and others.

Scalability of the system is also an important aspect of the architecture of corporate databases. During the company's development process, the volume of data may significantly increase, which can lead to a decrease in the performance of the database and an increase in response time to queries. Various scaling methods are used to solve this problem, such as horizontal scaling, vertical scaling, distributed systems, etc.

Another important aspect of database architecture is its ability to integrate with other systems and applications. Various standards and protocols are used for this, such as SQL, JDBC, ODBC, REST API, and others.

When developing database architecture, it is important to consider requirements for data backup and recovery. Having a backup copy of the database is a necessary condition for ensuring data security in case of system failures. Various backup methods are used for this, such as full, differential, incremental, etc. It is also necessary to provide the ability to recover data in case of data loss or database damage [5, p. 456].

In conclusion, it can be said that the development of enterprise database server architecture is a complex and responsible process that requires consideration of many factors, such as performance, security, scalability, and integration with other systems. When developing architecture, technologies and approaches that best meet specific requirements and tasks of the organization should be chosen. Relational databases are widely used in most organizations due to their simplicity and reliability. However, for large and complex systems where high performance and scalability are required, the use of NoSQL databases may be a more effective solution.

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## NEW GENERATION REACTORS IN THE USA

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**Abstract.** The nuclear power industry is actively developing these days in the United States. A new generation of reactors is described using the example of small modular reactors (SMRs), the widespread use of which will expand the distribution of low carbon-free electricity.

**Keywords:** atomic energy, nuclear energy, USA, atom, reactor, small modular reactor (SMR), uranium, fuel, reactor generations.

## РЕАКТОРЫ НОВОГО ПОКОЛЕНИЯ В США

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**Аннотация.** Отрасль ядерной энергетики активно развивается в наши дни в США. В статье описываются реакторы нового поколения на примере малых модульных реакторов (ММР), широкое применение которых позволит расширить распространение безуглеродной электроэнергии.

**Ключевые слова:** атомная энергия, ядерная энергия, США, атом, реактор, малый модульный реактор (ММР), уран, топливо, поколения реакторов.

The most important factor in scientific and technological progress is the development of the energy industry, which is the basis of production. The discovery of the energy contained in atomic nuclei gave a new impetus to the development of mankind. Every year, this industry is rapidly developing and progressing, which ensures the optimal use of natural resources and the reliability of power supply. In the 1950s, the penetration of nuclear energy into the electricity market began. This period is characterized by great enthusiasm, intensive research and development, it was full of hopes for the creation of a cheap and practically inexhaustible alternative source of

energy in the world. The world use of atomic energy has become a symbol of the progress and prosperity of mankind, interstate cooperation, which has become a reality, was carried out on an unprecedented scale. The media and the public highly appreciated and very favorably treated science, scientific achievements and scientists. By 1960, there were 17 power reactors in operation in four countries: Great Britain, the USSR, the USA and France with a total electrical capacity of 1200 MW. Another six states have launched nuclear power programs [1]. A nuclear reactor is made up of many components:

- Fuel (fuel elements). As usual uranium is used as fuel. Fuel rods formed from enriched  $\text{UO}_2$  pellets placed in tubes form fuel assemblies (FAs). The fuel assemblies are located in the reactor core. 1000 MW reactors can hold up to 51,000 rods with over 18 million pellets.

- Retarder. The material in the reactor core, which allows you to reduce the energy of neutrons to thermal. Light water usually acts as a moderator, but it can be heavy water or graphite. The difference between light and heavy water is that different isotopes of hydrogen are included in the water molecule. In light water it is  $^1\text{H}$ , and in heavy water it is  $^2\text{H}$ . In the first case, neutrons lose a greater fraction of energy in one act of elastic collision than in the second. However,  $^1\text{H}$  has a higher neutron capture cross section than  $^2\text{H}$ .

- Control rods. They are made of a material with a high neutron capture cross section (cadmium, hafnium, boron). With the help of control rods, you can slow down the course of the reaction or stop it altogether.

- Heat carrier. Fluid circulating through the reactor core and cooling it. In reactors where light water acts as a moderator, it is also used as a coolant. Reactors of this type are called pressurized water or boiling water reactors. In heavy water reactors, the coolant can be either heavy water itself or light water or gas. In graphite reactors, the coolant is light water or gas.

- Sealed housing. Depending on the combination of fuel, coolant and moderator, the vessel may or may not bear the pressure of the coolant washing the fuel rods. In the first case, the contact between the coolant and the moderator is allowed, and the housing is provided with inlet and outlet nozzles for the coolant and bears its full pressure. If direct contact between the coolant and moderator is unacceptable, fuel assemblies are placed in parallel sealed channels that carry coolant pressure.

- Reflector. The reactor core is surrounded by a reflector to reduce neutron leakage.

- Steam generator. Part of the cooling system for pressurized water reactors where the primary coolant is converted to steam to drive a turbine in a secondary circuit.

- Sealed shell. The structure in which the core of the reactor and steam generator is located. Protects the reactor from external influences and the nuclear power plant (NPP) employees from radiation. As usual it is a layer of concrete and steel meter thick. At present, the most common type of reactor is the pressurized thermal water reactor. In 2015, their number was 292 (out of 448 commercial reactors worldwide)

[2]. To understand the idea of developing next generation reactors, it is first necessary to consider previous generations of reactor technology.

Generation I (1950-1970; USA, USSR, France, Great Britain). The first power reactors of the 1950s and 1960s fall under this category. The fuel was mainly natural or low-enriched uranium (uranium oxide, UOX), the moderator was graphite, light and heavy water, and the coolant was water and CO<sub>2</sub>. The first fast breeder reactors with sodium coolant were also developed: in the USA – EBR-1 (1951), EBR-2, Enrico Fermi (1968); in France, Rapsodie, Phenix (1974); in the USSR – BOR-60, BN-350 (1973); in the UK – PFR (1974). They paved the way for future development of Generation IV reactors. This was the first attempt in history to achieve what is now called "sustainable development of reactor technology" (in particular, by optimizing the use of natural resources and reprocessing irradiated fuel to extract uranium and plutonium from it).

Generation II (1970-2000; 30 countries). Industrial reactors commissioned after the first oil crisis in 1974 are still in operation. These are mainly light water reactors, divided into two main groups: boiling water reactor (BWR) and pressurized water reactor (PWR).

Generation III (current period, evolutionary type reactors of the era of the "atomic renaissance"). While second-generation light water reactors have proven to be very safe in the field of safety, work continues to further improve their safety and performance, further reducing their already low releases of radioactivity to the environment. Generation III reactors were first developed in the 1990s. Some of them are currently under construction; as a rule, they refer to reactors with light water coolant [3].

Today, the international community is working out approaches to creating reactors of a new generation IV of reactors, which should come into operation in 2020-2030. 6 types of new generation reactors have been proposed. Four are fast reactors. It is significant that these fast reactors are not ordinary fast breeders. They do not have blankets where plutonium-239 is formed. The plutonium in them is formed in the core, where the burnup is high, and the pyroprocessing technology does not separate the plutonium. (Pyroprocessing is a process in which materials are subjected to high temperatures (typically over 800°C) in order to cause a chemical or physical change). All reactors operate at higher temperatures than previous generation reactors and can be used in a variety of industrial applications such as petrochemicals, synthetic fuel generation, biomass gasification, glass or cement production. Reactors, among other things, are designed for the production of hydrogen. The new systems must perform better than previous generations in terms of competitiveness, safety and reliability. New systems will have to ensure the utilization of all actinides, the formation of minimal amounts of waste. Their fuel cycle will be completely closed [4].

To date, the design of the 1st generation IV nuclear reactor has been approved for certification by the US Nuclear Regulatory Commission. This is a new type of

nuclear reactor – the NuScale small modular reactor (SMR) with a capacity of 50 MW or 160 MW [5].

The NuScale reactor (new trade name for the reactor is VOYGR) (Figure 1) is a pressurized water reactor operating on the classic principle: the breakdown of fuel turns water into steam, which turns a turbine. In this case, small modular molten salt reactors seem to be more promising, when fuel is supplied to the working zone along with the molten coolant. It is this adherence to the classical scheme that probably allowed the NuScale project to become the first certified small modular reactor in the United States.

The claimed advantages of small modular reactors, and the NuScale reactor in particular, are that the reactor can be almost completely assembled at the factory and transported to the site only for the installation of utilities. In the same way, it is sent for recycling after the end of its service life. Such an approach significantly reduces the cost of building a nuclear power plant and accelerates the construction time by many times, although experts warn of more than a 35-times increase in radioactive waste during the operation of small reactors compared to classical large reactors [6].

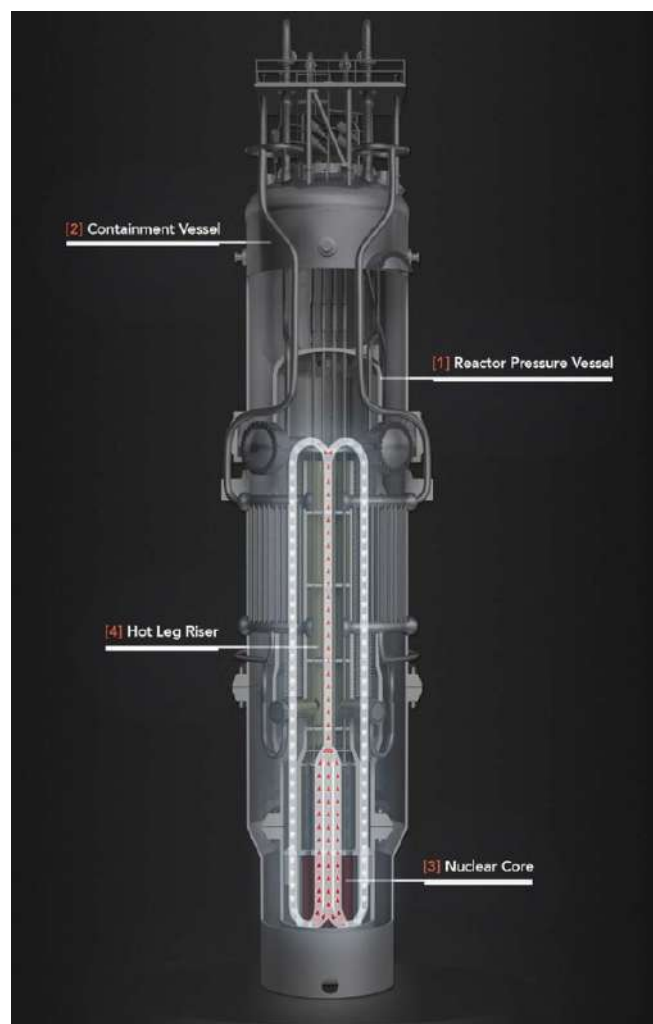


Figure 1. The NuScale SMR design

The small size and simple design of the VOYGR SMR units eliminate many of the complex systems used in larger nuclear plants. The plants are built using modular technology and simplified civil engineering, which increases their safety and makes them less expensive to build and operate. The VOYGR units are powered by a 77 MW (full power) NuScale Power Module (Figure 2). The module is manufactured at the factory and can be transported to the plant site by sea, rail, or road. industrial scale and other process heat applications.

Several types of VOYGR installation modules have also been developed:

1) VOYGR-12. This plant can generate 924 MWe in just 0.05 square miles. This makes it ideal for carbon-free energy production in places where space is limited. The capabilities of the VOYGR-12 make it an attractive solution as an emergency power source. After a catastrophic loss of infrastructure, the station can power a 154 MW microgrid of a critical facility for 12 years without new fuel.



Figure 2. NuScale Power Module

2) VOYGR-6. This installation is an affordable option for the transition to carbon-free energy. Combined with a 230,000 bbl/d refinery, VOYGR-6 can eliminate approximately 40 % of the plant's total emissions (175 t/h CO<sub>2</sub> reduction).

3) VOYGR-4. The plant is designed for lower generating capacity needs. VOYGR-4 is a small but powerful object. Combined with a desalination plant, the station can provide water to an entire city the size of Cape Town [7].

At present, nuclear energy plays an important role in meeting the energy needs of mankind, the demand for carbon-free energy is increasing, many nuclear plants are being built and nuclear plants with new types of reactors are being introduced, which makes it possible to ensure the optimal use of natural resources and the reliability of energy supply. Such new systems should have higher performance than previous generations, competitiveness and safety.



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## ANALYSIS OF INNOVATION MANAGEMENT METHODS IN THE COMPANY “YANDEX”

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**Abstract.** This article examines the activities of the company “Yandex”, on the basis of which the methods of innovation management in this company are identified. The main methods contribute to the improvement of the work of the team, the rapid introduction of innovations, adaptation to political and economic situations. The strategies of Yandex and the reasons why the company became the leader of the domestic market are also highlighted.

**Keywords:** innovation management, Yandex, methods, innovations, enterprise management system, potential.

## АНАЛИЗ МЕТОДОВ УПРАВЛЕНИЯ ИННОВАЦИЯМИ В КОМПАНИИ «ЯНДЕКС»

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**Аннотация.** В данной статье рассмотрена деятельность компании «Яндекс», на основе которой выявлены методы управления инновациями в этой компании. Основные методы способствуют улучшению работы коллектива, быстрому внедрению инноваций, адаптации к политическим и экономическим ситуациям. Также выделены стратегии компании «Яндекс» и причины, по которым компания стала лидером отечественного рынка.

**Ключевые слова:** управление инновациями, Яндекс, методы, инновации, система управления предприятием, потенциал.

In 2023, consumers are more demanding about the quality of Internet communication, educational and entertainment content ecosystems, information security services, cloud solutions and remote work services. The acceleration of digital transformation of various spheres of life and economy is noted, which stimulates the development and implementation of innovations as quickly as possible.

In the modern world, companies that are able to change quickly depending on the situation on the market and in the world, that follow the development of humanity, that work in popular areas, use new technologies, win. This is risky for many companies, but it allows you to get a big profit if you work with innovations correctly [1].

In order to study the methods of innovation management at the enterprise, it would be advisable to consider Yandex as the largest and leading IT company in Russia.

Yandex is one of the leading technology companies in Russia that develops a search engine, tools for Internet marketing, e-commerce, cloud technologies, autonomous vehicles and many other projects. The key factor of the company's success is constant development and an innovative approach to business. In this context, it is important to consider the methods of innovation management in Yandex.

The company started its activity in 2000, when the number of employees was 25 people, now more than 18,000 people, Yandex has offices and representatives in ten countries. In 2002, the company became self-supporting, and to this day Yandex's revenues are only growing [2].

In 2020, the company introduced four innovative technologies: improved snippets, auto-completion of forms, native authorization, and accelerated loading of site pages. They help to increase the conversion rate of the site and simplify the user's path to purchase. These technologies are useful for online stores, because they allow you to see the rating of the store, reviews of the product rating and its photos, as well as quickly make a purchase.

During the pandemic period from April 2020, Yandex shares began to increase sharply. The main advantage of the company during the coronavirus was the scaling of its own services in the market, where there was a high demand from customers for the period of self-isolation. Revenue growth was noticeable in the segment of "Media services", because being at home on isolation, people had a need to spend time in an interesting and exciting way, for example, the Kinopoisk service. Food delivery services – "Yandex. Food", "Yandex. Shop". These leaders showed the need for the company to function and helped it stay "afloat" [3].

In a difficult situation in the world, when people did not contact and worked remotely, Yandex services had a need. Delivery", "Yandex. Music", "Teleconference". And vice versa, Yandex was in decline. Taxi", "Yandex. Maps", "Yandex. Afisha", "Yandex. Travel".

At the moment, the company offers the best bet on the Russian IT industry due to the implementation of the development strategy and strong positions in the main segments.

Yandex services have a lot of data from which you can draw conclusions about the world around you and the changes that are taking place. On the company's website, you can see the results of research in various formats, on various topics and in different regions.

The company is taking concrete steps to develop an integrated IT ecosystem. Yandex does not stop diversifying its revenue structure, advertising-related industries provided 53 % of revenue, which is higher than in the previous year. Yandex invests in the development of research and development projects.

Yandex's strategy assumes an emphasis on the development of various user platforms based on its own technological developments and does not provide for direct sales of software and its personal development. The company has created its

own ecosystem with many directions, in which users can receive a large number of services, satisfying their needs. The ecosystem model makes it possible to work simultaneously in several services within one platform, increasing productivity. The rivalry here is very difficult, since the main competitor is the multinational corporation Google, which has enormous capabilities. Nevertheless, Yandex looks more than worthy in this struggle, at least in the market of Russia and the countries of the former USSR.

Yandex presented 12 areas of sustainable development, which are divided into four areas: quality of life, environmental impact, ethics and integrity, and human development. It was created to help people solve their problems with the help of modern Yandex technologies.

The directions of development were also divided into traditional priorities and relatively new ones. Among the traditional ones, those that have always been a priority for Yandex are convenience, quality and security of services; energy efficiency of its own infrastructure; information security and personal data protection; responsible procurement; content quality; anti-corruption and antitrust practices; Yandex employees. Among the relatively new priorities are those where there are growth areas and much can be improved with the help of the company's technologies – this is an accessible environment, waste management, carbon footprint, Yandex service partners, education for all.

The Smart Home system is a control system for home appliances using Alice's voice assistant. You can give a command to any device using a smart speaker or an application. One of the latest Yandex updates in 2023 was the introduction of new smart home devices with Zigbee protocol support. Zigbee technology connects wireless devices even without the Internet. Yandex offers five sensors with Zigbee support. These are a window and door opening sensor, a motion and lighting sensor, a temperature and humidity sensor, a leak sensor and a wireless button. They are miniature, have a concise design and will easily fit into any interior. In the "House with Alice" application, you can monitor the status of sensors and detect a breakdown in time.

It follows that technology improvement is required not only for efficient operation, but also for the convenience of customers and users of the search engine. Yandex has many competitors, such as Sberbank, Google, Uber, so in order to be first, "Yandex" is constantly being improved.

At the end of April 2022, Yandex announced that it was forced to reduce or stop many investments in experimental services at home and abroad due to the sanctions imposed by Ukraine. The representative of the company commented that the prolonged economic decline in Russia due to sanctions, the depreciation of the ruble or negative consumer sentiment can have a significant negative impact on the economic condition of the company and its performance.

But the company will continue to finance key business areas in the Russian Federation – search technologies, transport services, e-commerce, streaming services, cloud technologies, educational initiatives and others [4].

Analyzing the path of Yandex, we can identify several reasons that allowed the company to become the leader of the domestic information technology market and take a prominent place in the global IT industry:

1. The company focuses on creating and developing projects that people use every day, thereby increasing the quality of life;
2. A significant part of the income is directed to the development of new areas that are promising and the effect of them will not be now, but in the near future;
3. Adaptation to Russian-speaking users;
4. Yandex is a large-scale company, the parent company is located in the Netherlands, and offices are located all over the world [5].

It can be concluded that innovative technologies are constantly appearing in Yandex. The company conducts research at the regional and international level. However, recently the situation has been complicated by the economic situation related to the military actions in Ukraine.

Friendly and well-coordinated work of all employees is important for the quality work of the company. The important qualities they possess are openness, inner freedom and professionalism. Now Yandex has a system of business units, which allows the company to develop faster.

Yandex has freedom of action, employees are not restricted how to dress, what time to come, where to work, and this freedom allows people to think extraordinary, invent new things and work better.

In order for new thoughts to appear, an environment in which creativity will be in demand is necessary. To do this, we need a unified communication sphere, the integrity and unity of that very culture. Employees need to share their successes and ideas, find resources within themselves and easily cooperate.

At Yandex, anyone can come up with an idea and contact the manager for approval. If this makes sense, then the manager can allocate a small budget for it. Further, if the product turned out to be interesting, the idea can be protected, and it will receive the status of an official experiment.

One of the methods of innovation management at Yandex is the use of Agile and SCRUM methodology. This methodology allows you to solve problems quickly and efficiently, develop new products and services, while taking into account the needs of customers and the market. SCRUM allows you to create small teams consisting of developers, designers and managers who work on narrow tasks and at the same time can quickly change their direction if the client's requirements or the market situation change.

Another method of innovation management at Yandex is the use of design thinking. This method helps the company to create unique products and services that meet consumer needs and meet customer needs. The company actively applies this method both at the stage of product development and at the stage of its improvement. To do this, it uses tools such as collecting feedback from customers, creating prototypes of products and services, analyzing markets and audience segmentation.

Thus, technology improvement is required not only for the effective operation of the company, but also for the convenience of customers and users of the search

engine. Having analyzed the methods of innovation management in Yandex, the main ones are the following:

1. Focus on the economic and political situation in the world and the country;
2. Constantly improve, improve our own technologies;
3. In order for new thoughts to appear, an environment in which creativity will be in demand is necessary. Employees need to share their successes and ideas, find resources within themselves and easily cooperate.

Yandex uses a number of innovative methods to stimulate innovative activity, create unique products and services.

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## INTERNATIONAL CREDIT AND INVESTMENT RATING OF RUSSIA

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**Abstract.** Investments play an important role in the economy of any country, allowing the implementation of economic, social and environmental programs and projects in order to improve the welfare of citizens. Depending on the situation, the state regulates investment activities by developing and implementing investment policy and investment strategy.

**Keywords:** politics, investments, countries, Russia, economy, credit rating, assessment.

## МЕЖДУНАРОДНЫЙ КРЕДИТНЫЙ И ИНВЕСТИЦИОННЫЙ РЕЙТИНГ РОССИИ

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**Аннотация.** Инвестиции играют важную роль в экономике любой страны, позволяя реализовывать экономические, социальные и экологические программы и проекты с целью повышения благосостояния граждан. В зависимости от ситуации государство регулирует инвестиционную деятельность, разрабатывая и осуществляя инвестиционную политику и инвестиционную стратегию.

**Ключевые слова:** политика, инвестиции, страны, Россия, экономика, кредитный рейтинг, оценка.

Investments play an essential role in the functioning of the economy. Changes in the quantitative ratios of investments have an impact on the volume of social production and employment, structural shifts in the economy, and the development of industries and sectors of the economy.

The purpose of state regulation of investment activity is to create a favorable investment climate in the country, both for internal and external investors - business entities [1, p. 254].

An effective investment policy ensures sustainable economic growth, timely modernization of industries and restructuring of the economy, development of innovation, which ultimately positively affects the competitiveness of economic entities.

Russia has a long history of investing in public infrastructure, with some of its most significant investments during the Soviet era. The Soviet government invested heavily in the country's infrastructure, building new highways, railways, and airports, and expanding access to electricity and other public services. After the collapse of the Soviet Union in 1991, the Russian government continued to invest in public infrastructure to stimulate economic growth and development [2, p. 93-96].

The regulation of investment activity is closely connected with the implementation of social policy. The influx of investments provides the economy with additional jobs, affects the level of employment of the population, contributes to the preservation and development of human resources, and solves issues of a healthy and safe living environment. [3, p. 59-72].

In the second half of 2020, there was a noticeable decrease in investment activity in terms of importing investment equipment, in the construction business.

In agriculture, some companies have sharply reduced investment costs by reducing the purchase of agricultural machinery. The volume of consumer imports has decreased, which also indicates problems with investment and consumption [4, p. 309-311].

In May 2020, the President of the Russian Federation signed Decree of the Russian Federation No. 204 "National goals and strategic objectives for the development of the Russian Federation for the period up to 2024", according to which public and private investments should be directed to solving problems related to demography; development of the health care system; education; Sciences; digital economy; culture; urban environment; improvement of the environment; creation of safe and high-quality roads; increasing labor productivity and supporting employment; support for small and medium-sized businesses, individual entrepreneurial initiatives; development of international cooperation and export.

So, practice has shown that a certain role in reducing investment activity was played by an increase in value added tax (VAT) and an increase in the retirement age (the latter shook confidence in a stable future, which is the most important factor for investment). The threat of imposing new sanctions did not add to the desire to invest. And the specialists of the Institute of Globalization Problems explain the decline in investment activity in 40 regions of the country and investment activity in 40 regions of the country with an artificially created lack of money [5, p. 57-65].



The rating of 25 countries of the ForeignDirectInvestmentConfidence Index-2019, compiled by the international agency AT Kearney, has been led by the United States since 2014. Germany moved up to second place from fourth, while China dropped to third. The top ten also included the UK, Canada, Japan, France, India, Australia and Singapore.

Bloomberg specialists also compile their rating of the most attractive developing countries for investment. In the 2020 rankings, Russia ranked only 15th, mainly due to relatively low performance in current account balances, asset valuation and sovereign credit ratings [6, p. 186-191].

The different conditions of the regions are also important, especially large-scale countries, which include Russia. 85 Russian subjects are extremely different from each other in terms of investment attractiveness.

In the Rating of investment activity of regions for the first half of 2021, formed by Invest-Foresight, the first three places out of 81 regions were taken by the Lipetsk Region, the Republic of Tatarstan, Altai Territory (802, 499, 431 points, respectively). In 81st place is the Republic of Tuva with 9 points. The Vladimir region in the rating took 40th place (133 points).

The sovereign credit rating of Russia from the "big three" international rating agencies is presented in Table 1.

Table 1 – Sovereign credit rating of Russia from the "big three" international rating agencies for 2022

<i>International rating agencies</i>	<i>Long-term credit rating of Russia for liabilities in foreign currency</i>	<i>Long-term national currency rating</i>	<i>Short-term rating with obligations in national currency</i>
Standard & Poor's	SD	SD	C
Moody's	Ca	Ca	Not prime
Fitch	C	C	C

March 31, 2022 Moody's Investors Service withdrew Russia's sovereign ratings. March 28, 2022 Fitch Ratings has withdrawn the sovereign ratings of the Russian Federation. The recall is due to the sanctions imposed by the European Union against the Russian Federation.

Russia has a debt to some international financial institutions, reflected in the information on the external debt of the Russian Federation, and it is important to consider not only its dynamics, but its share in external public debt (the ratio of the analyzed debt to the total external debt, expressed as a percentage). The analyzed indicators from 2019 to July 2021 are presented in Table 2.

Table 2 – Indicators of Russia's debt to international financial institutions in 2019-2021 [7, p. 27-36]

<i>Indicators</i>	<i>2019</i>	<i>2020</i>	<i>2021</i>	<i>Growth rate, %</i>
External public debt, million dollars	491327	467356	472250	-3,88
Debt to the International Bank for Reconstruction and Development, million dollars	330	249	218	-33,94
Share in external public debt, %	0,067	0,053	0,046	-33,34
Debt to other financial institutions, million dollars	66	42	38	-42,42
Share in external public debt, %	0,013	0,009	0,008	-38,46

The dynamics of debt to financial institutions shows that the volume of this type of debt is decreasing, and its share in the external public debt does not exceed 1 % and is also decreasing. The fact is that most of this debt (in particular, loans from the International Bank for Reconstruction and Development) are loans that were issued to the Russian Federation even before the analyzed period, and the last loan was issued in 2013.

In general, due to the current situation in the modern world, both the investment and credit rating of the Russian Federation is currently under threat, which suggests that at the moment it is quite difficult in the Russian Federation to predict further relations with its Western neighbors.

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## LEXICAL MEANS OF EMOTION NOMINATION IN FRENCH

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**Abstract.** This paper discusses features of emotional vocabulary in French. Classes of positive and negative emotional vocabulary are distinguished. Examples of phraseological expressions containing an emotion component are considered. In conclusion, the main conclusions about the specifics of emotional vocabulary in the French language are presented.

**Keywords:** French, linguistics, emotions, vocabulary, idioms.

## ЛЕКСИЧЕСКИЕ СРЕДСТВА НОМИНАЦИИ ЭМОЦИЙ ВО ФРАНЦУЗСКОМ ЯЗЫКЕ

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**Аннотация.** В данной статье рассматриваются особенности эмоциональной лексики во французском языке. Выделяются классы позитивной и негативной эмоциональной лексики. Рассмотрены примеры фразеологических выражений, содержащих эмоциональный компонент. В заключении представлены основные выводы о специфике эмоциональной лексики во французском языке.

**Ключевые слова:** французский язык, языкознание, эмоции, лексика, идиомы.

Expressive speech, whether verbal or para-verbal, oral or written, lies in the complexity of linguistic and extralinguistic elements that represent a microstructure of signs capable of penetrating into the different layers of communication to convey a message, discover the attitude of the transmitter, sympathize with the receiver and feel the emotions. In the expressive function of language, it is the emotions that come into play and accentuate the enunciation [1, p. 12].

Emotions serve to communicate and influence other people. Whether we want it or not, our emotions send signals to others, and these signals will directly affect the emotional state of other people.

Facial expressions, movements and posture are directly related to emotions. In human societies, as well as in the animal world, nonverbal expressions are often a much more powerful and faster means of communication than words. For example, a face expressing anger, with a clenched jaw and a gloomy look, very clearly shows that the limit of patience has been reached and that one should not go further. Another example: a sad face and tears in the eyes will cause a desire to comfort a person. The more emotion is associated with the need for communication, the more difficult it is to calm it down, to suppress it until we are heard. This becomes a real problem when the other person is unwilling, unable or not available to receive the message conveyed by emotions.

Emotions motivate behavior and prepare for action. Motivations for action are often closely related to specific emotions. For example, fear precedes flight, anger – attack, joy – the search for someone who will share happiness. Emotions also allow you to act faster in important situations. They allow you to act even before time is spent thinking about the details. The stronger the emotion, the harder it will be not to act. Sometimes we deliberately increase the intensity of emotion to force ourselves to act.

In V.I. Shakhovsky's research, the expression of emotions is interpreted as their “linguistic manifestation”, i. e. “direct communication of emotions themselves, not their designations” [2, p. 32]. According to the scientist, the designation of emotions in language is carried out with the help of such linguistic means as:

- 1) emotive interjections;
- 2) lexical designations (expressions) of emotions and feelings;
- 3) description of the external state in which emotions manifest themselves [3, p. 313].

From a purely linguistic point of view, the expressive phenomenon is realized not only through the interjection, but it is the set of linguistic facts that plays the decisive role. Although the main function of the language is the transmission of relevant information, this process cannot pass without experiencing feelings, emotions, desires, and therefore they cannot be ignored from linguistics. Ch. Bally, studying the social aspect of language, sought to define the character of emotional speech. By posing the problem, he tries to illustrate its causes: But this emotion, where did it come from? Any words or tricks that the language has provided? Or the more or less personal way in which the sentences were pronounced, significant gestures, expressive mimicry, words used in new meanings, in a word: the speaker's own language? Or, finally, of the pure and simple reality of which the word is the material translation, of the circumstances in which it was pronounced, of the situation? [4, p. 56]

It is interesting by what factors an emotion can be reflected in language “in such a simple form” [4, p. 13] While analyzing the multimodal factors of emotion, Ch. Bally prioritizes his psychological nature. Before getting to the heart of the matter, we would like to give an overview of the definitions of emotions proposed by J. Cosnier and distinguish their intercultural aspects. Plato considered emotions as confusion, the disorder of the mind, according to E. Kant it was a mental illness, J.-P. Sartre treated them as one of the forms of consciousness. The concept of emotion

implies the feelings that connect the body and the mind [5, p. 3]. These objectively motivated verbal concepts create a kind of interconnected network combining thoughts, memories, feelings, expressive reactions. His interdisciplinary study combines psychological, physiological, sociological and linguistic factors. Joy thus announces a need for sharing, anger – a need for change, sadness - a need for comfort and fear – a need for protection<sup>1</sup>. In general, they must be shared. The cultural aspect of emotions that differs from one language to another shows that they are shared in different ways, by taking the child in the hands we share joy or sadness, by shaking hands we express benevolence or condolence. This type of communication contains a multitude of semiotic traits and carries cultural characteristics.

As concepts of language, emotions form the semiotic systems and they have the functionally quite relevant characteristics. Emotional lyrics are multifunctional, each of them has its own life cycle. The cognitive component that is reflected in expressive communication reveals the vital values of the individual. Therefore, the semiotic aspects of emotions can be analyzed according to two axes: static and dynamic. The static aspect includes the basic knowledge of the individual, the socio-cultural elements, the dynamic aspect directly concerns the communication interaction, it is contextually motivated. On the linguistic level, the expression of emotions essentially has two components: the direct component and the indirect component, called implicit [6, p. 69]. When the emotion is expressed through a feeling, when it is explained and verbalized, it is the direct component and it does not contain metaphorical concepts. The direct way to express emotions is to verbalize emotions without their metaphorical reinterpretation:

*heureux/heureuse, content(e)* – happy;

*triste* – sad;

*énervé(e)* – irritated;

*fâché(e)/en colère* – angry;

*fatigué(e)* – tired;

*navré(e)* – sorry/distressed;

*épuisé(e)* – exhausted;

*inquiet/inquiète* – worried/anxious;

*ravi(e)* – delighted;

*furieux/furieuse* – furious;

*enthousiaste* – enthusiastic.

Во французской фразеологии находим следующие примеры:

*Être au comble de ses vœux/au comble de la joie* – “to be at the peak of your desires / at the peak of joy” – to be very happy;

*Heureux comme un poisson dans l’eau/un oiseau dans l’air* – “happy as a fish in the water or a bird in the sky” – to be happy;

*La vie me sourit* – “life smiles on me” – to experience the joy of good luck;

*Sourire jusqu’aux oreilles* – “smile to the ears” – to experience joy;

*Le cœur saute de joie* – “the heart is pounding with joy” – to experience intense joy;

*Pleurer de joie, des larmes de joie* – “to cry with happiness, tears of joy” – to feel very happy;

*Bondir / sauter de joie* – “jump with happiness” – feel very happy;

*Faire triste mine, morne figure* – “to make a sad, gloomy expression” – to be sad;

*Avoir un regard éteint* – “to have an extinct look” – to experience sadness, depression;

*Être rouge de honte* – “blush with shame” – to feel a sense of shame;

*S'emporter de colère* – “burst into anger” – to feel anger, rage.

If at first glance implicit signs define a particular emotion, then this refers to an indirect way of expression, an implied manifestation of emotion, which is primarily conditioned by context. This is a meaning that, without being formulated formally, naturally arises from associations. This includes the following phraseological units:

*Être au septième ciel* – “to be in the seventh heaven” – to feel great joy;

*Être aux anges* – “to be with angels” – to be very happy;

*Mettre du baume au cœur* – “to pour balm on the soul” – to feel peace, tranquility, happiness;

*Baigner dans l'allégresse* – “to bathe in pleasure” – to experience happiness;

*Avoir la mort dans l'âme* – “as if the soul is dying” – to experience deep grief;

*Être pâle comme la mort* – “to be pale as death” – to be sad, depressed;

*Faire les gros yeux* – “to look strictly, to cast angry, dissatisfied glances” – to experience a feeling of dissatisfaction;

*Se sentir pousser des ailes* – “to feel the wings grow behind your back” – to feel happiness, spiritual uplift;

*S'enflammer* – “ignite” – to experience rage, irritation;

*Se faire un sang d'encre pour* – “make yourself inkblood” – worry very much;

*Avoir une peur bleue de* – “to have a blue fear” is to be very afraid of something;

*Être malheureux comme les pierres* – “to be miserable as stones” means to be miserable, very unhappy.

When we talk about emotions, the color factor deserves priority attention, especially in French. The colors seem to color the utterance and convey feelings both positive and negative. The following examples can be distinguished:

*Être vert / pâle de déception* – turn green/pale with disappointment;

*Marquer qqc d'un caillou noir* – “mark something with a black stone” – consider something a symbol of failure;

*Voir rouge* – “to see everything in red” – to feel anger, irritation;

*Être la lanterne rouge* – “to be a red lantern” – to lose, to take the last place;

*Être le maillot jaune* – “be a yellow jersey” – win;

*Avoir le cafard* – “to have a cockroach” – to be depressed, to be in a bad mood;

*Devenir chèvre* – “turn into a kid” – get angry, nervous, freaking out;

*Avoir la patate* – “to have potato stocks” means to be in a great mood.

It should be noted the general meaning of the color, from which the content of expressions belonging to this section comes, Black symbolizes sadness and melancholy, red – shame, anger, prohibition, white – innocence and fear, pink – hope and fun, blue – anger, melancholy. For a certain number of expressions, the boundary between emotions is not fixed and can correspond to several feelings at the same

time. We refer these combinations to the following patterns, which are determined by the nouns included in them:

*Être rouge de: colère, confusion, honte;*

*Être bleu de colère, peur, froid.*

Let us present the primary classification of emotion nominees based on the material of the French language in the form of a classification in which nominees are systematized according to lexico-grammatical classes of words and the specifics of the evaluative component of meaning.

*1. Nominees of positive emotions.*

*A. Nouns:*

- emotion “amour”: tendresse, admiration, adoration, affection, folie;
- emotion “espoir”: aspiration, assurance, attente, conviction, espérance, projet;
- emotion “joie”: agrément, aise, allégresse, amusement, ardeur, fierté;
- emotion “courage”: ardeur, assurance, audace, énergie;
- emotion “bonheur”: agrément, allégresse, bienfait, gaieté, satisfaction;

*B. Verbs and verb combinations:*

- emotion “amour”: aimer, adorer, raffoler, s'attacher, chérir, vénérer;
- emotion “espoir”: espérer, souhaiter, croire, attendre, promesse;
- emotion “joie”: rire, sourire;
- emotion “courage”: être courageux;
- emotion “bonheur”: être heureux;

*C. Adjectives, participles:*

- emotion “amour”: amateur, affectionné, affectueux, aimable, dévoué, aimant;
- emotion “espoir”: confiant, optimiste, assuré, causant, courageux;
- emotion “joie”: agréable, allègre, amusant, charmant, enjoué, radieux;
- emotion “courage”: acharné, ardent, audacieux, énergique, résolu;
- emotion “bonheur”: à l'aise, agréable, aisé, avantageux, enchanté, joyeux.

*D. Adverbs:*

- emotion “amour”: follement, passionnément;
- emotion “joie”: joyeusement;
- emotion “courage”: courageusement, hardiment;
- emotion “bonheur”: avantageusement, favorablement, harmonieusement, prospérement.

*2. Nominees of negative emotions.*

*A. Nouns:*

- emotion “haine”: abomination, aigreur, colère, cruauté, dégoût, détestation;
- emotion “désespoir”: angoisse, chagrin, dégoût, douleur, ennui, regret, souffrance;
- emotion “tristesse”: tristesse, chagrin, découragement, désespoir, malheur, mélancolie;
- emotion “peur”: affolement, angoisse, anxiété, crainte, effroi, horreur, inquiétude;



– emotion “malheur”: adversité, affliction, chagrin, désagrément, détresse, douleur.

B. *Verbs and verb combinations:*

– emotion “haine”: abhorrer, abominer, exécuter, haïr, honnir, jurer, maudire, répugner;

– emotion “désespoir”: abattre, accabler, chagriner, contrarier, décevoir, décourager;

– emotion “tristesse”: déplorer, attrister, regretter, pleurer, larmoyer, sangloter, gémir;

– emotion “peur”: effrayer, horrifier, frissonner, pétrifier, figer, tressaillir, frémir, craindre, avoir peur;

C. *Adjectives, participles:*

– emotion “haine”: haineux, rancunier;

– emotion “désespoir”: désolé, affligé, chagrin, confus, désert, triste;

– emotion “tristesse”: abouti, découragé, malheureux, chagriné, éploré, tourmenté, désespéré;

– emotion “peur”: affolé, angoissé, craintif, dégonflé, foireux, froussard, inquiet, lâche;

– emotion “malheur”: accablé, affligé, affligeant, besogneux, déplorable, désespéré, indigent;

D. *Adverbs:*

– emotion “désespoir”: désespérément, follement;

– emotion “tristesse”: cruellement, lugubrement, misérablement, regrettablement;

– emotion “peur”: couardement, craintivement;

– emotion “malheur”: malheureusement, malencontreusement, regrettablement, seulement.

The group of positive emotions included love, hope, joy, courage and happiness. The group of negative emotions is represented by such concepts as hatred, despair, sadness, fear, unhappiness. Analysis of the classification shows that the largest number of emotion nominees refers to substantive and adjectival emotive vocabulary. Adverbial emotive vocabulary is represented by the smallest number of lexical units.

The largest number of substantive and adjectival emotion nominees are formed by the synonymous groups “amour”, “joie”.

The above systematization also reflects the paradigmatic relations between the selected lexical units of the French language: synonymy and antonymy, which indicate a variety of means of direct rational nomination of emotions.

In conclusion, the means of expressing emotions belong to the paralinguistic and linguistic dimensions. Their lexical field is divided into two subgroups: positive/pleasant and negative/unpleasant feelings. According to the psychological concept, emotions are positive when we can cope with them, negative when we lose control over them. The essential signs of their linguistic manifestation are a special vocabulary, which often makes up the phraseological foundation of the language.

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## THE YIELD CURVE OF BONDS AS AN INDICATOR OF ECONOMIC WEALTH

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**Abstract.** It is known that various indicators are used to analyze the economic situation, such as GDP, unemployment rate, happiness index and many others. One such indicator is the bond yield curve. This article reveals the essence of this indicator, presents the main classification, and also analyzes the current yield curve of federal loan bonds for the period March-April 2023, and formulates some conclusions.

**Keywords:** yield curve, bonds, economic condition, FLB, macroeconomics, interest rates, economic indicators, stock market.

## КРИВАЯ ДОХОДНОСТИ ОБЛИГАЦИЙ КАК ПОКАЗАТЕЛЬ ЭКОНОМИЧЕСКОГО БЛАГОСОСТОЯНИЯ

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**Аннотация.** Для анализа экономической ситуации применяют различные индикаторы, такие как ВВП, уровень безработицы, индекс счастья и многие другие. Одним из таких индикаторов является кривая доходности облигаций. В статье раскрыта сущность данного показателя, представлена основная классификация, а также проведен анализ текущей кривой доходности облигаций федерального займа на период март-апрель 2023 года, сформулирован ряд выводов.

**Ключевые слова:** кривая доходности, облигации, экономическое состояние, ОФЗ, макроэкономика, процентные ставки, экономические показатели, фондовый рынок.

Most individual investors trading on the stock exchange focus their attention on one segment: stocks. However, another segment of the market, the bond market, significantly exceeds the stock market in terms of volume, and is also considered more stable and less susceptible to emotional influences, which is why the bond

market is better amenable to mathematical modeling and some indicators based on mathematical models have much greater analytical and predictive value, thereby allowing you to identify the current state economy and predict its further development. One of these indicators is the bond yield curve.

Of course, in the current realities, it is necessary to correctly approach the analysis of the economic situation of the state, in particular, using indicators that are able to display current economic trends, which allows interested actors to respond promptly to changes in the economy and take measures before the onset of negative consequences. For this reason, the topic of this article is certainly relevant at the moment.

The purpose of our research is to provide a description of such an indicator as the bond yield curve, to show its analytical and predictive value, as well as to analyze the current yield curve for federal loan bonds of the Russian Federation.

The objectives of our research are to characterize the concept of the bond yield curve, to present the classification of this indicator, to describe the interaction of the yield curve with the economic state of the state, to analyze and evaluate the economic situation of the Russian Federation for April 2023 using the example of the current yield curve for FLB (Federal Loan Bonds).

Many well-known economists, such as E. O. Svensson, Richard Nelson, S. Drobyshevsky and many others, have been studying bond yield curves.

Before proceeding to the consideration of bond yield curves, it is necessary to understand what they are and how they are related to the economy.

Bonds are debt securities that allow investors to lend money to borrowers, usually governments or corporations, with the promise of receiving interest and principal in return. Bonds are an important tool for analyzing the economy, as they can give an idea of the financial condition of the government and corporations, inflation expectations and interest rate trends.

One of the ways to use bonds in economic analysis is to use the yield curve. The yield curve is a graphical representation of the relationship between bond yields and their maturities.

Another use of bonds in economic analysis is to assess market sentiment relative to inflation expectations. When investors believe that inflation will rise, they often demand higher yields on bonds, especially long-term ones, to compensate for the loss of purchasing power that may occur over time. If bond yields rise sharply due to inflation concerns, this could have implications for monetary policy decisions, as central banks may raise interest rates to combat inflation.

Bonds can also provide insight into the financial health of governments and corporations. For example, credit rating agencies evaluate the creditworthiness of bond issuers based on factors such as cash flow, leverage ratios and overall financial stability. By analyzing bond issuance trends and credit rating changes, investors can get an idea of the economic and financial risks faced by various companies and government agencies.

Finally, bonds can help to get an idea of global economic trends. For example, US Treasury bonds, which are among the most liquid and widely traded bonds in the world, are often viewed as a safe haven asset in times of market turmoil. On the contrary, emerging market bonds can provide higher yields, but are often associated with increased risks, including currency fluctuations and political instability.

Bond yield curves are an important component of the bond market and can provide valuable information about future economic conditions. At its core, bond yield curves are a graphical representation of the relationship between bond yields and their respective maturities [1, p. 5].

A typical bond yield curve has an upward slope from left to right, with short-term bonds typically having lower yields than long-term bonds. This phenomenon is called the "normal" slope of the yield curve, and it is largely related to the time value of money. In other words, investors demand higher compensation for keeping their money for a long period of time.

There are three main types of bond yield curves: normal, inverted and flat. The normal yield curve is the most common type and has an upward slope from left to right. This means that bonds with a short maturity have lower yields than bonds with a longer maturity. The normal yield curve reflects the idea that investors tend to demand higher returns in order to hold their money for longer periods of time.

An inverted bond yield curve is a phenomenon that occurs when long-term interest rates on government bonds fall below short-term interest rates. This is an unusual phenomenon because, as a rule, long-term rates are higher than short-term ones in order to compensate investors for the risk associated with holding bonds for a longer period of time. When the yield curve is inverted, it can be an indicator of an economic downturn or a slowdown in growth.

An inverted yield curve can occur for several reasons. One reason is that investors may believe that the short-term prospects of the economy are good, which leads them to demand higher interest rates on short-term bonds. However, they may also believe that the long-term outlook is unfavorable, which forces them to accept lower interest rates on long-term bonds. This can lead to an inversion of the yield curve.

Inverted yield curves have been reliable predictors of past economic downturns, with a recession often occurring within 12-18 months after the inversion. This is due to the fact that inversion usually signals a decrease in investor confidence and expectations about future economic growth.

However, it is important to note that an inverted yield curve is not an ideal indicator of a recession. In some cases, an inversion may not lead to a recession, or a recession may occur without an inversion. In addition, there may be other factors that may affect the direction and timing of economic cycles.

A flat yield curve occurs when the yield of bonds with different maturities is low [2, p. 5]. In other words, the yields of short-term and long-term bonds are about the same. A flat yield curve can occur when the market is uncertain about future economic conditions or interest rates. A flat yield curve can also occur when there is

a period of stability in the market and serious economic changes are not expected in the near future [3, p. 5].

In addition to these three main types of bond yield curves, there are also variations such as the humpback yield curve [4, p. 5]. This curve has a slight upward slope at the beginning, followed by a downward slope, and then another upward slope. A crooked yield curve usually indicates that the market is not sure about future economic conditions or interest rates [5, p. 5].

As part of our research, the analysis of the current yield curve on bonds issued by the Ministry of Finance of the Russian Federation was carried out. The coupon-free yield curve of these bonds is shown in Figure.



Figure. Coupon-free yield curve of government bonds of the Russian Federation

As you can see on the chart, the yield curve as of 03/31/2023 is in the standard configuration. As the maturity of the bond increases, its yield also increases. Based on this, we can conclude that investors do not consider the likelihood of a potential recession or recession in the Russian economy, which is why the curve is in a normal position. Let's take a closer look. As you can see, bonds with a maturity of up to 1 year have approximately equal yields, this confirms the judgment that investors do not expect serious changes in the economy in the near future and evaluate the state's PREP positively.

Further, interest rates begin to gradually rise, reaching a peak in thirty-year bonds. This phenomenon is quite natural, since with an increase in maturity, uncertainty increases and investors demand high interest rates in order to hold their assets in these securities. This

In conclusion, it should be noted that bonds play a significant role in the country's economy, and it is necessary to pay attention to the indicators obtained with

the help of bonds. Bond yields provide valuable information about market expectations regarding future economic conditions and interest rate dynamics.

By analyzing various indicators of bonds, such as yield curves, investors can make informed decisions about where to direct their investments. In addition, bonds are an important tool that governments can use to raise capital to finance projects, and they also provide investors with a relatively stable source of income.

In general, monitoring the bond market is crucial for anyone who wants to understand the state of the economy and make informed investment decisions that meet their financial goals.

In the course of the study, a description of such an indicator as the bond yield curve was presented, its analytical and predictive value was disclosed, as well as an analysis of the current yield curve for federal loan bonds of the Russian Federation was carried out, some conclusions were formulated.

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## COMPARISON OF DIFFERENT TYPES OF OIL PUMPS

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**Abstract.** The paper examines and compares the types of pumps for pumping oil, the pros and cons of each type of pump presented.

**Keywords:** pump, oil, efficiency, design, costs, durability, wear and tear.

## СРАВНЕНИЕ РАЗНЫХ ТИПОВ НАСОСОВ ДЛЯ ПЕРЕКАЧКИ НЕФТИ

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**Аннотация.** В статье рассматриваются и сравниваются типы насосов для откачки нефти, приводятся плюсы и минусы каждого представленного вида насоса.

**Ключевые слова:** насос, нефть, эффективность, конструкция, затраты, долговечность, износ.

Oil pumping is a crucial process in the oil and gas industry, and it requires different types of pumps to efficiently move the oil from the ground to storage tanks or refineries. There are various types of pumps used for oil pumping, each designed for specific needs and conditions. In this article, we will discuss some of the different pumps used for pumping oil.

### 1. Centrifugal pumps.

Centrifugal pumps are one of the most common types of pumps used for oil pumping. These pumps use a rotating impeller to create a vacuum that draws the oil into the pump and then pushes it out through the discharge port. They are ideal for low viscosity fluids such as crude oil and are commonly used for offshore oil pumping where the oil is stored in large tanks.

A centrifugal pump comprises several components, including the impeller, volute, and casing. The impeller, which is the primary operating component, rotates inside the casing, creating a low-pressure zone that draws fluid from the inlet. The fluid then travels through the impeller's vanes, increasing in velocity, resulting in high-pressure discharge from the output pipe.



#### Advantages:

1. Centrifugal pumps can handle higher volumetric flow rates than other types of pumps.
2. Centrifugal pumps have fewer moving parts requiring maintenance, making them simpler and more reliable than other types of pumps.
3. Centrifugal pumps are more affordable than other types of pumps.
4. They have a simple design, making them relatively easy to install and operate.

#### Disadvantages:

1. Not always work correctly at high pressures.
2. Potential for air infiltration, which can lead to failure.

#### 2. Positive displacement pumps.

Positive displacement pumps are another commonly used type of oil pump that is ideal for pumping heavy and viscous oil. Instead of using centrifugal force to move fluid, the displacement pump works by changing pressure and volume to pump fluid from one point to another.

In a positive displacement pump, the fluid is moved by trapping a fixed amount of it and forcing it through the pump's discharge outlet. The mechanism for doing this can be either reciprocating or rotary. In a reciprocating positive displacement pump, a plunger, piston or diaphragm moves back and forth in a cylinder, trapping and expelling fluid from one side to the other. A rotary positive displacement pump, on the other hand, utilizes gears, lobes, screws, or vanes to trap and transfer the fluid through the pump. The mechanism then expands or contracts to allow fluid to be entrapped in between the parts of the pump and force it towards the output.

#### Advantages:

1. Displacement pumps are energy efficient and have low energy requirements.
2. One of the main advantages of these pumps is that they provide a constant flow rate, regardless of pressure.
3. Volumetric pumps have minimal risk of cavitation, which can damage the pump and reduce efficiency.
4. High efficiency

#### Disadvantages:

1. Positive displacement pumps operate at a relatively low speed compared to other types of pumps.
2. Positive displacement pumps have a limited pressure range and cannot handle high-pressure fluids as efficiently as other types of pumps.
3. When pumping high-viscosity fluids, such as crude oil, positive displacement pumps can overheat, which can damage the pump and ultimately lead to reduced efficiency or system failure.
4. Positive displacement pumps have a complex design that requires qualified personnel for repair and maintenance.

#### 3. Rotary pumps.

Rotary pumps are used for pumping heavy crude oil. They use a rotating screw or lobe-shaped impeller to move oil through the pump, and they work well in high-pressure applications. Rotary pumps are typically used in oil refineries where high volumes of oil need to be moved through the pump. The rotation of these parts creates a vacuum effect that draws fluid into the inlet port. As these parts rotate, they create a vacuum effect, which pulls the fluid into the inlet port. When these parts rotate in the other direction, they force the fluid out of the outlet port. Rotary pumps are typically used in oil refineries where high volumes of oil need to be moved through the pump.

Advantages:

1. These pumps are designed to withstand harsh operating conditions, including abrasive materials, high temperatures and aggressive media.
2. Rotary pumps have high volumetric efficiency and can pump liquids at a constant flow rate.
3. These pumps have few moving parts and are relatively easy to maintain, reducing operating costs.

Disadvantages:

1. Increased risk of leakage due to component design. This can lead to fluid or environmental contamination and system failure.
2. Rotary pumps are susceptible to cavitation when used in high flow systems. This can cause damage to internal pump components and lead to reduced efficiency levels.
3. Due to the design of the rotary pump its components wear out quickly. It is important to service the pump regularly and replace components to prevent mechanical failure and reduced efficiency.

4. Diaphragm pumps.

Diaphragm pumps are a type of positive displacement pump that moves fluids through the use of a flexible diaphragm. These pumps are popular in various industries due to their self-priming capabilities, versatility, and ability to handle abrasive, viscous, and corrosive fluids [1, 2].

Diaphragm pumps operate through the use of an oscillating diaphragm, which moves back and forth to create a vacuum at the inlet valve. The diaphragm draws the fluid into the pump chamber and then pushes it out through the outlet valve. The movement of the diaphragm is aided by compressed air or other energy sources, which can vary depending on the design of the pump. The transfer of fluid is thus achieved through the movement of the diaphragm side-to-side.

Advantages:

1. Diaphragm pumps can suck fluid through their inlet valve, making them ideal for applications requiring self-priming capability.
2. They have a stable flow rate, so that shear-sensitive fluids can be pumped without damage.
3. These pumps are affordable and, due to their simple design, require minimal maintenance.

4. Diaphragm pumps are highly durable and can last for years with minimal maintenance. They are resistant to wear and tear, making them ideal for use in harsh environments.

Disadvantages:

1. Although diaphragm pumps are easy to maintain and repair, they require frequent maintenance to ensure they operate at maximum efficiency. This may include regular replacement of parts such as diaphragms, valves and gaskets.
2. Diaphragm pumps may have a shorter life than other types of pumps, depending on the frequency and intensity of use. The diaphragm is the most critical component of the pump and can wear out quickly due to constant movement and exposure to fluids
3. Diaphragm pumps have a limited displacement capacity which makes them less suitable for high pressure applications. They are not suitable for pumping liquids over long distances, as this can result in inefficient transfer of liquids.
4. Have a limited flow rate compared to other types of pumps.
5. Electric submersible pumps.

Electric submersible pumps (ESPs) are a critical part of the oil and gas industry, used to extract oil from deep wells. These pumps are also used in other industries such as agriculture, mining, and construction, among others, where water needs to be drained or circulated. ESPs are among the most efficient types of pumps and work by sending an electrical current down a power cable to drive the motor, which rotates the impeller and moves the fluid up to the surface [3].

ESPs typically consist of three basic components: the motor, which converts electrical energy to mechanical energy that drives the impeller; the centrifugal impeller that forces the fluid to flow through the pump; and the intake screen, which filters larger particles of debris in the fluid. The motor and impeller are placed in a single housing, and the entire unit is lowered into a wellbore, with the motor being powered through a downhole transformer and controlled at the surface.

Advantages:

1. Have high efficiency, which makes them a popular choice for oil and gas production because they provide high flow rates at low operating costs.
2. ESPs are designed for continuous operation without the need for frequent maintenance, which ensures their long-term serviceability.
3. They do not emit harmful gases into the environment, making them ideal for use in environmentally sensitive areas.

Disadvantages:

1. ESPs can be affected by weather conditions causing power outages or sudden temperature changes that affect the motor, which can cause the system to fail.
2. One of the main disadvantages of electric submersible pumps is their high-power requirement.
3. Are limited in their ability to submerge to depth due to the distance and pressure requirements of their power cables.

In conclusion, the oil and gas industry require different types of pumps to efficiently move oil from the ground to storage tanks or refineries. Each type of oil pump is designed to suit specific needs and conditions, depending on the oil's viscosity, pumping temperature, and pressure. By understanding the different types of oil pumps available, oil companies can choose the right type of pump for their specific needs, allowing them to maximize production and minimize maintenance costs.

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## LINUX ARCHITECTURE

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**Abstract.** The article discusses Linux operating systems and their parts. The positive qualities of this OS are presented, as well as the reasons for its popularity. The architectural components of the Linux OS are considered, examples of the most frequently used ones are presented.

**Keywords:** Linux kernel, Linux history, operating systems, command shell, file system, desktop environment, Linux cli.

## АРХИТЕКТУРА LINUX

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**Аннотация.** В статье рассматриваются операционные системы Linux и их части. Представлены положительные качества данной ОС, а также причины ее популярности. Рассмотрены архитектурные компоненты ОС Linux, приведены примеры наиболее часто используемых из них.

**Ключевые слова:** ядро Linux, история Linux, операционная система, командная оболочка, файловая система, среда рабочего стола, Linux cli.

Operating systems (OS) of the Linux family are among the oldest at the moment, however, despite the age, this family of operating systems only continues to gain popularity. Linux OS runs on almost all platforms, from mobile devices to supercomputers [1, 2].

Linux, created by a small group of enthusiasts in the early 90s, has been a major family of systems for supercomputers and servers since the early 2000s.

Although most personal computers (PC) are still running the Windows family of operating systems, Linux is far ahead in the overall mass of computers on the planet, with almost every smartphone, server, supercomputer, smart TV and even cars running Linux-based systems [2].

As of April 2011, the Linux kernel-based operating system family is the fourth most popular in the world among World Wide Web customers (including mobile

phones). According to various data, their popularity ranges from 1.5 to 5 %. In the web server market, the share of Linux is about 32 % (64.1 % is given as the Unix share). Linux is used in all the Top500 supercomputers of the planet [1, 3].

Since mid-2010, Linux systems have been leading in the server markets (60 %), predominating in the data centers of enterprises and organizations (according to the Linux Foundation), occupy half of the embedded market, have a significant share in the netbook market (32 % for 2009). In the personal computer market, Linux stably occupies the 3rd place (according to various data, from 1 to 5 %). According to a study by Goldman Sachs, the market share of Linux among electronic devices as a whole is about 42 % [4, 5].

The main reason for the popularity of Linux is its openness. The Linux kernel is publicly available, it can be used for commercial purposes for free, create your own solutions based on it, and most modern OS based on the Linux kernel are free for users and have open source code [1].

Linux operating systems have been supported for a very long time. At each stage of its development, the system solved the tasks assigned to it and continues to do so today. Despite the existence of serious competitors, Linux confidently occupies a leading position in the server industry [4].

Linux is capable of running on diverse processor architectures, encompassing x86, x86-64, PowerPC, ARM, RISC-V, Alpha AXP, SPARC, Motorola 680x0, SuperH, IBM System/390, MIPS, PA-RISC, AXIS CRIS, Renesas M32R, Atmel AVR32, Renesas H8/300, NEC V850, Tensilica Xtensa, as well as the proprietary "Elbrus OS" among numerous others.

Unlike proprietary operating systems, such as Windows or macOS, the development of Linux is not centralized within a particular geographic location. This system is not owned by any particular organization. The development of Linux is attributed to an extensive array of projects. A number of these endeavors exhibit a centralized structure while others are localized within firms. Numerous initiatives bring together skilled individuals, commonly known as hackers, from a diverse range of geographical locations who solely interact through written communication. It is plausible for individuals to initiate their own project or partake in an extant one. If proven to be efficacious, the outcomes of the endeavor shall be disseminated to an extensive global user-base. Individuals participate in the assessment of costless computer programs and establish direct communication channels with developers. Such an approach permits prompt identification and resolution of glitches while facilitating the implementation of fresh features [4].

On the other hand, open source significantly reduces the cost of developing closed systems for Linux and reduces the price of the solution for the user, as a result, Linux has become a platform often recommended for products such as Oracle Database, DB2, Informix, Adaptive Server Enterprise, SAP R/3, Domino

The Linux operating system follows the modular design principles, standards, and conventions that were established by Unix in the 1970s and 1980s. A system of this nature employs a monolithic kernel that oversees the requisite components of process management, network functionalities, peripheral operations, and file system accessibility. The integration of device drivers into the kernel or the ability to add

them as modules loaded during system operation are two common approaches utilized in computing systems.

Various programs, which interact with the kernel, offer system functions that operate at a higher level. As an instance, the GNU user components constitute a pivotal component within the majority of Linux systems, encompassing prevalent implementations of the C language library, widely used operating system shells, and numerous Unix tools that execute fundamental tasks of the operating system. As part of a family of UNIX-like systems, Linux-based systems follow standards and include several parts:

- Linux kernel;
- Daemons;
- File system;
- Command shell;
- Command shell utilities;
- Display server;
- Desktop environment (for non-CLI distributions).

The kernel is a single block of binary code, with support for loadable modules. The Linux kernel is monolithic. This means that it is self-sufficient and performs all low-level tasks. The kernel code can be divided into blocks. Part of the code is responsible for communicating with the hardware, the other for virtualization, and so on. The higher the level, the more system calls are available to programs. The kernel works with all computer components: processor, RAM, network, input/output devices. Unlike other monolithic kernels, in the Linux kernel, drivers are easily assembled into modules and loaded or unloaded as needed. All kernel and data structure codes, including device drivers, resource allocation and virtual memory codes, network support, and the file system, are stored in a single address space. The Linux kernel incorporates critical structural elements that hold significant significance. The core is partitioned into multiple subsystems at varying elevations or depths. The integration of fundamental services into the kernel of Linux allows for its consideration as a cohesive unit. The architectural approach under consideration, as contrasted with the microkernel framework, exhibits distinct characteristics by furnishing fundamental services such as communication, I/O operations, memory handling, and process administration. "The microkernel layer is enhanced with additional specialized services." The inherent benefits of individual kernels are not expounded upon within this discourse. Gradually, the Linux kernel demonstrates an enhanced efficacy and unprecedented stability in relation to memory usage and CPU utilization. The noteworthy attribute of Linux, despite its extensive magnitude and intricacy, pertains to its proficiency in attaining commendable portability. Linux has been compiled to be compatible with a diverse range of processing units and platforms possessing unique architectural limitations and requirements. Several kernel variants can be supported within the same distribution, for example:

- Mainline ("main");
- LTS (with extended support);
- RT (patched to support real-time execution);
- With various patches to improve performance or security (zen, hardened etc);

– Libre (a kernel cleaned from proprietary blobs, which is expected to support little hardware) [3].

On Unix systems, the term "daemon" is often used as a synonym for the term "background process". In other words, it is a process that has been disconnected from any shell and continues to work outside the GUI. The real daemon must also designate itself as a child process of a special init process, which has a special process ID with the number 1. Most often, these are programs that run in the background, monitor, and maintain some subsystems to ensure the operation of the entire system. Daemons perform their actions on a schedule or depending on some events, each of them monitors only its allotted small part of the operating system. Daemons are not under the direct control of the user, so they are virtually invisible, but necessary. Usually, the names of daemon processes end with the letter d. The most common daemons are crond, httpd, sshd. Cron (crond) is a daemon that executes other programs on a schedule. Most Unix systems configure it to run automatically at startup. It wakes up once a minute, checks the configuration files and executes all the commands set to run during that minute. Web servers, such as Apache's httpd, often work as daemons. The Apache daemon handles incoming requests by creating a pool of child processes to distribute the load. You can use a helper program like apachectl to control the httpd daemon itself more easily. Finally, sshd is another common example of a daemon, this time one that handles SSH connections. Again, it usually starts at boot and runs indefinitely, relying on signals to perform certain operations. For example, the SIGHUP signal causes sshd to re-execute itself, while reloading its configuration file. In Linux, it is customary to call daemons that way [5].

The file system (FS) in Linux is a component designed to store and exchange information placed on various media. The FS driver organizes the interaction between the storage, the operating system, and the application software. The correct choice of a file system for specific user tasks affects the speed of data processing, distribution principles and other functionality necessary for the stable operation of any computer systems. File systems run continuously in the background and are barely visible in everyday use. The Linux file system represents a built-in layer of the OS that controls how data is stored and retrieved, it manages the file name, its size, date of creation and other information. File systems in Linux are used not only to work with files on disk, but also to store data in RAM or access the kernel configuration while the system is running. The main file systems on Linux are ext4, XFS, and BTRFS [6].

The command shell, or command line interface (CLI) is a text interface for communicating with the operating system. CLI organizes the environment for running other programs. The command shell has its own built-in commands, operators, syntax expressions, but its main task remains to run other programs. It is Shell that searches for programs in directories, manages the change of the current directory and environment variables. Shell's main task is to interpret user commands. All command shells support running scripts – text files with sequentially recorded commands. The main command shells in Linux are Bash and Zhs [5].

Command shell utilities in Linux are divided into several types:



- Commands for file management (ls, cd, pwd, mkdir, mv, rm);
- Commands for working with text (more/less, grep, sort, wc, diff);
- Commands for process control (kill, ps, top, time);
- User environment commands (su, sudo, date, uptime, sleep);
- Linux commands for user management (useradd, passwd);
- Linux commands for network management (ip, ping, nethogs, traceroute).

A display server is a program whose main task is to coordinate data input and output from clients to the rest of the operating system, hardware, and each other. The display server interacts with its clients using the display server protocol. The display server is a key component of any graphical user interface, in particular a window system. It is the main component of the graphical user interface (GUI), which is located between the GUI and the kernel. Thus, thanks to the display server, you can use your computer with a graphical user interface. Without it, you would be limited to the command line interface only. It is very important not to confuse the display server with the desktop environment. The desktop environment uses a display server. The display server communicates with its clients via the display server protocol. There are two main display servers on Linux: Xorg and Wayland. The Xorg server interacts with client applications via the X11 protocol to draw objects on the display and send input events such as mouse movements, clicks and keystrokes. Usually an X server is started, which is waiting for client applications to connect to it. Xorg is based on a client/server model and therefore allows clients to work both locally and remotely on another machine. In Wayland, compositor is a display server. Compositor is a window manager that provides applications with an off-screen buffer for each window. The window manager combines the window buffers into an image representing the screen and writes the result to the display memory. The Wayland protocol allows the composer to send input events directly to clients, and the client to send a damage event directly to the composer [2].

The desktop environment defines the appearance of the OS and the visual means for interacting with the user. The desktop environment does not affect the technical capabilities of the OS, only gives it the ability to graphically display, and also helps the user in everyday tasks. The most popular desktop environments are: GNOME, KDE Plasma, XFCE, Cinnamon. KDE is one of the oldest graphical environments for Linux, and at the same time one of the easiest both to master and in terms of resources spent. At the same time, KDE Desktop has good functionality, and for fans of combining devices, it has the KDE Connect function. Gnome is one of the most popular desktop environments - about a third of all Linux users in the world use the Gnome desktop as their primary one. With regard to GNOME, we can say that it is not intended for weak PCs, because it consumes a lot of computer resources. Cinnamon, based on GNOME 3, is becoming a very good help for beginners in Linux. But not only for beginners – experienced users will also be able to appreciate Cinnamon for its speed and undemanding computer resources. XFCE is one of the lightest shells for the OC Linux family, which does not require special user knowledge. It does not require a powerful PC – an operating system with such a graphical environment can be run on an ancient computer. It does not carry

unnecessary software – everything is strictly functional and simple; nothing can be added here [1].

In conclusion, it is worth saying that Linux OSS are popular currently. These systems have high fault tolerance, stability, security, and modularity. Linux is the main OS family for corporate use and proprietary tasks.

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## STOCK MARKET AS AN INDICATOR OF THE ECONOMIC WELFARE OF THE STATE

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**Abstract.** The stock market is an important component of the economy of almost any state. This article presents the relationship between the stock market and the state economy, describes the main mechanisms of the stock market's influence on the economy, considers positive and negative aspects, and also provides an analysis of the relationship between the capitalization of the Russian stock market and Russia's GDP for the period from 2000 to 2022, some conclusions are formulated.

**Keywords:** stock market, state economy, economic welfare, russian stock market, GDP, stock index, economic forecasting.

## ФОНДОВЫЙ РЫНОК КАК ПОКАЗАТЕЛЬ ЭКОНОМИЧЕСКОГО БЛАГОСОСТОЯНИЯ ГОСУДАРСТВА

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**Аннотация.** Фондовый рынок является важной составляющей экономики практически любого государства. В данной статье представлена взаимосвязь фондового рынка и экономики государства, описаны основные механизмы влияния фондового рынка на экономику, рассмотрены положительные и негативные аспекты, а также выполнен анализ взаимосвязи между капитализацией российского фондового рынка и ВВП России за период с 2000 по 2022 год, сформулирован ряд выводов.

**Ключевые слова:** фондовый рынок, экономика государства, экономическое благосостояние, российский фондовый рынок, ВВП, фондовый индекс, экономическое прогнозирование.

It's no secret that the stock market is an important component of the economy of almost any country. In developed countries, the stock index can easily accurately determine the current state of the economy, as well as the phase of the economic cycle, which makes it possible to evaluate and make economic forecasts much faster.

This allows State leaders to take the necessary measures in advance, thereby reducing the consequences of economic crises and production downturns.

In today's rapidly developing world, it is necessary to take measures as quickly as possible, since changes are taking place in the global economy every moment. Traditional methods of assessing the state of the economy are gradually giving way to more innovative ones – the analysis of the impact of the stock market on the economy is no exception. For this reason, the topic of this article is certainly very relevant.

The purpose of our research is to reveal the relationship between the stock market and the economic well-being of the country, to describe the main mechanisms of the stock market's influence on the economy, as well as to present an analysis of the relationship between the capitalization of the Russian stock market and nominal GDP (Gross National Product) of Russia.

The objectives of our research are to characterize the relationship between the stock market and the economy of the state, to consider the main areas of interaction, to present the positive and negative factors of the stock market's influence on the economy of the state, to analyze the relationship between the capitalization of the Russian stock market and the nominal GDP of the Russian Federation and to assess further prospects for the interaction of these indicators.

Many well-known economists, such as Charles Henry Dow, Luther Lee Blake, John Maynard Keynes, Irving Fisher and many others, have studied the relationship between stock markets and the economic well-being of the country.

The stock market and the economy of the state are, of course, inextricably linked. Consider the relationship between the stock market and the state economy, including how they affect each other and what factors affect their relationship.

The stock market and the state economy. The stock market is usually considered a barometer of the efficiency of the economy as a whole. When the economy is doing well, businesses tend to make more profits, which leads to higher stock prices. Conversely, when the economy is struggling, companies may struggle to make a profit, which leads to lower stock prices.

Therefore, investors tend to look at the state of the economy when deciding where to invest their money. If the economy is strong, with low unemployment and high consumer confidence, investors are more likely to invest in stocks [1, p. 5]. Thus, the stock market can be an indicator of economic growth or recession.

Figure 1 shows the dynamics of the SNP 500 index over the entire period of its existence.

## S&P 500 Index Historical Chart

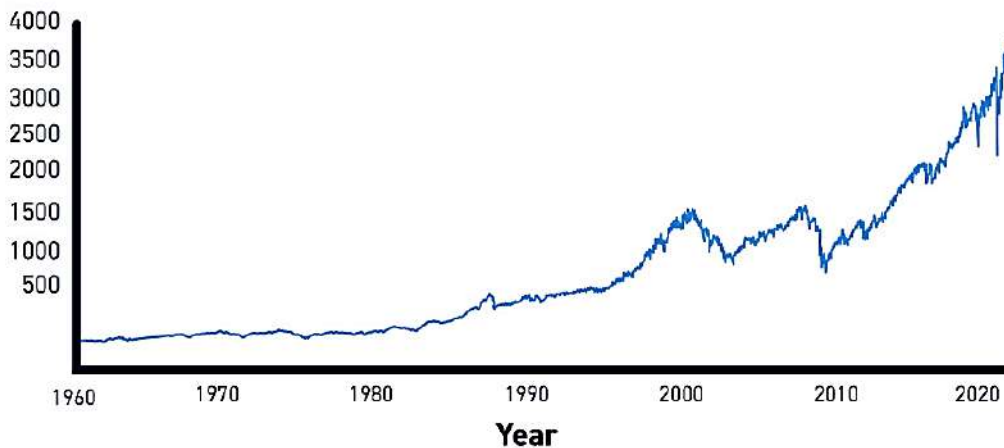


Figure 1. Dynamics of the American stock index SNP 500 for the entire period of existence

The graph below shows that the American stock index SNP 500 (Standard and Poor 500) has grown from near-zero values to incredible levels of 4000-5000 points over the entire period of its existence.

The impact of the economy on the stock market. A strong state economy usually means a strong stock market. For example, if businesses provide solid growth and generate profits, investors are more likely to invest in stocks. Also, if consumer spending is high, businesses are more likely to grow, leading to higher stock prices. Conversely, the weak state of the economy may have a negative impact on the stock market. When consumers have less money to spend or businesses have difficulties, investors may lose confidence in the market, which may force them to sell their assets or avoid investing altogether [2, p. 5].

Factors affecting correlation. Although the economy and the stock market are closely related, there are many factors that can affect how closely they are connected. One of the main factors is macroeconomic events, such as changes in interest rates or government policy.

For example, if the Federal Reserve raises interest rates, businesses and consumers may be less likely to spend money, which will cause the stock market to fall. Similarly, political instability or changes in government policy can also affect investor confidence and lead to fluctuations in the stock market.

Let's look at the impact that the stock market can have on a country's economy, including how it can stimulate growth and innovation, as well as lead to instability and inequality. The stock market can have a positive impact on the economy in several ways. One of the most significant is the provision of capital to enterprises. When companies conduct a public offering of their securities on the stock market, they can raise a lot of money, which they can use to invest in their business, expand operations or finance research and development [3, p. 6]. These investments can lead to job growth, increased productivity and other economic benefits.

In addition, the stock market can encourage companies to innovate and improve their operations. Investors are looking for profitable, growing and innovative companies, which means that businesses must constantly strive to improve in order to attract investors [4, p. 6]. This competition can stimulate innovation and productivity growth, which can ultimately benefit both the company and the economy as a whole. Finally, a strong stock market can create a wealth effect in which consumers feel richer and more confident because of the increased value of their investments. This could encourage consumers to spend more money, which in turn could boost the economy.

But, do not forget about the negative impact of the stock market on the economy. One of the most significant risks is excessive speculation, when investors buy and sell shares solely based on future price changes, and not on the company's fundamentals [5, p. 6]. This can lead to bubbles when stock prices rise rapidly but are not supported by fundamental economic factors. When these bubbles burst, the economy suffers significant damage.

Finally, an unstable stock market can provoke instability in the economy. If investors lose confidence in the market, this may incline them to sell off, which will affect the entire economy and lead to a recession.

Let's turn to the consideration and analysis of the relationship between the Russian stock market and the level of nominal GDP for the period from 2000 to 2022 (Figure 2).

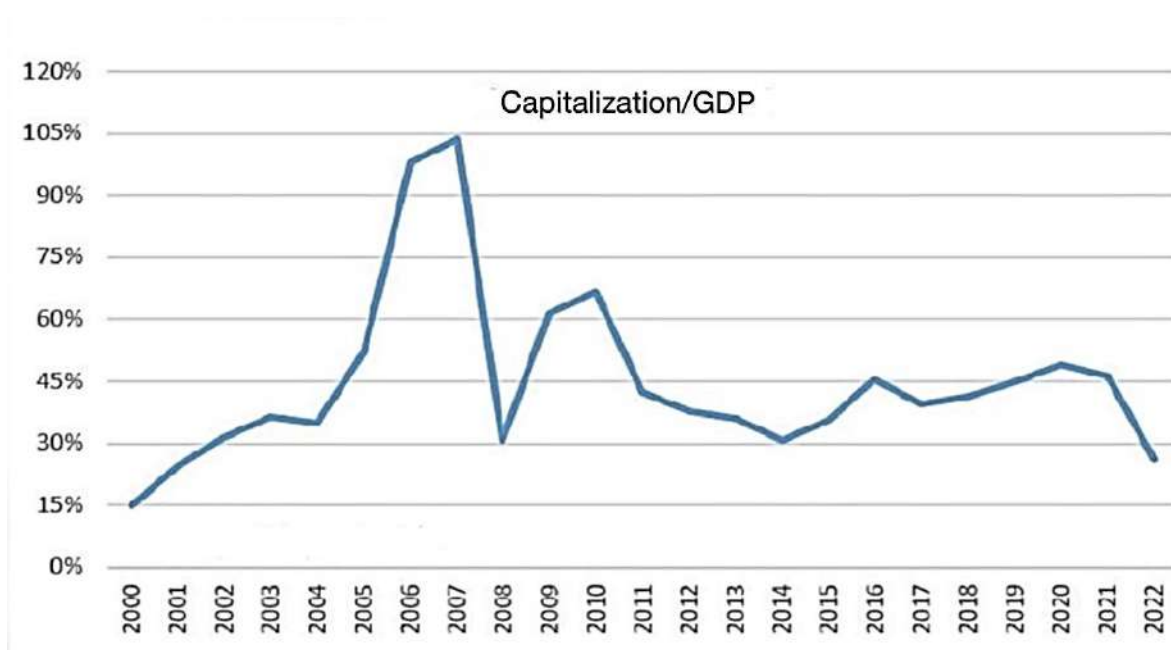


Figure 2. Is a graph of the ratio of the capitalization of the Russian stock market to the nominal GDP of Russia for the period 2000-2022

As we can see in the graph above, since the beginning of the 2000s, the capitalization of the Russian stock market has been rapidly increasing relative to Russia's nominal GDP, reaching a peak in 2007. After the beginning of a serious crisis, the capitalization of the Russian stock market showed a significant decline in relation to GDP and, after 2012, passed into a phase of stagnation, in particular, due

to restrictions on the turnover of foreign capital within the country. Closer to 2020, the situation began to gradually improve, but after the start of a special military operation in 2022, significant amounts of foreign capital began to flow out of the country again. From this we conclude: until recently, the Russian stock market was strongly influenced by foreign capital, which, under the influence of recent events, began to leave our country. In the current situation, excellent conditions are being created for the development of the domestic market: attracting primarily domestic capital. This significantly reduces the sanctions risks and makes the country's economy more stable and independent. For this reason, in the coming years we expect a gradual increase in the capitalization of the Russian stock market based primarily on domestic capital.

In conclusion, it should be noted that the stock market and the state economy are closely interrelated, although their relationship is complex and multifaceted. The stock market can be viewed as a barometer of the overall state of the economy: a strong economy usually leads to a strong stock market, and a weak economy potentially leads to lower stock prices. However, there are many factors that can influence the correlation between them, including macroeconomic events, government policy and investor sentiment. It is important for investors, politicians and the general public to understand the complexity of the relationship between the stock market and the state economy and make informed decisions based on a full understanding of the risks and benefits associated with this.

The study examined the relationship between the stock market and the economy of the state, revealed the impact of the stock market on the economy of the state, as well as analyzed the ratio of the capitalization of the Russian stock market to the nominal GDP of Russia for the period 2000-2022, formulated some conclusions.

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## DEGLOBALIZATION IN THE GAS SECTOR

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**Abstract.** The article analyzes the Russian gas industry in the global economy over the past 5 years. Moreover, are considered alternative sources of gas in the global energy sector. As a result of the analysis, possible trends in the Russian gas.

**Keywords:** natural gas, Russian gas policy, world economy, alternative gas sources, deglobalization.

## ДЕГЛОБАЛИЗАЦИЯ В ГАЗОВОЙ ОТРАСЛИ

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**Аннотация.** В статье анализируется газовая отрасль России в мировой экономике за последние 5 лет, рассматриваются также альтернативные источники газа в мировой энергетике. В результате анализа приведены возможные тенденции развития газовой отрасли России.

**Ключевые слова:** природный газ, газовая политика России, мировая экономика, альтернативные источники газа, деглобализация.

The gas industry is considered to be the basis for significant earnings of the country. For this reason, a huge amount of funds and the interest of the government are allocated to its formation and modernization. This leads to the fact that the area is regularly formed and improved. For this reason, there are prospects for its effective and productive formation.

This study will be devoted to the following goals: conducting a comparative analysis of the Russian gas industry in the global economy over the past 5 years, identifying alternative sources of gas in the global economy. What's more, SWOT analysis of the current state of the Russian gas industry will be pointed out. Moreover, trends in the Russian gas industry will be determined.

The international market for natural gas is one of the more actively developing energy carriers. Over the past years, the growth in production and use of gas in the world amounted to more than 70 %.

Natural gas is rapidly used in various sectors of life, but according to the considerations of many experts in the long term, it will also be used on a large scale. This is facilitated by the environmental friendliness of gas as well as fuel, its mobility



and the ability to store in liquefied form. At the end of 2018 the total production of natural and associated gas in Russia amounted to 733 billion cubic meters, which shows an increase of 8 % compared to 2017 (Figure 1).

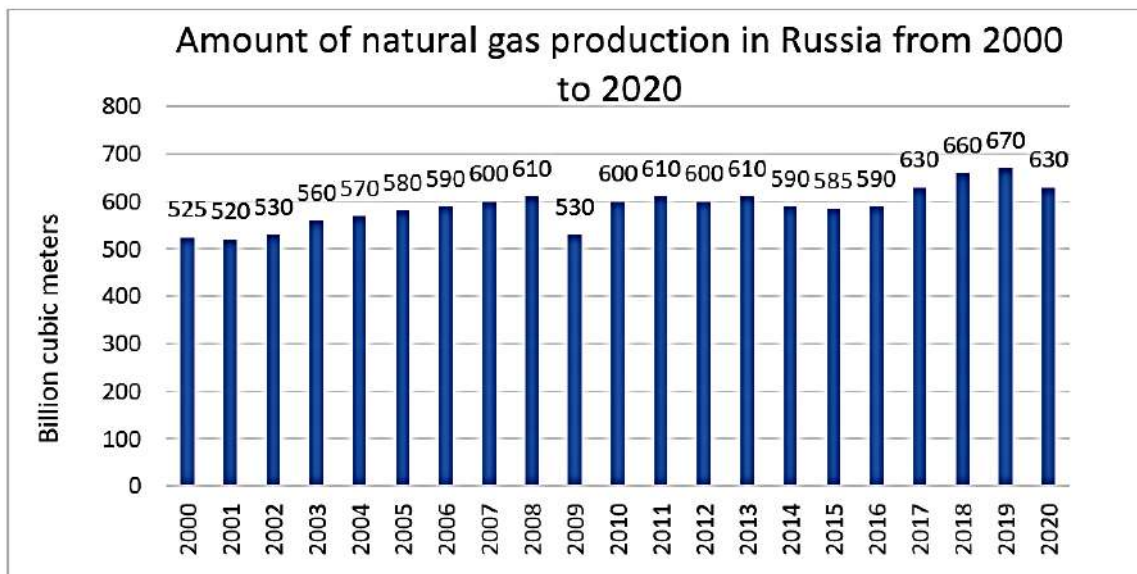


Figure 1. Amount of natural gas production in Russia from 2000 to 2020 [1]

According to the data of Main indicators of the gas industry, natural gas production in the Russian Federation is carried out by 254 enterprises, which include 144 independent oil and gas processing companies. However, the author considered that 85 companies included in the structure of vertically integrated oil holding companies. Besides that, 15 subsidiaries in the Gazprom group, 7 structural divisions of NOVATEK, and in addition 3 companies operating in terms of production sharing agreements – PSA operators [2] (Figures 2, 3).

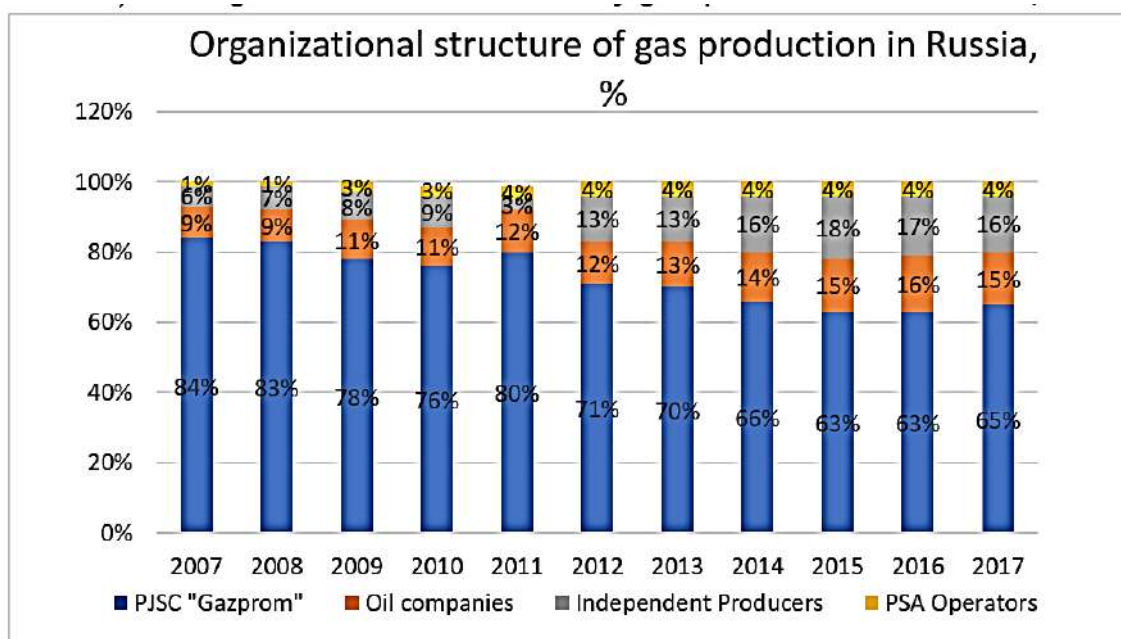


Figure 2. Organizational structure of gas production in Russia, % [1]

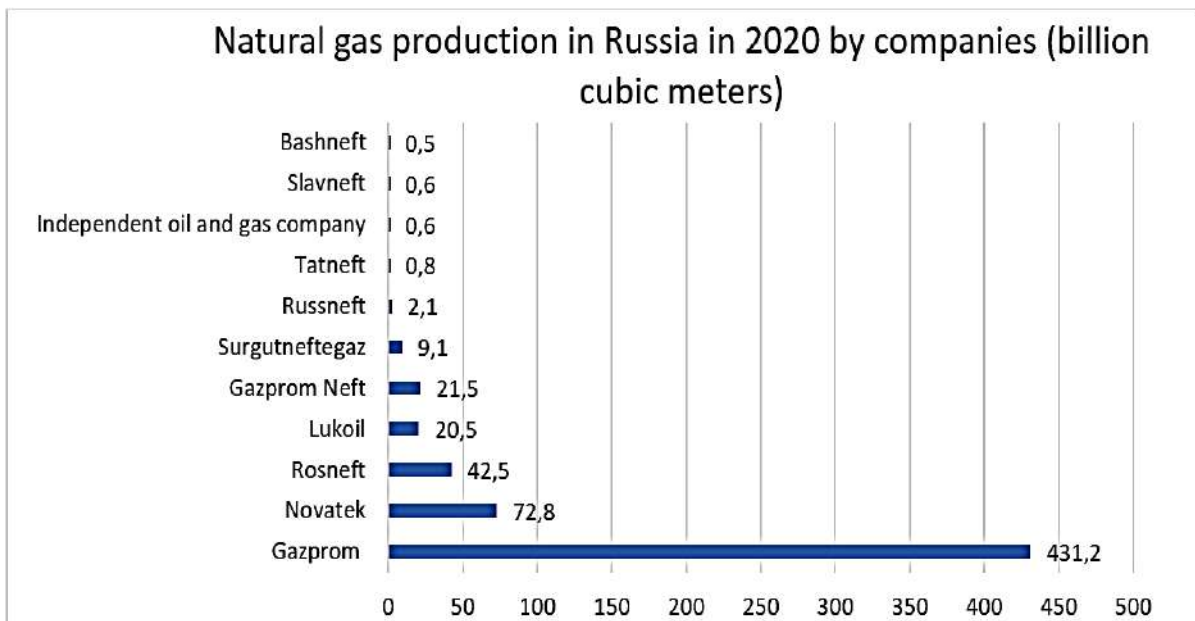


Figure 3. Natural gas production in Russia in 2020 by companies (billion cubic meters) [1]

The strategic vulnerability of the gas industry is considered to be interdependent on motor transport corridors and on buyer states that are considered monopolists: Germany, Turkey, China. Approximately 20 % of absolutely all investments in the gas industry, which set, among other things, the trends in the formation of the entire industry, depend on demand from the countries mentioned above (Figures 4, 5).

The cost of natural gas exports from Russia from 2000 to 2021 (in billions of US dollars)

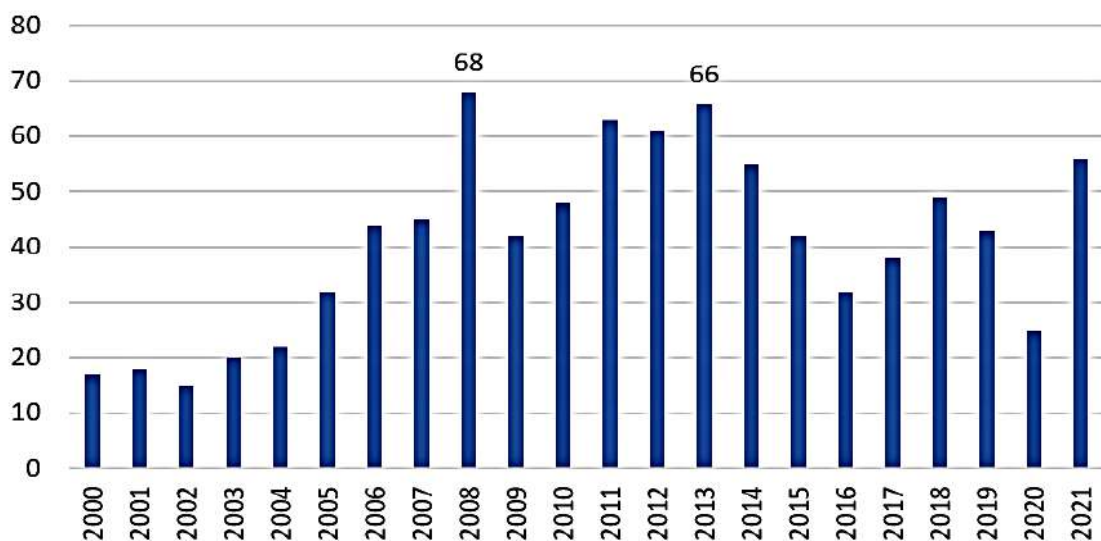


Figure 4. The cost of natural gas exports from Russia from 2000 to 2021 (in billions of US dollars) [1]

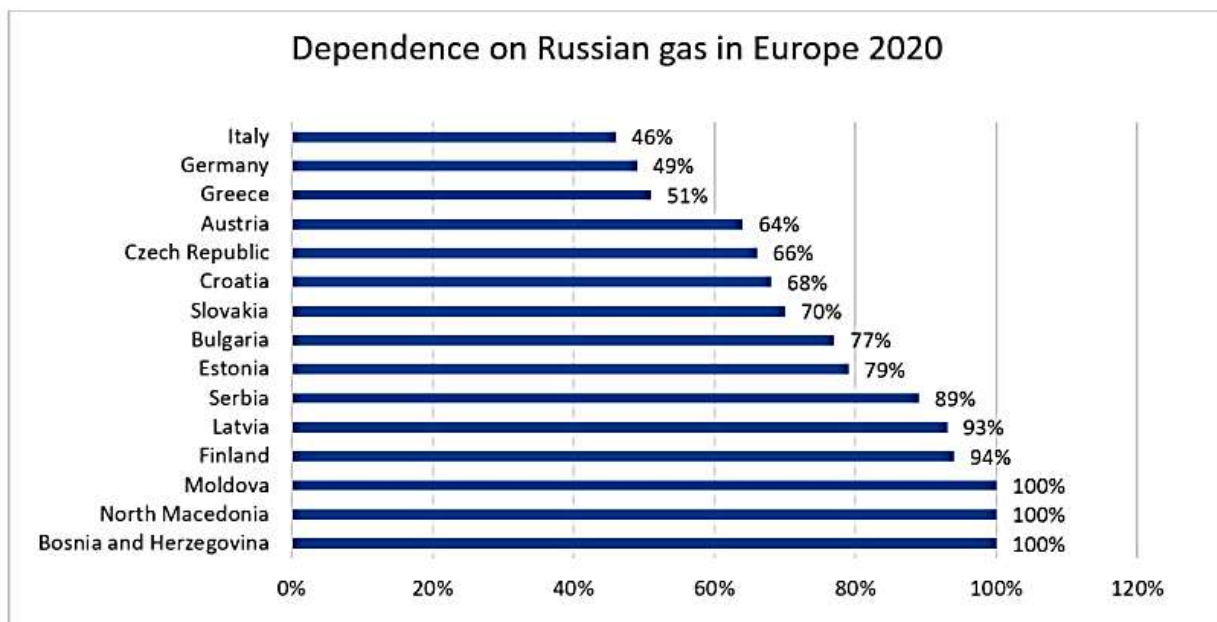


Figure 5. Dependence on Russian gas in Europe 2020 [1]

In the option of Pavlyuk O., Petrova N. the increase in the production of natural gas and its analogues over the past years has been growing and, in addition, it will continue to grow. At the same time, gas exports will increase but mainly in Asian direction. The opportunities for the formation of gas chemistry in the Russian Federation are due to two main competitive advantages: the low price of the material in the metal industry and the growing global demand, mainly due to China, which is considered to be not only the largest buyer and importer of the product, but also to contain the main opportunity growth provided by the development of production [3].

Among the main types of alternative gas sources are liquefied gas, shale gas and gas hydrates, associated petroleum gas, compressed natural gas, biogas, hydrogen [4].

However, the main types of alternative gas sources cannot fully assume the role of a universal energy carrier, which is played in our time by oil and liquid products of its processing. However, they cannot fully assume the role of a universal energy carrier, which is played in our time by black gold and liquid products of its processing. For this reason, the issue of the conversion of hydrocarbon gases of various compositions and origins into the most convenient liquid fuel, and in addition, the most attractive gas energy carriers from an environmental point of view, primarily hydrogen, is becoming increasingly relevant. However, the existing technological processes are still not very attractive for practical application. Because the conversion of methane which is considered to be the main element of natural and associated gases, into other chemical products is a very complicated and energy-consuming procedure [2].

The state of the Russian gas industry today is characterized by a significant development of gas transmission infrastructure, a well-established natural gas production process, a qualified professional structure, the presence of buyers in

Russia, the CIS, as well as foreign countries, the presence of significant property assets owned by companies and the ability of scientific and technological potential.

However, high wear of equipment, depletion of major gas fields, lack of investment, high credit debt, technological lag behind foreign energy companies, high social burden, dependence on socio-political circumstances, increased costs for gas production and transportation to the domestic and international markets, the incompleteness of the process of formation of legislative and regulatory frameworks and the functioning of the domestic market for liquefied natural gas are becoming the main weaknesses of this industry.

After analyzing the main advantages and disadvantages of the gas industry, some opportunities can be identified. Among them is entering new market segments in Russia and abroad. Also, expanding sales of natural and liquefied gas and the presence of significant interest from investors can be of great importance. Moreover, extension of the gas transmission network and increase in the number of independent private gas producers can lead to good deals.

Also, there are several threats in the gas sector. First of all, a decrease in the purchasing power of consumers in the domestic market in a crisis and increased wear of equipment can be challenging. Also, increase in the cost of service and maintenance of gas equipment and increased competition of foreign TNCs can lead to problems. Moreover, projected significant growth in gas prices, social limit for the growth of gas prices and imposition of sanctions by European states and the United States are the points the current discussion is centered round.

Based on the SWOT analysis, fair factors in Russia can be concluded. Firstly, there are still no circumstances for the formation of a full-scale competitive gas market. Secondly, the government will become and will have an important role in the functioning of the gas industry. Also, it is still necessary to outline the appropriate limits for gas market liberalization and the main trends in government regulation. Thirdly, the scientific and technical basis of the created gas trading is considered to be its commodity distribution concept. Fourthly, one of the main threats (the imposition of sanctions by European states and the United States) has become a reality, which has affected the entire global gas market and has become the reason for the formation of a strategy for the development of the gas industry in the new conditions. Fifthly, the well-established process of natural gas production, the availability of consumers, as well as resources, contribute to the further development of this industry.

The main directions for the formation of the gas industry in Russia have been determined today. They correspond to the specifics of not only the fuel and energy sector, but also the entire economic system of today's society. In particular, the document "Energy Strategy of the Russian Federation for the period up to 2035" sets out the corresponding tasks that must be solved in this decade [5].

Directions included increasing in the level of gasification of urban and rural settlements of the Russian Federation. Also, increasing the share of independent producers in the Russian gas market and development and implementation of large-

scale projects for the production of liquefied natural gas is identified. Moreover, active development of the continental shelf, Eastern Siberia, Yamal and creation of new gas production centers there and further development of the infrastructure of main gas pipelines and gas transportation systems should be considered.

Modern realities should also be taken into account. With the introduction of sanctions against Russia, the gas industry needs to adapt to the new conditions. The most important tasks facing the oil and gas sector today are: import substitution of equipment and technologies after large foreign companies leave Russia; search for new markets after the US, UK and EU embargo.

The Russian Federation is looking for alternative markets. At the present moment Russia is connected by gas transmission networks with the countries of Europe, the CIS and China. All other markets are either geographically distant (Pakistan, India) or oriented towards LNG supplies (Japan, Republic of Korea). The laying of gas pipelines to them has been repeatedly recognized as economically inefficient. In Europe, apart from unfriendly countries, Russian gas is supplied only to Turkey, Serbia, and Bosnia and Herzegovina. An increase in exports to the CIS countries (EAEU, Moldova, Georgia and Uzbekistan) is unlikely, despite the expected growth in demand in Kyrgyzstan, Kazakhstan and Uzbekistan. A possible increase in supplies will be offset by a decrease in demand from Belarus and Moldova.

Short-term prospects for reorientation from Russian gas to other sources of supply, as well as a significant reduction in demand for gas without injuring its own economy, the EU will need from 4 to 8 years. At the same time, such a radical change in the gas balance will require maintaining high gas prices throughout this period. In the context of an inevitable drop in supply volumes, this will support the high-cost indicators of Russian exports, at least in 2022–2024. If developed countries (EU, Japan, Korea) reduce LNG imports from Russia for political reasons, then it is very likely that its flows will be redirected to developing Asian countries, including China, from where other suppliers leave in search of easy money on the European market.

All this together will lead to a gradual change in the economic model for the development of the Russian gas industry with an increase in the attention of gas industry participants and regulators to the domestic gas market, both in terms of stimulating demand and changing its institutional framework, including the search for a new balance between market participants, the likely abandonment of regulation of prices for industrial consumers, further development of exchange trading.

At the same time, from the point of view of maintaining and developing exports in 2020–2030, efforts to accelerate import substitution of large-tonnage LNG production as the bottleneck for the Russian gas industry in the new economic conditions will be of key importance.

Summing up, the gas industry can be concluded as one of the components of the basis of the state economy. In turn, the Russian gas industry is a significant contribution to the gas industry of the international economy, as well as its support. In our time, many trends are opening up for this industry, including the development

of alternative gas energy sources and the deglobalization of the Russian gas sector. The imposition of sanctions by European states and the United States, which has become a reality today, affected the entire global gas market and becoming the reason for the formation of a strategy for the development of the gas industry in the new conditions. Thus, Europe, which was one of the major buyers of Russian gas, left. The Russian Federation will start selling more to Asian countries. While for Europe, leaving the Russian market is a much bigger problem because LNG prices are rising. If the total gas produced by the USA, Australia, Qatar, Malaysia are considered, there will not be enough gas to heat the whole of Europe.

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## APPLYING DEEP LEARNING TO OPTIMIZE THE PERFORMANCE OF METALWORKING MACHINES

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**Abstract.** This article discusses the use of deep learning to optimize the performance of metalworking machines. The basic principles of deep learning, as well as methods for its application in metalworking, are considered. Examples of using deep learning to solve metalworking problems, such as determining the optimal processing parameters, improving the quality of processing, predicting the time required for the production of parts, are described.

**Keywords:** metalworking, deep learning, performance optimization, metal processing, machine learning.

## ПРИМЕНЕНИЕ ГЛУБОКОГО ОБУЧЕНИЯ ДЛЯ ОПТИМИЗАЦИИ ПРОИЗВОДИТЕЛЬНОСТИ МЕТАЛЛООБРАБАТЫВАЮЩИХ СТАНКОВ

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**Аннотация.** В данной статье рассматривается применение глубокого обучения для оптимизации производительности металлообрабатывающих станков. Рассмотрены основные принципы глубокого обучения, а также методы его применения в металлообработке. Описаны примеры использования глубокого обучения для решения задач металлообработки, таких как определение оптимальных параметров обработки, улучшение качества обработки, предсказание времени необходимого для производства деталей.

**Ключевые слова:** металлообработка, глубокое обучение, оптимизация производительности, обработка металла, машинное обучение.

The metal processing industry plays an important role in the production of metal products such as automobiles, aircraft, electronics and other products. One of



the key aspects of the production of metal products is the efficient use of metalworking machines such as lathes, milling machines, drilling machines and others. Optimizing the performance of these machines can lead to increased production efficiency, reduced costs and improved product quality.

Deep learning is a subsection of machine learning that is based on the use of artificial neural networks with a large number of layers (deep networks) for automatic feature extraction and learning on large amounts of data [1]. Deep learning is one of the approaches to machine learning that allows you to create complex models that can automatically train on large amounts of data without explicit programming. One of the key benefits of deep learning is its ability to find complex and abstract patterns in data, making it a powerful tool for solving complex problems such as pattern recognition, classification, segmentation, etc. (Figure 1).

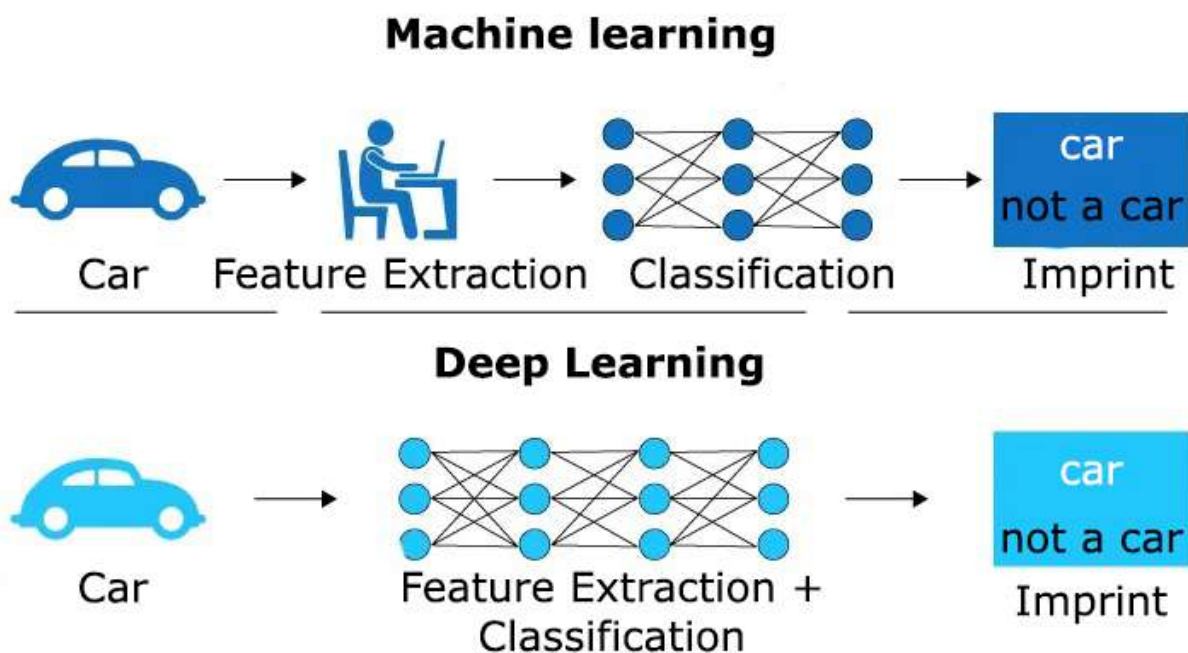


Figure 1. An example of how deep learning works

Deep learning is based on the concept of artificial neural networks that mimic the work of the human brain and consist of many interconnected neurons. Each neuron takes input, performs mathematical operations, and passes the results to the next layer of neurons. The deep architecture of neural networks, which consists of many layers, allows the model to extract more and more complex features from the data at each successive layer, which allows the networks to learn representations of the data with varying degrees of abstraction. This type of training is widely used in various fields, including computer vision, natural language, speech technology, medicine, finance, industrial automation, and others. In optimizing the performance of metalworking machines, deep learning can be applied to automatically determine the optimal machining parameters, predict equipment failures, optimize equipment



setup, control product quality, and other tasks related to the optimization of manufacturing processes.

In recent years, deep learning has become one of the most rapidly developing areas of artificial intelligence, and it is widely used in various industries, including industry. Deep learning based on neural networks allows you to automatically extract complex patterns from large amounts of data, which can be useful for optimizing the performance of metalworking machines. However, the application of deep learning to optimize the performance of metalworking machines is still an open problem and requires further research. In this scientific article, we will consider the use of deep learning to optimize the performance of metalworking machines and evaluate its effectiveness based on the results of the research.

The application of deep learning to optimize the performance of machine tools can involve several different approaches, such as [2]:

1. Predict machine performance based on past operation data. Deep neural networks can be trained on historical machine performance data such as cutting speed, depth of cut, operation duration, and other parameters to predict machine performance in future operations (Figure 2). This allows you to optimize machining parameters such as cutting speed and depth of cut for maximum machine performance.

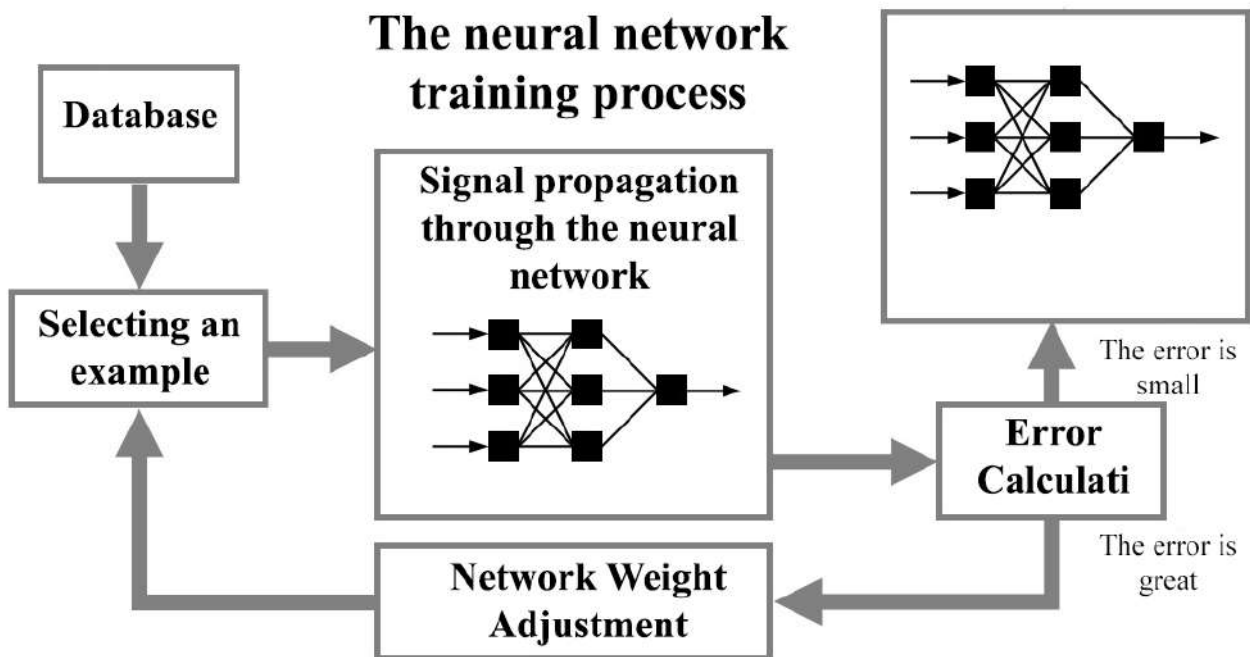


Figure 2. The process of training neural networks

2. Optimization of machine parameters in real time. Deep neural networks can be integrated into a machine control system to automatically optimize machine parameters in real time based on feedback from machine sensors such as load, vibration, temperature, and other parameters. This allows the machine parameters to

be dynamically adjusted according to the machining conditions, which can greatly improve the productivity of the machine.

3. Determination of optimal processing strategies. Deep neural networks can be used to determine the optimal machining strategies, such as the sequence of operations, the choice of tools and cutting parameters, based on data on the properties of the machined material, product geometry, quality requirements and other factors. This allows you to optimize the processing process and minimize the time and cost of production.

4. Control and diagnostics of the state of the machine. Deep neural networks can be used to monitor and diagnose the condition of metalworking machines, such as identifying possible defects, tool wear, anomalies in machine operation, and other problems. This allows early detection of problems and preventive maintenance, which helps to reduce downtime and increase machine productivity.

Several studies have been conducted to confirm the effectiveness of using deep learning to optimize machine tool performance. In one study, the authors proposed a method based on deep neural networks to optimize the performance of a milling lathe [3]. The study proposed an algorithm for optimizing cutting parameters based on data on cutting speed, depth of cut and other parameters collected from machine sensors. The deep neural network was trained on a large amount of machine performance data, including various combinations of cutting parameters. The results showed that the proposed method using deep learning allowed to achieve a significant increase in machine performance compared to traditional optimization methods.

In another study, the authors proposed a method for optimizing the performance of a milling machine using deep neural networks and genetic algorithms [4]. In this study, a hybrid optimization system was developed that included a deep neural network trained on machine performance data and a genetic algorithm that optimized cutting parameters based on predicted machine performance. The results showed that the proposed method allowed to reduce the processing time and reduce tool wear, which led to an improvement in machine productivity.

The application of deep learning to optimize the performance of metalworking machines is of great importance in today's manufacturing industry. This improves the efficiency of machining processes, reduces processing time and production costs, and improves the quality and reliability of manufactured products. The use of deep learning also contributes to the development of automation and intellectualization of production, which is an important direction in the development of modern industry. The results of the conducted research show that deep learning can be successfully applied to optimize various aspects of the operation of machine tools, such as cutting parameters, machine settings, tool selection, and other factors that affect productivity [5].

However, despite the results achieved, there are some limitations that researchers and industry face when applying deep learning to optimize performance. Some of them include:

1. Limited data: training deep neural networks requires a large amount of data, including information about machine performance, cutting parameters, working conditions, etc. However, in a real production environment, there may be limited access to such data due to confidentiality, limited availability, or difficulty of collection. This can make it difficult to train deep neural networks and reduce their accuracy and efficiency.

2. Difficulty in evaluating models: Assessing the accuracy and reliability of deep neural networks is a challenging task, especially in a manufacturing environment where many factors can affect machine performance. Model evaluation also requires experimentation on real machines, which can be difficult and costly.

3. Need to update models: Metalworking and machine tool technology is constantly evolving and manufacturing conditions may change over time. This requires constant updating and adaptation of deep neural networks in order for them to remain relevant and effective in the long term.

4. Integration into production processes: The use of deep learning to optimize the performance of metalworking machines also requires the integration of the developed models into real production processes. This can cause technical, organizational and cultural challenges. For example, integrating new algorithms and models into an existing machine park may require hardware and software upgrades, staff training, and workflow changes. These changes can be complex and require additional resources and time.

5. Security and Ethics: The use of deep learning in a production environment also raises security and ethical issues. Incorrect or incorrect application of deep learning can lead to undesirable consequences, such as equipment damage, increased energy costs, product losses, and others. In addition, privacy and data protection issues arise, especially when using data on manufacturing processes and machine parameters. These aspects also require careful attention and compliance with relevant norms and standards.

In conclusion, we would like to note that the use of deep learning to optimize the performance of metalworking machines presents significant potential for improving manufacturing processes, reducing costs and increasing efficiency. However, there are limitations and challenges such as limited data, difficulty in validating models, the need to update models, integration into manufacturing processes, and security and ethical issues. Further research and development in this area will contribute to the development of more accurate and efficient solutions for optimizing the productivity of metalworking machines, which in turn can lead to improved production activities and economic efficiency of industrial enterprises.

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## **SUGGESTION SYSTEM AS A FACTOR OF AN ENTERPRISE ECONOMIC SECURITY**

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**Abstract.** This paper discusses effective Suggestion system implementation in manufacturing companies. As a result of the analysis, a link between Suggestion system and enterprise economic security is disclosed.

**Keywords:** lean manufacturing, suggestion system, economic security, personnel security.

## **СИСТЕМА ПРЕДЛОЖЕНИЙ КАК ФАКТОР ЭКОНОМИЧЕСКОЙ БЕЗОПАСНОСТИ ПРЕДПРИЯТИЙ**

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**Аннотация.** В работе рассмотрены проблемы внедрения системы предложений и показана взаимосвязь Системы предложений с экономической безопасностью предприятий.

**Ключевые слова:** бережливое производство, система предложений, кадровая безопасность, экономическая безопасность.

In today's rapidly evolving business landscape, the ability to adapt and innovate is crucial for an enterprise's long-term success and economic security. One often overlooked yet powerful tool for driving innovation and continuous improvement is Suggestion system. In this article, we will explore the role that a well-designed and efficiently implemented Suggestion system can play in a company's economic security. We will dive into the challenges faced by organizations implementing Suggestion systems, discuss best practices for enhancing their effectiveness, and demonstrate how a robust suggestion system can contribute to

a company's overall economic stability and growth. By understanding and harnessing the potential of Suggestion systems, enterprises can unlock new avenues for innovation, employee engagement, and long-term success.

The article holds relevance and scientific novelty for several reasons. By exploring the connection between Suggestion systems and enterprise economic security, the article sheds light on an underexplored area of research, offering new insights and perspectives on the subject.

There are many definitions of the enterprise economic security given by different researchers. One of the latest definitions have been proposed by Linko I. V. and it is stated as follows: “The economic security of an enterprise is a condition of an enterprise in which it is not in danger, its independence and integrity are preserved, resources are used most effective way to ensure the normal functioning of the enterprise preventing various dangers and threats to the enterprise's operations” [1, p. 449].

The system of economic security consists of a number of constituent elements. Figure 1 shows the economic security structure based on [2, p. 58-59]:

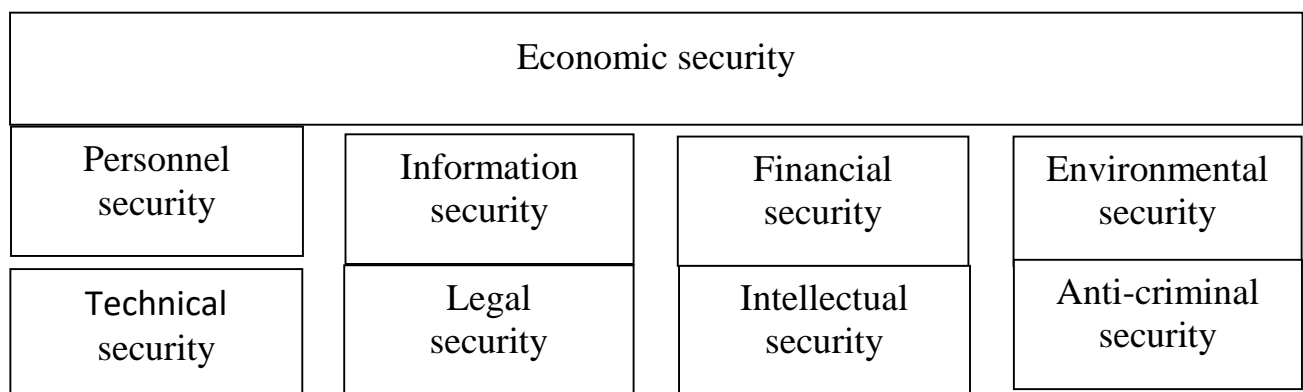


Figure 1. System of economic security

Personnel security occupies a leading place in the structure of economic security. Personnel security is the provision of economic security of the enterprise by reducing the risks and threats associated with work of personnel, their intellectual potential and labor relations in general [3, p. 173].

There are two types of threats to personnel security. These are internal (like ineffective motivation system) and external (for example, a threat that personnel will leave the company for competitor).

In this situation any means which might help to motivate personnel and involve it into the effective work for the company can level out the negative effect of the threats.

Suggestion system have long been recognized as an essential lean tool for organizations seeking to foster a culture of continuous improvement. By encouraging employees to share their ideas and insights, this system can help identify opportunities for streamlining processes, reducing waste, and enhancing overall efficiency.

A Suggestion system is a structured process that enables employees to submit ideas for improving various aspects of an organization's operations. These ideas can range from simple process improvements to more complex, innovative solutions that address specific challenges. The primary goal of a Suggestion system is to tap into the collective knowledge and experience of the workforce, empowering employees to contribute to the organization's continuous improvement efforts.

In today's competitive business environment, organizations must prioritize both operational efficiency and security to ensure long-term success. Suggestion system, as a lean tool, can play a crucial role in driving continuous improvement and fostering a culture of innovation. At the same time, it might enhance personnel security which is a critical component of enterprise economic security, protecting the personnel from being not motivated and engaged.

We can see that Suggestion system is a popular topic of recent publications.

For instance, in the article titled “Enterprise Suggestion system enhancement” [4, p. 167] the authors investigated Suggestion system of Taganrog Commercial Sea Port and found low involvement of the personnel into the process. For further improvement they recommended the following changes:

- improvement of the submitting suggestions process in terms of information and training activities aimed at forming a loyal attitude to the ideology, principles, and tools of lean production;
- implementation of the principles of personal responsibility of the managers for the quantity and quality of submitted suggestions in their departments;
- development of a system for further personnel motivation using moral and material incentives.

In the other article “Organization of work with kaizen suggestions” the author describes the stages of the process based on the Irkutsk division of Russian railway company [5, p 316-320].

In the articles reviewed we see the Suggestion system’s challenges underexplored. We also have not seen in any source a reference to the relation between Suggestion system as a lean tool and personnel security as a part of the economic security of an enterprise.

Despite the fact that many companies implement the Suggestion system into their business processes and report a certain progress on that, frequently they face

obstacles which prevent them from delivering the expected results, leading to frustration and skepticism among employees and management.

Let us systemize the most common Suggestion system implementation difficulties and the ways to overcome them.

Table 1 – Suggestion system challenges and strategies to overcome them

<i>Challenges</i>	<i>Strategies</i>
<u>Unclear Goals:</u> Without well-defined goals, Suggestion systems can become unfocused and ineffective. Employees may submit ideas that are unrelated to the organization's priorities, making it difficult to identify and implement meaningful improvements.	<u>Establish Clear Goals:</u> Clearly define the goals of your Suggestion system and communicate them to employees. Ensure that the objectives are aligned with the organization's overall priorities and encourage employees to focus their ideas on the areas where they will have the greatest impact.
<u>Inadequate Communication:</u> Poor communication about the purpose and process of the Suggestion system can lead to a confusion and disengagement among employees. If employees do not understand how their ideas will be evaluated and implemented, they may be less likely to participate.	<u>Improve Communication:</u> Regularly communicate the purpose, process, and progress of the Suggestion system to employees. Keep them informed about the status of their suggestions and the results of implemented ideas.
<u>Insufficient Management Support:</u> A lack of commitment from management can undermine the success of a Suggestion system. If leaders do not actively support and promote the system, employees may perceive it as a low priority and be less inclined to contribute.	<u>Ensure Management Support:</u> Obtain buy-in from management and ensure that they actively promote and support the Suggestion system. This can include regular updates on the system's progress, celebrating successes, and encouraging employee participation.
<u>Complex Submission Process:</u> A cumbersome submission process can discourage employees from sharing their ideas. If it is too time-consuming or difficult to submit suggestions, employees may opt not to participate.	<u>Simplify the Submission Process:</u> Streamline the process for submitting suggestions, making it as easy and efficient as possible. Consider using an online platform or other user-friendly tools to facilitate participation.
<u>Inadequate Review and Feedback:</u> If suggestions are not reviewed promptly	<u>Enhance Review and Feedback:</u> Establish a process for promptly



and feedback is not provided, employees may become disillusioned with the system. A lack of timely feedback can create the impression that the organization is not genuinely interested in employee input.	reviewing suggestions and providing feedback to employees. Consider forming a cross-functional team to evaluate ideas based on their potential impact, feasibility, and alignment with organizational goals.
<u>Insufficient Recognition and Rewards:</u> Failing to acknowledge and reward employees for their contributions can lead to disengagement and a decline in participation. Employees need to feel that their efforts are valued and appreciated.	<u>Recognize and Reward Contributions:</u> Develop a system for acknowledging and rewarding employees for their suggestions. This can include public recognition, monetary incentives, or other forms of appreciation that demonstrate the organization's commitment to employee input.

Satisfaction and involvement of employees lead both to the enterprise's business goals achievement and to personnel security level increase which is a part of the company's economic security.

The Suggestion system reduces the risks of exposure to both external and internal threats to personnel security. The development of personnel, their qualifications, increased involvement and motivation, which can be achieved with help of the Suggestion system, reduce the likelihood of such internal threats to personnel security as lack of qualifications and inefficiency of the personnel motivation system on the one hand, and such external threats as the luring of specialists by competing companies on the other.

Figure 2 shows the relation between Suggestion system and economic security.

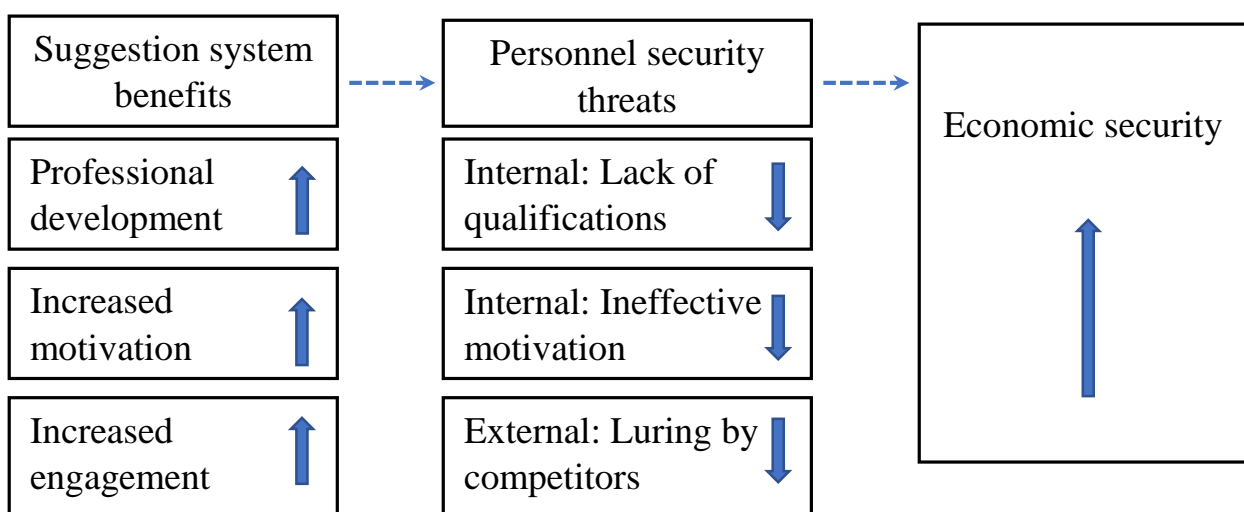


Figure 2. Relation between Suggestion system and Economic security

The implementation of an efficient Suggestion system is a critical factor in enhancing an enterprise's economic security. Throughout this article, we have examined the importance of fostering a culture of innovation and continuous improvement, as well as the various activities that can be employed to optimize the effectiveness of a Suggestion system. By embracing these best practices, organizations can not only tap into the collective wisdom and creativity of the employees but also create a more resilient and adaptable business environment.

A well-designed and efficiently implemented Suggestion system can lead to increased employee engagement, improved problem-solving capabilities, and the identification of new opportunities for growth and cost reduction. Ultimately, these factors contribute to a stronger, more secure economic foundation for the enterprise. By prioritizing the development and refinement of Suggestion systems, organizations can unlock their full potential and navigate the challenges of an ever-changing business environment with confidence and agility.

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## CHARACTERISTICS OF THE DIGITAL ECONOMY AND THE DIGITAL ENVIRONMENT, THEIR HISTORICAL RETROSPECTIVE

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**Abstract.** Social relations are changing significantly due to the impact of the latest communication, innovative, information technologies, which in modern post-industrial society explains the formation of a new information society, bearing the term "digital economy". In this regard, it is necessary to investigate the significance of these digital technologies in solving modern issues of an accountant, analyst, and auditor.

**Keywords:** digitalization, digital economy, digital assets, trends, organization management.

## ХАРАКТЕРИСТИКИ ЦИФРОВОЙ ЭКОНОМИКИ И ЦИФРОВОЙ СРЕДЫ, ИХ ИСТОРИЧЕСКАЯ РЕТРОСПЕКТИВА

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**Аннотация.** Социальные отношения существенно меняются под воздействием новейших коммуникационных, инновационных, информационных технологий, что в современном постиндустриальном обществе объясняет формирование нового информационного общества, носящего термин «цифровая экономика». В связи с этим необходимо исследовать значение этих цифровых технологий в решении современных задач бухгалтера, аналитика, аудитора.

**Ключевые слова:** цифровизация, цифровая экономика, цифровые активы, тренды, управление организацией.

In conditions of uncertainty, digital improvement of the economy becomes an integral process that significantly affects all spheres of life, including the modernization of economic sciences, and determines in advance the direction of their development. The emergence of the Internet has provided new opportunities for both people and companies in the world, which has become a kind of revolution [1]. This network is constantly being improved, and doing business online is becoming more

and more popular. This explains the scientific novelty of this work: the sooner an organization accepts changes and adapts to the web economy, the more it will contribute to obtaining a positive financial result [1].

The digital economy is an economic activity in which digital data is a key factor of production, and contributes to the formation of an information space taking into account the needs of citizens and society in obtaining high quality and reliable information. The development of the country's information infrastructure, the creation and application of Russian information and telecommunications technologies, as well as the formation of a new technological basis for social and economic spheres" [1]. Digital technologies are important components of the process of using information resources in accounting and reporting.

The subject of the digital economy is the economic relations that develop in the process of production, exchange, distribution and consumption of scientific and technical information through digital information technologies, and the economic laws that govern the development of these processes.

In turn, digital technologies are technologies that are used for collecting, processing, storing, transmitting, searching and presenting data in electronic form [1]. "Digitalization is the process of transferring business processes and functions previously produced by people and companies into a digital environment. These concepts allow us to identify the main differences between the digital economy and the real (traditional) one" [2].

Information is a special commodity (economic benefit) that takes the "form of information products and services. In a digital economy, information, acting as a valuable resource, is created, stored, transmitted and processed using information and communication technologies" [2].

"The digital economy is no longer considered a separate part of the state economy or the global economy, as information technologies, due to their quantitative increase, penetrate into various areas of digitalization" [2].

Let's group the digital economy (web economy) depending on various criteria and give its types.

Next, consider the essence of the digital environment. It is an integral communication environment where the subjects of the information environment who manage content and activities in it create digital communication devices. The digital environment is part of the global information space and includes various information technologies and cyberspace. A different interpretation of the concept sounds like this: "the digital environment (digital web) is the material and technical side of the multimedia and digital information revolution of the XXI century, the technological base and tools of all processes of globalization. This is the sphere of so-called high technologies (high-tech), the material environment and the incentive of their industrial and scientific cluster (high technologies of the military-industrial complex, digital electronics, nanotechnology, biotechnology, neuroethology, etc. [3].

The digital environment has the following components:

- "a structure consisting, firstly, of network software protocols that transmit information over various networks, including the Internet, corporate, etc., and secondly, programs and software platforms that store, process and provide information - from databases to operating systems (Linux, Windows and-etc.), thirdly, interface programs that ensure the perception of information by end users (interfaces of blogs, applications, etc.);
- infrastructure, which includes, firstly, communication and Internet lines, secondly, computing complexes of various dimensions (supercomputers, supersmartphones), thirdly, computational control units embedded in various kinds of real-world objects;
- ultrastructure, which is an information sphere containing direct and hidden meanings that are receptive to humans. The latter are expressed in tables, texts, videos, audio. The ultrastructure includes, firstly, public access network resources such as websites, portals, social networks, blogs, etc., secondly, protected information resources of state and corporate affiliation, and thirdly, public resources with paid content" [3].

The Association of Certified Professional Accountants of Canada (CPA Canada) tried to link a certain IFRS standard for evaluating cryptocurrencies [3].

As a result, cryptocurrency cannot be used in many states as a monetary equivalent (in the Russian Federation - not a means of payment), hence the lack of application of IAS 7 "Cash Flow Reports".

Ignoring the fact that some business entities have the right to take risks and buy cryptocurrencies in the hope of increasing their value over time, this does not compare to investment real estate according to the definitions of IAS 40.

Another problem in the study of this type of digital assets is the revaluation of its value due to the volatility of the cryptocurrency exchange rate in an active exchange market. In this regard, the impairment of the fair value of cryptocurrencies under IAS 36 "Impairment of assets" will be displayed in the income statement (analogous to the Russian statement of financial results) (accumulated net loss effect), and in the statement of other comprehensive income – the accumulated net growth effect [4].

Due to the recognition of contracts for the purchase or sale of cryptocurrencies in the near future (futures), in some states (including the Russian Federation) they allow trading on exchange markets that are regulated, and, consequently, digital currencies have every chance to meet the definition of a derivative and be accounted for according to the logic of financial instruments [4].

Due to the high role of intangible assets, the digital economy makes it possible to overcome some of the prohibitions inherent in the traditional economy. Unlike material products, which are used by only one person, digital products can be used by several people, as well as copy data with minimal costs. Moreover, while tangible products wear out in the process of their use, intangible (digital) goods do not lose their consumer properties. At the same time, properties are often improved if there is

a joint use and exchange. Online stores can dodge restrictions on areas, unlike typical trading platforms, and therefore on the variety of assortment.

The increasing impact of information on the management of an enterprise requires additional research on the methods of its use as a basic resource for improving the efficiency of economic activity. Unfortunately, quite often organizational and managerial problems can be observed in business practice, and it is becoming increasingly difficult to solve them by classical deepening of the hierarchy and setting up business processes. The digital economy has brought the following qualitative changes to the firm's level:

a) "creating an information production factor that has become an important resource;

b) reducing the number of transaction costs due to the use of ICT (information and communication technologies);

c) reducing the importance of the uncertainty factor due to the active use of an information resource;

d) increase in production costs, since information has a price;

e) the increasing importance of the human factor in the introduction of production based on ICT" [4].

The digital economy should develop, first of all, by activating the innovative direction, development, implementation and commercialization of innovative products. Today, a variety of indicators for evaluating the effectiveness of individual areas of innovation activity are widely used. One of these indicators is the Global Innovation Index (GII), developed by the World Intellectual Property Organization (WIPO), which is calculated on the basis of a rating assessment of innovation activity of the economies of 127 countries. To measure the rating, indicators are calculated, covering innovations in the fullest extent, including the economic, social and political climate in the country, the level of education, infrastructure and the complexity of doing business [5]. The GII clearly defines the weaknesses and strengths of the conditions that somehow affect innovation activity in the country, reflects the most important parameters of innovative development, the level of which is significantly affected by the level of knowledge dissemination, the development of the educational sphere, the activity of research activities, human capital. Weaknesses in the field of innovative entrepreneurship, especially in terms of investing in innovative activities, are obvious.

Thus, the modernization of the digital economy significantly affects the external and internal environment of today's business. Drastic changes are taking place in the field of information and communication technologies, affecting different areas of companies' activities.

In order for companies to develop and survive in modern conditions, they need to dynamically increase the knowledge of employees in the field of digital information technologies. When introduced into the organization's activities, the latter provide a number of advantages, among which is the qualitative improvement of the company's business processes in connection with the innovation of innovations and the adaptation of business models to the conditions of the modern digital environment.

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**EMOTIONS AND THEIR IMPLEMENTATION IN SPEECH  
(BASED ON THE MATERIAL OF THE FRENCH LANGUAGE)**

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**Abstract.** This paper discusses features of the lexicon, associated with the verbalization of emotions and feelings in the material of the French language. A partial attempt is made to describe such characteristics of the linguistic expression of emotions as subjectivity, affectivity, expressiveness. The author also attempts to differentiate the concepts associated with the nomination of human emotional states in the French language.

**Keywords:** French language, emotions, feelings, verbalization, speech, context.

**ЭМОЦИИ И ИХ ВЫРАЖЕНИЕ В РЕЧИ  
(НА МАТЕРИАЛЕ ФРАНЦУЗСКОГО ЯЗЫКА)**

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**Аннотация.** В данной статье рассматриваются особенности лексикона, связанного с вербализацией эмоций и чувств на материале французского языка. Предпринимается попытка частичного описания таких характеристик языкового выражения эмоций, как субъективность, аффективность, экспрессивность. Автором также предпринята попытка разграничения понятий, связанных с номинацией эмоциональных состояний человека во французском языке.

**Ключевые слова:** французский язык, эмоции, чувства, вербализация, речь, контекст.

In recent years, we have been witnessing a considerable development of new technologies which, with the emergence of the Internet, was at the origin of the appearance of various new forms of communication and interpersonal expression.



Thanks to the progress and the massive diffusion of information technologies, our communication and expression habits have been largely disrupted and thus new language practices are emerging. A very large number of people around the world use social networks and interact using various means such as *e-mails, chat, forums, blogs, Twitter, Facebook*, etc. while using specific practices that are constantly developing and multiplying. These practices were at the origin of the creation not only of new language forms but also of new forms of sociability and interaction.

Nowadays, the high-speed appropriation of the Internet and socio-digital networks, by individuals but also by organizations, is rapidly and strongly reconfiguring public space. Electronic communication has also become, and as Liénard and Zlitni point out, a social and societal activity allowing users to exchange information of various kinds and in various forms using New Information and Communication Technologies (now NTIC) [1, p. 20]. Citizens thus have unprecedented abilities to express themselves, to be heard and also to exchange and expand their relational networks remotely.

Digital technology puts at their disposal various tools of expression and communication. These tools of individual and collective emancipation, exploited in an open, plural, participatory and well-informed public space, play the role of *trigger* but also *accelerator* of social changes. This creates in the users a powerful desire to emancipate themselves, a desire to use these new channels of exchange to inform themselves, but also to express themselves and to exist in the eyes of the world. The evolution of tools and their uses is extremely fast. It depends on the services and features offered by the different platforms. Indeed, the massification of the uses of new media and the progression of Internet practices have influenced very varied fields. The rapid development of these new Information and communication technologies has largely contributed to changing our ways of expression and our relationships with others, in particular with the arrival and the excessive development of the Internet and its practices and thanks to the appearance of mobility tools such as *laptops, smartphones, tablets*, etc.

We live in a digital environment evolving at full speed. In public or private spaces (*train, metro, bus, cafes*, etc.), on the street, anywhere and at any time, people interested in the screens of their devices, immersing themselves in their virtual world and often forgetting a large part of their real world. The arrival of the web and social networks has also inaugurated *the era of debate* allowing citizens to speak without intermediaries and to freely launch discussions on the topics that interest them. These networks have promoted accessibility to public expression and knowledge sharing. New discursive practices have emerged to become essential methods and means of exchange and expression today. The man speaks publicly and converses today with a wide variety of interlocutors in real time.

Subjectivity is a broad and complex phenomenon that dates back to the centuries of philosophers and which entails a multidisciplinary. Nevertheless, faced with the multiplicity and complexity of the terms associated with this field, these

works have not quite revealed the difference between the different notions associated with subjectivity. In the present work, our attention will be focused mainly on emotions and feelings as an affective category always present in our discourses. In this paper there's a presentation of the theoretical framework that will allow us to contextualize the concept of emotion in relation to the other notions associated with it. Let's focus on the *lexicon* relating to emotions:

### 1. *The notion of subjectivity.*

Subjectivity was often defined as opposed to *objectivity*, which confirms its intrinsic presence in language. That is, even in terms of dichotomy, we cannot talk about objectivity without talking about the subjectivity that opposes it and vice versa. Which implies its presence at any speech and which explains the fact of considering it as being the zero degree of writing. It is through language that this phenomenon is translated. However, we deduce that the definition of subjectivity remains unclear and vague. Being linked to the enunciation and the markers of the presence of the enunciator, it can include the feelings and emotions that will constitute a trace and a marker. We can, therefore, say that subjectivity is *a generic term that could be translated by various operators and means, mainly the feelings and emotions* on which we focus our attention in this research work. Moreover, the relationship between subjectivity and emotion is *a relationship of inclusion and not of equivalence*. Indeed, all emotion is indeed subjective, but all subjectivity is not only emotion or feeling.

Being a generic phenomenon, subjectivity can include all the categories that manifest the presence of the subject-speaker such as *judgments, affects, attitudes, values, opinions*, etc. It is similar to other generic terms with which it shares the same semantic universe, but which are less generic such as *affectivity*.

### 2. *The notion of affectivity.*

By studying the acceptances of affectivity in the dictionaries of the French language, we notice that this term, unlike that of subjectivity, acquires less generic and more restricted definitions. Thus, *le Grand Robert* and *le Trésor de la Langue Française* do not differ much in the definition of this notion. They define it as being “*ensemble des phénomènes dits affectifs; ensemble des sentiments, des émotions, des affects. C'est l'aptitude à être affecté de plaisir ou de douleur*” [2]. The TLFi defines it psychologically as being “*disposition affective élémentaire (par opposition à intellect), que l'on peut décrire par l'observation du comportement, mais que l'on ne peut analyser*”:

A. *Caractère des phénomènes dits affectifs.*

B. *Ensemble des sentiments et des émotions.*

C. *Faculté d'éprouver, en réponse à une action quelconque sur notre sensibilité, des sentiments ou des émotions* [3].

We thus deduce that affectivity is directly related to feelings and emotions. The affects constitute here a large category including other subcategories which are the feelings and the emotions which serve to mark the subjectivity of the speaker. They

are usually tried and tested and displayed abundantly in everyday life. And everyone has their own way and means of expressing themselves and externalizing their feelings and emotions.

### 3. *Expressiveness and expressive function.*

With regard to expressiveness, it should be noted that the study of this question and its linguistic manifestations leads to the confrontation of several difficulties, especially when it comes to defining this notion and its relationship with other notions belonging to the same field, in this case feelings and emotions. This is a confusing phenomenon, difficult to delimit both from the point of view of identification and expansion. It is a very vast field so that some researchers do not limit it exclusively to its linguistic dimension thus Raymond Ruyer, in an article in *Revue de métaphysique et de morale* (1955), begins by treating the question of the expressiveness of things as a starting point before talking about that of language.

*Expressiveness* or expressive function is a question focused essentially on language offering the speaker the necessary linguistic processes allowing him to mark his subjectivity and his enunciative presence. Expressiveness is, therefore, one of the functions of utterance which refers to subjectivity, affectivity and in particular to the emotionality of the enunciator [4, p. 139]. In fact, being able to be associated with various fields and various operators, we notice that the question of expressiveness is still imprecise, it is a question that always remains ambiguous and problematic because of the magnitude of its manifestations and its meaning. The language sciences seem not to be able to do without this concept while remaining incapable of fixing a permanently fruitful definition of it.

In fact, the notion of expressiveness continues to nourish research on linguistic processes allowing the speaker to express and mark his presence in the utterance to slide later to that of subjectivity. Bally says that “any fact of language associated with an emotion would be expressive” to note, moreover, all the ambiguity because he shows that the emotion conveyed by any sentence can arise either from the content of the sentence, or from the way in which it is stated, or from the situation of enunciation, which would in sum, according to him, three types of expressiveness [5, p. 113]. Moreover, developing a typology of emotions is also not a simple matter, even for psychologists. We will not dwell only on the notion of expressiveness, which has been extensively studied in the three volumes of *La fonction expressive* published in *Presses Universitaires de Franche-Comté*, where the authors have tried to put into perspective the relationship between expressiveness, emotions and language.

Plantin sees that an emotion can present itself as dynamic, externalized, uncontrolled (being struck, broken with emotion, being crimson with emotion) or internalized (ruminating on one's emotions) and controlled (concealing, mastering one's emotion). He adds that, in certain contexts, emotion, being linked to the idea of movement, presupposes the existence of an object towards which it is directed. It

constitutes, therefore, a reactive conduct often unconsciously translated by the body. It was born following an external trigger or an internal feeling.

In the table below (Table 1), Ch. Plantin (2005) summarizes the evaluation of the studied terms according to their psychic (*psychique*), intellectual (*intellectuel*), physiological (*physiologique*), mimo-postural-gestual (*mimo-posturo-gestuel*), behavioral weight (*comportemental*), their relationship to consciousness (*rapport à la conscience*) and to the internal or external origin (*origine*) of the stimuli that cause them (Table).

Table – Evaluation of the terms likely to designate the field of emotions

	psychique	intellectuel	physiologique	mimo-posturo-gestuel	comportement action	rapport à la conscience	origine
affect ( <i>affect</i> )	++	+	?	-	-	-	externe
émotion ( <i>emotion</i> )	+	-	+	+	+	+	externe
humeur ( <i>mood</i> )	+	-	+	+	?	-	interne
passion ( <i>passion</i> )	+	-	-	-	++	-	interne
sentiment ( <i>feeling</i> )	+	++	++	?	-	++	interne
éprouvé ( <i>sense</i> )	?	-	-	?	-	++	int./ext.

The analysis of the table shows that emotions and feelings, although they belong to the same category, namely that of affects, have both common criteria and different and distinctive criteria. We find that both affects have the same psychic weight. However, they do not have the same origin, if the feeling is an internal psychic state, the emotion often constitutes a reactive conduct born following an external trigger (even if some emotions are born following an intense inner feeling). Moreover, the table illustrates well that feelings do not lead to any mimo-gestural or behavioral manifestations, as for emotions, they are rather verbalized through gestures and reactions affecting the behavior externalized by the body. As for their relationship with consciousness and the intellect, we observe that feelings rather belong to consciousness while emotions are unconscious and involuntary states, which may explain a priori their punctuality and non-durability. In fact, what characterizes feelings is a pleasant or unpleasant state in relation to a reference object in the external or internal environment of the individual and especially the absence of physiological activation as in the field of emotion. We retain the feeling as one of the components inherent in the emotional process.

The two terms *sentiment* (feeling) and *émotion* (emotion), belonging to the same lexical field as that of *affects*, are two complementary terms even if they have some differences. Some dictionaries define them as being the result of each other. The emotion, which is generally a reactive externalization of a feeling, can then be considered as the culmination and the result of this feeling. In other words, a feeling can be the trigger of an emotion that will have external manifestations that will influence our behaviors and our reactions. It is for this reason that emotion, as a reactive behavior, often constitutes the verbalization and externalization of a feeling. It constitutes a psychological and physical reaction triggered following a feeling experienced by the experiencer (it is the one who experiences the feeling). In fact, various factors enter into the functioning of an emotion such as intensity, duration, the cognitive component (dialogue with reason), the physical component (somatic markers), the stimulation it produces towards action (vigorous impulse or no impulse). In most dictionaries, these two terms are presented as synonyms, having as their equivalent essentially the terms affection, emotion, sensation, meaning, impression, emotion, feeling, etc. The word 'émotion', quite generic, is often used as a hyperonym to indicate the very varied modalities of affective involvement. The hyponyms of *émotion*, *sentiment*, *affection*, *éprouvé*, *passion*, *humeur* (emotion, feeling, affection, experienced, passion, mood) are comparable on the basis of a series of parameters of which we can cite the depth, the duration, the intensity, the presence/absence of somatic markers (small pleasant or unpleasant physical reactions).

In summary, we emphasize that the study of the field of affects in French, just at the level of definitory criteria, constitutes a problematic and complex question. This complexity is, at first glance, due to the multiplicity and variety of notional fields associated with this field. We noticed that almost most of the terms (*subjectivité*, *expressivité*, *affect*, *sentiment*, *émotion* (subjectivity, expressiveness, affect, feeling, emotion)) were defined using the same vocabulary, what differs them is rather the factors that intervene in their formation. Feelings and emotions are potentially attached to subjectivity and expressiveness of which they constitute traces and means of expression. These two categories can be verbalized in various ways. They are intrinsically linked to language and by extension to speech. They can be grouped under the term *affect*, as being a psychological data, which can rule out any possible ambiguity in the differentiation of the terms *sentiment* (feeling) and *émotion* (emotion). The phenomena that we have just compared can be considered as different manifestations of the same reality, because the differences that allow us to conceptually separate an emotion from an experienced one or a mood from a feeling often coincide with a varied dosage of the same elements. The differences persist in particular at the level of manifestations. Rather, they differ in intensity, duration, somatic component, etc. Emotion manifests itself at the linguistic level in different ways: choice of words, intonation, exclamation, etc. It encompasses all the phenomena of emotional life and refers in a way to feelings.

The linguistic manifestations of emotion lead to both the richness and the complexity of this field. Emotion and language are integrated into the notional networks necessary for the elaboration of an idea in a given context and for its expression by means of speech. The question of putting into perspective the relationship between emotion / language and emotion / speech proves essential for our work, which had as its main objective the study of the linguistic dimension of emotions and not their psychological dimension.

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## ENHANCING STUDENTS' MOTIVATION TO LEARN FOREIGN LANGUAGES IN HIGHER EDUCATION INSTITUTIONS

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**Abstract.** The article is devoted to identifying reasons for ineffective studying foreign languages in universities and the methods of improving the efficiency of teaching. The students' survey found the reasons for low students' motivation: the lack of practical implementation of foreign languages in a future profession, a shift towards grammar-translation methods of teaching and a low level of international integration in the professional environment in Russia. The authors describe interactive methods of teaching as a must for increasing students' motivation.

**Keywords:** higher school, foreign languages, motivation, interactive methods, communicative learning.

## ПОВЫШЕНИЕ МОТИВАЦИИ СТУДЕНТОВ ВЫСШИХ УЧЕБНЫХ ЗАВЕДЕНИЙ К ИЗУЧЕНИЮ ИНОСТРАННОГО ЯЗЫКА

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**Аннотация.** Статья посвящена выявлению причин нерезультативного изучения иностранного языка в высших учебных заведениях, их исследованию и поиску способов и методов повышения эффективности образовательного процесса. Анкетирование студентов определило причины недостаточной мотивации студентов: отсутствие практического примера применения знаний иностранного языка в будущей профессии, смещение в сторону грамматико-переводного метода преподавания и низкий уровень международной интеграции в профессиональной среде в России. Рассматривая преимущества интерактивных методов обучения, авторы описывают возможности их применения на практике при обучении будущих юристов с целью повышения мотивации к изучению иностранного языка.

**Ключевые слова:** высшая школа, иностранные языки, мотивация, интерактивные методы обучения, коммуникативное обучение.

In today's world, there is a growing spread of globalization, which every year is increasingly penetrating all spheres of society. The professional field is one of the main areas where the influence of a foreign language, mainly English, as a mean for

international integration. can be traced especially significantly. Nowadays, the English language, being an obligatory element of the curriculum, is taught at the higher educational institutions of the Russian Federation both in linguistic and non-specialized spheres. However, along with other non-core disciplines, students lack motivation to learn it. The low level of students' motivation is the reason for the low effectiveness of educational process.

This problem is both a normal phenomenon and a failure of the educational system. On the one hand, students are supposed to be responsible for the quality of the material they learn on their own, on the other hand, the existence of teaching inefficiency should not be ignored, as the quality of education affects future professional activity in Russia.

To determine the level of motivation for learning foreign languages, we conducted a survey of 168 students of Faculties of Law and Public and Municipal Administration of Moscow, Vladikavkaz and Volgograd higher schools in social networks, using Google forms. Considering the reasons for students' low motivation to learn a foreign language and the results of the survey, we can identify several most common psychological aspects.

First, the lack of basic knowledge of the language obtained earlier, such as in school, is a significant reason. If in the academic environment there is a significant differentiation in the level of initial knowledge of the language studied, it is likely that students will be "lost" in the information flow and, as a result, will be focused on avoiding, rather than assimilating the material.

This reaction is due to human psychology: as long as the task seems feasible, it is approached consistently and with some interest, but as soon as it goes beyond the person's capabilities, a protective mechanism is activated, which pushes them to minimize contact with the irritant. It leads to emotional aversion, lack of motivation to solve the problem, as well as the search for ways to avoid the problem.

Secondly, students' motivation is significantly influenced by predictive perceptions of the future. Students often do not see a practical example of linguistic skills application in their profession. The reason for this may be a low level of awareness about both the real content of professional functions in the training profile and about the prospects of development in the profession.

In social networks we also conducted a survey of students working in areas involving communication with customers or clients, among whom there may potentially be foreigners. The respondents included restaurant administrators, customer service managers, middle managers and service workers in Volgograd, Moscow, and Vladikavkaz.

The research showed that the level of wages in most cases does not depend on knowing a foreign language. Employers are not interested in or do not attach importance to this skill when hiring. This indicates a low level of international integration in the professional environment of the Russian Federation. Such a problem has two sides. Due to the low demand, the training of specialists with foreign language skills is not popular, leading to a shortage of such specialists in the labor market, which over time is perceived as the normal state of the sphere.



In addition, teaching methods have a significant impact on student motivation. It is generally recognized that foreign language teaching in higher educational institutions emphasizes grammatical skills of students. Instead of a balance of conversational skills and theoretical knowledge, there is a shift towards the latter.

This approach does not seem interesting to students and directly reduces the motivation for studying. Furthermore, it strengthens the communicative uncertainty of students. Often students who do not experience any particular difficulties in writing their thoughts in a foreign language are completely deprived of their conversational skills due to internal restraining attitudes formed because of the fixation on the grammatical fidelity of the sentence being built.

Based on the above reasons, there are several ways to increase the students' motivation. Despite the general low level of international integration in the business sphere of Russia, in many cases knowing several languages is regarded by employers as an advantage for a candidate when applying for a job. The skill will affect both the field of activity of such an employee and their remuneration. According to a study by experts from the National Research University Higher School of Economics, the salary of a professional fluent in a foreign language is on average 27 % higher than that of the colleagues. The percentage is due, among other things, to the difference in professional areas. So, for representatives of blue-collar jobs, language skills are not of particular importance, meanwhile, for office workers, as well as for senior and middle managers, the difference can be significant – 20-50 % [1].

In addition to the obvious advantages indicated, speaking a foreign language has an impact on general business and personal qualities. On the one hand, such a skill develops sociability, general erudition, the ability to find creative and non-standard solutions to problems, as well as many other skills. On the other hand, it simultaneously serves as a psychological indicator of the existence of such qualities for the employer and colleagues [2, p. 22]. Often a person who speaks several languages gives the impression of a more erudite and responsible person, which undoubtedly affects the attitude towards him in the working environment.

The psychological aspect of the influence of knowledge of a foreign language on human behavior in professional activities should not be overlooked. Due to more extensive knowledge, the specialist gains confidence, which significantly improves his communication skills. Such an advantage will be especially significant for people who are directly involved in working with people. Moreover, the so-called communicative competence is developing – the ability to build effective speech activity and behavior that corresponds to the norms of social interaction [3, p. 130].

These facts should be brought to the attention of students through practical examples in the learning process.

Firstly, it seems advisable to devote the first few lessons at the beginning of studying the discipline "Foreign Language" or "Foreign Language of Professional Communication" to introducing the positive impact of learning a foreign language on professional and personal qualities, for example, using information on popular sites such as MOOC.org [4], University of North Georgia [5] or Go abroad [6]. Using these materials, it is possible to develop lexical and grammatical exercises and present information in a useful and exciting context.

Secondly, it is important to create a more engaging and interactive learning environment for students. Instead of relying solely on traditional lectures and grammar exercises, teachers can incorporate games, role-plays, discussions and other interactive activities into their lessons. These types of activities make the learning process more enjoyable and engaging, which can increase students' motivation to learn.

Thirdly, it is essential to provide students with practical examples of their language skills application in their future careers. Educators may illustrate the beneficial effects of learning a foreign language in thematic lessons devoted to the analysis of specific professions and professional functions in the spectrum of foreign language use. Teachers can also invite guest speakers from various professions to talk about their experiences of using foreign languages in their jobs. Students can also participate in internships or study abroad programs, which provide practical opportunities to use their language skills in real-life situations.

In addition, one should periodically depart from the theoretical format for conducting practical conversational classes, taking into account the simulation of real work situations in a foreign language. Such a format will more clearly show the practical significance of the skills being studied, students will have an idea of the goals of the work being done and will gain confidence in its practical usefulness.

We consider that using interactive methods in teaching will definitely increase students' motivation as they help students to search, explore, find the material they are going to learn, discover solutions to problems on their own, process knowledge and learn how to work independently. Practical application of interactive methods and techniques in the teaching process has allowed us to identify the most successful ones which can be used in classes with future lawyers.

The "Pyramid" or "Snowball" method is based on a mixture of individual and cooperative activities within the group. The main point is to include the opinion of each member of the group in solving a more global problem or issue [7].

The "Diamond" method helps students describe a character. They are offered a noun (symbol) and then, having read the text, they need to find two adjectives that describe this word, three verbs, one sentence, a gerund or a synonym for a noun in the text.

"Calligram" can be used during the systematization of knowledge. Students are offered words and they should arrange them so that the words represent the form that is the object of the proposed topic. For example, students are first given a scheme of the courtroom and the corresponding vocabulary. Then, it is proposed to enter into this scheme other words on the topic studied, and the number of letters must correspond to the number of chairs in the ranks of jurors, places for the public, etc.

The "ATI" method (Answer – Throw – Interrogate) can be used for achieving feedback. The student asks a question about the topic of the lesson and throws a small ball to the student who must answer this question. The one who catches the ball answers the question and throws it to another participant, asking a new question. The student who does not know the answer is out of the game [7].

Brainstorming is the most common method of stimulating creativity in group activities by encouraging all participants to communicate. It can be defined as "a way

to get a large number of ideas from a group of people in a very short time." The expressed ideas cannot be discussed, evaluated or screened out, since a student whose idea is rejected is likely to take it as a categorical refusal and will not want to express any more ideas. For example, when studying the topic "Family Law and Children's Rights," the following problems can be brought up for discussion: "What can the government do to reduce children's stress during parents' divorce?" and "What are the reasons for the deprivation of parental rights?"

Clustering is a teaching method using a graphical way of brainstorming to show relationships and connections between ideas. The cluster is a reflection of a non-linear form of thinking and contributes to the development of students' critical thinking.

The Think – Work in Pairs – Communicate method involves learning through collaborative activity. It encourages students working with a partner to think about the text and its information content, formulate ideas and present them to another pair of students or the whole group.

"Case study" is a teaching method that involves using real-life scenarios that relate to social, economic, political, or other problems. Through analyzing the situation and the issues it presents, students are encouraged to research and explore various fields of knowledge that may be relevant to their future professions. This approach allows future specialists to understand real-life situations, which reflect practical problems and require a certain set of skills and knowledge to solve. However, it is important to note that the problems themselves do not always have a straightforward solution [7]. For instance, students could be presented with a hypothetical scenario involving the drafting of a law that prohibits begging in Norway, and asked to discuss the possibility of implementing such a law in Russia

Another interactive learning method that can be used is the "Gallery Walk". In this method, students are divided into small groups, and each group is assigned a specific task related to a topic or concept. The groups rotate through stations, where each station has information or materials related to the task. The students interact with the materials, discuss their findings and observations, and then move on to the next station. This method encourages student collaboration and discussion, and also allows for a variety of learning styles to be addressed.

In addition to these specific methods, there are also general principles of interactive learning that can be applied in any classroom. For example, incorporating technology into lessons can enhance student engagement and allow for interactive experiences, such as online quizzes or interactive simulations. Providing opportunities for student choice and autonomy, such as allowing them to choose their own research topics or projects, can also increase engagement and motivation.

Overall, using interactive learning methods can have numerous benefits for students, such as increasing engagement, promoting critical thinking and problem solving, and improving collaboration and communication skills. By incorporating a variety of interactive methods and principles into their teaching, educators can create a more dynamic and engaging learning environment for their students.

Based on the phenomena considered, we can conclude that low motivation among students learning foreign languages is a common problem in higher education

institutions in Russia. However, there are several reasons for this, including the lack of basic knowledge of the language, the lack of perceived practical application in their future careers, and the teaching methods used. To increase students' motivation to learn foreign languages, it is necessary to provide practical examples of how language skills can be applied in their future careers, create a more engaging and interactive learning environment, and highlight the advantages of knowing a foreign language, including increased job opportunities and higher salaries. the program of teaching a foreign language should be personalized in more detail for a specific learning profile, as well as become more practically applicable.

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## PROSPECTS FOR THE PROFESSION OF WEB DESIGNER IN TODAY'S LABOR MARKET

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**Abstract.** The article describes the importance of the web design profession in today's job market, citing key skills that a designer should possess. Different examples and trends in design today are discussed and examples of their use are given with comparison with examples from earlier times. The article also provides information about the prospects of the web designer profession in today's labor market and helps decide on the choice of career path.

**Keywords:** design, profession, career development, UX designer, web designer, graphic designer, freelancing.

## ПЕРСПЕКТИВЫ ПРОФЕССИИ ВЕБ-ДИЗАЙНЕРА НА СОВРЕМЕННОМ РЫНКЕ ТРУДА

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**Аннотация.** В статье описывается важность профессии веб-дизайнера на современном рынке труда, приводятся ключевые навыки, которыми должен обладать дизайнер. Рассматриваются различные тенденции в дизайне на сегодняшний день и приводятся примеры их использования в сравнении с примерами более раннего времени. В статье также представлена информация о перспективах профессии веб-дизайнера на современном рынке труда, что помогает определиться с выбором карьерного пути.

**Ключевые слова:** дизайн, профессия, карьерный рост, UX-дизайнер, веб-дизайнер, графический дизайнер, фриланс, веб-сайт.

In today's world, where more and more people are spending time online, web designers play a key role in creating quality and attractive websites. A web designer is a professional who creates the design and visual presentation of a website with the

needs and expectations of users in mind. He or she should be able to create a unique and functional design that not only attracts the attention of users, but also ensures the usability of the website. This profession is in constant evolution and change. Today's job market requires web designers not only the ability to create beautiful and functional sites, but also to constantly learn new technologies and adapt to changing customer requirements [1].

The importance of web design in our lives is increasing day by day. Websites are used to promote a brand, sell goods and services, share information and much more. Therefore, web designers are an integral part of modern business and play a key role in the success of any company. Web design plays a huge role in today's world, as most people use the internet to search for information, buy goods and services, communicate and have fun. The quality of website design can have a significant impact on site traffic, conversion rates and user satisfaction. Today's design work is very different from what you might have seen before. A comparison of examples of old web design with modern design can be seen in Figure 1 [2].

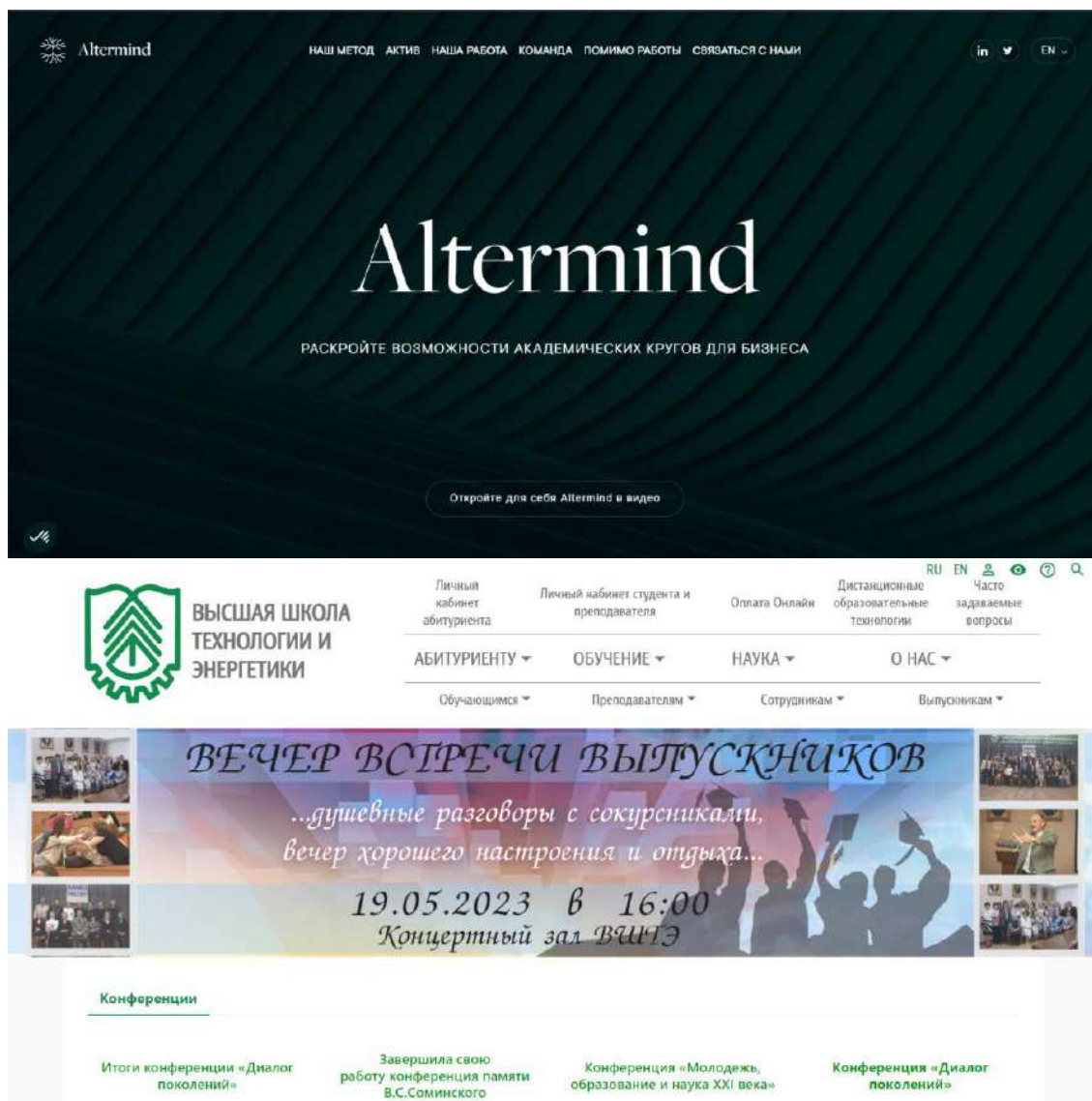


Figure 1. Comparing examples of old web design to modern web design

One of the main problems web designers face is the difficulty of creating a unique design that meets client expectations and site objectives. In addition, it is necessary to take into account SEO requirements and optimize the site for search engines, which can also be a difficult task.

Another challenge is teamwork. Web designers often work with other professionals such as developers, marketers and project managers. This can be difficult, especially if team members have different design visions. But despite these challenges, the web design profession remains in demand and promising. Every year, more and more companies realize the importance of having a quality and functional website, which opens up new opportunities for web designers.

However, along with the growth in demand, the demands placed on a good designer are also growing. At the moment, an experienced web designer must have the following skills:

1. Knowledge of the basics of design: a web designer should have an understanding of the basics of design, such as colors, composition, typography, proportions, and more.

2. Ability to work with graphics editors: a web designer should be able to work with graphics editors such as Adobe Photoshop, Sketch, Figma and others.

3. Knowledge of markup languages: a web designer should know the markup languages HTML and CSS in order to create and style web pages.

4. Ability to work with CMS: A web designer must be able to work with various content management systems (CMS) such as WordPress, Joomla, Drupal and others.

5. Experience with UX/UI: A web designer should have experience with UX/UI to create user-friendly and intuitive interfaces for users.

6. Ability to work with animation: a web designer should be able to create animated elements to make the site more attractive and interactive.

7. Knowledge of security principles: a web designer should have an understanding of security and data protection principles in order to create sites that are protected from hacking and malicious attacks.

8. Ability to work in a team: a web designer should be able to work in a team with other specialists such as developers, marketers and designers.

9. Up-to-date knowledge: a web designer should constantly update his knowledge and follow new trends in web design in order to create modern and effective websites.

These are just some of the requirements for a web designer in today's job market, which is constantly changing and evolving. It is important not only to have the knowledge and skills, but also to be able to put them into practice.

One of the main web design trends in today's market is adaptive design. With more and more people using mobile devices to access the internet, web designers need to consider different devices and their permissions when creating websites. Another important trend is to create a user-friendly and intuitive interface that allows users to quickly and easily find information or perform necessary actions. This includes proper placement of elements on the page, the use of clear and comprehensible names and descriptions, and the ease of navigating the site.



Finally, web design should be accessible to people with disabilities to ensure equal access to information and services for all users. This includes the use of special technology and tools for people with visual, hearing or motor disabilities.

Unfortunately, because of the high demand for this profession, it is often difficult to find clients, so to become a successful specialist in this field, you need to have experience in a related occupation from one year, portfolio, which will demonstrate all the skills and experience, it is often necessary to learn 3D modeling and know the basics of animation, in addition, the web designer must be creative, attention to detail, be able to work with large amounts of information and quickly adapt to new technologies and market requirements. Drawing skills are of great importance. If a good web designer has basic drawing skills and an understanding of composition, his work can reach a whole new level. An example of work using hand-drawn drawing can be seen in Figure 2 [3].



Figure 2. Example of work using a hand-drawn drawing

Also nowadays minimalistic and simple design with correct accents is getting the most attention, often interactive elements are used which make the final product more interesting and fascinating, large background images or videos are often used which create the effect of presence and help to attract the attention of users. In addition, more and more sites use non-standard fonts and colors, which makes them more memorable and unique. With the development of artificial intelligence and machine learning, the personalization of content on the site depending on the interests of the user is gaining popularity. This can be the use of recommendation systems or analysis of user behavior on the site. An example of a design with emphasis placement can be seen in Figure 3 [4].





Figure 3. Example of an accent design

Despite the difficulties faced by novice designers, many people in one way or another associate their lives with this direction, which is not surprising, because for the designer there are many opportunities for career advancement. Here are some of them:

1. Design team leader: a designer can move up the ranks and become a design team leader. This allows him or her to oversee the website creation process and lead the team to success.

2. UX designer: UX designer is in charge of creating interfaces that are as user-friendly as possible. A designer can switch to this specialization and become an expert in user experience.

3. Web Developer: a designer can learn programming and become a web developer. This will allow him to create not only the design, but also the functionality of websites.

4. Graphic Designer: a designer can focus on creating graphic elements such as logos, brand books, banners, etc.

5. Freelancing: a designer can start working as a freelancer and provide his services on a remote basis. This will allow him to work with different clients and projects, as well as manage his time and work schedule.

6. Training: a designer can become a teacher in the field of web design and transfer his knowledge and experience to the next generation of designers [5].

In general, the profession of web designer in today's labor market remains promising and in demand. Despite the challenges associated with creating unique design and teamwork, web designers have the opportunity to evolve and adapt to the changing demands of clients and technology.

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## FORMATION, OPERATING AND GROWTH OF THE REGIONAL BANK SERVICES MARKET IN THE BELGOROD REGION

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**Abstract.** This article discusses the regional banking services market of the Belgorod region, its development and current state. The study examined the dynamics of attracted funds of legal entities, individuals and individual entrepreneurs. The analysis of the dynamics of loans issued to legal entities, sole proprietors and small and medium entrepreneurship was carried out, as well as the structure of allocated funds was also identified.

**Keywords:** banking services market, banking system, funds raised, allocated funds, deposit.

## ФОРМИРОВАНИЕ, ФУНКЦИОНИРОВАНИЕ И РАЗВИТИЕ РЕГИОНАЛЬНОГО РЫНКА БАНКОВСКИХ УСЛУГ БЕЛГОРОДСКОЙ ОБЛАСТИ

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**Аннотация.** В данной статье рассматривается региональный рынок банковских услуг Белгородской области, его развитие и текущее состояние. В ходе исследования была изучена динамика привлеченных средств юридических лиц, физических лиц и индивидуальных предпринимателей (ИП). Проведен также анализ динамики выдаваемых кредитов юридическим лицам, ИП и субъектам малого и среднего предпринимательства, выявлена структура размещенных средств.

**Ключевые слова:** рынок банковских услуг, банковская система, привлеченные средства, размещенные средства, депозит.

The development of the banking services market at the regional level is determined mainly by the level of business activity of individual economic systems, which is detected based upon statistical evidence of the Central Bank (CB) and Rosstat.

The urgency of examining this theme is selected by the necessity to reveal the development prospects of services for commercial organizations in the region, which

have both economic and social significance. The evaluation of the regional aspects of the evolution of credit institutions makes it possible to identify development trends of banking services not only within a given region, but also within the integral financial system of the whole country.

Evaluation by independent rating analysts is one of the main indicators of banks stability. If a financial institution is open to the maximum number of national and international agencies, this is positive evidence that shows the transparency and financial stability of this institution. The more analysts evaluate a particular company, the less chance that an important point in reliability assessment will be missed.

Data on cash receipts and turnovers are updated monthly. Banks rating in terms of reliability is compiled according to the data of the CB. The ability of a particular institution to fully fulfill its obligations to both individuals and legal entities is taken into consideration. The CB carefully checks compliance of institutions with certain indicators.

The rating of banks in the Russian Federation, compiled by the CB, is considered fundamental. This body provides a unified state monetary policy. The list compiled by this structure may concern not only banks, but also non-state pension funds and insurance companies. It is created on the performance of financial statements and the output of the institutions.

Before choosing a financial institution, it is recommended to focus on whether it is a member of the state deposit insurance. The larger the founders are, the more reliable the financial institution is. Attention should be drawn to organizations with domestic capital that service the largest industrial enterprises in Russia.

As at January 1, 2023, there are 342 institutions of the banking sector in the Belgorod Region, involving 1 establishment of the CB, 1 lending institution, 3 branches of lending institutions and 337 additional offices of credit organizations. Compared to 2022, the number of institutions of the banking system of the Belgorod region decreased by 3, and compared to 2021 – by 30 [1]. The drop in the number of banks can be associated with the policy of the CB, targeted improving and strengthening the banking sector and consists in liquidation of unreliable and unstable banks.

Deposits of individuals and legal entities remain primary source of increase in bank resources in the region. Moreover, the share of deposits of legal entities is 22 %, and individuals – 63 %. In the Belgorod Region, credit institutions attracted funds from organizations, bank deposits (investments) and other assets received from legal entities and individuals in the amount of 435,691 million rubles, which is 0.87 % of the total amount gained from clients in the Central Federal District (5th place) and 0.53 % in the country (26th place) [2].

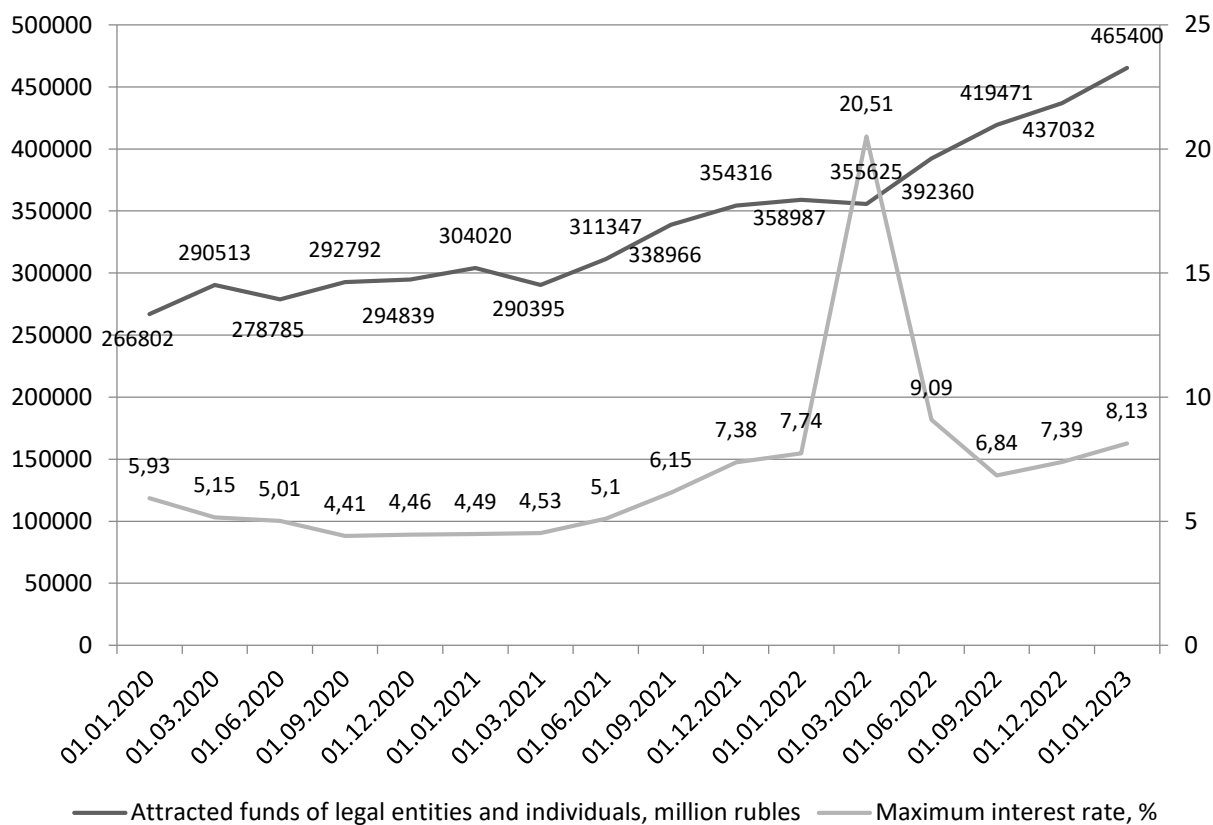


Figure 1. Dynamics of attracted funds and the maximum interest rate, 2020-2022 [1]

Based on the graph data (Figure 1), we can talk about a positive trend in the volume of attracted funds from legal entities and individuals. At the same time, at the beginning of 2023, the total amount of deposits amounted to 465.4 billion rubles, (29.6 % more than in previous month). In March 2022 the decrease in the value of deposits by 3.4 billion rubles took place. To restore the attractiveness of deposits, the CB raised the average maximum rate in the ten largest banks in the country to 20.51 %. This made it possible to increase the amount of attracted funds by 36.7 billion rubles. (by 10.3 %). In total, Belgorod residents returned 4.4 billion rubles in March, which amounted to over half of the funds withdrawn in February [3].

In addition, the positive dynamics of deposits may be associated with increase in public confidence in banking services. According to a joint letter from the CB and the Federal Antimonopoly Service on the disclosure of information on financial products on the websites of banks and other financial organizations, since last October, banks are required to indicate all the terms of the deposit in a simple and visual form – a standard table, now they will have to abandon the practice, which is misleading and leads to infringements in the field of competition. The consumer should immediately see the size of the minimum guaranteed rate on the deposit, and not just the high rate highlighted in bright and large print [1].

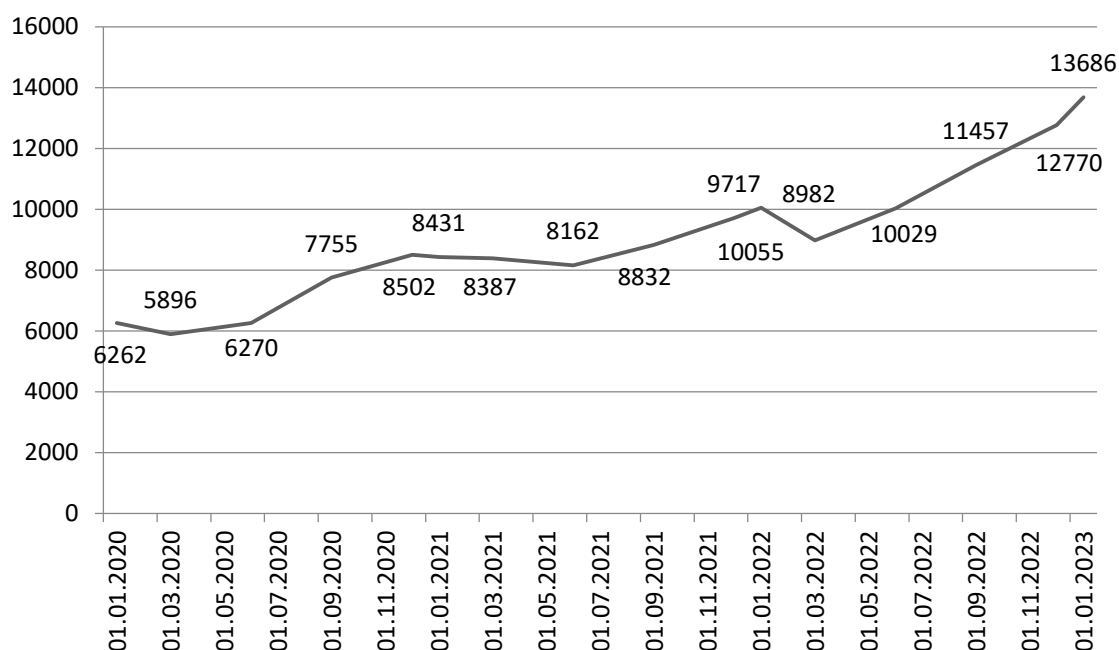


Figure 2. Dynamics of funds raised by individual entrepreneurs, 2020-2023, million rubles [1]

Based on the chart (Figure 2), at the beginning of 2023, the total amount of individual entrepreneur deposits in banks of the Belgorod Region amounted to 13.7 billion rubles, which is 36 % more than last year. The implementation of a 20 % maximum rate for the ten largest banks by the CB allowed the individual entrepreneurs to increase the volume of deposits at the beginning of 2023 by 4.7 billion rubles. (52.4 %) compared to March 2022.

In total, at the beginning of 2023, the volume of placed customer funds amounted to 19 billion rubles, which is 8.9 billion rubles less in comparison with the beginning of 2022 (31.8 %). The dynamics of amount of loans is shown in Figure 3.

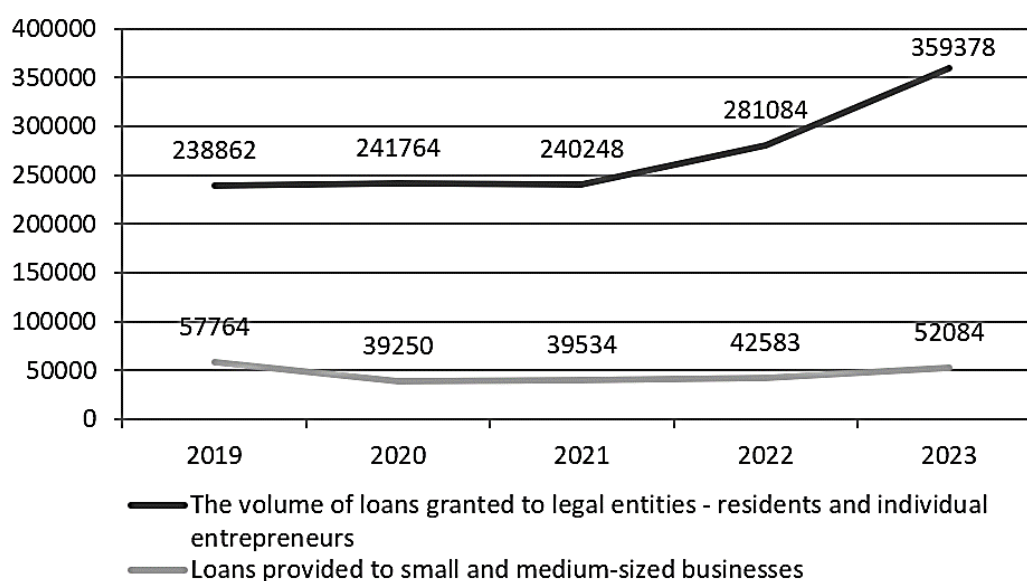


Figure 3. Dynamics of loans, 2019-2023, million rubles [1]

The Figure 3 shows the rise of the volume of credits among legal entities and sole proprietors in 2023. The difference is 78 billion rubles, and the maximum number is 359 billion rubles. The main part of the funds is directed to the manufacturing sector – 50.6 %. The second part goes to agriculture with forestry – 21.9 %. Wholesale and retail trade; repair of vehicles, motorcycles, etc. is on the third place – 14.3 % [4].

Percentage of loans to small and medium enterprises of the Belgorod region in the total volume of loans issued was less than 15 %. In 2023, loans in the amount of 52 billion rubles were issued to small and medium entrepreneurship, which is 22 % more than in 2022. 8.5 billion rubles from this sum was received by individual entrepreneurs [5].

Thus, the bank deposit remains the main source of attracting clients' funds in the Belgorod Region. This instrument is more reliable than investment products, since funds on deposits are insured by the state in the amount of up to 1.4 million rubles. Besides, the CB is implementing policies to enhance financial products sales.

The banking services market of the Belgorod region is gradually neutralizing the consequences of the financial crisis. However, the problem of high levels of arrears remains. The largest arrears are observed in the food production and agricultural industries. Therefore, the task is, on the one hand, to weaken the bank's requirements for loans, and to maintain and increase the profitability of the banks.

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## ALTERNATIVE ENERGY AS A TOOL FOR ENSURING THE DEVELOPMENT OF SMALL ARCTIC TERRITORIES

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**Abstract.** Recently the Arctic and its oil and gas potential have been increasingly discussed. Different departments call the Arctic the world's center of business attraction. In spite of this, heavy hydrocarbons are still used locally for energy supply, which has a negative impact on the environment. Therefore, reliance on renewable energy sources (RES) in the small territories of the Arctic zone is a good alternative to traditional energy sources.

**Keywords:** alternative energy, energy supply, the Arctic, renewable energy sources, energy systems.

## АЛЬТЕРНАТИВНАЯ ЭНЕРГЕТИКА КАК ИНСТРУМЕНТ ДЛЯ ОБЕСПЕЧЕНИЯ РАЗВИТИЯ МАЛОЧИСЛЕННЫХ ТЕРРИТОРИЙ АРКТИКИ

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**Аннотация.** В последнее время все чаще обсуждается Арктика, ее нефтегазовый потенциал. Разные ведомства называют Арктику мировым центром притяжения бизнеса. Несмотря на это, для нужд энергоснабжения локально еще используются тяжелые углеводороды, что отрицательно сказывается на экологии. Поэтому ставка на возобновляемые источники энергии (ВИЭ) в малочисленных территориях Арктической зоны является хорошей альтернативой традиционным источникам энергии.

**Ключевые слова:** альтернативная энергетика, энергоснабжение, Арктика, возобновляемые источники энергии, энергосистемы.

The main source of energy at the current stage of energy development is organic fuel, the share of which in the energy balance of the country is more than 90 %. Combustion of fossil fuels leads to dangerous environmental consequences, pollution of the atmosphere. Therefore, since the second half of XX century more and



more attention is paid to the environmental aspects of energy and the development of clean energy production.

Sustainable development of small territories assumes their stable socio-economic development, increase of production volume, increase of economic efficiency, achievement of full employment of the population and improvement of their living standards, as well as rational use of land.

The extraction of hydrocarbons in the Arctic is extremely difficult, risky and expensive. Today there are no particularly effective technologies for dealing with oil spills in ice conditions in order to quickly and efficiently deal with a large spill in emergency situations. It is no coincidence that drilling on the Arctic shelf during (Figure 1) the ice season is prohibited in the United States [1].



Figure 1. Drilling on the Arctic shelf

The discussion of the development of the Arctic region considers its potential in terms of hydrocarbon production and transport development. But there is an important conflict here: oil extraction and transportation is a source of threat to the ecosystem. Any activity in the Arctic, especially oil and gas extraction, requires serious preliminary work. Since the task of protecting the environment is enshrined in the agreement signed by all Arctic countries on readiness to eliminate oil spills in the Arctic.

The Arctic contains approximately 30 % of the world's gas reserves and 13 % of oil reserves. According to the Russian Ministry of Energy, explored oil reserves in the Russian Arctic amount to 7.3 billion tons, gas – 55 trillion m<sup>3</sup>. And almost all this volume is licensed and involved in exploration and development at different stages [2].

It is obvious that the development of such volumes of hard-to-recover resources, and even in difficult weather conditions, will require effective solutions for energy supply not only to facilities at the fields themselves, but also related infrastructure, including in small towns.

At the moment, the energy industry in the Arctic region is built mainly on the use of fuel and lubricants, which are consumed by diesel-electric power plants. Coal, fuel oil and wood are also used for heating purposes, which has a negative impact on the environment. In addition, some of these energy carriers are imported as part of the northern delivery.

Therefore, betting on RES in the Arctic zone is a good alternative to traditional energy sources. Despite the fact that the construction of RES facilities in our country is more expensive than traditional energy facilities due to the lack of large-scale equipment production, it is still economically justified in the Far North. The fact is that it is practically impossible to reach the remote northern regions with power grids or they will turn out to be "golden".

Electricity tariffs in the isolated power supply systems of the Far North today are 22-237 rubles/kWh, which is 5-55 times higher than the average in Russia. At the same time, for comparison, if we take the average price of electricity in the area of centralized power supply in the country – it is 3-5 rubles per kWh for the end consumer [3].

The development of technologies for the use of alternative energy in the Arctic territories will allow:

- identify ways to develop the industry on the basis of renewable energy sources, to choose the most optimal combination of different types of energy;
- demonstrate the opportunities for development of the Arctic zone on the basis of alternative energy, and demonstrate the opportunities and consequences of rebuilding the Arctic region on the basis of extensive use of wind, water, and solar energy;
- show that the introduction of alternative energy will reduce the region's dependence on external energy sources, improve the environmental situation, reduce the likelihood of man-made disasters, create a more favorable social climate, cause the development of related economic sectors, and become the basis for modernizing society and sustainable development of the region.

The potential for RES development in the Arctic is enormous and equals almost 15 times the consumption of the entire country. The range of potential consumers is very wide, including power supply for navigation beacons and buoys, cellular and radio-relay stations, local radio and television broadcasting systems, equipment for airfield services and ground meteorological stations, etc. [4]. However, despite the obvious advantages of RES, in order to provide electricity to sufficiently large objects it is necessary to use additional generating capacities operating on traditional hydrocarbon fuel. Therefore, on the one hand, they cannot depend on the irregularity of solar and wind energy, and on the other hand, they have an insignificant harmful impact on the environment. So unconventional power plants can have inexpensive backup power generators with internal combustion engines that use carbon fuel.

Risks and threats in the energy sphere of the Arctic zone should be emphasized separately. The "Strategy for Development of the Arctic Zone of the Russian Federation and National Security" highlights the following problems in the development of the Arctic territory of Russia [4]:

- remoteness from industrial regions, including high dependence on imported fuel;
- depreciation of fixed assets in the energy sector;
- underdevelopment and imbalance of the energy system;
- high energy intensity;
- high cost of electric power.

Without reliable, system-organized energy supply, it is impossible to solve such strategic task as development of territories of the Arctic zone.

Russia's Arctic territories are facing a significant challenge in the development of alternative energy sources, with the country's energy minister urging the world to take action. The Russian government has been focusing on the development and use of renewable energy sources in the Arctic since the 1990s, but it has not yet decided on a specific strategy. The US has been working with the Arctic Energy Agency to develop a plan to integrate solar panels and solar collectors into the homes of Arctic residents, according to a report published. The project is expected to be implemented in the coming months. The Arctic territories have been a key source of energy for decades, with Russia aiming to use more than half of its energy from renewable sources by 2050.

The UN has also been working on implementing a new plan to use solar panels in the homes and businesses of Arctic people, which will allow them to decentralize energy supply and diversify RES. The plan is also expected to include the installation of solar panels on the homes, which are reliable, easy to operate and require virtually no periodic maintenance [5].

The proposal is also being considered by the UN and the European Commission to implement a comprehensive approach to the development. The EU has also urged the EU to adopt a policy of limiting the use of solar power in the region, which would allow the use to be regulated and regulated (Figure 2).

The European Union has also called for the creation of a regional energy system that could be used to generate electricity from renewable energy. The United States and other countries have also been urged to use the system to generate energy from the Arctic, including the United States, Canada and the United Kingdom.

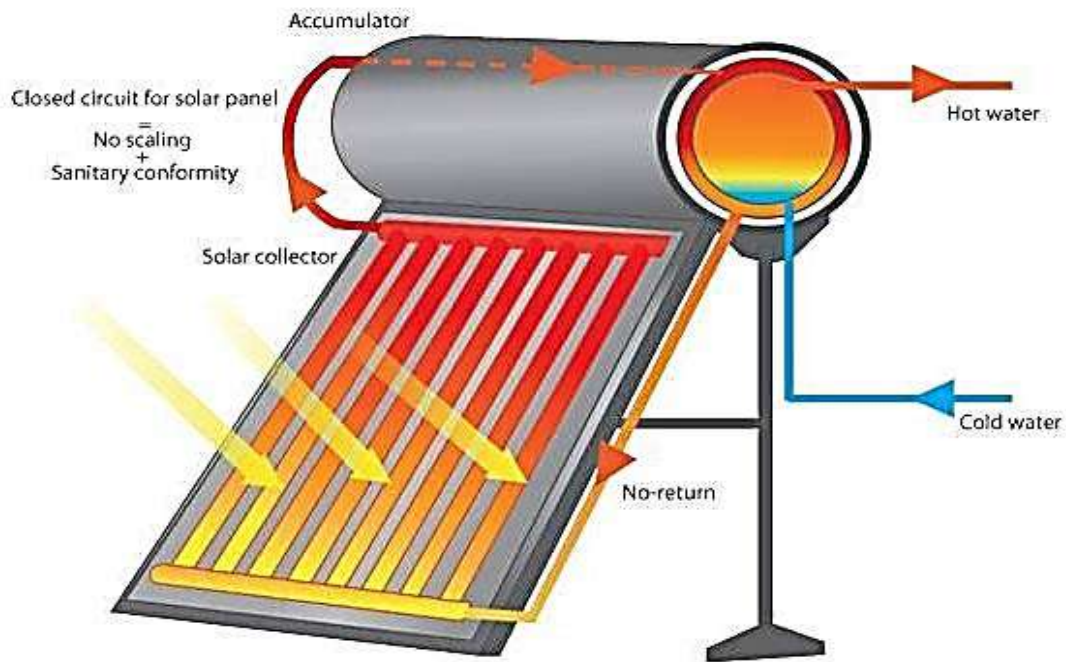


Figure 2. Solar collectors

Regarding the development of wind energy, the introduction of autonomous wind turbines (Figure 3), which do not require constant monitoring and maintenance, is promising and, accordingly, is the best option for power supply of remote facilities from the traditional grid. Autonomous wind turbines are widely used for power supply of private houses, recreation centers in mountainous and steppe areas, individual consumers, as well as navigation, meteorological and other posts with uninterrupted power supply in the field.

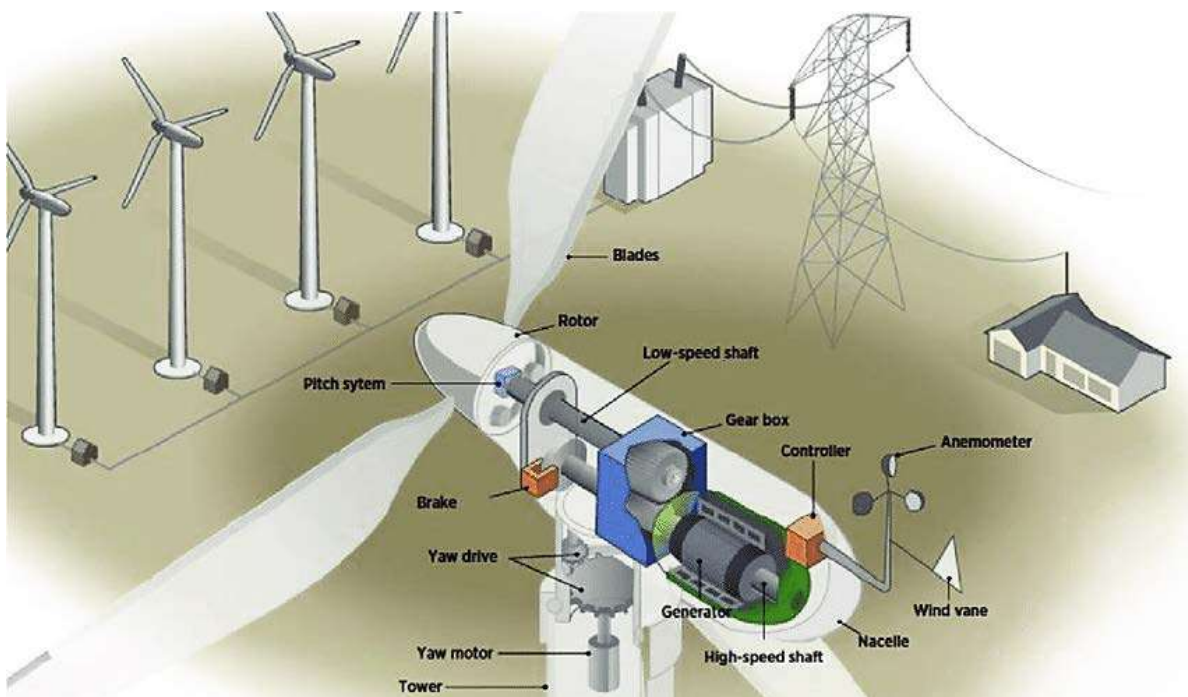


Figure 3. The autonomous wind turbines

Such energy systems based on RES and fuel cells will last long enough and be characterized by ecological safety and higher efficiency as compared with traditional energy sources. In addition, such RES-based energy systems will demonstrate the ability of energy units to operate efficiently under adverse natural and climatic conditions, giving the Arctic's alternative energy industry a "test of strength".

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## INVESTIGATION OF THE CARDANO LATTICE AS A TOOL IN STEM EDUCATION

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**Abstract.** This article is devoted to the analysis of a new system of STEM education. As well as consideration of the application of the principles of message encryption using the Cardano lattice as a tool for the development of children's intelligence. The rules of construction of the Cardano lattice pattern are also considered. The Cardano Lattice is a mathematical tool that has been used in a variety of fields, including mechanics, robotics, and computer science. More recently, it has attracted attention in STEM education as a tool for teaching mathematical concepts and problem-solving skills. This article reviews the literature on the use of the Cardano lattice as a STEM learning tool, discusses its advantages and disadvantages, and suggests potential areas for future research. The article concludes that the Cardano lattice can be an effective tool for teaching mathematical concepts and problem solving skills in STEM education.

**Keywords:** STEM education, permutation coding, Cardano lattice, mathematical education, problem solving skills, mathematical concepts, learning tool, educational technology, robotics, mechanics.

## ИССЛЕДОВАНИЕ РЕШЕТКИ КАРДАНО КАК ИНСТРУМЕНТ В STEM ОБРАЗОВАНИИ

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**Аннотация.** Данная статья посвящена анализу новой системы STEM-образования. В работе также рассматривается применение принципов шифрования сообщений с использованием решетки Кардано как средство для развития детского интеллекта. В статье отражены правила построения шаблона решетки Кардано. Решетка Кардано представляет собой математический инструмент, который использовался в различных областях, включая механику, робототехнику и информатику. В последнее время он привлек внимание в области STEM-образования в качестве способа обучения математическим понятиям и навыкам решения задач. В данной статье проводится обзор литературы по такому использованию решетки Кардано, рассматриваются его преимущества и недостатки, а также предлагаются потенциальные области



будущих исследований. В статье делается вывод о том, что решетка Кардано может стать эффективным инструментом для обучения математическим понятиям и навыкам решения задач в STEM-образовании.

**Ключевые слова:** STEM-образование, перестановочное шифрование, Решетка Кардано, математическое образование, навыки решения проблем, математические концепции, обучающий инструмент, образовательные технологии, робототехника, механика.

Man does not stand still and constantly develops. And in this century, when there is a lot of information flow, it is difficult not to miss useful information. This task should correspond to the modern school, teaching the future generation. But, unfortunately, the traditional education system does not quite match the data, it is outdated. The new STEM education system comes to the rescue in solving this problem.

The purpose of this study is to analyze the STEM education system. As well as the use of detection using detectors using the Cardano lattice, as a means for developing the detection of intelligence. The rules for constructing the Cardano stencil lattice are also considered. In the course of the study, it is necessary to use encryption of text values [1].

STEM education is a system that includes natural sciences and engineering subjects in a single system. This system is application oriented based on this directed attention. These areas are not taught separately, but taught in chains.

The Cardano lattice, also known as the Cardano gear mechanism or the gimbal mechanism, is a mechanical system consisting of two perpendicular rotating shafts that are connected by a set of interlocking gears [2]. The Cardano lattice has been used as a tool in STEM education to help students understand complex mechanical concepts and to encourage them to think critically and creatively about engineering design. In this literature review, we will explore the various ways in which the Cardano lattice has been used in STEM education and discuss its effectiveness as a teaching tool [3].

In a more recent study by Camacho et al. (2021), the Cardano lattice was used as a tool to teach students about the relationship between geometry and mechanical function in engineering design. The authors had students design and build Cardano lattices using different geometries, and then tested the performance of their designs using a custom-built testing apparatus. The authors found that the use of the Cardano lattice was effective in helping students understand the importance of geometry in mechanical engineering design.

Overall, the use of the Cardano lattice as a tool in STEM education has been shown to be effective in engaging students and helping them understand complex mechanical concepts. The Cardano lattice has been used to teach students about gear ratios, torque, precision, degrees of freedom, and geometry in engineering design. Future research could explore the effectiveness of the Cardano lattice in teaching other concepts in STEM education, such as programming, electronics, or materials science.

Modern realities are such that an employer does not need a simple engineer, he needs a person with engineering thinking, who would also have managerial skills and a flexible worldview. All this comes together in STEM.

Traditional education is geared towards literacy, which results in the child only learning the facts that the other person has experienced. Such an education system is not focused on the characteristics of a person, which leads to an incorrect assessment of the child. As Albert Einstein said: “We are all geniuses, but if you judge a fish by its ability to climb a tree, it will live a lifetime, deserves to be a fool.” On the contrary, STEM technology focuses on experiment, creativity, skills, and not just on “empty” information.

STEM skills are practically useful for any career. So 75 % of the fastest growing professions require STEM skills, and 82 % of today's employees value STEM skills, even if they are not required for work. Such skills can increase a child's potential income to earn a higher salary or be more employable in the future [4, 5].

One of the earliest examples of the use of the Cardano lattice in STEM education was described in a paper by Van der Linde et al. (2005). The authors used the Cardano lattice to teach high school students about the principles of mechanical engineering, including gear ratios, torque, and rotational motion [6]. They found that the use of the Cardano lattice was effective in engaging students and helping them understand these complex concepts.

In a study by Çelik and Yılmaz (2014), the Cardano lattice was used as a tool to teach students about the importance of precision in engineering design. The authors had students design and build their own Cardano lattices using a 3D printer, and then tested the precision of their designs using a laser displacement sensor. The authors found that the use of the Cardano lattice helped students develop an appreciation for precision in engineering design [7].

Another study by Huang et al. (2017) used the Cardano lattice to teach students about the relationship between the number of degrees of freedom in a mechanical system and its ability to perform complex tasks [8]. The authors had students build and test Cardano lattices with different numbers of degrees of freedom, and then had them use their designs to perform various tasks, such as picking up objects and manipulating them in different ways. The authors found that the use of the Cardano lattice was effective in helping students understand this important concept in mechanical engineering.

In modern realities, STEM tests for teaching children are being introduced even in preschool educational institutions. This assumption is valid at the state level.

The purpose of these projects is to build a system of innovative work in preschool educational institutions aimed at developing intellectual abilities in the process of cognitive activity and involving scientific and technical scientific creativity. The main objectives of the projects are:

1. Building a developing subject-spatial environment that contributes to the development of technical and artistic creativity.
2. Improving the quality of education through the creation of scientific and educational laboratories.
3. Improving the efficiency of using interactive technologies and modern teaching aids.



In the coming decades, it is expected that the implementation of projects will create an innovative subject-developing environment that promotes the development of scientific, technical and artistic creativity of students, it will be possible to create a multifunctional, variable environment for the development of technological competence of children in the field of robotics, mathematics, natural sciences, engineering graphics, research and design activities.

Today we can say with confidence that STEM education helps modern children to think in a new way, modern and keep up with the times. Such children can accurately search for interesting and necessary information, compare, analyze, understand, act, make decisions, protect and broadcast their experience.

So for the development of a child in a playful way, you can use the Cardano lattice.

As an encryption system, this technique has not been used for a very long time due to significant shortcomings and the development of technology. It will not be difficult for a specialist to open a message using the frequency analysis of letters. However, this will help the child develop motor skills, spatial thinking, consolidate mathematical skills, engineering abilities and other scientific knowledge.

It is worth noting that the Cardano lattice is historically the first known encryption lattice, widely used in correspondence of the 16th-18th centuries.

There are several varieties of this lattice:

- 1) Encryption with the addition of "garbage".
- 2) Encryption without adding "garbage".

To encrypt using the Cardano lattice, a square stencil is needed, in which square holes are cut out with a certain square, and the dimensions of the sides of this stencil must be even.

The holes cut in the stencil must be positioned so that no two holes overlap when rotated through  $90^\circ$ . For a square, the easiest way to achieve this is using the so-called Cardano Lattice Builder. The stencil can be mentally divided into four identical squares and holes cut out in only one of the squares.

When recognizing text, it is necessary that the person who encrypts and decrypts the text has the same stencil. Only in this case, the person who received the message will be able to understand the text.

When the stencils are ready, the text is encrypted like this:

Let's show how to encrypt using the phrase "Encryption using the Cardano lattice" as an example.

1. We take a lined sheet of paper according to the size of the stencil. Put the Cardano lattice on it.
2. Consistently enter in the empty cells a part of the text of the message that we want to encrypt.
3. Then we turn the lattice by  $90^\circ$  and again enter a part of the text of the message into the formed empty cells.
4. Next, we remove the Cardano lattice and fill the cells that remain empty with "garbage": various letters, punctuation marks, numbers.
5. Table and examples.

Table – Text used for encryption

Ш	Ю	Ж	С	Р	Е	И	Е
С	В	Ф	Ш	Р	О	1	С
Е	К	9	О	Й	О	Т	1
В	С	К	А	И	К	Н	Н
А	И	К	Ф	Т	У	А	А
Р	З	Л	Е	С	Д	П	Н
О	А	Н	Ь	А	И	М	О
А	И	О	И	Р	Щ	Я	Б

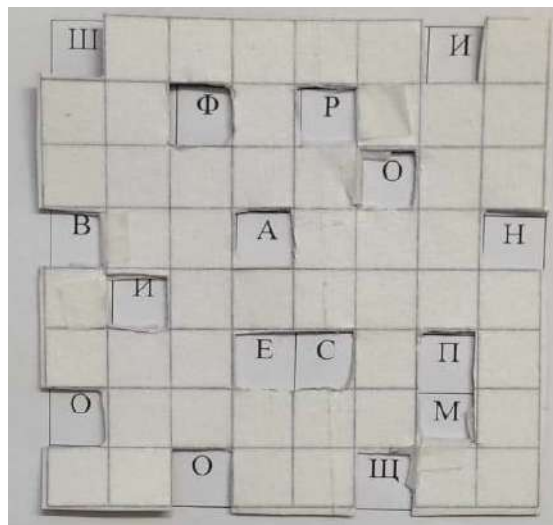


Figure 1. The result of encryption

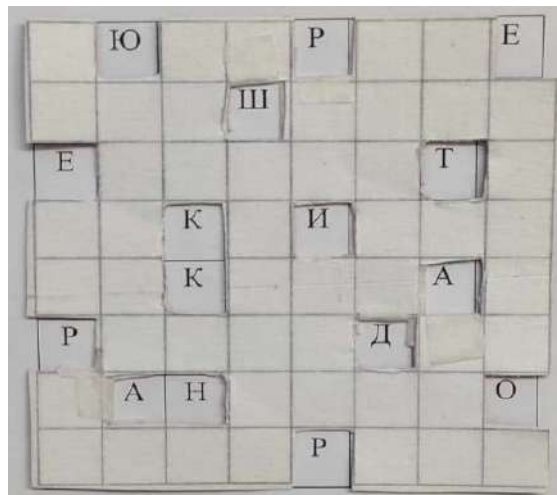


Figure 2. The result of encryption



Figure 3. The result of encryption

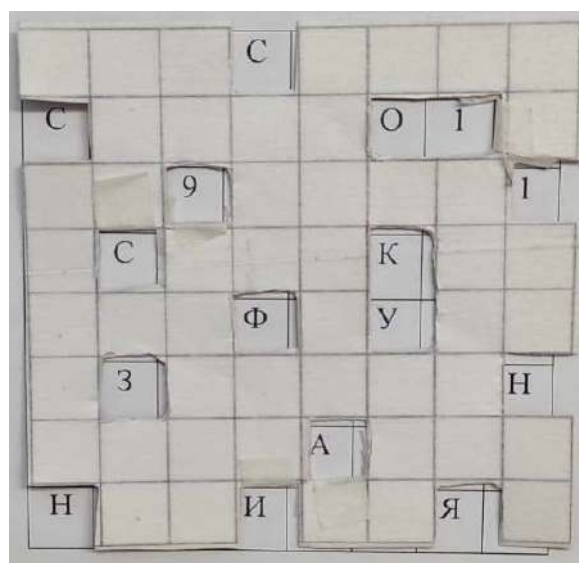


Figure 4. The result of encryption

Conclusion. Considering the above, we can say that:

1. Traditional education is becoming obsolete and needs to be replaced, as this system does not meet the requirements of the modern world for the training of specialists.
2. It is necessary to apply an integrated approach to education to the child, so that from an early age a versatile personality develops, with a large baggage of not only knowledge, but also skills.
3. The government understands the importance of developing the education system, so STEM education is supported by the state.
4. As one of the tools in STEM education, it is possible to use the Cardano lattice in a playful way, which opens motor skills, spatial thinking, reinforces mathematical skills, engineering abilities and other scientific knowledge.

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## COSMECEUTICALS VITAMINS

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**Abstract.** Cosmeceuticals – a fusion of the terms cosmetic and pharmaceutical – represent one of the most promising treatment options, which have been developed specifically for their medical and cosmetic benefits. In particular, vitamins are being explored and widely used in the cosmeceuticals industry as compounds that contain biologically active ingredients with therapeutic benefits. In recent years various natural product have been introduced in various cosmetics for safe dermal applications with minimum side effects.

**Keywords:** cosmeceuticals, vitamins, skin treatment, dermatology, cosmetics.

## ВИТАМИНЫ В КОСМЕЦЕВТИКЕ

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**Аннотация.** Космецевтика – сочетание терминов «косметический» и «фармацевтический», представляет собой один из наиболее перспективных вариантов ухода за кожей, который был разработан из-за его медицинских и косметических преимуществ. В частности, витамины изучаются и широко используются в космецевтической промышленности в качестве соединений, содержащих биологически активные ингредиенты с терапевтическими свойствами. В последние годы различные продукты натурального происхождения были введены в состав различных косметических средств для безопасного нанесения на кожу с минимальными побочными эффектами.

**Ключевые слова:** космецевтика, витамины, уход за кожей, дерматология, косметические средства.

**Introduction.** Vitamins are essential compounds for many functions of the human organism. Some vitamins can be synthesized, but others need to be obtained by an adequate diet. The condition of skin is very much affected by what you eat [1, 2]. Up to 80-90 % of skin care depends on internal issues of human body. Eating

variedly and healthy, outdoor activity and relaxing skin condition can make the most effective result. However, external skin care is also very important.

The most important are vitamins A, B, C, D, E, and K. Scientific evidence shows that, in addition to their specific functions, certain vitamins are useful for prevention, as well as for topical and systemic treatment of photoaging and chronologic skin aging. They are also effective in the management of acne vulgaris. Various vitamins are used as drugs or cosmeceutical products are also of great interest for topical treatment. It is postulated that molecular mechanisms of photoaging are the same for chronologic skin aging, which also occurs in all others organs.

Vitamins are organic substances as opposed to minerals such as zinc or magnesium which are also essential to nutrition. Vitamins are a rather miscellaneous set of substances. Vitamins are divided into water-soluble and fat-soluble vitamins. This partition is very important to understand when making cosmetics. The fat-soluble vitamins are mixed with the oil phase during the manufacturing process and the water-soluble ones with the aqueous phase [3].

In cosmetic products quite often raw materials can be used that already contain vitamins as natural accompanying substances. In this context, particularly fatty oils such as wheat germ oil, avocado oil or extracts should be mentioned. The skin does not really care whether the vitamins are derived from natural or synthetic sources if the molecules are chemically identical [4].

Table 1 – Vitamin generic, chemical names and natural sources [1]

<i>Vitamin (Generic name)</i>	<i>Vitamin Chemical Name(s)/Class</i>	<i>Natural Sources</i>
A	Retinol, retinal, $\alpha$ -carotene, $\beta$ -carotene, $\gamma$ -carotene, xanthophylls, $\beta$ -cryptoxanthin	Leafy vegetables, spinach, carrots
B1	Thiamine, thiamine pyrophosphate	Potatoes, vegetables
B2	Riboflavin, flavin mononucleotide, flavin adenine dinucleotide	Vegetables, fruits
B3	Niacin (nicotinic acid), niacinamide	Yeast, nuts
B5	Pantothenic acid, panthenol, pantetheine	Pulses, grains
B7	Biotin	Nuts
C	Ascorbic acid, dehydroascorbic acid, calcium ascorbate, sodium ascorbate	Citrus fruits, cabbage, paprika
D	Calcitriol, ergocalciferol (D2), cholecalciferol (D3)	Yeast, wheat germ oil, cabbage, citrus fruits
E	Tocopherols ( $\alpha$ , $\beta$ , $\gamma$ , $\Delta$ ), tocotrienols ( $\alpha$ , $\beta$ , $\gamma$ , $\Delta$ )	Nuts, seeds, grains
K	Phylloquinone (K1), menaquinones (K2) and menadiones (K3)	Green leafy vegetables

The Egyptians were the first to recognize the health properties of cosmetics. Up to the 19th century, there was no clear distinction between cosmetics and pharmaceuticals; the separation occurred when the first modern pharmaceutical industry was developed. Cosmeceuticals rapidly expanded in the 1980s due to hydroxy acids (natural fruit acids) used as exfoliants against wrinkles. Raymond Reed, founding member of the United States Society of Cosmetic Chemists, coined the term 'Cosmeceutical' in 1961. In 1971, Albert Klingman reactivated interest in cosmeceuticals by developing a formula to improve the appearance of UV damaged and wrinkled skin, using retinoic acid. Cosmeceuticals improve appearance, but they do so by delivering nutrients necessary for healthy skin. Desirable features of cosmeceutical agents are efficacy, safety, formulation stability, novelty, and patent protection, metabolism within skin and inexpensive manufacture [5].

Currently, cosmeceuticals are very popular, with sales representing one of the largest growing segments of the skin care market, especially for products that are designed to help in the prevention and the treatment of aging skin. The demand for products that reduce the cosmetic effects of aging continues to grow because people wish to remain looking youthful as long as possible. These products are represented by vitamins, peptides, growth factors, and botanical extracts.

There are still many controversial points about the drugs presented in cosmeceutical products; among them, mechanisms of action, optimal concentration, biologically active form, formulation stability, penetration, and retention within the skin. Although tests are available to answer some of these questions.

As a result more ingredients have appeared that may actually improve not just the appearance of the skin, but the health of the skin as well. We now have products that renew, restore, and rejuvenate—not just cleanse, protect, and moisturize. There is probably no greater focus of interest currently than the incorporation of vitamins and antioxidants in skin care products. There are considerable data to suggest the benefits of such ingredients in cosmetics. The ingestion and absorption of vitamins and antioxidants, most importantly through diet, and secondarily through intake of manufactured supplements, is critical to the health of human beings. The skin is the largest organ; as our primary external barrier, it is on the forefront of the battle with external causes of damaging free radicals. Ultraviolet light and environmental pollutants are known initiators of free radicals. Free radicals are highly reactive molecules with an unpaired electron that result in damage to surrounding molecules and tissues. It is thought that additional, topical use of vitamins and antioxidants in cosmetics can better protect and possibly correct the damage by neutralizing these free radicals. In addition, some vitamins may be beneficial to the skin because of other actions such as effects of suppression of pigmentation and bruising, stimulation of collagen production, refinement of keratinization, or anti-inflammatory effects [6].

Cosmetology is the developing branch of science, having direct impact on the society. The cosmetic sector is interested in finding novel biological alternatives which can enhance the product attributes as well as it can substitute chemical compounds. Many of the compounds are having biological origin and are acquire from bacteria, fungi, and algae. A range of biological compounds, like bio-surfactant, vitamins, antioxidants, pigments, enzymes, peptides have promising features and

beneficial properties. Moreover, these products can be produced commercially with ease. The review will encompass the importance and use of microbial compounds for new cosmetic formulations as well as products associated with it [7].

*Vitamin A.* Vitamin A is a generic term for a family of organic lipid-soluble substances related to all-trans-retinol e.g. retinal, retinoic acid and several provitamin A carotenoids.

Retinoids, such as retinoic acid and retinol, have been widely used in the treatment of skin aging. Retinoic acid was first shown to be an effective treatment for photoaging in both a mouse model and a clinical study in the mid-1980s. Topical application of retinoic acid resulted in histological improvements including increased dermal collagen synthesis. Retinoic acid was later shown to play an important role in blocking collagenase activity, thus, preventing collagen degradation, which appears to be the molecular basis of its anti-aging clinical efficacy. While there is significant clinical evidence for the efficacy of retinoic acid/tretinoin to be effective to reduce photodamage, hyperpigmentation spots, fine lines and wrinkles, this form of vitamin A is also very irritating and has suspected teratogenic effects. Retinol and its derivatives are oil soluble, so you may need to dilute or mix them with oil before adding them to a formula, depending on the form you use. Also adding anti-irritant ingredients are highly recommended [8, 9, 10].

*B vitamins.* B vitamins are a group of water-soluble vitamins (thiamin, riboflavin, niacin, pantothenic acid, pyridoxine, biotin, folate, and cobalamin) that are used in cosmetics due to their beneficial properties for dermatological care.

Thiamin and riboflavin are used in the treatment of rosacea and seborrheic diseases, due to the antipruritic effect of thiamine and the anti-inflammatory effect of riboflavin. Nicotinamide (form of niacin) has anti-microbial, anti-inflammatory, antipruritic, lightening, barrier- and photo-protective, and sebostatic effects on the skin. Therefore, it is effective in the treatment of acne, atopic dermatitis, skin aging, light damage of the skin, hyperpigmentation, psoriasis and other skin diseases and conditions. Similarly, topical use of dexpanthenol is widespread for the treatment and care of damaged skin, wound healing, dermatitis and scar management, due to its moisturizing and anti-inflammatory effects on fibroblast proliferation. Biotin acts as a hair and skin-conditioning (miscellaneous) agent and is thus commonly found in hair conditioners and masks. Folic acid is an upcoming agent in the treatment of photodamaged and aged skin due to its involvement in cell replication, regulation of gene activity, and skin renewal. The topical application of vitamin B12 is also a new approach in the treatment of atopic dermatitis and childhood eczema.

The main challenge associated with the formulation of B complex vitamins is assuring their stability. Most B complex vitamins are unstable and sensitive to various environmental factors (heat, oxygen, and light). Their instability in cosmetic products may lead to their degradation, which affects the quality and efficacy, and safety of the product. The instability of B complex vitamins may also be associated with the formation of degradation products with different and unwanted effects on the skin [11, 12].

*Vitamin C.* Vitamin C is one of the naturally occurring antioxidants in nature. Vitamin C is the one vitamin that can accelerate wound healing, protect fatty tissues



from oxidation damage, and play an integral role in collagen synthesis. Thanks to it, skin cells age more slowly and are resistant to the harmful effects of various pathogens. Also, it helps to unify the complexion and brings radiance to the skin. This property makes it an ingredient of choice for peeling products [13, 14].

L-ascorbic acid is the most abundant antioxidant in the skin and is the biologically active form of vitamin C. The maximum concentration of topical L-ascorbic acid for percutaneous absorption is 20 % [15].

However, vitamin C is poorly tolerated by factors such as oxygen, high temperature, pH, metal ions, and strong light. Adding vitamin C directly to cosmetics usually reduces the stability of the product [16].

*Vitamin D.* Also known as calciferol, vitamin D is comprised of a group of fat-soluble vitamins. There are two different types of vitamin D: D2 and D3. And while both major forms of Vitamin D can be formed and obtained artificially, only D3 can be synthesized by the skin following exposure to UVB sun radiation. Herbal vitamin D2 is naturally present in many vegetable oils and very commonly used in skin care products.

Vitamin D should be used in skin care products, especially during the long and dark winter months. Vitamin D's potent antioxidant effects help to neutralize free radicals that are present in the environment, especially those caused by UV radiation on the skin. Additionally, Vitamin D3 has been shown to effectively improve skin hydration. It is an antioxidant that helps fight the signs of aging on the skin and it supports normal skin function and cell regeneration [17, 18].

*Vitamin E.* Vitamin E is a fat-soluble vitamin. It contains natural mixed tocopherols which are obtained from edible vegetable oils. Vitamin E is an important ingredient in many cosmetic products because it is very well absorbed into the skin as it is a natural component of the skin. This vitamin can be included in all kind of formulations containing an oil phase such as creams, lotions, balms, hair products and other topical formulations. Moreover, this cosmetic ingredient is effective at low concentrations [3, 19].

A whole series of vitamin E features are used in the cosmetic field:

- It protects the skin from various deleterious effects due to solar radiation by acting as a free-radical scavenger;
- Vitamin E has antitumorigenic and photoprotective properties;
- Vitamin E supplementation improves the shelf life of products;
- Vitamin E improves the skin's moisture balance;
- Vitamin E repairs minor skin damage;
- Vitamin E is a very strong antioxidant. Therefore, it is well suited for aged skin [20, 21].

*Conclusion.* Cosmeceuticals containing topically applied vitamins have an increasing place in the cosmetics market. The growing demand for combating the signs of aging has had a profound effect in society. Requests for aesthetic medical treatments have grown considerably. Medical treatments such as chemical peelings, botulinum toxin, laser, and soft tissue augmentation are gaining more and more popularity. On the other hand, these treatments are expensive and moreover very traumatic for the skin. So, the first step to keeping the skin in good condition is to

choose a skin care routine. The popularity of individual vitamins among customers differs from year to year. While in 2017-2019 customers searched for vitamin E in the products, for the past two years vitamins A (especially in the form of retinol), B3 and C are in the first line of demands. The topical application of vitamins can go a long way towards correcting and preventing a number of skin concerns, but it is the safest way to deal with imperfections on the skin [22, 23, 24].

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## LINEAR ELECTRIC MOTORS

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**Abstract.** The paper considers the prospects for using linear electric motors as a source of translational motion. As a result of the analysis, the most promising type of linear motor is selected, its advantages and disadvantages are considered. The analysis of the advantages and disadvantages of linear motors in general is carried out.

**Keywords:** linear motor, drive, translational motion, inductor, armature, asynchronous linear motor.

## ЛИНЕЙНЫЕ ЭЛЕКТРИЧЕСКИЕ ДВИГАТЕЛИ

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**Аннотация.** В работе рассматриваются перспективы использования линейных электрических двигателей в качестве источника поступательного движения. В результате анализа выбирается наиболее перспективный тип линейного двигателя, описываются его достоинства и недостатки. Производится анализ достоинств и недостатков линейных двигателей в целом.

**Ключевые слова:** линейный двигатель, привод, поступательное движение, индуктор, якорь, асинхронный линейный двигатель.

Feed drives of many modern mechanisms, in which the task of converting rotational motion into translational motion, are built according to the traditional scheme. For example, in one of the types of machine tools, the movement of the working body of the FC (feed carriage) is carried out from a DC motor through a belt drive to the lead screw [1]. Through the ball nut (it is fastened to the FC by the springs of the anti-collision mechanism), the rotation of the screw is transformed into the longitudinal movement of the FC.

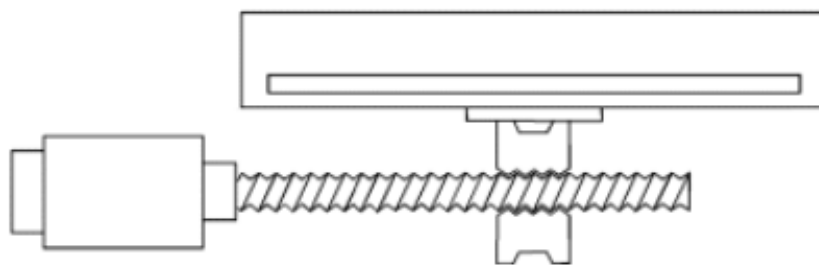


Figure 1. Feed drives with direct connection

More reliable and modern drives are made without a belt drive.

In these drives, a high-torque AC motor is directly connected to the lead screw.

The disadvantages of these types of drives are well known:

- a large number of intermediate elements from the energy source to the FC;
- high inertia of these elements, especially in large mechanisms;
- the presence of gaps in the transmission devices;
- friction in a plurality of mating parts (dramatically changing when the system moves from a state of rest to a state of motion);
- temperature and elastic deformations of almost all transmission links;
- wear of mating elements during operation and loss of initial accuracy;
- errors in lead screw pitch and accumulated length error.

Since these shortcomings determine the main quality characteristics of the drives (accuracy and uniformity of the FC stroke, backlash value during reverse, allowable accelerations and speeds of the каретка подачи), there was a natural need to reduce the impact of these shortcomings on the operation of drives and equipment as a whole. For individual units of the unit, various technical solutions are used to reduce the influence of shortcomings. But these design features are not a complete solution to the problem. In addition, there are some types of problems that cannot be solved in this way. For example, the problems associated with lead screws cannot be solved definitively due to their physical and technical nature.

One solution to eliminate these shortcomings may be to use a different type of engine. For example, a linear motor (LM).

We will understand the design and principle of operation of the LM.

It is worth noting that there are two options for manufacturing a linear motor [2]. So, it is possible to make the inductor from permanent magnets, and the armature from the magnetic circuit and winding. Conversely, the motor inductor can consist of a laminated magnetic circuit and winding, and the armature can be a core magnet. We will consider the first manufacturing option, as the most modern and common.

Figure 2 shows the principle of operation of a linear motor. The inductor is made in the form of an open strip of permanent magnets. The armature is made in a single housing and consists of a multi-phase winding system and a ferromagnetic plate that closes the inductor flow. The armature is fixed on a transport plate, which can reciprocate along the linear rolling guides. Through a flexible cable channel, cables are connected to the armature and to the sensor, respectively, powering the windings and feedback (signals of the linear displacement sensor).

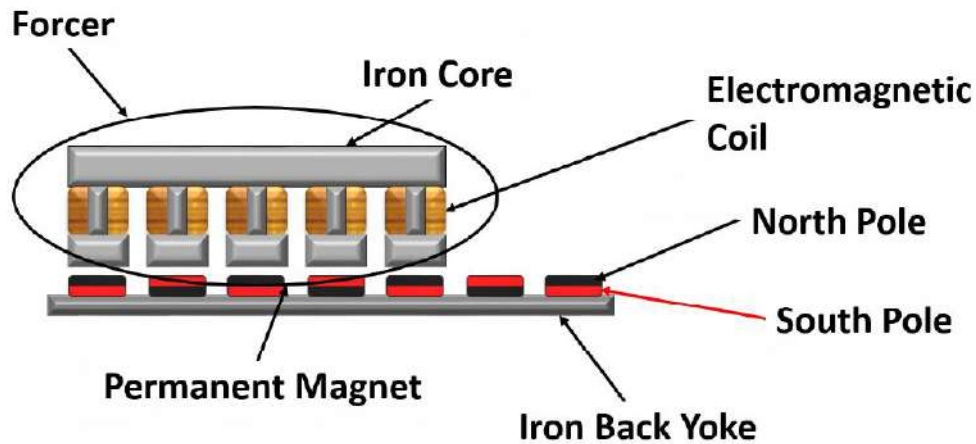


Figure 2. Operating principle of a linear motor

The principle of operation of the LM is similar to the principle of operation of a conventional rotary engine. Consider it on the example of a synchronous linear motor. The windings of the moving coil are connected to a three-phase AC voltage source, which creates a magnetic field that moves in a straight line, equivalent to the rotating field in a conventional cylindrical synchronous motor. A constant magnetic field, created magnetically, interacts with an alternating electromagnetic field in the same way as it happens in a circular rotation machine, in connection with which a displacement of a moving coil occurs. In this case, the speed of the field, as well as the speed of the moving coil itself, is determined by the formula:

$$V = 2 * t * f [m/s],$$

where  $t$  is the pitch of the poles,  $f$  is the frequency of the power supply.

Many varieties (types) of linear electric motors have now been developed [3]. The classification is shown in Figure 3.

Many types of linear motors, such as asynchronous, synchronous or direct current, repeat the corresponding rotary motion motors in their principle of operation, while other types of linear motors (magnetostrictive, piezoelectric, etc.) do not have a practical implementation as rotary motion motors.

The most widespread in transport and for large linear displacements are asynchronous and synchronous linear motors, but linear DC motors and linear electromagnetic motors are also used. The latter are most often used to obtain small movements of the working bodies and at the same time ensure high accuracy and significant traction.

Consider asynchronous linear motors as the most common and frequently used.

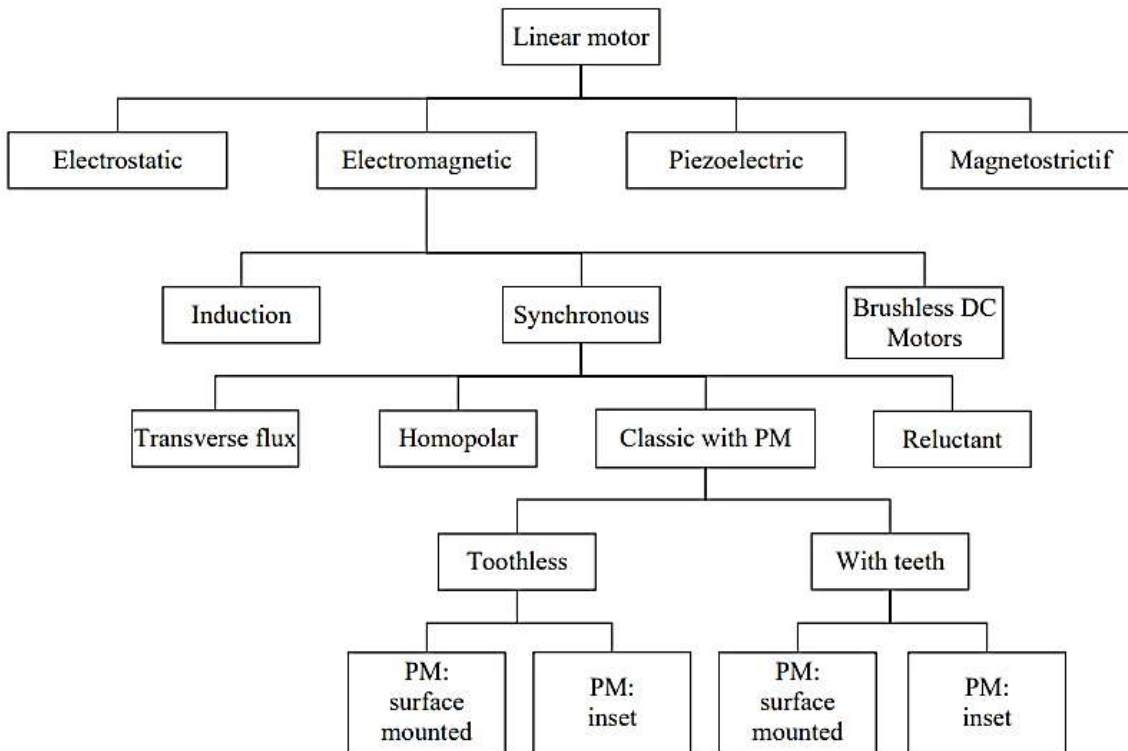


Figure 3. Classification of linear motors

An idea of the device of a linear induction motor can be obtained if you mentally cut the stator and rotor with the windings of a conventional induction motor along the axis along the generatrix and turn it into a plane. The resulting flat structure is a schematic diagram of a linear motor. If now the stator windings of such a motor are connected to a three-phase alternating current network, then a magnetic field is formed, the axis of which will move along the air gap at a speed proportional to the frequency of the supply voltage and the length of the pole division. This magnetic field moving along the gap crosses the conductors of the rotor winding and induces an EMF in them, under the influence of which currents will begin to flow through the winding. The interaction of currents with a magnetic field will lead to the appearance of a force acting, according to the Lenz rule, in the direction of the movement of the magnetic field. The rotor under the action of this force will begin to move.

Let's make some comparison of asynchronous and synchronous linear motors. Describe their strengths and weaknesses

Linear induction motors are not recommended for use as machine tool motors because they have low efficiency and power factor and generate a lot of heat. Permanent magnet synchronous linear motors or permanent magnet brushless linear motors are much better motors because they are smaller and can achieve over 75 % efficiency, high power factor and fast response. According to Shinko Electric Co. Ltd, Takegahana Ise, Japan, the so-called permanent magnet high thrust linear motor has an efficiency of more than 90 % at low speed and very high acceleration [4, 5].



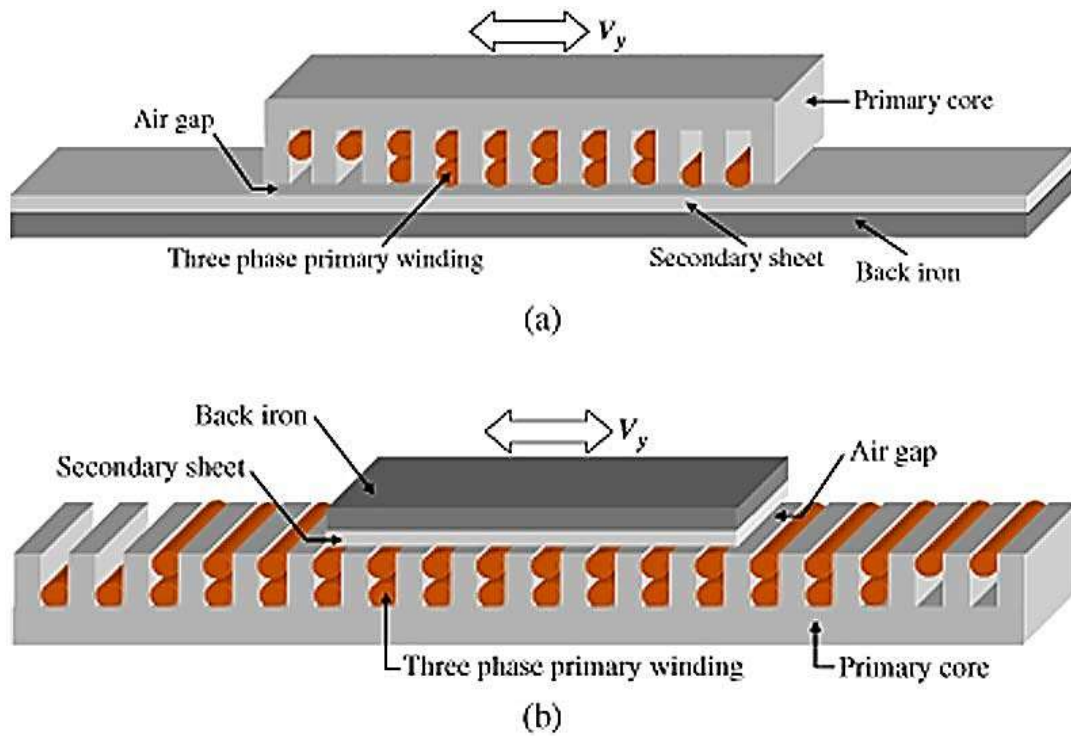


Figure 4. Linear induction motor

The main area of application of synchronous motors, where their advantages are most pronounced, is high-speed electric transport. The fact is that under the conditions of normal operation of such transport, it is necessary to have a relatively large air gap between the moving part and the secondary element. In this case, an asynchronous linear motor has a very low power factor ( $\cos\varphi$ ), and its use is not economically viable. A synchronous linear motor, on the contrary, allows a relatively large air gap between the stator and the secondary element and operates with  $\cos\varphi$  close to unity and high efficiency, reaching 96 %.

Considering the advantages of linear motors, first of all, it should be noted the possibility of an almost unlimited increase in their speed. By increasing the pole division and the frequency of the current, it is possible to obtain the speed of the traveling electromagnetic field close to the speed of light. The absence of kinematic connections between the stator and the secondary element, as well as any intermediate working fluid in the form of a liquid or gas, makes it possible to obtain almost any movement. In this sense, the linear motor is out of competition compared to devices using mechanical, hydraulic or pneumatic transmissions, as well as solenoids and electromagnets. The simplicity of the device and the possibility of manufacturing a very light secondary element from non-magnetic materials make it possible to obtain high accelerations and speed of the drive in comparison with hydraulic and known types of electric drives. In this case, the drive with linear motors is relatively light and compact.

The stator of a linear motor can be separated from the secondary element not only electrically, but also mechanically. This is especially important in cases where you have to deal with high-temperature, aggressive media and vacuum.

The secondary element can be used not only as a working body of any machine. It can simultaneously participate in the creation of useful traction and heating forces. A linear asynchronous motor allows you to simply solve the issues of braking the secondary element for its exact stop. In this case, all known methods of engine braking can be used.

The speed of the secondary element and the tractive force developed by the motor can be adjusted in the same ways as for asynchronous rotary motion machines.

The disadvantages of linear motors include a large energy consumption when working on emphasis. The power loss is somewhat greater than the product of the thrust force and the sliding speed of the traveling field relative to the secondary element. Obtaining low speeds of a traveling magnetic field (less than 0.1 m/s) requires the use of a motor with a special winding and a frequency converter. The use of holding coils compensates for the lack of a thrust motor, but somewhat complicates the device. When generating a useful longitudinal force, there are also transverse forces that push the secondary element to the side or press it against the stator. In this regard, it becomes necessary in some cases to use guide bearings and rollers. This is inconvenient at high speeds, as the design of the engine becomes more complicated, and the drive becomes less reliable.

Relatively large working gaps, as well as edge effects and electromagnetic transients, somewhat worsen the efficiency and  $\varphi$  of the engine.

The absence of a rotating shaft to accommodate the fan requires special measures to remove heat from the active materials of the linear motor.

Thus, linear motors of various types and designs can become a working alternative to classical circular motors where the conversion of rotational motion into translational is required.

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## CORRUPTION OFFENSES AS A THREAT TO STATE SECURITY

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**Abstract.** Corruption offenses pose a serious threat to the security of the state, as they undermine the foundations of the rule of law, lead to a violation of equality before the law, as well as reduce citizens' trust in the authorities and lead to economic losses. Corruption, thanks to its mechanisms, affects all spheres of state life, from education to healthcare, as well as political processes and international relations.

**Keywords:** corruption activity, bureaucracy, state economic policy, offenses.

## КОРРУПЦИОННЫЕ ПРАВОНАРУШЕНИЯ КАК УГРОЗА БЕЗОПАСНОСТИ ГОСУДАРСТВА

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**Аннотация.** Коррупционные правонарушения представляют серьезную угрозу для безопасности государства, так как они подрывают основы правового государства, ведут к нарушению равенства перед законом, а также снижают доверие граждан к власти и приводят к экономическим потерям. Коррупция благодаря своим механизмам влияет на все сферы жизни государства – от образования до здравоохранения, а также на политические процессы и международные отношения.

**Ключевые слова:** коррупционная деятельность, бюрократия, государственная экономическая политика, правонарушения.

Corruption offenses are one of the main threats to the security of the state all over the world. Corruption is the illegal use of power, money or resources that are intended for the benefit of society, for their own personal interests or the interests of a small group of people. This phenomenon has a negative impact on the economy, social sphere, political life and security of the state as a whole. When receiving data on the commission of corruption crimes, the anti-corruption bodies transmit them to the relevant state bodies.

Anti-corruption is an important factor for ensuring the security of the state and improving the standard of living of citizens. Corruption is a significant problem in many countries, and it has a negative impact on the economy, society and political life. Anti-corruption begins with the creation of effective legal mechanisms designed

to prevent, detect and punish corrupt actions. This may include the development of laws and regulations that regulate public activities and establish responsibility for corrupt actions. In addition, it is necessary to create anti-corruption services and mechanisms for their control. One of the most effective anti-corruption tools is the creation of open and transparent management systems. This includes the development of audit and control mechanisms, ensuring access to information and mandatory disclosure of financial interests of officials and other public servants. It is also necessary to strengthen the mechanisms of public control over the activities of state bodies so that citizens can study and control actions related to the use of budgetary funds. In addition, an important aspect of the fight against corruption is to improve the quality of education and increase budget transparency. Educated people and society, who have access to information about the activities of the state, can more effectively identify possible threats to corruption and counteract it. In general, the fight against corruption is a long process that requires intensified efforts on the part of government agencies, society and the international community. However, the need for this struggle is obvious – only by creating open, transparent and responsible management systems can we create a sustainable and secure future for our states.

Many experts rely on the fact that one of the main causes of corruption is the imperfection of social and political institutions that provide external and internal deterrence mechanisms. Nowadays, there are several causes of corruption in the economy, highlighting socio-cultural, institutional and economic reasons. The socio-cultural causes of corruption may be a low degree of organization and informativeness of citizens, demoralization of society, as well as public inactivity in relation to the fight against corruption. The economic causes of corruption are, first of all, low wages of citizens, as a result of which corruption can arise. The institutional causes of corruption are a high level of secrecy in the work of state structures, an excessively large reporting system, as well as unstable government policies. Unfortunately, corruption acts are very common nowadays, where officials have too high powers to dispose of any scarce goods. This is especially noticeable in transition countries, but it also manifests itself in developed countries. Also, one of the important reasons for the prosperity of corruption is the greed of people. Greed always leads to an unlimited desire for power and money. After all, the more money a person has, the more he needs. This is a kind of innate impulse.

As a rule, corruption activities have a negative impact on the development of any country. First of all, the negative consequences of corruption are that corruption crimes are an obstacle to the implementation of the state's economic policy. In the course of the development of corruption of the highest and middle levels of the management system, the authorities cannot achieve their goals and plans, and they also cease to receive genuine information about the real state of affairs in the country's economy. Unfortunately, corrupt officials are very inclined to direct public funds to such areas of activity where control and supervision is simply impossible and where it is more likely to receive bribes. One of the main manifestations of the economic impact of corruption acts is an increase in the costs of enterprises. Thus, the difficulties of business development in modern countries are primarily due to the fact that officials extort and often force entrepreneurs to give bribes, which according

to the documents are presented in the form of an additional tax. If an entrepreneur is honest and tries in every possible way to avoid giving bribes, then he may suffer damage from corruption, since he has to spend a huge amount of his time on the honest development of his business ideas. And finally, bureaucracy and corruption hinder investment, which ultimately leads to the economic downturn of the country.

Corruption is a serious obstacle to the development of the state and can have a negative impact on the security of the country. The consequences of corruption can be different, depending on the nature of corrupt actions and the degree of their prevalence, but they all pose a threat to the security of the state. One of the main consequences of corruption is economic damage. Corruption leads to the fact that resources that should have been used for the development of the economy and society are stolen or fall into the hands of corrupt officials. This leads to the fact that the economy is slowing down, investors are leaving, and poverty in the country is increasing. This greatly weakens the state and makes it more vulnerable to external threats. In addition, corruption can lead to a lag in the field of science and culture. In conditions of corruption, the intelligentsia does not contribute to the progress and scientific development of the country. This may prove to be critically important for the state in the long term. Another negative consequence of corruption is the deterioration of the quality of education and health care. Officials who have received bribes do not fulfill their official duties and do not provide the highest possible quality of services in these sectors. This leads to higher mortality and a low level of education, which ultimately negatively affects the development of the country. In addition, corruption can cause political instability and lead to violence in the country. Corrupt officials can use their resources and power to retain their positions. This can lead to political instability and violence. Corruption can also undermine the security of the State. Corrupt officials can sell classified information to other states or organizations, which can lead to a loss of national interests and a violation of the country's security. Corruption can also lead to a deterioration in the quality of security services, such as police and military protection. Thus, the consequences of corruption can be very serious and dangerous for the state. The fight against corruption is a necessity to preserve the security and prosperity of the State. It is necessary to create effective mechanisms to prevent and combat corruption in order to ensure the security and well-being of the national community.

To conduct a successful analysis of a corruption offense as a threat to the security of the state, it is necessary to consider several key factors. First, it is necessary to determine the scale and nature of the corruption offense. Corruption can manifest itself in various forms, from bribery to abuse of power and resources. Determining the scale and nature of the corruption offense will allow us to assess how much resources and power were stolen, as well as to identify possible consequences for the state. Secondly, it is necessary to analyze the existence of a control system and mechanisms to combat corruption in the country. The existence of effective anti-corruption mechanisms (for example, anti-corruption services, legal norms and control mechanisms) will help deter corrupt actions and protect the interests of the state. Thirdly, it is necessary to assess the impact of corruption offenses on the economy, social sphere and political life of the country. Corruption

can greatly worsen the economic situation of a country, destroy social institutions and provoke political instability. All this has a negative impact on the security of the state as a whole. Fourth, it is necessary to assess the potential consequences of a corruption offense for national security. Officials engaged in corruption may sell classified information to other countries or organizations, which leads to damage to national interests and violation of the security of the country. In addition, corruption can lead to a deterioration in the quality of security services, such as police and military protection. Thus, a successful analysis of a corruption offense as a threat to the security of the state should include several key factors that will allow assessing the scale of the problem, identifying the causes and consequences of corruption, as well as determining the necessary measures to combat this phenomenon. This will make it possible to develop an effective strategy to prevent corruption and ensure the stability and security of the state [1, 2, 3].

Unfortunately, corruption still remains one of the main problems of our country. It affects all spheres of life – from economics and business to justice and public administration. At the moment, Russia occupies a high place in the world ranking in terms of corruption. However, the Russian government is taking a number of measures to combat this problem. In 2015, the Federal Law "On State Civil Servants" was adopted, which obliges civil servants to declare income and property, as well as carefully check for conflicts of interest. The Anti-Corruption Commission under the President of Russia was also created. Nevertheless, despite these measures, corruption in Russia still remains a widespread problem. Many civil and public organizations continue to speak out against corruption and demand more effective measures to combat it. In addition, it should be noted that corruption in Russia has various forms and manifestations – from "small" cases in everyday life to large corruption schemes at the state level. That is why the fight against corruption requires a comprehensive approach and includes both legislative measures and active public participation. In general, we can say that although the fight against corruption continues in Russia, so far it remains a significant problem for our country [4, 5, 6]. However, we must continue to work together to achieve success in this area and achieve a cleaner and fairer society. Nowadays, in the Russian Federation, acts of corruption are very common in various forms. Over time, such a variety expands, as a result of which new forms appear that do not yet have a name and an accurate description. Corruption at all times of human life has led to the destruction of the country's democratic institutions, reduced the efficiency of the market economy, undermined people's trust in the government, aggravated economic and political inequality, and also generated crime that threatens the national security of the country. Corruption is one of the most acute problems in our country, the scale of which is so huge that the government risks a complete loss of control over the life of society and the state.

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